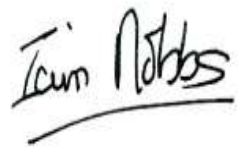


# SWWITCH Rail Strategy – Final Report



Prepared by:  .....  
Michael Gross  
Senior Consultant

Checked by:  .....  
Iain Mobbs  
Associate Director

Approved by:  .....  
Craig Bell  
Regional Director

SWWITCH Rail Strategy

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3rd Floor, Portwall Place, Portwall Lane, Bristol, BS1 6NB  
Telephone: 0117 901 7000 Website: <http://www.aecom.com>

Job No 60304852

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# Table of Contents

<b>1</b>	<b>Introduction .....</b>	<b>6</b>
1.1	Requirement for updating the SWWITCH Rail Strategy .....	6
1.2	Study Area .....	6
1.3	Policy Context.....	7
1.4	Structure of the Report .....	8
<b>2</b>	<b>Baseline Analysis.....</b>	<b>11</b>
2.1	Introduction.....	11
2.2	Network Characteristics and Services .....	11
2.3	Analysis of Journey Patterns .....	15
2.4	Passenger Focus Data .....	19
2.5	Freight .....	20
2.6	Comparison of Car Journey Times .....	21
2.7	Role of Other Travel Modes.....	22
2.8	Summary of Main Issues .....	25
<b>3</b>	<b>Base Case – Developing the Rail Strategy.....</b>	<b>28</b>
3.1	Introduction.....	28
3.2	GWML Electrification and IEP Services to Swansea .....	28
3.3	Local Services between Swansea and Cardiff.....	28
3.4	Other Possible Service Changes.....	29
3.5	Station Improvements.....	29
3.6	Rail Passenger Growth.....	29
3.7	Freight Growth.....	33
3.8	Implications for Other Modes.....	35
3.9	Estimating the Consolidated Growth Rates .....	35
3.10	Overview of the Base Case Timetable.....	38
3.11	Summary of Issues.....	39
<b>4</b>	<b>Option Generation and High Level Sifting Tool.....</b>	<b>41</b>
4.1	Introduction.....	41
4.2	Option Generation .....	41
4.3	Overview of the High Level Sifting Tool .....	43
4.4	Outputs from the High Level Sifting Tool .....	51
<b>5</b>	<b>Short Term Interventions.....</b>	<b>53</b>
5.1	Generic Themes .....	53
5.2	Spatially Specific Themes.....	56
5.3	Scheme Prioritisation.....	58
<b>6</b>	<b>Medium Term Interventions .....</b>	<b>60</b>
6.1	Introduction.....	60
6.2	London to Swansea .....	60
6.3	Cardiff to Swansea .....	62
6.4	Role of Swansea Interchange.....	62
6.5	Swansea to Milford Haven.....	63
6.6	Swansea to Pembroke Dock .....	64
6.7	Swansea to Fishguard .....	66
6.8	Other Services West of Swansea .....	66
6.9	Heart of Wales Line .....	67
6.10	Rolling Stock Requirements .....	68
6.11	Swansea District Line .....	69
6.12	Proposed New Stations .....	70
6.13	Further Development of a Complementary Rapid Transit Strategy .....	71
<b>7</b>	<b>Long Term Interventions .....</b>	<b>73</b>
7.1	Introduction.....	73

7.2	Improved Surface Access Links to Heathrow Airport.....	73
7.3	High Speed Rail to South Wales and West of England .....	73
7.4	Possible Land-bridge to Southern Ireland.....	74
7.5	Further Incremental Electrification .....	74
7.6	Upgrading the Rapid Transit Network.....	74
<b>8</b>	<b>Appraisal of the Business Case.....</b>	<b>76</b>
8.1	Introduction.....	76
8.2	Revenue Forecasts.....	76
8.3	Underlying Growth.....	78
8.4	Operating Costs.....	78
8.5	Infrastructure Costs .....	79
8.6	Economic Appraisal.....	79
8.7	Revenue Shortfall .....	80
<b>9</b>	<b>Conclusions and Recommended Next Steps .....</b>	<b>82</b>
9.1	Main Findings .....	82
9.2	Identifying and Mitigating Potential Risks .....	82
	<b>Appendix A Supplementary Datasets .....</b>	<b>85</b>
	<b>Appendix B Glossary .....</b>	<b>89</b>

## Introduction

# 1 Introduction

## 1.1 Requirement for updating the SWWITCH Rail Strategy

The South West Wales Integrated Transport Consortium (SWWITCH) comprises four authorities (Carmarthenshire, Neath Port Talbot, Pembrokeshire and Swansea) and has appointed AECOM to prepare an updated rail strategy. The timescales for undertaking this study are opportune. Following the preparation of a rail strategy in 2002 and the update in 2005, a further study was then completed in 2008/9 to assess the business case for service improvements if the single track section between Swansea and Llanelli was doubled. The improvements between Swansea and Llanelli have now been completed.

As well as influencing part of the wider National Transport Plan, the outputs from this study could be used to:

- inform Network Rail's Long Term Planning Process;
- influence the forthcoming Great Western and Wales & the Borders franchise specifications;
- contribute to the Welsh Government's Planning Framework;
- input to the multi-modal Regional Transport Plan.

The designation of the Swansea Bay City Region during 2013 reinforces the economic importance of the SWWITCH area, particularly as the city region status is the first of its kind in Wales. This should help to raise the profile of South West Wales, helping to attract investment and should form a focus to help secure funding from the European Union.

The number of rail passengers within the SWWITCH study area has increased by 27% during the last 5 years. The successful implementation of various initiatives recommended in the 2002 Rail Strategy and the subsequent Addendum study prepared in 2005 have contributed to this success. Capacity has also been increased with Network Rail recently completing a major £48m project to replace the Loughor viaduct near Swansea, as well as redoubling the line between Cockett west of Swansea and Duffryn east of Llanelli. A reinstated platform and the track doubling has enabled 14 services per day to call additionally at Gowerton.

Funding for an ambitious programme of rail investment has also been committed with the electrification of the Great Western Main Line from Paddington to Swansea. The GWML forms part of the Trans-European Network reinforcing the strategic importance of this corridor. The overall scheme is due for completion by 2018 which will deliver faster journey times and offer carbon and other environmental benefits compared with diesel traction. It is also envisaged that seating capacity on the replacement Intercity Express Programme (IEP) units will be higher compared with the existing High Speed Trains. This committed investment could provide a catalyst to support other service changes, helping to distribute the potential benefits more widely across the SWWITCH area.

The SWWITCH rail network is also served by freight including oil and coal trains from various terminals in South West Wales. The Network Rail Working Timetable indicates there is 2-4 oil trains per day from Milford Haven. A former freight line to Cwmgwrach north east of Neath has been brought back into operational use, enabling coal traffic to be moved by rail to Aberthaw. With rail freight helping to remove over 150 lorry movements per week from the local road network, ensuring passenger services integrate effectively with rail will be essential to ensure the available network capacity can be optimised.

## 1.2 Study Area

Figure 1.1 illustrates the study area:

- Great Western Main Line to Milford Haven via Port Talbot, Neath, Swansea, Llanelli, Carmarthen and Haverfordwest;
- the line to Pembroke Dock which diverges at Whitland;
- the line to Fishguard which diverges at Clarbeston Road;
- the Heart of Wales Line which diverges at Llandeilo Junction east of Llanelli and includes intermediate stations to Cynghordy;
- various freight only lines including Robeston, Swansea Docks and Gwaun-cae-Gurwen.

Most trains are required to reverse at Swansea and Carmarthen stations to continue their journeys. Whilst there are avoiding lines including the Swansea District Line which offer some journey time savings for through passengers, for

example, there is a daily service in each direction to / from Fishguard via the Swansea District Line. However, if other services were diverted by this route, it would provide reduced connectivity to the major station.

**Figure 1.1: Rail Network in the SWWITCH Study Area**



### 1.3 Policy Context

#### Objectives from the South West Wales Regional Transport Plan (RTP)

The remainder of Chapter 1 summarises the overarching objectives supporting the Regional Transport Plan prepared by SWWITCH, along with the strengths and weaknesses of rail. A summary of these objectives provides a useful framework illustrating the main themes to be addressed:

- to improve access for all to a wider range of services and facilities including employment and business, education and training, health care, tourism and leisure activities;
- to improve the sustainability of transport by improving the range and quality of, and awareness about, transport options including those which improve health and wellbeing;
- to improve the efficiency and reliability of the movement of people and freight within and beyond South West Wales to support the regional economy;
- to improve integration between policies, service provision and modes of transport in South West Wales;
- to implement measures which make a positive contribution to improving air quality and reducing the adverse impact of transport on health and climate change, including reducing carbon emissions;
- to implement measures which help to reduce the negative impact of transport across the region on the natural and built environment including bio-diversity;
- to improve road safety and personal security in South West Wales.

#### Strengths and Weaknesses of Rail

In addition to the underlying RTP objectives, the strengths and weaknesses offered by rail has been examined. An understanding of these characteristics has helped to inform this study, particularly when understanding the type of roles which rail is more suitable to fulfil. The following describes some of the main strengths offered by rail within the SWWITCH study area and the types of travel market it may be best suited to serve:

- connectivity to the main employment centres (primarily Swansea and Cardiff which are City Regions) to facilitate economic growth, with rail providing a convenient alternative to car commuting particularly catchments adjacent to the M4 / A48 corridor;
- facilitate inter-urban travel between the largest population centres within the SWWITCH area and other major catchments in South Wales and elsewhere;
- provide access to Key Settlements including Haverfordwest and Carmarthen from rural areas to support social inclusion;
- generate safety and environmental benefits (although the latter is dependent on load factors);
- encourage freight using the M4 / A40 / A477 to be diverted to rail;
- enhance rail connectivity to the ferry terminals at Fishguard and Pembroke Dock for passengers;
- forms part of an integrated public transport network by encouraging connectivity between bus and rail;
- promote tourist travel by rail as an alternative to driving, with space on trains for cycling to encourage more sustainable travel movements.

In spite of these characteristics affecting rail services within the SWWITCH area, there are a number of key limitations to be addressed, as set out below:

- limited coverage of the network which restricts the usefulness of rail as a mode;
- high operating costs per passenger journey, which creates affordability and value for money concerns;
- low frequencies from several stations reduces the convenience of rail compared with other modes, particularly examples adjacent to the M4 / A48 corridor;
- slow rail journey times versus car means the former is uncompetitive;
- some stations only serve small, low density population catchments restricting their scope to boost passenger numbers;
- a service pattern which tries to fulfil both longer distance and local flows means rail is less competitive versus other modes as journey times are extended;
- inconvenient arrival and departure times of some services to / from major centres specifically for commuting or business travel opportunities;
- low rolling stock quality (Class 14X or Class 15X units) are not attractive to passengers;
- some stations are poorly integrated with other modes, with limited availability of connecting bus services, or car parking spaces for the onward journey.

Rail may be less suitable for some travel markets, so it is important to acknowledge there may be alternative modes which are more appropriate to serve these journeys.

#### **1.4 Structure of the Report**

This report includes a review of the baseline issues and constraints affecting both rail and competing modes. This report also includes a review of the Base Case scenario and an assessment of the potential options that could be applied to address these gaps. Chapter 2 summarises the main conclusions emerging from the baseline analysis. A range of performance indicators have been selected to understand the strengths and weaknesses affecting existing passenger rail services and freight in the SWWITCH area. In addition to the demand patterns, the capacity and capability of the network has also been examined to ensure demand and supply is considered in an integrated manner. In addition, the suitability of alternative modes has been examined, to assess the potential for mode transfer from other modes to rail to help boost the existing travel patterns.

In Chapter 3, the potential drivers of change have been reviewed to ensure the impact of passenger growth is overlaid onto the existing trip patterns. The impact of the committed investment has been incorporated (recognising the emerging proposals may still be subject to revision in due course as the project is refined), since this could influence service patterns west of Swansea.

The results from the option generation are presented in Chapter 4 which has been developed by the consultants with contributions from stakeholders. A stakeholder workshop in Carmarthen was held and this process encouraged attendees to share their ideas and help compile the long list of options generated. Following the compilation of these ideas, a sifting tool has been developed to appraise the potential benefits and costs associated with each proposal to help prioritise the strongest performing options for more detailed analysis. The results from this more detailed analysis will be reported as part of the next phase of the study.



The remainder of this report presents the recommendations for the short, medium and long term SWITCH rail strategy in Chapters 5, 6 and 7 respectively. For each time period, the rationale for the proposed measures is described along with any critical dependencies which will influence the overall success of each scheme. For example, the delivery of employment and population growth will be essential to make the case for selected timetable improvements, along with the associated infrastructure changes. The business case for the package of measures is examined in Chapter 8. The recommended next steps and principal issues are presented in Chapter 9.

A glossary to explain selected technical terms is included in Appendix B. The Final Report will examine the potential options in more detail and assess the economic business case for the proposed schemes.

## **Baseline Analysis**



## 2 Baseline Analysis

### 2.1 Introduction

Chapter 2 collates a range of data which represent existing rail passenger journeys, freight services, infrastructure characteristics of the rail network and the role of competing modes. Evidence from Network Rail, Arriva Trains Wales, Passenger Focus and other data sources have been examined to identify gaps and constraints.

### 2.2 Network Characteristics and Services

#### Network Characteristics

The first part of this chapter examines the characteristics of the existing rail network. The data in Table 2.1 predominantly uses information from the Network Rail Route Utilisation Strategy published in 2007, revised to take account of the recent track doubling between Llanelli and Swansea. This illustrates the network speeds are relatively slow, with restrictions affecting some parts of the network which constrain the opportunities for freight traffic. The capacity utilisation varies across the network, even though several sections are just single track. The availability of passing loops and the specific operational characteristics determine the proportion of capacity used. The Heart of Wales Line has the most capacity available given the number of intermediate passing loops and the scarcity of services. In contrast, the Pembroke Dock has just a single passing loop and this means the majority of the line capacity available is absorbed even though trains operate at just 2-hourly intervals.

**Table 2.1: Summary of the Network Characteristics**

Indicator	Port Talbot – Swansea	Swansea – Whitland	Whitland – M. Haven	Fishguard – Clarbeston Road	Pembroke Dock – Whitland	Heart of Wales Line
Speeds	90mph, but slower approaching Swansea (40mph)	75mph, but slower approaching Carmarthen (20-25mph)	75mph to Clarbeston Road, 55mph max thereafter with sections of 25-40mph	55mph, with a section of 40mph close to Fishguard and Goodwick	50mph, but slower at Tenby, Narberth and Pembroke tunnels (15-25mph)	Maximum speed is 60mph with most of the route 45-60mph
Route availability	RA8	RA8	RA8	RA7	RA7 (RA6 west of Pembroke)	RA5
Gauge clearance	W8	W8	W7	W6	W7	W6
Network utilisation	Medium	Medium	Medium	Medium	High	Low
Other comments	Committed electrification for the GWML in 2018	Track doubling has improved network efficiency	Passenger services share network with oil trains	Usage has increased following frequency increases	Single passing loop results in low usage of the network. Several level crossings contribute to slow speeds	Several passing loops mean there is adequate spare capacity given the frequencies

Source: AECOM analysis of Network Rail Wales RUS.

There are a number of level crossings for vehicles in the SwwITCH study area, including four between Whitland and Pembroke Dock, three between Whitland and Carmarthen, plus two east of Carmarthen towards Gowerton. Network Rail is examining the benefits and costs associated with replacing or upgrading these crossings to address safety concerns. Furthermore, journey times could be reduced too, with the three crossings between Tenby and Pembroke Dock highlighted as a particular issue.

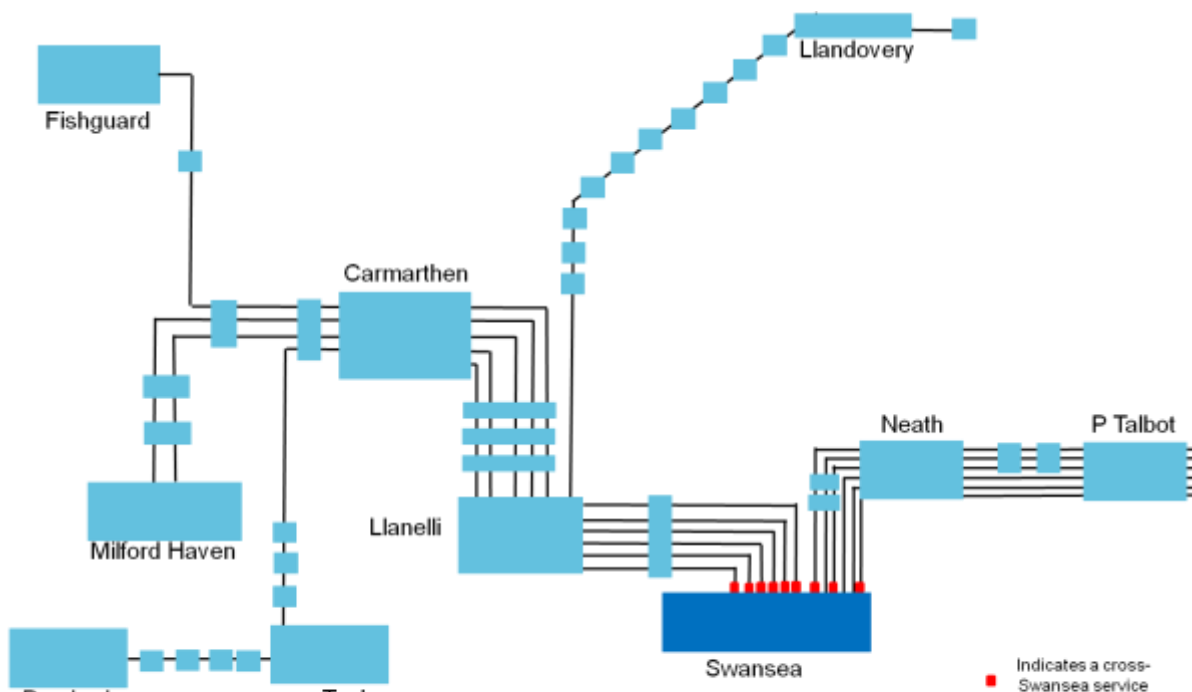
The SwwITCH area has benefited from investment from the National Stations Improvement Programme (NSIP), with recent improvements at Carmarthen and Swansea stations. Funding has also been secured for improvements

at Port Talbot Parkway since it generates one of the highest number of complaints about the station environment in the SWWITCH area. Poor access for mobility impaired passengers forms the main cause of complaints. Preparatory work has also been completed to facilitate future funding (NSIP+) for the SWWITCH area.

The service specification is summarised in Figures 2.1 and 2.2 for the AM Peak (07.00-10.00) and the inter-peak (12.00-14.00) respectively. Trains towards Swansea via Llanelli and Port Talbot are shown separately, for example, a train from Milford Haven to Manchester is illustrated west of Swansea, but the stopping pattern east of Swansea is not included. The following summarises the main conclusions for the AM Peak:

- from the west, there are 6 trains from Llanelli to Swansea during the morning peak period (07.00-10.00), with 2 services from Milford Haven, plus 1 train from Carmarthen, Pembroke Dock, Fishguard Harbour and the Heart of Wales Line. Trains call at all intermediate stations and operate as cross-Swansea services;
- there are six arrivals at Swansea from the eastbound direction during the morning peak. In contrast with the trains via Llanelli, three services run non-stop between Port Talbot and Neath, and Neath to Swansea.

**Figure 2.1: AM Peak Service Specification to Swansea**



• Source: Analysis of National Rail Timetable

During the inter-peak, the following summarises the main conclusions:

- there are fewer arrivals per hour at Swansea during the inter-peak via Llanelli. There are two-hourly services from Carmarthen, Milford Haven (both trains continue to Manchester) and Pembroke Dock. In addition, there is an infrequent service on the Heart of Wales Line (trains do not operate within every 2 hour period). Furthermore, the Fishguard trains do not operate every 2 hours, and terminate at various stations including Clarbston Road, Carmarthen, Swansea and Cardiff;
- east of Swansea during the off-peak, there are hourly trains from London and Manchester, plus a two hourly service from Cardiff which stops at the intermediate stations between Port Talbot and Swansea.

The specification shown in Figures 2.1 and 2.2 illustrates the 'typical' weekday service patterns to Swansea, although these do not take account of seasonal weekend revisions. For example, the extension of some Swansea or Carmarthen trains to Pembroke Dock and Tenby on summer Saturdays which are operated by FGW and ATW respectively are not included within these Figures.

**Figure 2.2: Off Peak Service Specification**

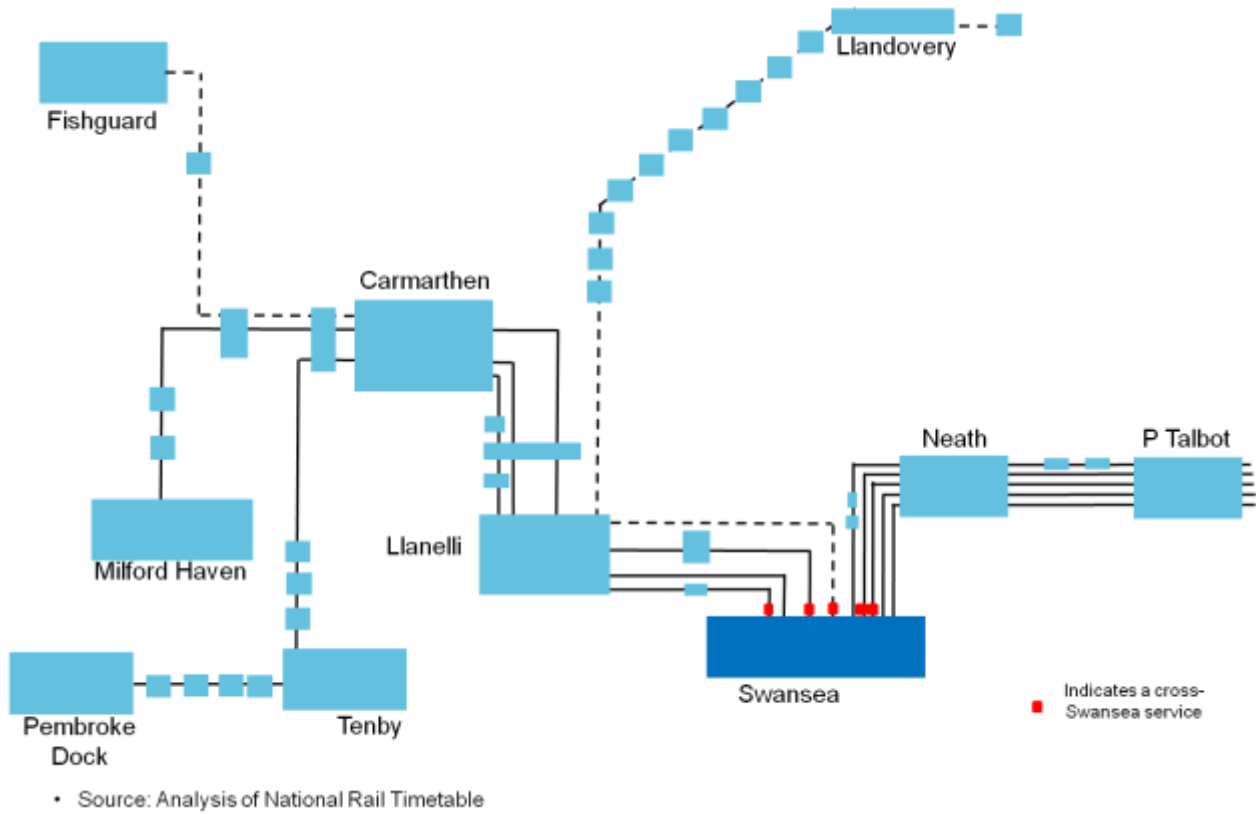
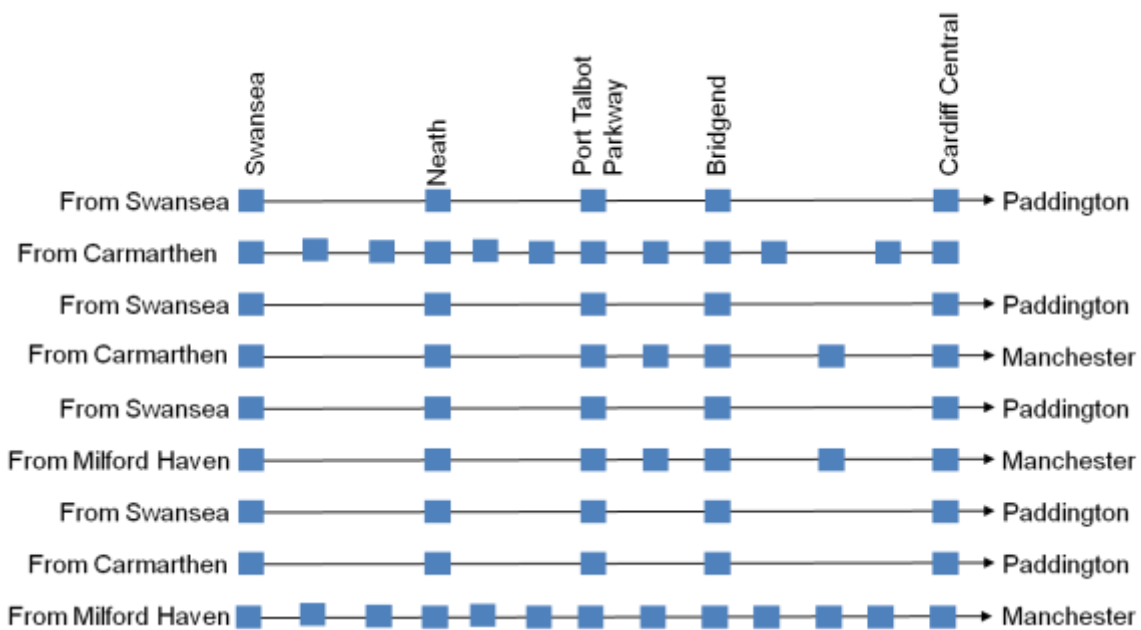


Figure 2.3 illustrates the AM Peak journey opportunities towards Cardiff Central for arrivals between 07.00 and 10.00 (each line represents one service). There are nine arrivals within this period, with the majority of trains extended to London Paddington or Manchester. Whilst there is a frequent service from Neath and Port Talbot Parkway, the number of trains from the intermediate stations between Swansea and Port Talbot is very limited.

**Figure 2.3: Summary of the AM Peak Service Pattern to Cardiff Central (07.00-10.00)**



Source: Analysis of National Rail Timetable

## Timing of Services and Frequencies

Table 2.2 presents the frequencies, first and last arrival at Swansea and the availability of commuting journeys with arrivals between 08.00 and 09.00, plus departures between 17.00 and 18.00. Port Talbot and Neath benefit from the highest service frequencies in the SWWITCH area. During the inter-peak, these stations benefit from two fast services per hour between Swansea and Newport (which are then extended to offer through journey opportunities to London and Manchester), plus a two hourly stopping train between Swansea and Cardiff. Elsewhere in the SWWITCH area, the two hourly services on the Pembroke Dock Line and between Carmarthen and Milford Haven, along with the irregular service pattern on the Heart of Wales and Fishguard Lines, leads to irregular gaps between trains. This is a constraint affecting the stations with the fewest trains (for example, Ammanford has just 4 services each day in each direction). Despite the higher frequencies to Llanelli, the irregular timings (1.5 trains per hour from Carmarthen, plus the trains to / from the Heart of Wales Line) are less convenient for passengers.

Table 2.2 also indicates passengers from several stations do not have the opportunity to commute or to travel to Swansea during the high peak periods (between 08.00 and 09.00 or 17.00 to 18.00). Whilst passengers from stations towards Carmarthen and Port Talbot towards Swansea benefit from travel opportunities during these periods, users from the Pembroke Dock Line and Heart of Wales Line during the morning or evening peak have no services. Furthermore, there is no departure towards Milford Haven and Haverfordwest between 17.00 and 18.00. Journey opportunities are also restricted by the timing of the first and last services. In particular, the arrival time of the first train arriving at Swansea from the Pembroke Dock Line is 09.23, whilst the latest departure time from Swansea for stations on the Heart of Wales Line is 18.21.

**Table 2.2: Service availability to / from Swansea**

Station	Frequency	First arrival - Swansea	Last departure - Swansea	Arrival: 08.00-09.00?	Departure: 17.00-18.00?
Carmarthen	1.5 / hour	06.38	00.45	√	√
Fishguard	7 / day	08.49	23.45	√	√
Haverfordwest	0.5 / hour	07.45	22.27	√	x
Llanelli	about 2 / hour	06.38	00.45	√	√
Llandovery	4 / day	09.05	18.21	x	x
Milford Haven	0.5 / hour	07.45	22.27	√	x
Neath	2.5 / hour	06.34	22.32	√	√
Pembroke Dock	0.5 / hour	09.23	20.11	x	x
Port Talbot	2.5 / hour	06.34	22.32	√	√
Tenby	0.5 / hour	09.23	20.11	x	x
Whitland	1.5 / hour	07.45	23.45	√	√

Source: AECOM analysis of National Rail Timetable

## Rolling Stock

The capacity and classification of the rolling stock is shown in Table 2.3. High Speed Trains are deployed between London Paddington and Swansea. The HST sets are configured with relatively high density to reflect the loading patterns closer to London, although the internal layout is generally conducive for business travellers. Class 175 units operate between Milford Haven / Carmarthen and Manchester and feature air conditioning and a layout which is attractive for leisure passengers. The Class 175 sets comprise a mixture of 2 and 3 car sets, so ATW deploys the trains with the highest capacities on the busiest parts of the route at specific times of the day. However, this may not necessarily coincide with the timing of all journeys within the SWWITCH area. Furthermore, business passengers do not benefit from the availability of plugs for laptops / phones etc which may be a constraint on longer journeys. A mixture of Class 14X and 150 / 153 units operate the remaining services in the SWWITCH areas and offer a relatively poor service quality, particularly for passengers making journeys which can last over 2 hours. It is possible

the Class 14X units will not be modified to comply with post 2020 Disability Discrimination Act legislation, given the likely costs and hence will not operate beyond this timescale, but it is envisaged the Class 15X fleet will be modified.

**Table 2.3: Rolling Stock Capacity**

Unit	Service	Number of Seats
High Speed Train	(Carmarthen) – Swansea – London, plus summer weekend extensions to Pembroke Dock	533
Class 175	Manchester – Cardiff – Swansea – Carmarthen / Milford Haven, some weekend trains to Pembroke Dock	118-186
Class 14X, 150, 153,	Pembroke / Fishguard / Heart of Wales / local Cardiff – Swansea services	75-149

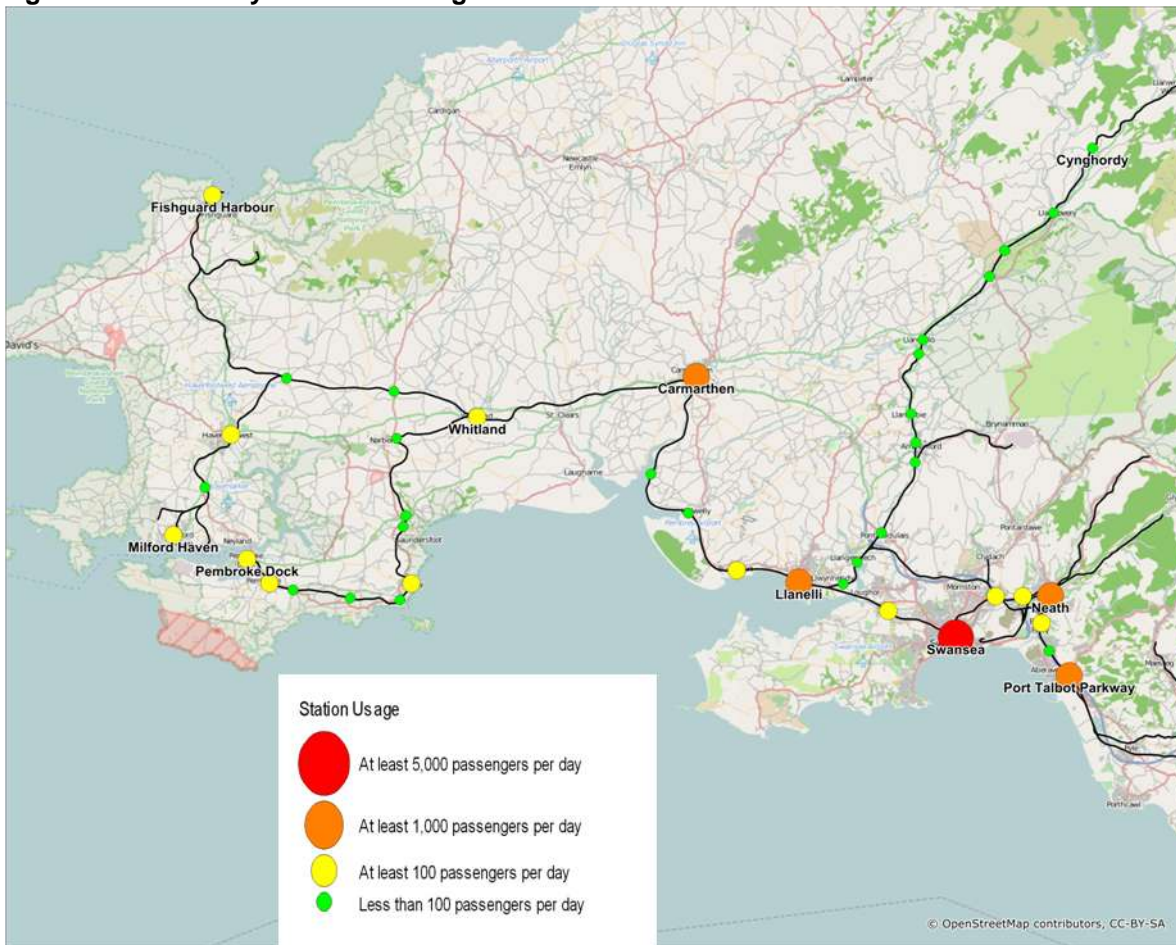
Source: AECOM analysis of Locomotives and Coaching Stock

### 2.3 Analysis of Journey Patterns

#### Station Usage

The number of passengers using each station is plotted in Figure 2.4 based on 2011/12 data collated by the Office of Rail Regulation (ORR).

**Figure 2.4: Summary of Station Usage**



Source: AECOM analysis of ORR data, 2011/12

The annual totals calculated by the ORR have been dis-aggregated to a daily total using a conversion factor of 312. Four categories are used to differentiate between the different types of station:

- **Major stations:** Swansea, with 6,900 passengers per day;
- **Large stations:** Neath (2,600 per day), Port Talbot Parkway (1,550), Carmarthen (1,350), Llanelli (1,300);
- **Medium:** Haverfordwest (460 / day), Pembrey & Burry Port (420), Tenby (360), Gowerton (250), Milford Haven (200), Whitland (170), Pembroke Dock (155), Fishguard Harbour (125), Skewen (120), Llansamlet (105), Briton Ferry (105);
- **Other smaller stations:** there are 26 stations within this category in the SWWITCH study area which are used by fewer than 100 passengers per day.

MOIRA data has also been reviewed to help confirm the ORR outputs. This indicates the ORR totals for Swansea, Llanelli and Neath are within 1% of the MOIRA total, whilst Carmarthen is within 3%. It is important to acknowledge that the recent service improvements affecting the Fishguard Line will not be fully represented in this dataset, since five additional trains per day were introduced after this dataset was compiled. This under-estimation of demand would be reinforced by the opening of Fishguard & Goodwick station in May 2012. Existing journey patterns on the South West Wales rail network has been analysed, primarily using MOIRA data. This is based on ticket sales data provided by Arriva Trains Wales to May 2013. This has been reviewed to establish the level of existing demand, journey patterns and growth over the past five years. To simplify the presentation of the analysis, the rail network was split into a series of sectors as shown in Table 2.4.

**Table 2.4: Sectors used for the MOIRA Journey Analysis**

Sector	Location
1	Swansea
2	East of Swansea to Cardiff
3	West of Swansea (Gowerton to Whitland)
4	Heart of Wales Line (Bynea to Shrewsbury)
5	West of Whitland to Milford Haven & Fishguard Harbour
6	West of Whitland to Pembroke Dock
7	Beyond Cardiff

### Trip Distribution from Principal Stations

The journey patterns from selected stations have been examined to illustrate the main trends. Using the sectors defined above, the number of trips to / from these stations is presented to understand the main flows. Table 2.5 presents the main results.

**Table 2.5 – Journey Patterns from Selected Stations**

Station	Sector							Total
	1	2	3	4	5	6	7	
Carmarthen	21%	17%	23%	0%	11%	9%	18%	435,224
Fishguard Harbour	10%	19%	7%	0%	1%	0%	63%	35,743
Haverfordwest	13%	23%	6%	0%	33%	0%	24%	142,329
Llanelli	48%	18%	20%	2%	1%	1%	8%	403,254
Llandoverly	31%	5%	0%	60%	0%	0%	5%	17,728
Milford Haven	16%	19%	22%	0%	15%	0%	28%	63,202
Neath	35%	53%	2%	0%	0%	0%	10%	807,331
Pembroke Dock	9%	7%	19%	0%	0%	50%	15%	47,881
Swansea	0%	49%	17%	2%	2%	1%	30%	2,164,239
Tenby	10%	11%	27%	0%	0%	43%	9%	109,063
Whitland	10%	8%	43%	0%	29%	3%	6%	56,167
<b>Total</b>	<b>15%</b>	<b>44%</b>	<b>16%</b>	<b>1%</b>	<b>4%</b>	<b>3%</b>	<b>16%</b>	<b>4,282,161</b>

Source: AECOM analysis of ATW MOIRA data and ORR station counts

The following summarises the main trends:

- **Swansea:** nearly 50% of demand at Swansea is between intermediate stations towards Cardiff. Nearly one-third of trips from Swansea have a destination beyond South Wales, including London, Bristol and Reading.



About 15% of trips are made between Swansea and the intermediate stations to Whitland, primarily highlighting the importance of flows to Llanelli and Carmarthen;

- **Neath:** nearly 90% of trips originating have a destination at Swansea or the intermediate stations to Cardiff, with just 10% of trips to other destinations beyond South Wales. The number of trips to stations in South West Wales or the Heart of Wales Line is negligible;
- **Carmarthen:** local trips to stations between Whitland and Gowerton account for a nearly a quarter of trips from Carmarthen, with demand to Swansea representing a further 20%. Journeys to the Pembroke Dock and Milford / Fishguard lines account for a further 20% and this highlights the role of Carmarthen as an important destination in South West Wales. Despite the increased distance from Carmarthen to Bristol and London compared with Neath, the busiest railway station in Carmarthenshire generates a higher (18%) percentage of trips to stations outside South Wales. Carmarthen station may be acting as a rail-head for a large part of South West Wales for long distance trips, thus contributing to this pattern of journeys;
- **Llanelli:** Similar to Neath, about 85% of trips from Llanelli are completed to stations between Whitland and Cardiff. Just 2% of trips are made to stations on the Heart of Wales Line, with fewer than 10% of the trips to external stations;
- **Other stations:** almost two-thirds of trips to/ from Fishguard Harbour have an origin or destination outside South Wales. This reflects the longer distance nature of passenger journeys towards the ferry port. About 50% of passengers from Pembroke Dock station are completed to intermediate stations to Narberth which demonstrates that the line is serving a local need. About 60% of trips from Llandovery are made to stations on the Heart of Wales Line, reinforcing its self-contained nature.

In addition to analysis above, the distribution of trips using the Pembroke Dock, Milford Haven and Fishguard and the Heart of Wales Line, plus the screenlines west of Llanelli and west of Port Talbot Parkway are shown below. More details are included in the Appendices:

- **Pembroke Dock Line:** To supplement the journey data for individual stations, the following analysis examines trip patterns using different parts of the South Wales rail network. MOIRA data has been extracted for journeys to and from the Pembroke Dock branch, with the results shown in Table A1.1. The total number of passengers using the line is about 197,000 per annum, equating to about 600 daily trips or 300 in each direction. The average loading per train is about 35 passengers. Tenby is the busiest station on this line, accounting for around half the demand, with Pembroke Dock second busiest. Nearly one third of passengers from this line are making trips between Whitland and Gowerton (Sector 3, including Carmarthen), with a further 26% local journeys not continuing beyond Narberth. Swansea is a relatively important destination, accounting for 11% of total trips. A further 33% of trips are completed to stations east of Swansea;
- **Milford Haven & Fishguard Harbour Lines:** Journeys patterns on the Milford Haven and Fishguard Harbour branches are shown in Table A1.2. The 274,200 annual journeys equate to around 900 trips per day (or 450 in each direction). There are significantly fewer self contained trips, with only 7% of journeys starting and finishing at a station west of Whitland. Over 42% of trips have a destination between Carmarthen and Swansea, with a further 21% of journeys to stations east of Swansea towards Cardiff. Interestingly, over one-third of trips have a destination beyond South Wales. There are a number of contributory factors for this outcome. Firstly, there are fewer stations on these lines compared with Pembroke Dock. Secondly, the opportunity for through journeys from Milford Haven coupled with the longer distance nature of ferry passengers to / from Fishguard has influenced this trend. Haverfordwest is by far the busiest station and accounts for about half the total demand. Milford Haven is the second busiest station followed by Fishguard Harbour;
- **Heart of Wales Line:** Table A1.3 shows the pattern of journeys using the Heart of Wales Line. There are only four trains per day in each direction and this is reflected in the low demand. There are about 146,000 passengers per annum, which equates to around 470 passengers per day, or 60 per train. Although this indicates a relatively high load factor, it should be noted passengers may be making shorter distance trips. Over 60% of trips using the Heart of Wales Line have an origin / destination between Craven Arms and Llanelli. Swansea accounts for 20% of the total trips despite the relatively slow journey times, but only 7% of journeys have a destination elsewhere in the UK;

- **West of Swansea:** Table A1.4 illustrates a summary of journey patterns crossing a notional screenline between Pembrey & Burry Port and Llanelli. In contrast with the results presented in Tables 2.3-2.5 above, this screenline could include trips from the Pembroke, Milford Haven and Fishguard Lines, as well as trips from intermediate stations between Carmarthen and Pembrey & Burry Port. As a result, both the origin and destination are shown to illustrate the main journey patterns more accurately. Over 635,000 trips cross this screenline each year, equating to about 2,000 trips per day. It is interesting to note that 63% of these journeys have a destination beyond Swansea. However, the potential benefits of a service changes which could improve links to Port Talbot, Bridgend, Cardiff and stations beyond the capital need to be considered in relation to the implications such changes would have for Swansea and Neath stations. There are very few journeys west of Llanelli interchanging onto the Heart of Wales Line;
- **Journey Patterns East of Swansea:** Similar to the journey patterns crossing a cordon west of Swansea, Table A1.5 illustrates the journey patterns crossing a screenline between Baglan and Port Talbot to represent flows east of Swansea on the Great Western Main Line. The table shows that 34% of these two way journeys are between Swansea and stations towards Cardiff. A further 20% of trips are 'internal' journeys between Neath and Cardiff, Port Talbot and Bridgend. There are two other movements which account for more than 10% of trips crossing this screenline, from Swansea to stations beyond Cardiff (12%) and cross Swansea trips (14%). The relative size of these travel markets will be considered when evaluating possible revisions to service options.

### Passenger Growth Rates

MOIRA has been used to determine the level of passenger demand growth using four service codes over the past five years (March 2008 to 2013). Data has been extracted for four MOIRA service groups relevant to SwwITCH:

- Swansea to Milford Haven (MOIRA code 4320);
- Heart of Wales Line (MOIRA code 4350);
- Swansea to Pembroke Dock (MOIRA code 4370); and
- Swansea to Cardiff (4380, all services operated by ATW).

Table 2.6 illustrates the growth rates. Of the four revenue codes examined, stations between Cardiff and Swansea achieved the highest growth rate between 2008 and 2013. Passenger numbers increased by 31% during this five year period, with growth between 2009 and 2011 contributed to this outcome. Demand growth using the Milford Haven Line has also been relatively high between 2008 and 2013, with a 28% growth (or about 5% per annum). Growth was highest in 2008-09 and 2010-11 when 8% was achieved, although this reduced to just 2% in 2012-13. The growth trends for the Pembroke Dock Line have been more consistent pattern with about 4% per annum on average although passenger numbers were stable between March 2012 and 2013. In the 5 years to 2013, the number of passengers using the Heart of Wales Line increased by just 1%.

The FGW services to Swansea from London Paddington are represented as a single service group (MOIRA code 3750, which also includes trains from Cardiff Central to London). Since the majority of passengers using this service will board trains outside the SwwITCH area, so the presentation of growth rates for this MOIRA service group would offer limited value. However, the change in passenger numbers for all operators is shown in Table 2.6. This demonstrates the overall change in passenger numbers for ATW and FGW between Baglan and Port Talbot is slightly lower than the results for stations between Swansea and Cardiff using Arriva services.

**Table 2.6: Growth in Passenger Numbers (2009-2013 versus 2008)**

Year	Swansea to Milford Haven	Heart of Wales	Swansea to Pembroke Dock	Swansea to Cardiff	Baglan to Port Talbot
Mar-09	8%	-1%	5%	12%	12%
Mar-10	9%	-3%	8%	17%	16%
Mar-11	18%	2%	14%	26%	24%
Mar-12	25%	2%	21%	28%	27%
Mar-13	28%	1%	21%	31%	29%

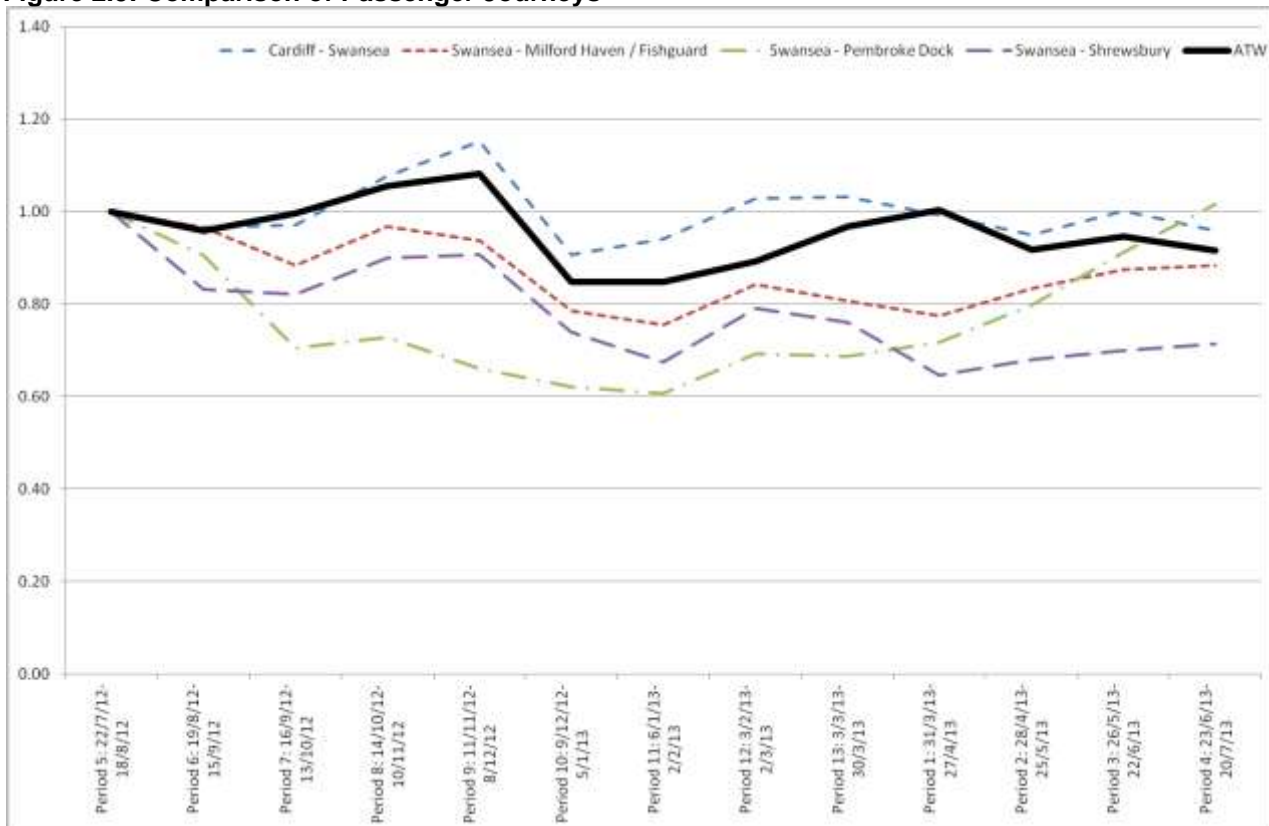
Source: AECOM analysis of MOIRA data. Growth rates are shown as a percentage of the demand in March 2008. The change in passenger numbers using Baglan to Port Talbot includes data for both Arriva Trains Wales and First Great Western

### Seasonality Issues

In addition to the annual journey patterns presented in this section, the number of trips within each four weekly period has also been examined to understand seasonality issues. LENNON data has been supplied for the four service groups presented above for the 13 four weekly periods between Period 5 2012/3 (broadly equates to mid July to mid August) and Period 4 2013/14 (late June to late July). The Period 5 data covers a large part of the school summer holiday period, so it is interesting to understand how journey patterns change compared with other times of the year for the four service groups. The results are shown in Figure 2.5 and the main trends include:

- With the exception of passenger journeys using the Cardiff to Swansea service group, the total number of journeys for Period 5 2012/13 is higher compared with any other four week period in the next 12 months. Periods 8 and 9 are 10-15% higher than the results for Period 5, indicating the proportion of tourists accounts for a significantly smaller percentage;
- The number of passengers using the three other routes presented in Figure 2.5 is higher in Period 5 compared with other times of the year. For example, demand during the summer is at least 20% higher compared with Periods 10 and 11 which broadly equate to December and January. In particular this highlights the importance of seasonal flows, particularly on Pembroke Dock Line where passenger numbers are 40% higher during July / August compared with December and January;
- The variation in passenger numbers between the summer versus other times of the year can also result in overcrowding problems if 1 or 2-car trains are deployed on the busiest services, especially as trains operate at just two hourly intervals;
- The estimated result for ATW is also shown and this is broadly consistent with the trend for stations between Swansea and Cardiff.

Figure 2.5: Comparison of Passenger Journeys



Source: AECOM Arriva Trains Wales data

### 2.4 Passenger Focus Data

Passenger Focus conducts twice-yearly surveys with a sample of passengers during Spring and Autumn each year. The self-completion questionnaires examine a range of issues about the quality and availability of facilities at the departure station, plus a separate group of questions about the journey itself. Results are produced for each train

operator, with comparative analysis to highlight the longer term trends and specific issues. In addition, data for smaller geographic areas is also collated for selected train operators to determine whether there were specific issues affecting individual parts of the franchise.

The results for ATW are presented for South Wales as well as the overall operator. This analysis highlighted that the station security, facilities, cleanliness, ticket costing, punctuality, reliability, and information on the services operated in South Wales produced above average scores compared with the wider TOC. However, the customer satisfaction scores were lower for connections with other rail and other public transport services, plus service frequencies. The latter concern appears consistent with some of the issues highlighted earlier relating to the timetable.

FGW results are too aggregate to produce meaningful conclusions, since the results include the overall service between London and South Wales. Since the proportion of passengers interviewed using FGW services from Swansea, Neath and Port Talbot Parkway of the total, these results are unlikely to be representative of the issues affecting South West Wales.

## 2.5 Freight

Rail freight in Wales is mostly concentrated on the corridor in south east Wales and along the North & West border counties line. But the SWML is part of the national freight network in Wales which supports the movement of freight from branch lines and freight only lines to not only the rest of Wales but to other destinations in the UK and even Europe. In addition to the pattern of passenger journeys described earlier in this chapter, there are a number of freight flows to / from terminals adjacent to the Great Western Main Line, as well as freight only lines including Robeston, Gwaun-cae-Gurwen, Swansea Docks and two lines north of Neath.

The UK rail freight market was privatized in 1994 and has seen some significant growth since then due to competition and a genuine choice in companies and operating models. There are seven companies with Freight Operating licenses to run goods trains in the UK and of these, five operators work in South Wales but only three regularly work into the SWWITCH area:

- **DB Schenker:** bulk metals, coal, oil, intermodal, and wagonload traffic;
- **Freightliner:** operates intermodal traffic between Wentloog (Cardiff) and various destinations in England and Heavy haul moves coal and other bulk goods;
- **Colas Direct:** Operates a timber flow from Briton Ferry to Chirk (Kronospan).

The other two operators in South Wales are:

- **GB Railfreight Limited:** a flow of scrap traffic between Cardiff and various terminals in England;
- **Direct Rail Services Limited:** intermodal service from Daventry to Wentloog (Cardiff) for Tesco.

The main freight markets are traditional bulk flows of products running between point A and Point B including regular flows of:

- **Petroleum:** (from the terminal at Robeston near Milford Haven to Westerleigh (Bristol), Bedworth (Nuneaton) and Theale (Berkshire);
- **Metals:** (TATA Margam, near Port Talbot) steel coil to the steel coating plant at Trostre and to TATA Steel's distribution centre at Llanwern for onward movement to others destinations in the UK. There may be occasionally imported steel through Port Talbot Docks. Also some steel trains have operated to Mainland Europe through the Channel Tunnel;
- **Coal:** (From some open cast sites, North of Swansea and particularly to/from the coal washing plant at Onllwyn, Neath) to the Electricity power station at Aberthaw and occasionally to industrial users.

Less frequent flows include:

- **Aggregates:** from Neath and Carmarthen to various destinations although flows are affected by the overall construction sector;
- **Logs:** from Briton Ferry to Kronospan at Chirk;
- **Scrap Metal:** from the Midlands to Swansea Docks.

The busiest section of railway for freight within the SWWITCH area is east of Port Talbot. The combined flows of goods were presented in terms of tonnages and total train movements and reported in the Wales Route Utilisation Strategy (RUS) 2007. These results equated to a maximum of 8m tonnes per annum near Port Talbot (up to 24 trains per day), up to 4m tonnes per annum near Swansea (up to 12 trains per day) and up to 2m tonnes per annum between Milford Haven and Llanelli (up to 12 trains per day). There have been some minor changes in overall volume since then but broadly the picture today is similar.

## 2.6 Comparison of Car Journey Times

Table 2.7 compares car journey times versus rail for a sample of journeys to Swansea. Car journey times taken from Google, along with the typical rail times have been examined. In general, car journey times are generally faster than the equivalent timing by rail. The car journey times in Table 2.7 are generally faster than rail, although the impact of peak travel congestion may not be fully represented in these timings. Peak travel congestion is likely to deteriorate in the future, leading to an increase in the car journey times shown in Table 2.7. Furthermore, journey time reliability will become an increasingly important consideration, with some car drivers including an larger allowance to reflect the uncertainty of travel time. This will strengthen the competitiveness of rail versus car.

**Table 2.7: Comparison of Car and Rail Journey Times to / from Swansea and Cardiff**

Station	Timings to Swansea			Timings to Cardiff		
	Typical rail journey time (mins)	Car journey times (mins)	Difference (mins)	Typical rail journey time (mins)	Car journey times (mins)	Difference (mins)
Carmarthen	48-52	41	+7 to 11	105	75	+30
Fishguard	111	95	+16	150-160	132	+18 to 28
Haverfordwest	86	83	+6	144	119	+25
Llanelli	16 to 23	31	-8 to -15	77	71	+6
Llandoverly	78	60	+18	150-163	78	+72 to 85
Milford Haven	101	92	+9	169	128	+41
Neath	12-17	17	0-5	40	49	-9
Pembroke Dock	126	81	+45	214	117	+97
Port Talbot	19 to 28	16	+3 to 12	34	42	-8
Swansea	N/A	N/A	N/A	54-68	51	+3 to 17
Tenby	105	76	+29	185	110	+75
Whitland	65	55	+10	123	89	+34

Source: AECOM analysis of the National Rail Timetable and car speeds from Google

- For example, the Pembroke Line is particularly affected by slow journey times, with rail delivering a journey time of 30-45 minutes longer than the equivalent timing by car. For example, the A477, A48 and M4 offer a more direct route to Swansea from Pembroke Dock.
- The extended rail journey times also apply to the Milford Haven / Fishguard Lines, plus the Heart of Wales Line although there is a smaller gap. The difference in car journey times versus rail is further exacerbated by the relatively low frequencies, particularly as the timings shown in Table 2.7 do not take account of waiting time for the next service.
- The two exceptions to the main trend shown are Llanelli and Neath. Llanelli is less convenient to the strategic road network compared with most stations shown in Table 2.12. As a result, car journey times will be considerably slower. Secondly, the rail alignment from Llanelli is relatively direct with just a single intermediate station at Gowerton. Similarly car drivers from Neath have very limited opportunities to use

roads with a 60 or 70mph speed limit for their trips to Swansea, so the slower car speeds strengthen the attractiveness of rail. This is reinforced by the small number of trains operating non-stop to Swansea.

- Table 2.7 also compares rail and car journey times to Cardiff. Similar to the results for Swansea, there are only two stations which benefit from faster rail journey times compared with car. Port Talbot and Neath benefit from a small journey time saving as a result of the two fast services each hour to Cardiff. The car journey times between Cardiff and Swansea are broadly consistent with the rail timings. Rail is fairly competitive against car for stations to the east of Swansea, particularly when the impact of peak period congestion is taken into account.
- However, car has a significant journey time advantage compared with other rail for other stations to Cardiff. For example, car has a journey time advantage of 30-40 minutes compared with many stations in the SWWITCH area, whilst the difference is even larger for stations on the Pembroke Dock Line, or the Heart of Wales Line. The results for the latter route take account of the circuitous rail route via Llanelli and Swansea compared with the alternative choice for cars via the A470.

## 2.7 Role of Other Travel Modes

### Data for the SWWITCH Study Area

The first sections in this chapter examined the existing rail journey patterns to help understand the benefits and gaps. This section examines the characteristics of car trips which could potentially transfer to rail to understand the size of the competing travel market. A number of data sources have been collated including household interviews, Census data by travel mode and the number of car trips using selected parts of the network. Additionally, traffic count data has been sourced and compared to demand on the rail corridors in South West Wales and some other routes in northern England.

### Car Usage

AECOM was previously commissioned by SWWITCH to conduct a series of household interviews of travel patterns across the SWWITCH area in 2011. The household travel survey highlighted the fact that car ownership and use in South Wales is high compared with other parts of the UK. The main mode of transport from the survey was car driver, which is higher than the national average and increased between 2006 and 2010. The proportion of rail trips is less than the national average, with the vast majority of residents never travelling by rail. Figure A1.1 is calculated from the household travel survey and shows percentage of trips by mode in each of the SWWITCH areas in 2010. Overall, rail trips account for around 1% of the total including a lower percentage in Pembrokeshire which is less than the national average (2%), although this result is consistent with the reduced availability of train services in these rural areas. The low rail mode share also appears consistent with the relatively slow journey times and low frequencies affecting several corridors.

The study also found that work related rail journeys in Neath Port Talbot and Carmarthenshire accounted for a higher percentage compared with the rest of the SWWITCH area (5% and 4% respectively). About 10% of 18-24 year olds use rail in Carmarthenshire, which is the highest proportion of any age group. Interestingly, over three-quarters of rail users stated that they have access to a car which suggests that some passengers are choosing rail over road. Car availability was high in all areas but highest in Carmarthenshire at 88%.

### Journey Patterns

To supplement the data illustrating the mode share, respondents completing the household travel survey were asked to record their journey patterns, with Table 2.8 illustrating the distribution of all trips. The majority of trips from in each area have a destination in the same location, with over 80% of trips from Swansea starting and ending in the same area. Swansea is also the most popular destination from Pembrokeshire and Neath Port Talbot which reflects the concentration of employment opportunities and other trip generators including leisure and retail. In contrast, Carmarthenshire generates more trips to Pembrokeshire than Swansea and reflects the proximity between these locations. The majority of the SWWITCH study area has a smaller percentage of rail trips which remain in the same area, indicating that the majority of journeys completed cover a relatively long distance. The exception is Neath Port Talbot which has a relatively high proportion of trips within the authority which is consistent with the availability of local stations.

**Table 2.8: Journey Patterns in SWWITCH Areas**

		To				
	District	Pembrokeshire	Carmarthenshire	Swansea	Neath Port Talbot	Other
From	Pembrokeshire	79.3%	6.2%	11.1%	0.2%	3.2%
	Carmarthenshire	13.2%	66.5%	8.8%	2.4%	9.1%
	Swansea	0.7%	4.9%	80.9%	6.1%	7.4%
	Neath Port Talbot	0.7%	1.5%	17.2%	70.3%	10.3%

Source: AECOM analysis of household interview surveys conducted within the SWWITCH area

### Estimated Journey Times

Rail is generally used for longer distance journeys in South West Wales. Figure A1.2 indicates the travel times by different modes and indicates there are very few rail journeys completed in less than 21 minutes, whilst there are about two-thirds of rail journeys are at least 31 minutes. This further reinforces the conclusion that rail is generally used for longer distance rather than local journeys. The characteristics of rail in parts of South West Wales are less convenient for localised journeys which are could be served by bus or private car.

### Comparison of Mode Share – South West Wales

An analysis of road traffic flows and rail trips at key locations has been carried out for different parts of the SWWITCH area and also for other selected areas in Northern England as a comparison since the consultants have data for this area. Road traffic flows have been taken from the Department for Transport Traffic Counts database and rail trips from MOIRA. Table 2.9 illustrates the comparison of passengers switching between road and rail. The rail trips represent the number of trips passing between two locations each day and the road trips represent daily traffic flows in both directions. This is intended to provide an overview of flows on adjacent road and rail routes, although there are often alternative road routes and each location has different characteristics. The rail mode share ranges from 1% near Pembroke Dock to 8% near Whitland or Carmarthen / Llanelli. The potential contributory factors are discussed below:

- **Relatively high mode share (circa 8%):** the screenline near Llanelli achieves a rail mode share of 8%. The relative distance to the A48 / M4 corridor from the rail corridor together with the higher service frequencies may be contributing to these outcomes. As a result, there is limited overlap between these travel markets. Furthermore, the screenline west of Whitland also generates a rail mode share of 8%, yet the service is less attractive. The more dispersed settlements west of Carmarthen and hence longer distance journeys could mean rail is more suited to these types of trips;
- **Relatively low mode share (circa 1-2%):** if the traffic counts approaching Pembroke Dock are examined in conjunction with other data, this suggests there are a significant number of local car trips. Frequency and journey time issues highlighted earlier appear to be contributing to this low rail mode share. The Heart of Wales Line also attracts a low mode share, which appears consistent with the service patterns;
- **Other mode share (circa 5-6%):** there are several other screenlines in the SWWITCH area which generate a 5-6% rail mode share but the contributory factors are different. The Narberth to Whitland screenline generates a lower mode share than the results for the Milford Haven route and appears consistent with the slower journey times affecting the Pembroke Dock Line. Furthermore, the screenline between Baglan and Port Talbot achieves a similar mode share to the Narberth to Whitland section. Whilst the higher frequencies and faster journey times improve the competitiveness of rail east of Swansea, the opportunities to increase the number of rail trips are constrained by the strong competition from the M4, as demonstrated by the relatively fast car journey times to Cardiff shown in Table 2.7.

**Table 2.9: Daily Number of Two-Way Trips – Comparison of Road and Rail**

Rail Location	Road Location	Rail	Road	Rail Share
Pembroke Dock-Pembroke	A477 E of Pembroke Dock	153	13,202	1%
Narbeth-Whitland	A477 W of St Clears	467	7,117	6%
Milford Haven-Johnston	A4076 N of Milford Haven	203	8,742	2%
Clunderwen-Whitland	A40 Clunderwen	814	9,122	8%
Bynea-Llanelli	A40 Llandeilo	182	7,293	2%
Pembrey-Llanelli	A48 E of Carmarthen	2,323	26,762	8%
Baglan-Port Talbot	M4 J42-41	4,138	74,605	5%
Pyle – Port Talbot	M4 J37-38	4,310	50,500	8%

Source: AECOM analysis of traffic counts and rail journeys

### Comparison of Mode Share – Other Examples

The mode share results from the various screenlines in South West Wales have been compared with the results for other locations in England as shown in Table 2.10. These examples include several case studies which offer a range of rail services (frequencies and journey time competitiveness) and road conditions. These examples indicate rail can achieve a higher mode share if there are regular services and/or adjacent roads are affected by congestion.

- **Huddersfield – Deighton:** this includes trips on the TransPennine route between Manchester and Leeds. The rail share is high on this corridor (19%), but there are 4 fast trains per hour between Huddersfield and Leeds throughout the day. Equally, the adjacent M62 is also very congested, especially during peak hours;
- **Ferriby – Brough:** this screenline represents journeys to / from Hull. Rail achieves a 13% mode share, but this is still higher than the examples presented in South West Wales. There are direct hourly trains to Leeds / Manchester, York plus a regular service to London. The M62 is less busy in the Hull area but the wider M62 and A1/M1 are heavily congested at times;
- **Habrough – Stallinborough:** journeys to/from Grimsby and Cleethorpes are represented. The rail mode share is 8% which is consistent with the less frequent service and reduced road congestion on the M180 corridor;
- **Ulverston – Cark:** journeys to/from Barrow-in-Furness are represented by this screenline. Rail attracts 10% of the market and reflects 1-2 trains per hour including some trains to Manchester Airport. The parallel A590 includes some sections of dual and some single carriageway, but the road takes an less direct route with higher flows during high tourist season;
- **Parton – Harrington:** this screenline forms part of the Cumbrian Coast line north of Whitehaven. Rail mode share is just 6%, and this is consistent with the lower rail frequencies and the relatively slow services between Barrow-in-Furness and Carlisle. However, the parallel road network is also relatively slow, given the lack of high capacity routes offering fast journey times.

**Table 2.10: Road and Rail Comparison in Northern England**

Rail Location	Road Location	Rail	Road	Rail Share
Huddersfield-Deighton	M62 J26-27	30,443	126,529	19%
Ferriby-Brough	M62 J37-38	5,520	36,062	13%
Habrough-Stallinborough	A180 W of Grimsby	1,978	22,060	8%
Ulverston-Cark	A590 E of Ulverston	1,745	16,530	10%
Parton-Harrington	A595 N of Whitehaven	960	15,339	6%

Source: Highways Agency counts and AECOM analysis of MOIRA data

Although there are some important differences between the comparator locations and the SwwITCH area with higher capacity roads and more frequent rail services, the results do indicate the potential to increase the rail mode share in South West Wales. However, the relatively low road flows in South West Wales compared with other



locations suggests that even if the rail market share was increased by 2-3%, the actual number of trips affected would be relatively small.

## 2.8 Summary of Main Issues

The analysis of baseline data has highlighted a number of important issues which will influence the subsequent phases of the study:

- **Network characteristics:**
  - line speeds east of Swansea are generally 90mph, with 75mph permitted west of Swansea towards Milford Haven. Elsewhere in the SWWITCH area, line speeds are generally 45-60mph, although other locations have permitted speeds of just 15-25mph. There are a number of level crossings which necessitate very slow speeds, including the Pembroke Dock Line;
  - the route to Milford Haven is the most suitable for freight in terms of the gauge clearance and route available. The scope for freight via the Heart of Wales Line is limited due to infrastructure constraints, whilst freight access to the docks at Pembroke has been encroached by development activity;
  - Funding to electrify the GWML east of Swansea is committed and will be delivered by 2018;
- **Service patterns:**
  - during the AM peak, there are six arrivals at Swansea via Llanelli calling at all intermediate stations. There are six trains via Neath in this same period, including two with a skip-stop calling pattern;
  - during the inter-peak period, there are 1.5-2 trains per hour via Llanelli towards Swansea with some services adopting a skip-stop pattern east of Carmarthen. Similarly from the east, there are two 'fast' services per hour that originate beyond Cardiff and just a two-hourly local train which serves the four intermediate stations between Port Talbot Parkway and Swansea;
  - the Heart of Wales and the Pembroke Lines do not offer arrivals or departures between 08.00 and 09.00 or 17.00 and 18.00 which reduces the attractiveness of services for commuters;
- **Rolling stock:**
  - a mixture of High Speed Trains (London to Swansea and Carmarthen), Class 175 (Manchester to West Wales) and Class 14X and 150 / 153s (other services) are deployed in the SWWITCH area. Whilst the HSTs and Class 175s are generally suitable for business and leisure passengers including those making longer distance trips, the other units are uncomfortable for journeys lasting more than 1 hour. This affects passengers from West Wales to Swansea;
- **Journey patterns:**
  - only five stations within the SWWITCH area are used by more than 500 passengers per day, with nearly two-thirds of stations in the SWWITCH area are used by less than 100 people / day;
  - The table below illustrates the total number of passengers using selected parts of the rail network within the SWWITCH area.

Line	Total Annual Trips
Pembroke Dock	198,000
Milford Haven / Fishguard	275,000
Heart of Wales Line	146,000
West of Swansea (Pembrey & BP – Llanelli)	635,000
East of Swansea (Baglan – Port Talbot Parkway)	1,146,000

Source: AECOM analysis of MOIRA data

- the distribution of these annual trips was also examined. About half of the 635,000 trips between Pembrey and Burry Port and Llanelli had a destination east of Swansea, although just 13% of the trips between the Baglan and Port Talbot screenline were travelling beyond Swansea. The high number of trips between Swansea / Neath and Cardiff, plus Bridgend / Port Talbot and Swansea contributed to the smaller proportion of cross-Swansea trips recorded by the eastern screenline;
- seasonality is an important factor affecting several routes. For example, usage of the Pembroke Dock Line was 40% higher during the summer compared with the winter highlighting the importance of tourists, whilst passenger numbers using stations between Swansea and Cardiff were 20% higher during the autumn compared with other times of the year;

- Passenger numbers using the Milford Haven / Fishguard and stations between Swansea and Cardiff have increased by around 30% during the last five years, with a 20% change using the Pembroke Dock Line. Usage of the Heart of Wales Line is unchanged versus five years ago.
- **Competition with other modes:**
  - Journey times by car are generally faster compared with rail from the selected SWWITCH stations to Swansea, with the Pembroke Dock Line performing particularly poorly versus road. The relative lack of congestion (except the approaches to / from Swansea during the peak periods), the requirement to stop at several intermediate stations and the rail alignments which cover a longer distance compared with road contribute to this outcome. Timings to Cardiff are faster by rail from Neath and Port Talbot;
  - The rail mode share varies from 1-8% depending on location across the SWWITCH area. The screenlines which generate the lowest rail mode share generally have the lowest frequencies and slowest rail journey times compared with car, whilst the parallel road corridor is generally uncongested. The low number of daily car trips using some corridors also indicates the potential to grow the rail market is comparatively limited;
  - Higher fuel charges and worsening congestion approaching Swansea and Cardiff could boost the proportion of trips using rail.
- **Interface with freight:**
  - There is a diverse freight market from the SWWITCH area via the GWML. The busiest part of the network is east of Port Talbot with a maximum of 24 trains / day in each direction. Some of the freight trains west of Swansea operate overnight and as a result have a minimal interface with passenger services.

## **Base Case – Developing the Rail Strategy**

## 3 Base Case – Developing the Rail Strategy

### 3.1 Introduction

The rail strategy for the SWWITCH area needs to take account of the recent growth trends and the potential to grow the market during the next 10-15 years. The Base Case scenario illustrates the likely starting position to define the future Rail Strategy for the SWWITCH area and comprises several elements. Network Rail's committed investment is considered, along the forecast growth affecting both passenger and freight services. Some of the potential changes resulting from the committed investment have yet to be finalised, so a flexible approach has been adopted which should enable changes to be made to this Strategy if subsequent revisions are proposed.

The impact of future growth has also been examined. Recent changes in passenger numbers using the individual routes in the SWWITCH area have been compared against forecast growth rates produced to support the Wales Planning Assessment and the Wales Route Utilisation Strategy. The study brief makes specific reference to the forecast employment growth proposed in the Swansea Bay City Region, plus the population growth. It ensures the revised forecasts take account of these proposals.

This chapter also considers the potential changes to the freight market, recognising these flows are more subject to changes compared with passenger services. Despite the potential fluctuations in freight flows, outputs from the Freight Route Utilisation have been collated alongside discussions with the freight industry to understand the potential changes that could result. Finally, there are a small number of road schemes that could enhance the strategic road network, helping to cut journey times and improve reliability.

### 3.2 GWML Electrification and IEP Services to Swansea

Funding has been committed to electrify the Great Western Main Line between London, Bristol (via both Parkway and Temple Meads), Cardiff Central and Swansea. It is envisaged these works will be completed by 2018. The combination of improved acceleration / deceleration offered by the proposed new Intercity Express Programme trains, together with changes to the stopping pattern will deliver journey time savings. For example, it is envisaged the stops at Swindon and Didcot Parkway will be omitted throughout the day from the London to Swansea services, whilst IEP trains will only call at Bristol Parkway during the peaks. The rolling stock and timetable changes are expected to cut journey times to London from Swansea by around 15-20 minutes with a future end-to-end journey time of about 160 minutes. The increase in passenger numbers resulting from these journey time reductions could be further supplemented by the impact of the rolling stock

There is a daily FGW service extended beyond Swansea to Carmarthen which could be operated by 5-car bi-mode unit (this comprises a diesel engine as well as a pantograph for electric operation). The 9-car electric trains could also deliver an increase of about 20% in seated capacity compared with the existing HST sets, although it is currently uncertain whether these will operate as 5-car bi-mode sets. Whilst passenger loadings using the GWML in the SWWITCH area are relatively low, the capacity improvements will be relevant to users boarding east of Cardiff.

Network Rail and other stakeholders are presently finalising timetables for the GWML following the introduction of the IEP rolling stock, although these remain subject to further revision and iteration. The current draft IEP timetable suggests the turnaround times at Swansea could be about 55 minutes. This is a relatively lengthy layover and indicates there may be scope to amend the timetable to improve rolling stock efficiency. However, the high number of other services to / from Paddington creates a number of operational constraints, particularly between Reading and London. As a result, the potential scope to modify the timing of the Swansea trains to reduce the layover time and improve rolling stock efficiency may be limited.

### 3.3 Local Services between Swansea and Cardiff

It is also assumed the local stopping trains between Cardiff and Swansea will be operated using electric traction once the GWML is electrified from 2018. At present, these trains only operate every two hours for most of the day, although there are extra trains towards Swansea during the morning peak. Our Base Case assumes the current

stopping trains between Swansea and Cardiff will be replaced on a like-for-like basis from 2018, despite the Welsh Assembly Government making a commitment in its National Transport Plan to strengthen connections to South West Wales. Whilst it is envisaged that the frequency of the local Cardiff to Swansea service could be increased from every two hours to hourly based on the results of the business case (a Benefit to Cost Ratio (BCR) of 2.5), this timetable change is not included in the Base Case. The electrification would deliver capacity benefits for passengers since 2-car diesel sets are likely to be replaced by 4-car trains.

### 3.4 Other Possible Service Changes

The hourly diesel service between Manchester and Carmarthen or Milford Haven which operates hourly may be retained in its current format post electrification, even though trains would operate under the wires between Newport and Swansea. At present, the 'fast' trains between Cardiff and Swansea in the westbound direction are bunched within a relatively narrow time period each hour, with a large gap prior to the next service. However the scope to modify the timing of the fast services is restricted due to capacity bottlenecks elsewhere.

With the Welsh Government committed to improve connectivity between South Wales and Greater Bristol / Severnside, there is a possibility that the existing trains from Manchester to West Wales could be terminated at Cardiff. Firstly, the introduction of new services using electric traction between Bristol Temple Meads and Swansea via Cardiff Central would help to support the overarching case for GWML electrification and reduce the diesel train mileage operating under the wires. Furthermore, there may be fewer constraints preventing the introduction of a fast hourly train between Bristol Temple Meads and Swansea from operating 30 minutes apart from the London service between Newport and Swansea compared with the service which starts in Manchester. This may offer greater flexibility to improve connections to / from West Wales, since the pattern of arrivals at Swansea could be more evenly spaced if electric trains operated from London and Bristol.

This uncertainty regarding some of the future service patterns means the consultants will evaluate the impact of both scenarios as part of the more detailed analysis. The impacts of retaining diesel services from Manchester or introducing electric trains from Bristol to Swansea will be examined as part of more detailed analysis completed in Phase 2.

### 3.5 Station Improvements

Station improvements have been delivered at Carmarthen and Swansea using the National Station Improvement Programme funding. Carmarthen station has benefited from a refurbished ticket office, improved waiting facilities and better passenger signs / other information. Furthermore, better waiting facilities and information for passengers, access to taxis, improved station amenities have been delivered at Swansea. 'NSIP Plus' Funding for Port Talbot Parkway has also been secured comprising measures to address accessibility constraints at the station for the mobility impaired, as well as enhancing the general station environment. This scheme is included in the Base Case. There are proposals for other station improvements as part of the option development with Regional Transport Plan money used to fund GRIP feasibility studies at Pembroke Dock, Milford Haven and Llanelli.

### 3.6 Rail Passenger Growth

#### Comparing Forecast Growth with Observed Changes

In addition to the potential revisions to the service specification, the Base Case scenario must also consider the impact of background growth. Forecast growth takes account of changes in employment, population, car ownership plus changes in the cost and competitiveness of other modes. Elasticities would then be applied in accordance with the Passenger Demand Forecasting Handbook depending on the characteristics of the travel market. Two sets of growth forecasts have been previously prepared as follows:

- **Wales Planning Assessment: forecasts of 35% to 40% growth between 2005 and 2026 which equates to 1.7-1.9% per year;**
- **Wales Route Utilisation Strategy (published in November 2008):** this includes estimates of 20% for internal trips within South West Wales in the 11 years to 2018/19 (1.7% per annum), between South West

and Mid South Wales will be about 21% (1.75% per annum), and 22-32% between South West Wales and Cardiff equating to 1.85% to 2.2% per annum.

These estimated growth rates compare relatively poorly compared with the observed growth rate over the last 5 years to March 2013 calculated from MOIRA. With the exception of the Heart of Wales Line, the actual growth rates between 2008 and 2013 have been significantly higher, comprising 31%, 28% and 21% for the Swansea to Cardiff line, Milford Haven / Fishguard and Pembroke Dock Lines respectively. They equate to annual change of 3.8% to 5.6% per annum over this initial five year period and is significantly higher than forecast assumptions. As noted earlier, the Heart of Wales line grew just 1% over the same 5 year period with the poor frequency and inconvenient timing of services contributing to these outcomes.

### **Long Term Planning Process**

It is also worthwhile acknowledging the potential role of the Long Term Planning Process which will be completed by Network Rail. Network Rail will adopt an evidence-based approach to understand the economic factors that influence changes in demand over the next 10 to 30 years. The LTPP takes account of changes affecting the rail industry and assesses a range of options to address gaps between existing capacity and future demand, initially by making better use of existing services and then identifying value for money solutions to deliver enhancements. It is envisaged the LTPP will inform the next High Level Output Specification for Control Period 6 (2019-24). Network Rail will shortly be commencing the LTPP for Wales which will consider:

- passenger journey patterns within Wales;
- any interventions required to support future passenger and freight requirements. Ensuring these options reflect any trade-offs between different stakeholder priorities must be taken into account.

Outputs from the LTPP should be closely aligned with Regional Transport Plans to highlight the role of rail in helping the economy grow and complementing the committed investment described above.

### **Drivers of Change – Understanding the Employment and Population Forecasts**

Although passenger numbers using stations between Swansea and Cardiff plus the lines to Milford Haven and Pembroke Dock Lines have increased by an average of 3.8-5.6% during the last five years, understanding the potential contribution of future employment and population trends will help to determine whether these recent trends can be extrapolated forward. The Swansea Bay City Region was established in 2013 and has 685,000 residents supporting 280,000 jobs in 20,000 companies. The region benefits from the location of leading universities, global firms, and local businesses in its study area which drive growth and development. Investment over the last decade has focussed on regeneration and connectivity, helping the region to prosper. Despite these improvements, sustained growth must be continued to tackle the relatively low productivity compared with the rest of Wales and the UK. The Swansea Bay City Region Economic Regeneration Strategy includes four main locations to target growth:

- Felindre Business Park;
- Baglan Energy Park;
- Cross Hands East and West Strategic Employment Parks;
- Haven Waterway Enterprise Zone.

The 60 hectare Felindre Business Park site is located 7.5km north of Swansea city centre with direct access to M4 Junction 46. This site could be accessed by rail if regular passenger services operated via the Swansea District Line and a railway station was constructed. The site has been allocated for B8 use including advanced manufacturing and this assumption was used to estimate the total number of jobs (3,400).

Baglan Energy Park is located on the coast, covering about 180 acres and forms part of a larger regeneration project for Baglan Bay. One of main features of this development is the low cost electricity produced on site. The masterplan indicates a total of 3,000 jobs will be created once the development has been completed, indicating a further 1,400 posts will form part of the next phase. The site is located within walking distance of the railway station, creating an opportunity to encourage a relatively high mode share by rail.

Of the 50 acres available at Cross Hands Strategic Employment Park, there is about 30 acres yet to be developed. The site has a strategic location about 15 miles west of Swansea on the A48. This site forms part of the Ammanford to Cross Hands regeneration area which will generate significant employment growth. Between Swansea and Carmarthen, the railway follows an alignment adjacent to the coast rather than the A48 corridor. Furthermore, the site is about 10 miles from Ammanford railway station which will require bus feeder services to strengthen connectivity and help encourage a proportion of the 1,600-1,700 new jobs at this development to use rail travel.

Haven Waterway Enterprise Zone includes the dockyard at Pembroke Dock, and several other areas around the waterway including Milford Haven, Waterston, Blackbridge, South Hook Liquefied Petroleum Gas, Cleddau Bridge, Llanion and Withybush Airport. Rail serves both Pembroke Dock and Milford Haven, but the opportunity to attract commuting trips to these developments is constrained by the low frequency and restricted availability of passenger services. A total of 1,500 new jobs are expected to be created, based on data from the Port of Milford Haven Business Review 2012.

**Figure 3.1: Development Site Locations**



<b>Development sites</b>	
1.	Felindre Business Park
2.	Swansea West Business Park
3.	Swansea Vale
4.	Cross Hands East and West Strategic Employment Parks
5.	Baglan Energy Park
6.	Haven Waterway Enterprise Zone

In addition to the four sites described above, City and County of Swansea have prioritised Swansea Vale and Swansea West Business Park for regeneration. Swansea West Business Park is 6.5km west of Swansea City Centre, and is south of junction 47 of the M4. The main railway lies to the site to the south. The closest stations are Gowerton and Swansea but the distance to these stations may restrict the role of rail in serving this development. A

25ha extension to the Business Park is being developed with potential to create 3,400 new jobs. Light industrial activities are proposed for this site following redevelopment.

Swansea Vale is located 8km northeast of Swansea City Centre and a short distance northwest of Llansamlet station. Two large business parks and a new residential development are planned creating 1,200 new jobs plus a residential catchment of 1,600 people. A large portion of the land is designated for ecological use or green spaces. The site comprises:

- 7 hectares for recreation and leisure;
- 5.4 hectares for business;
- 23.4 hectares for residential development;
- 1.2 hectare for a community hub/mixed use development.

The number of trains calling at Llansamlet would need to increase if a proportion of these trips would choose rail, given the limitations of the current service pattern described in Chapter 2. Figure 3.1 illustrates the four priority locations identified in the Swansea Bay City Region plus the two supplementary sites highlighted by the City and County of Swansea.

Table 3.1 illustrates the total number of new jobs that could be created by the proposed developments described above. Assuming the development proposals are fully realised, these sites could generate about a 5% increase in the total number of jobs.

**Table 3.1: Summary of Major Development Sites**

Development	Change in Jobs / Residential Catchment
1. Felindre Business Park	3,400 jobs
2. Swansea West Business Park	3,400 jobs
3. Swansea Vale	1,200 jobs, 1,600 people
4. Cross Hands East and West Strategic Employment Park	1,600-1,700 jobs
5. Baglan Energy Park	1,400 jobs
6. Haven Waterway Enterprise Zone	1,500 jobs

Source: AECOM analysis of Regional Economic Strategy

In addition to these six major developments, a new Bay Campus of Swansea University is being constructed on Fabian Way. This is intended to create a research and innovation hub around which existing and new businesses can grow and agglomeration impacts can develop. The number of employees is yet to be finalised, but it is likely to represent a major development.

### Population Forecasts

The assessment of future population incorporates the proposals described in the document 'Wales Population: A Demographic View' published by the Welsh Government in 2010. This document used 2008 population as the starting point to estimate the likely changes for the five year intervals to 2023. These estimates produced by the Welsh Assembly Government have also been benchmarked against information from the individual Unitary Development Plans. This comparative analysis reinforces the broad consistency between these datasets. Furthermore, supporting evidence prepared by each authority has been examined to understand the potential distribution of the new houses and assess the potential to develop the rail market. The results in Table 3.2 indicate Swansea and Carmarthenshire are likely to experience the largest change in population, although a relatively high proportion of the new residents will not be immediately located adjacent to the rail network.



**Table 3.2: Summary of the Population Forecasts**

District	Sources		Further Information
	Wales' Population, A Demographic Overview 2010	Local UDP	
Carmarthenshire	2013 population of 187,400 Annual population growth of 0.71% pa equating to an extra 13,500 by 2023	Current population of 183,700 Annual growth in population of 0.45% p.a.	Sustainable growth will be encouraged at strategic sites such as West Carmarthen, and South Llanelli Strategic Zone. Most of the population increase is expected in the towns, as evidenced by the strategic sites. Local authority population forecasts are one-third lower compared with WAG estimates
Neath Port Talbot	2013 population of 140,400. Annual growth in population of 0.42% pa equates to 6,100 people by 2023	Current population of 139,900 Annual growth in population of 0.62% p.a.	The major development site is Coed Darcy Urban Village which will account for 53% of the total development, with a further 20% in Port Talbot (including Baglan) and a further 13% in Greater Neath.
Pembrokeshire	2013 population of 120,500 Annual growth in population of 0.47% pa equates to 5,600 people by 2023	Annual growth in population of 0.40% p.a. Current population of 120,500	New homes to be distributed evenly between urban and rural areas. Urban housing growth will be focussed on Haverfordwest, Milford Haven, Neyland, Pembroke Dock, Pembroke, plus Fishguard & Goodwick. Only Neyland is not directly rail served
Swansea	Current population of 237,400 Annual growth in population of 0.70% p.a. equating to 17,900 extra people by 2023	Annual growth in population of 0.74% p.a. Current population of 238,100	Over 55% of growth will occur in and around the city centre, around the bay and to the east. This may lead to increased use of Swansea and Llansamlet stations. A further one-third of houses are expected to be located to the north and northwest although access to the rail network is relatively poor via links to Pontarddulais (Heart of Wales Line). Less than 10% of growth will occur in the west, but these areas have no rail coverage.

Source: AECOM analysis of Wales' Population A demographic view (2010), plus the Unitary Development Plans for Carmarthenshire, Neath Port Talbot, Pembrokeshire and Swansea

### 3.7 Freight Growth

#### Forecast Growth

The 2013 Freight Market Study 'Draft for Consultation' has been jointly developed by various industry stakeholders and sets out how demand for rail freight is expected to change over the next 30 years for the main commodities. It examines how individual sectors have changed recently, and how they might change in the future. Network Rail has produced forecasts for freight growth for a 10, 20 and 30 year planning horizon. The total tonne kilometres are forecast to increase by 2.2% per annum to 2033, with an annual 2.1% increase to 2043. This implies a near doubling of the market over this 30 year period. The growth rate in tonnes is slightly lower (1.3-1.5% per annum) over the same period and reflects the changes in composition of commodities from a reduction in the heavier coal

flows offset against an increase in the lighter intermodal flows. Growth in the intermodal sector and the energy related material is likely to be the main contributors to the overall growth forecasts. The forecasts took account of a possible 20% increase in train load by 2023, which is consistent with the objectives of the Strategic Freight Network objectives include measures to enable longer and heavier trains. Further increases beyond 2023 may be realistic assuming constraints at terminals and on the network can be overcome. The forecasts underpinning the Market Studies take account of the strategic network investments including the development of the Strategic Freight Network and electrification including the GWML to Swansea. The forecasts show the following results by sector:

- **Deep sea containers:** average annual growth of 5.5% changes in tonne kilometres to 2033;
- **Domestic intermodal:** 6-12% growth;
- **Construction materials:** 1.2% growth per annum;
- **Metals, petroleum, chemicals, industrial minerals and automotive:** 1% per annum;
- **Coal:** is forecast to fall by 74% by 2023 and 90% by 2030 compared with 2011;
- **Energy related material:** this sector is forecast to expand rapidly replacing coal based electricity with a central estimate of 14 million tonnes by 2023;

A further consideration which could affect these growth targets are the emerging opportunities for the waste management sector. This could involve the production of energy from waste plants and there are a number of regions in the UK evaluating the potential impacts and the role for rail to minimise the impacts. Although public policy supports local management of waste, securing planning consent for new plants near urban areas is very difficult and could result in larger facilities serving a wider catchment. If this type of waste management facility became more common, rail could have an integral role in supporting these developments.

### Addressing Uncertainties

There are some uncertainties affecting these freight forecasts as set out below:

- **Development of future inland terminals:** The Network Rail study assumes that capacity will be delivered to meet future forecast growth using a market-led approach. The capacity of rail connected sites needs to increase at about 370,000 square metres per year, a similar rate to recent years and is consistent with the assumption that 35-40% of new large warehousing developments will be rail connected. A high proportion of the rail connected developments are expected to be National Distribution Centres;
- **Track access charges:** the higher charges particularly for coal may discourage longer distance flows, such as those from Scotland to England. This could mean coal is imported to the nearest port close to coal fired power stations, although changes to the coal and energy related markets described above may influence this policy.

### Specific Implications for Freight in South West Wales

Two of the main rail freight markets in the SwwITCH area are petroleum and metals. These sectors have achieved modest growth recently and the future trends are dependent on the price of oil and steel. Operations at Port Talbot, Trostre and Milford Haven are expected to continue. The quantities of coal are affected by wider energy prices such as gas, but in the short to medium term this market will also be affected by the closure of a proportion of coal fired power stations and the increased use of energy related material as an alternative. Energy related material is much bulkier and has a significantly lower calorific value than coal, so it will be necessary to run more trains to achieve similar amounts of power output compared with coal. Energy related material has to be imported through ports and the facilities are being introduced to handle this material. There could be potential for trains transporting energy related material to operate from Milford Haven and the quantity to be transported could equate to an hourly freight train in each direction throughout the day. The Port of Swansea could also be expanded in response to this potential growth in this sector.

Intermodal flows offer potential to achieve some of the most significant growth, with the emerging low carbon and “green” agendas contributing to this outcome. On certain parts of the network, it is uncertain whether sufficient train

paths will be available to support the forecasts. This sector covers a number of themes, firstly port related movements from Southampton to Cardiff and Swansea following the GWML electrification, or the new London Gateway port to Swansea. Secondly there could be potential for domestic inter-modal “supermarket” trains, by extending services from Scotland, the Midlands or Northern England beyond Cardiff to serve Swansea. A modern purpose built terminal would be required, which could be developed at Felindre since it would offer convenient access to the local and regional road network. The third type of inter-modal service represents the proposed ‘landbridge’ freight corridor from Mainland Europe to Southern Ireland via a port in South Wales. With a significant volume of lorries using the M4 to connect on to ferries for Ireland, there may be potential to divert these trips onto a train service instead.

### Infrastructure Requirements for Freight

At present, there is up to two freight train paths per hour on the GWML near Port Talbot during the daytime although these may not necessarily be used, with additional capacity at night. These are mostly Class 6 freight trains with a maximum speed of 60mph which generally have a full load in one direction and tend to return empty. Inter-modal trains are normally Class 4 services and can operate at 75mph, and therefore fit in with passenger services more easily. They also have a more balanced load on the outward and return directions. Many freight train paths still only run on certain days or have designated ‘Q’ paths which indicate they only run occasionally. On this basis, it is understood there is still some spare capacity in the current timetable for modest freight growth.

### 3.8 Implications for Other Modes

There are a number of road improvement schemes identified in the Regional Transport Plan which are expected to be delivered during the short term. These schemes will address a number of objectives, including delivering faster, more reliable journey times to the major population centres and improving safety. The proposals include:

- **A477 St Clears – Red Roses improvement:** this scheme will further increase the journey time advantages of car compared with rail on the Pembroke Dock Line, since this part of the A477 has a 40mph speed limit;
- **A40 Llanddwei Velfrey – Penblewin improvements (west of St Clears):** this scheme is primarily focussed towards safety improvements;
- **A40 The Kell (south of Fishguard):** similar to the A40 scheme, the main objective of this scheme is primarily related to road safety improvements;
- **A483 Llandeilo bypass:** the A483 forms an important link from east Carmarthenshire to Llanelli and Swansea via Ammanford, so the bypass will offer journey time and road safety benefits;
- **Potential M4 active motorway management:** with the M4 approaching Swansea already affected by congestion during the peak periods, this scheme would help to improve journey time reliability. This technology based solution would smooth traffic speeds and optimise the capacity of the existing network since the opportunities to deliver significant capacity enhancements through road widening are limited.

There are two long distance coaches per day between Milford Haven to Pembroke, Tenby, Carmarthen and Swansea, with services then continuing to Birmingham or London Victoria. Journey times are slower compared with car or rail, and consequently these services are primarily serving passengers who are not particularly time sensitive. Between Cardiff and Swansea, there is a more comprehensive coach service with Greyhound departures at least every hour, plus 13 National Express coaches per day. In spite of the highway improvements to be delivered in the SWWITCH area, and further afield particularly for the M4 and M5 corridors, there is a likelihood that coach journey times will increase. There is a relatively small likelihood these passengers would alter their travel behaviour, but even if some of these trips did transfer to rail, the number of passengers involved is likely to be modest.

### 3.9 Estimating the Consolidated Growth Rates

Strong rail growth has been achieved in recent years, with a number of factors influence rail demand including the economy, population, car ownership and car running costs. However, the traditional assumption that the linkages between the economy and rail growth were relatively close has been weakened by the recent downturn in the economy which indicates there may be other contributory factors. For example, rail demand has generally continued to grow, whilst the economy has either shrunk or remained static. Table 3.3 shows the economic growth and rail demand growth since 2007-08.

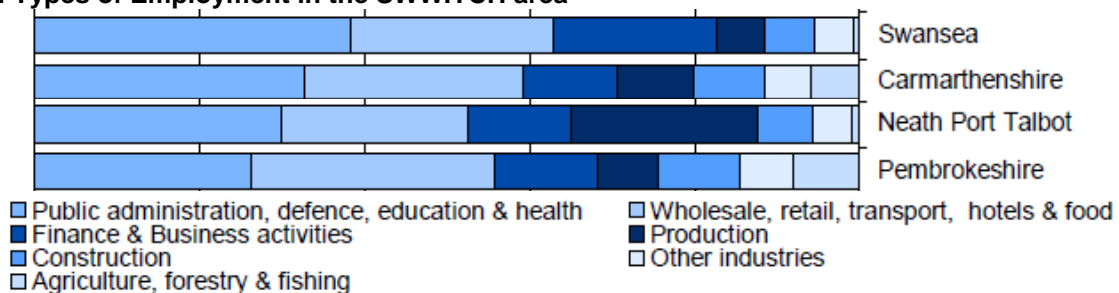
**Table 3.3: GDP Growth and Rail Demand Growth Great Britain**

Year	GDP Growth	Rail Growth
2008-09	-3%	4%
2009-10	-3%	-1%
2010-11	2%	8%
2011-12	1%	8%
2012-13	0%	3%

Source: DfT

Over the five year period shown in Table 3.3, rail has seen increased by 23% while GDP has reduced by almost 4%. A study conducted by OXERA and Arup in 2010 examined a range of factors influential to rail demand including economic growth, car ownership, rail reliability (public performance measure) and journey times. The study found that while there is evidence that growth in the economy will lead to growth in rail demand, there are a number of other factors that have a large influence on rail demand. In particular, the costs of running a car have a strong influence and continuing increases in car running costs are likely to generate higher rail market shares. The study also found that reliability is important. Rail reliability has improved significantly in recent years and this is thought to have a strong influence on demand. Reliability is thought to be more important than journey time in some instances but journey time is an influencing factor.

Car ownership in the SWWITCH area is generally high which is consistent with the lower population densities. According to the OXERA/Arup study this does not necessarily have a negative impact on rail demand as owning a car allows people to access rail stations, assuming there are adequate parking facilities at stations. Competitive rail journey times are an influential factor to encourage modal shift. Furthermore, there have been significant changes in the employment market in South Wales in recent years, shifting away from manufacturing and heavy industries towards service sector employment. Despite the decline of certain industries in South West Wales, the overall employment market grew between 2001 and 2011 by between 6% (in Swansea) and 13% (in Pembrokeshire). However, between 2010 and 2011 there was a slight fall in employment in Carmarthenshire. Figure 3.2 shows the types of employment in the SWWITCH area.

**Figure 3.2: Types of Employment in the SWWITCH area**

Source: Workplace employment by industry in Wales, 2001 to 2011, Office for National Statistics

Rail demand has growth significantly throughout the period where employment has shifted and grown slightly. Construction and agriculture account for over half the employment market in the SWWITCH area. Agriculture in particular is an industry that is unlikely to lead to demand for rail, with construction similarly limited. Production is largest in Neath Port Talbot, largely due to the steel works. Industrial employment is generally based on shift work, which does not lend itself well to rail travel although the steel industry in Port Talbot generates demand for rail freight. The increasing size of the services sector in South West Wales is well suited to rail travel, particularly if based in central locations such as Swansea city centre.

The pattern of rail growth and economic growth in South West Wales shows a similar pattern to the national trend, which suggests that a range of factors are influencing rail demand growth. The average annual employment growth rate was 1% in Pembrokeshire, 0.7% in Carmarthenshire, 0.6% in Swansea and 1.2% in Neath Port Talbot. This compares to average rail growth in the SWWITCH area of 5% per annum between 2008 and 2013.

Although the population and employment forecasts presented earlier in Chapter 3 provide some useful context that demonstrate growth, the potential uncertainty between the traditional factors contributing to rail growth and the economic performance, suggests an alternative approach may be advantageous. With this in mind, two growth scenarios are proposed which incorporate observations of rail growth in recent years (this informs the ‘high’ growth scenario), whilst the forecasts presented in the 2008 Route Utilisation Strategy (form the ‘central’ scenario). The ‘high’ growth scenario assumes a continuation of growth rates observed over the past five years for 2014-2018, with a 50% reduction to 2026 to reflect future uncertainties. For the Central scenario, RUS forecasts are extrapolated forward to 2026. It should be noted that the growth rates for the Heart of Wales Line have been switched, as actual growth on the line is less than predicted in the RUS. The High scenario therefore represents RUS forecasts while the Central scenario represents forecasts based on observed growth.

Table 3.4 shows cumulative growth rates for the Central and High scenarios to 2026. Growth rates are presented in separately for the four rail lines in the SwwITCH area.

**Table 3.4: High and Central Scenario Growth Rates versus 2013**

Year	Central Scenario				High Growth Scenario			
	Swansea-Milford Haven	Heart of Wales Line	Swansea-Pembroke Dock	Swansea to Cardiff	Swansea-Milford Haven	Heart of Wales Line	Swansea-Pembroke Dock	Swansea to Cardiff
2014	2%	0%	2%	1%	5%	1%	4%	6%
2015	3%	0%	3%	2%	10%	3%	8%	11%
2016	5%	0%	5%	4%	16%	4%	12%	18%
2017	7%	1%	7%	5%	22%	6%	17%	24%
2018	9%	1%	9%	6%	28%	7%	21%	31%
2019	10%	1%	10%	7%	31%	9%	24%	35%
2020	12%	1%	12%	9%	35%	11%	26%	39%
2021	14%	1%	14%	10%	38%	12%	28%	42%
2022	16%	1%	16%	11%	41%	14%	31%	46%
2023	18%	1%	18%	13%	45%	15%	34%	51%
2024	20%	1%	20%	14%	49%	17%	36%	55%
2025	22%	1%	22%	15%	52%	19%	39%	59%
2026	24%	1%	24%	17%	56%	20%	42%	64%

Source: AECOM calculation

Under the High scenario, demand is expected to increase significantly including a 64% for stations between Swansea and Cardiff and a 56% increase on the route to Milford Haven. However, demand using the Heart of Wales Line is only expected to increase by 20% (although this total does not include initiatives being developed on behalf of the Heart of Wales Line Forum) which is examining opportunities to boost usage on the line including commuting flows to Swansea. Any interventions on the line as a result of the study will help to boost growth on the line and in the SwwITCH area. Table 3.5 shows forecast demand in the SwwITCH area when the growth rates are applied to 2013 flows for each growth scenario.

**Table 3.5: Forecast Demand in 2021 and 2026**

Year	Central Scenario				High Scenario			
	Swansea-Milford Haven	Heart of Wales Line	Swansea-Pembroke Dock	Swansea to Cardiff	Swansea-Milford Haven	Heart of Wales Line	Swansea-Pembroke Dock	Swansea to Cardiff
2013	895,868	206,003	394,763	2,185,538	895,868	206,003	394,763	2,185,538
2021	1,021,290	208,063	450,030	2,404,092	1,236,298	230,723	505,297	3,103,464
2026	1,110,876	208,063	489,506	2,557,079	1,397,554	247,204	560,563	3,584,282

Source: AECOM estimate using ATW MOIRA data

The High growth scenario would result in significantly higher flows compared with current totals and may necessitate investment in higher frequencies and / or longer trains to support the forecast growth. The Central scenario also

indicates there could be relatively large increases in demand. There may be potential to generate further increases if other service improvements were delivered and these will be examined in more detailed as part of the detailed option appraisal.

### 3.10 Overview of the Base Case Timetable

#### Overview of the Possible Service Scenarios

Funding for an ambitious programme of rail investment has also been committed with the electrification of the Great Western Main Line (GWML) from Paddington to Swansea. The overall scheme is due for completion by 2018 which will deliver faster journey times, higher seating capacities and plus carbon and other environmental benefits compared with diesel traction. This committed investment should provide a catalyst to support other service changes, helping to distribute the potential benefits more widely across the SwwITCH area.

Before identifying the short, medium and long term interventions to inform the SwwITCH rail strategy, the Do Minimum scenario needs to be defined. The Interim Report highlighted the current uncertainties affecting the future service specification between Swansea and Cardiff since Network Rail and other stakeholders are continuing to develop the business case to electrify the GWML. In response to these uncertainties, two possible scenarios have been considered:

- **Scenario 1:** replace the existing London to Paddington with IEP trains and retain the Manchester to West Wales services to provide the second hourly 'fast' train between Swansea and Cardiff;
- **Scenario 2:** modify the existing Manchester to West Wales services to terminate at Cardiff. New electric services between Swansea and Cardiff could be introduced to replace the diesel service from Manchester, and then extended beyond Cardiff to Bristol Temple Meads. The new Swansea to Bristol services would strengthen the case for electrification and improve rail connectivity via the M4 corridor.

In addition, the 2 hourly stopping services between Swansea and Cardiff could also be converted to electric traction, although this change could be introduced regardless of the two scenarios above. Some of the contributory factors which will influence the suitability of Scenario 1 or 2 are examined below.

- **Down (westbound) services:** trains from London now arrive at Cardiff at xx.38 before continuing to Swansea and arriving at xx.31. The journey time savings achieved by the IEP trains between London and Cardiff mean the London trains now arrive at a similar time to the hourly Manchester to West Wales train (they are only 10 minutes apart at present). However, the scope to retime the Arriva service between Manchester and South West Wales service may be restricted by network capacity constraints elsewhere. For example, the Arriva trains overlap with Virgin Trains between Manchester and Crewe, and with other Arriva services from Holyhead between Shrewsbury and Cardiff.

Although it may be possible to introduce minor timing revisions for the fast services from Cardiff and Swansea in the westbound direction, the scope to amend the timing of the Manchester services to ensure the services operate 30 minutes apart is severely limited. If the Manchester services were revised to terminate at Cardiff, this could create an opportunity to introduce a replacement electric service that operated 30 minutes apart from the London trains between Cardiff and Swansea. Whilst the revisions to the Manchester trains would inevitably create some dis-benefits for through passengers, these impacts would be offset by the improved connectivity for stations on the M4 corridor by minimising the number of diesel trains operating under the wires. It would strengthen the overall business for the GWML electrification and be consistent with the draft SEWTA strategy which recommends electric services between Bristol Temple Meads to Swansea via Cardiff Central. This service specification should offer increased flexibility enabling the second 'fast' westbound train each hour to operate 30 minutes apart from the London trains between Cardiff and Swansea since there is likely to be fewer operational constraints between Bristol and Cardiff versus trains from Manchester. These timetable changes may also provide an opportunity to provide more convenient connections at Swansea to other stations in the SwwITCH area.

Journey times for a typical Electric Multiple Unit (EMU) that could operate between Cardiff and Swansea have been assessed. Although the station-to-station journey times are slightly longer than the expected timings achieved by the Intercity Express Programme (IEP) trains, the EMUs will require shorter dwell times at stations. As a result, the end-to-end times are very similar (typically about 50 minutes between Swansea and Cardiff). This equates to a saving of

4 minutes compared with existing journey times, given the faster acceleration of the electric units. The timing of the eastbound EMU services from Swansea to Cardiff must ensure convenient connections to other departures towards Manchester or Nottingham via Cardiff are available to minimise the negative impacts of removing through journeys.

The local stopping service between Swansea and Cardiff could also be operated by electric traction. The Do Minimum specification assumes existing trains are replaced on a like-for-like basis, rather than addressing the relatively poor daytime frequencies. These trains could also be extended to Bristol Temple Meads and would replace a diesel service. This would further strengthen the business case for GWML electrification.

### **Proposed Base Case Service Specification**

Although a small number of passengers would be affected if trains between Manchester and West Wales were revised to start / finish at Cardiff Central, these impacts would be offset by other factors. For example, these dis-benefits would be outweighed by the improved connectivity between Swansea and Bristol via Cardiff. Secondly, the introduction of additional electric trains between Swansea and Cardiff would strengthen the overall business case for the GWML electrification. The opportunities to operate longer distance fast trains to /from Swansea at regular 30 minute intervals also creates a framework to introduce a regular interval service pattern west of Swansea. If these timings were not available at Swansea, the connections for through passengers travelling towards Llanelli and Carmarthen would be significantly less convenient resulting in significant gaps in the timetable for passengers travelling towards Pembroke Dock, Milford Haven and Fishguard from stations east of Neath. In response to these conclusions, it is assumed the Do Minimum scenario to support the SWWITCH rail strategy will feature electric trains between Swansea and Bristol.

### **3.11 Summary of Issues**

Some of the main issues emerging from the analysis of issues presented in Chapter 3 include:

- Significant differences between the observed growth rates for stations between Swansea and Cardiff, plus the Milford Haven / Pembroke Dock Lines and the forecast growth outlined in the RPA and RUS documents
- Swansea Bay City Region includes several proposals for major employment sites which could create 10,500 jobs in addition to the existing total of 280,000 jobs. Rail service improvements at Swansea Vale (Llansamlet), Energy Park (Baglan), Haven Water Enterprise Zone (Milford Haven / Pembroke Dock) will be required to encourage the role of rail in promoting sustainable access to these sites. However, the role for rail serving other sites is limited Cross Hands / Swansea West (requires complementary links from central Swansea) or Felindre (upgrading the Swansea District Line and a new station);
- The proposed road schemes are expected to improve journey times, especially around Swansea and via the main links (A477, A40 and A483) to the largest population centre. Journey times via the M4 will also be improved. This may have a modest impact on rail demand;
- The Base Case scenario is affected by:
  - Uncertainty about the Base Case timetable specification and the possible introduction of new Bristol – Swansea electric trains. This could possibly replace the existing diesel service between Manchester and West Wales and means both timetable options require further evaluation. Electrification could also deliver capacity benefits assuming 9-car electric IEP services replace HSTs, with 4-car electric units replacing the 2 or 3 car diesel fleet;
  - The background growth rate could be 65% to 2026 from stations between Swansea and Cardiff with passenger numbers using the Milford Haven line increasing by 56%. As a result, trains towards Swansea in the peak could be significantly busier, resulting in a requirement for additional services and / or extra carriages to accommodate the growth. The passenger growth resulting from the potential timetable changes need to be examined separately;
  - Freight is expected to increase by around 2.1% per annum, although there will be a greater emphasis towards inter-modal and energy related material. In particular, the development of the energy sector at Milford Haven could necessitate a step change in rail network capacity as a result.

## **Option Generation and High Level Sifting Tool**





## 4 Option Generation and High Level Sifting Tool

### 4.1 Introduction

The gaps identified in Chapters 2 and 3 have been used to inform the development of the long list of schemes for evaluation. As noted in the introduction, a stakeholder workshop was convened to examine the suitability of potential schemes. Representatives from the member authorities in SWWITCH, Network Rail, Arriva Trains Wales, First Great Western, Rail Freight Group and other user groups attended the workshop. The consultant's facilitated this discussion, which tried to identify a range of possible options that could be delivered to address the existing constraints. The opportunities which could also emerge following the implementation of committed service changes or the delivery of employment or population forecasts have also been considered.

The option generation phase has been completed in two phases. Firstly, in response to the number and range of possible solutions, a high level review using a high level sifting tool to identify options which could generate the strongest benefits has been developed. This initial review is required, since it would not be time or cost effective to examine all proposals in a detailed manner.

Following this initial selection of options, the shortlisted proposals will then be evaluated in more detail. The conclusions from the second phase will be used to inform the development of a short, medium and long term strategy, with proposals allocated to each time period depending on the relative cost and complexity of delivery. The potential improvements identified in the current Regional Transport Plan have been considered to help shape the overall framework.

### 4.2 Option Generation

#### Generic Themes

The first part of this section describes the possible generic themes that could be introduced in multiple locations:

- **Improved station facilities:** covers measures delivered as part of the station improvements. A package of measures would complement the improvements at Carmarthen, Swansea and Port Talbot Parkway focussed on Pembroke Dock, Milford Haven, Llanelli and Neath;
- **Enhanced modal integration:** includes better linkages between bus interchanges and railway stations, along with additional car parking at selected stations;
- **More flexible ticketing:** progression towards a fully integrated ticket system covering rail and all local bus operators;
- **Service quality improvements:** enhanced rolling stock quality for the Class 15X units, plus incremental improvements for the Class 175s especially for the business passengers;
- **Rolling stock cascades:** there is a likelihood that Class 14X units will not continue beyond 2020 in response to the likely costs associated with the modifications to make these units compliant with the DDA legislation. Other units displaced following the GWML electrification will be cascaded as a result.

Other possible themes which could apply include infrastructure upgrades, new services to support growth, higher service quality, revisions to the existing service patterns, measures to reduce costs, identification of resource efficiencies, increased freight activities, journey time savings from electrification, new stations plus the role of upgrading other alignments or using alternative technologies to serve wholly travel markets. The suitability of these themes is examined below for the individual corridors.

### **Spatial Themes – East of Swansea**

Several generic interventions could be applied including bus feeder services to expand the station catchments, integrated ticketing, plus a package of station improvements. The latter could be delivered at Swansea and Neath to reflect their strategic importance, plus enhancements at the smaller intermediate stations if other interventions were delivered as set out below. The following spatial themes were also proposed:

- Timetable changes resulting from electrification and future line speed improvements;
- Amend the West Wales – Manchester service and replace with alternative electric trains to introduce other ‘fast’ trains between Swansea and Cardiff which have improved operational flexibility;
- Introduce a more frequent stopping service serving the local Swansea to Cardiff stations;
- Enhance London frequencies to 2tph all day from Swansea;
- Examine the potential for new passenger services via the Swansea District Line plus a new parkway station;
- Construction of a new station at Landore to serve the expanded Liberty Stadium.

### **Spatial Themes – West of Swansea**

In addition to a package of station improvements at Carmarthen and Llanelli, the following describes the specific interventions for the Swansea to Carmarthen section of the route:

- Increase service frequencies between Swansea and Carmarthen to enable a new regular interval timetable;
- Examine the potential for some skip-stop calling patterns to help cut journey times;
- Review the feasibility of incremental electrification between Swansea and Carmarthen and extend the IEP train to Carmarthen;
- Review the feasibility of using the Swansea District Line for regular passenger services, by extending the hourly IEP service from Cardiff to Carmarthen. Examine the role for a park and ride serving the SDL;
- Deliver a package of infrastructure enhancements to increase capacity at Swansea Loop East Junction and additional platforms at Swansea to address operational resilience;
- Construction of new stations at Cockett and Bynea.

### **Spatial Themes – Carmarthen to Milford Haven**

A package of measures to improve rolling stock quality (Class 175s), and support the Enterprise Zone if flows to / from Milford Haven form generic interventions.

- Examine the role for frequency improvements between Carmarthen and Milford Haven;
- Review the scope for skip-stop trains to help reduce journey times;
- Promote Clunderwen as a park and ride for North Pembrokeshire (Cardigan)
- Deliver a package of infrastructure enhancements to increase capacity at Swansea Loop East Junction and additional platforms at Swansea to address operational resilience;
- Examine the role for possible new stations at St Clears and Merlin’s Bridge;
- Review the business case for new services via the Swansea District Line to deliver faster journey times to Cardiff and other stations east of Neath.

### **Spatial Themes – Whitland to Pembroke Dock**

In addition to the package of measures to integrate bus and rail services more effectively, the following spatial interventions are proposed

- Review scope for journey time savings following changes to the level crossing operations to deliver timetable efficiencies;
- Examine the role for a possible new station at Templeton;
- Revise timetable to improve rolling stock efficiencies;
- Review role of alternative technologies to reduce operating costs;
- Review the role for skip-stop services to help improve journey time savings;
- Assess the opportunities for trains via the Swansea District Line to achieve faster journey times to Cardiff;
- Further promote links to Pembroke Dock for ferry passengers

### **Spatial Themes – Clarbeston Road to Fishguard Harbour**

The baseline analysis has identified a number of constraints currently affecting the Fishguard Line:

- Retain the existing frequencies to Fishguard Harbour;
- Amend the existing timetable to progress towards a regular interval timetable;
- Examine the role for new station at Wolfs Castle;
- Review the scope to improve frequencies and address the timetable gaps;
- Continue promoting links to Fishguard for ferry users.

### **Spatial Themes – Heart of Wales Line**

- Develop the possible opportunities to promote additional tourist trips to the Brecon Beacons National Park;
- Review the scope to modify the timing of the first and last trains;
- Examine the opportunities for frequency improvements, including new shuttle services;
- Examine the role to boost rolling stock capacity

### **Spatial Themes – New Corridors**

- Identify opportunities to enhance connectivity to major destinations within parts of the city region by developing a complementary rapid transit network;

### **Spatial Themes - Freight**

- Examine opportunities to expand new freight markets including energy related material and inter-modal markets.

## **4.3 Overview of the High Level Sifting Tool**

In response to the numerous potential options identified above, an initial sifting tool has been developed to evaluate these proposals. This high level sifting tool incorporates a series of criteria to evaluate the relative performance of possible schemes, to ensure the trade-offs and potential risks can be easily identified. The preliminary option sift will highlight any aspirations would incur significant capital costs, proposals which create major operational constraints

or serve a relatively small travel market. This approach ensures such examples can be rejected at an early stage of the sifting process without necessitating more detailed analysis. The high level sifting tool will ensure potential synergies with other interventions can also be identified, by assessing the relative performance of individual proposals. Furthermore, with insufficient time and budget to complete a detailed appraisal of all options, it also provides a transparent approach to identifying the best performing schemes. The application of the sifting tool will also help to determine the implementation timescale, since some elements could be introduced as a quick-win, whilst others will require a longer delivery time period. Each performance indicator has been appraised using a scale of strongly positive (+3) to strongly negative (-3). Average scores and a supporting narrative have been collated to illustrate the best performing elements for subsequent analysis.

**Table 4.1: Summary of the Assessment Criteria**

Assessment Criteria	Number	Assessment Criteria	Number
• Improves accessibility	(1)	• Modal shift	(5)
• Promotes rail use	(2)	• Promoting the environment	(6)
• Financial viability	(3)	• Access to new development	(7)
• Faster journeys	(4)	• Encourage multi-modal journeys	(8)

The results from the high level sifting tool shown in Table 4.1 has identified a number of proposals that could potentially address a number of gaps identified by the baseline and the drivers of change. This sifting tool has been used to understand the options which provide the strongest alignment with the policy objectives. Whilst the majority of possible schemes have been shortlisted for further timetable analysis, a small number have not been recommended for further analysis, since the likely business case is likely to be relatively weak. Alternatively, there may be other solutions which offer stronger value for money.

With the exception of proposed new stations at St Clears, Landore and Cockett, other potential new stations are not recommended for further analysis. The likely catchment areas for the other proposals served are modest and each proposal would create extended journey times which could have an adverse impact on operational performance. Whilst the proposals at Landore and Cockett have been shortlisted for further analysis, the more detailed appraisal will need to examine the potential revenue generation plus the operational issues during the next phase of work.

Furthermore, the introduction of shuttle services from Pembroke Dock to Whitland, or Fishguard to Clarboston Road to achieve cost efficiencies was not supported by stakeholders since the majority of passengers would need to interchange. With alternative proposals being examined for these routes, the shuttle services have not being shortlisted for further analysis. The proposal to introduce a secondly hourly service between London and Swansea operating all day is also not recommended for further analysis. Other timetable changes between Swansea and Cardiff (including the introduction of other electric trains which are less expensive to operate) are likely to represent a stronger value for money case than extending the hourly IEP trains from Cardiff.

Furthermore, there are a limited number of examples which may support broadly similar objectives to alternative proposals. For example, the introduction of trains via the Swansea District Line would help to reduce journey times for longer distance passengers making east – west journeys. However, the business case for this proposal will be dependent on the impact of alternative measures, along with possible synergies resulting from other schemes. These issues need to be examined in more detail as part of the next phase of the study before the main characteristics of the strategy are finalised. The potential freight interventions will be examined separately and supported by discussions with industry stakeholders to ascertain their overall suitability.

Table 4.2: Summary of the Results from the High Level Sifting Tool

Proposal	Assessment Criteria									Recommendation and Supporting Comments
	1	2	3	4	5	6	7	8	Ave.	
<b>Generic Themes:</b>										
Improved station facilities	1	1	1	0	1	1	2	3	<b>1.25</b>	<b>Shortlisted:</b> Scope of improvements will depend on the scale of existing facilities and the passenger usage at each station. Minimum level of facilities should be specified for each category of stations. Stakeholders could audit existing facilities and develop a business case for improvements which could be delivered independently of other service changes
Enhanced modal integration	1	1	1	1	2	2	3	2	<b>1.63</b>	<b>Shortlisted:</b> Measures should include both car parking and integration with other modes, buses / walk / cycle. Stations with the highest footfall or adjacent to the strategic road network should be a priority for investment. Stakeholders could deliver improvements collaboratively with third parties independently of other service changes
More flexible ticketing	1	1	0	0	1	1	1	1	<b>0.75</b>	<b>Requires further analysis:</b> Smart ticketing is generally used to develop more flexible ticketing, although there are large costs associated its implementation hence it requires implementation as part of a wider programme
Service quality improvements	0	1	1	1	1	1	1	1	<b>0.88</b>	<b>Shortlisted:</b> Rolling stock quality is important, although the higher specification units can be more expensive to operate. Depending on the characteristics of the diesel fleet post 2020, there may be potential to enhance the internal quality using a similar approach to the ATW Class 158.
Rolling stock cascades	1	2	-1	1	0	1	1	1	<b>0.88</b>	<b>Shortlisted:</b> the introduction of electric units in South Wales will trigger a wider rolling stock cascade. The speed, capacity and quality factors of each unit need to be examined in conjunction with the characteristics of each route to ensure proposals offer the strongest value for money.
<b>Spatial Themes – East of Swansea</b>										
Timetable changes: electrification / line speed improvements	0	2	0	2	2	3	1	1	<b>1.38</b>	<b>Shortlisted:</b> Electrification should help to reduce operating costs, cut journey times, whilst boosting seating capacities. There may be scope for further incremental line speed improvements to be identified as part of other improvements.
Amend the West Wales – Manchester service to terminate at Cardiff with electric trains between Swansea and Cardiff	0	2	1	1	2	2	1	1	<b>1.25</b>	<b>Shortlisted:</b> Services from Manchester to West Wales allow cross Cardiff / Swansea journeys, albeit for a small number of users. A revised timetable including electric trains from Bristol to Swansea would strengthen the case for GWML electrification. It could also allow more flexible service patterns at Swansea for connecting trains compared with the current timetable
Introduce a more frequent stopping service between Swansea and Cardiff	2	2	2	2	1	2	1	2	<b>1.75</b>	<b>Shortlisted:</b> Extra service will lead to higher operating costs but the higher frequencies should lead to an increase in demand. Change would deliver a regular hourly service from the intermediate stations between Port Talbot and Swansea

Table 4.2 (cont): Summary of the Results from the High Level Sifting Tool

Proposal	Assessment Criteria									Recommendation and Supporting Comments
	1	2	3	4	5	6	7	8	Ave.	
<b>Spatial Themes – East of Swansea</b>										
Enhance London frequencies to 2tph all day from Swansea	2	1	-3	1	0	1	0	1	<b>0.38</b>	<b>Not recommended:</b> Additional London services would improve connections for longer distance trips. However, expensive additional rolling stock would be required, and an EMU service to Bristol would offer a more affordable solution.
Examine the potential for new passenger services via the Swansea District Line, plus a new station serving the M4 corridor	1	1	1	1	2	1	-1	1	<b>0.83</b>	<b>Shortlisted:</b> this proposal would reduce journey times for some east – west journeys in the SWWITCH area and beyond, whilst a new park and ride serving the M4 could strengthen the case. However, this may be expensive to operate when there may be alternative, more affordable solutions to be examined
Proposed new station at Landore serving the Liberty Stadium	2	0	1	-1	1	1	2	2	<b>1.00</b>	<b>Shortlisted:</b> this proposal would improve access to the proposed Liberty stadium and could potentially serve a large catchment. More detailed work to assess the potential usage and the impact of the operational issues is required.
<b>Spatial Themes – West of Swansea</b>										
Increase service frequencies between Swansea and Carmarthen	2	2	0	2	1	2	1	1	<b>1.38</b>	<b>Shortlisted:</b> A regular interval timetable makes departure times easier to understand for passengers. This timetable change may be linked to other revisions affecting the Milford / Pembroke / Fishguard trains to strengthen the overall business case.
Examine the potential for some skip-stop calling patterns to help cut journey times	2	1	2	2	1	1	1	1	<b>1.38</b>	<b>Shortlisted:</b> A skip-stop calling pattern could may other trains from West Wales benefit from reduced journey times. This would need to be linked to changes affecting other services from West Wales. There may be potential to reduce operating costs if a unit can be saved through quicker turnaround times.
Review the feasibility of incremental electrification between Swansea and Carmarthen and extend IEP trains to Carmarthen	1	0	-3	2	1	1	0	0	<b>0.25</b>	<b>Not recommended:</b> The business case for electrification is usually reliant on higher service frequencies using a core section to help make a compelling business case. The scheme would deliver faster journey times and improve connectivity, but the capital / operating costs would be prohibitively expensive so an alternative, more cost effective solution has been identified to address this gap.
Review the feasibility of using the Swansea District Line for regular passenger services, plus a park and ride	1	1	1	1	2	1	-1	1	<b>0.83</b>	<b>Shortlisted:</b> this proposal would reduce journey times for some east – west journeys in the SWWITCH area and beyond, whilst the availability of a new park and ride serving the M4 could strengthen the case. However, this intervention may be relatively expensive to operate and alternative, more affordable solutions will be examined by the more detailed appraisal.
Enhance infrastructure to boost capacity at Swansea Loop East Junction	2	2	1	1	1	1	1	1	<b>1.25</b>	<b>Shortlisted:</b> the introduction of extra trains via Llanelli would be dependent on addressing this capacity bottleneck west of Swansea. The likely capital costs could be reduced if it was completed in conjunction with the Port Talbot re-signalling scheme.
New railway station at Cockett between Gowerton and Swansea	2	0	1	-1	1	0	2	2	<b>0.88</b>	<b>Shortlisted:</b> station could serve a relatively large travel market, although the yields generated are expected to be low and this could create some operational challenges
New stations in Llanelli at North Dock and Trostre	1	0	-3	-2	1	1	1	1	<b>0.00</b>	<b>Not recommended:</b> the financial and economic case for the new stations are relatively weak, so these are not recommended to supplement or replace the existing stations

Table 4.2 (cont): Summary of the Results from the High Level Sifting Tool

Proposal	Assessment Criteria									Recommendation and Supporting Comments	
	1	2	3	4	5	6	7	8	Ave.		
<b>Spatial Themes – Carmarthen to Milford Haven</b>											
Review the scope for skip-stop trains to help reduce journey times	2	1	2	2	1	1	1	1	1	<b>1.38</b>	<b>Shortlisted:</b> Skip-stop trains could improve journey times between the Milford Haven branch and Swansea/beyond helping to deliver rolling stock efficiencies. Proposal would need to be linked to other timetable changes to optimize the overall benefits
Examine the role for frequency improvements between Carmarthen and Milford Haven	2	1	0	1	1	2	2	2	2	<b>1.38</b>	<b>Shortlisted:</b> Employment and housing growth is required to support these improvements, but the revised journey times leading to improved rolling stock efficiency could help to make the case for the frequency improvements. Trains would need to provide travel opportunities to Haverfordwest and Carmarthen
Promote Clunderwen as a park and ride for South Ceredigion	1	0	0	0	1	2	1	2	2	<b>1.12</b>	<b>Shortlisted:</b> This would encourage some modal shift from car if a package of service changes to optimize the potential benefits would be required. This proposal would also help to make the case for frequency improvements to / from Milford Haven
Enhance infrastructure to boost capacity at Swansea Loop East Junction, with an extra platform at Swansea	2	2	1	1	1	1	1	1	1	<b>1.25</b>	<b>Shortlisted:</b> the introduction of extra trains via Llanelli would be dependent on addressing this capacity bottleneck west of Swansea. The likely capital costs could be reduced if it was completed in conjunction with the Port Talbot re-signalling scheme.
Examine the role for possible new stations at St Clears	1	0	-1	-1	1	1	1	2	2	<b>0.50</b>	<b>Shortlisted:</b> Preliminary feasibility work indicates a new station would deliver a reasonable economic business case assuming high growth forecasts were achieved. The scheme costs ranged from £2.3-2.7m.
Examine the role for possible new stations at Merlin's Bridge	1	0	-2	-1	1	1	1	1	1	<b>0.25</b>	<b>Not recommended:</b> New stations are expensive unless special derogations are granted including very short (15m) platforms. The introduction of new stops would also extend journey times. The proximity to Haverfordwest means Merlin's Bridge is very unlikely to generate any significant wholly demand
Review the feasibility of using the Swansea District Line for regular passenger services, plus a park and ride serving the SDL	1	1	1	1	2	1	-1	1	1	<b>0.83</b>	<b>Shortlisted:</b> this proposal would reduce journey times for some east – west journeys in the SWWITCH area and beyond. Park and ride is unlikely to be relevant for this corridor though. However, this intervention may be relatively expensive to operate and alternative, more affordable solutions will be examined by the more detailed appraisal.

Table 4.2 (cont): Summary of the Results from the High Level Sifting Tool

Proposal	Assessment Criteria									Recommendation and Supporting Comments
	1	2	3	4	5	6	7	8	Ave.	
<b>Spatial Themes – Whitland to Pembroke Dock</b>										
Revise level crossing operations to help deliver faster journey times	1	0	2	2	0	1	0	0	<b>0.75</b>	<b>Shortlisted:</b> Scheme could potentially cut journey times by several minutes making rail more competitive versus other modes. This could generate rolling stock efficiency savings. Network Rail is examining the feasibility of improving safety and hence reducing journey times at a number of level crossings
Examine the role for a possible new station at Templeton	1	0	-2	-1	1	1	1	1	<b>0.25</b>	<b>Requires further analysis:</b> Although the station serves a relatively small catchment given its proximity to Narberth and Kilgetty, it could serve as a ‘gateway’ to several major tourist attractions. The impact on journey time savings identified elsewhere for the Pembroke Dock Line require further analysis, and the interface with existing stations
Review role of alternative technologies to reduce operating costs	-1	0	-1	0	0	1	0	0	<b>-0.13</b>	<b>Not recommended:</b> Rolling stock would need to be sufficiently crash-worthy to interact with other units. Costs of a tram-train may be marginally lower, but other costs would be incurred including a depot unless this technology became more widespread. Requires street running to maximize the overall benefits.
Review role for skip-stop services to deliver journey time savings	2	1	2	2	1	1	1	1	<b>1.38</b>	<b>Shortlisted:</b> Skip-stop trains could improve journey times between the Milford Haven branch and Swansea/beyond helping to deliver rolling stock efficiencies. Proposal would need to be linked to other timetable changes to optimize the overall benefits
Assess the opportunities for trains via the Swansea District Line to achieve faster journey times to Cardiff	1	1	1	1	2	1	-1	1	<b>0.83</b>	<b>Shortlisted:</b> this proposal would reduce journey times for some east – west journeys in the SWWITCH area and beyond. Park and ride is unlikely to be relevant for this corridor though. However, this intervention may be relatively expensive to operate and alternative, more affordable solutions will be examined by the more detailed appraisal.
Further promote links to Pembroke Dock for ferry passengers	1	0	0	0	0	1	2	2	<b>0.75</b>	<b>Shortlisted:</b> The opportunities to market these services will be influenced by the scale of other improvements that could be delivered in terms of journey time reductions and other timetable changes to improve connectivity at Swansea
Shuttle service between Pembroke Dock and Whitland	-2	0	0	-2	0	-1	-1	-1	<b>-0.83</b>	<b>Not recommended:</b> there was strong stakeholder opposition for this proposal, since it would require the majority of passengers to change at Whitland which currently offers minimal facilities. Alternative solutions to improve rolling stock efficiency have been identified given the likely dis-benefits
Retention of the through trains to Pembroke Dock on summer Saturdays	3	0	-2	1	1	2	2	1	<b>1.00</b>	<b>Requires further analysis:</b> these services provide an important through function for tourists, but there is an issue around the compatibility of the IEP trains using selected parts of the Line



Table 4.2 (cont): Summary of the Results from the High Level Sifting Tool

Proposal	Assessment Criteria									Recommendation and Supporting Comments
	1	2	3	4	5	6	7	8	Ave.	
<b>Spatial Themes – Clarbston Road to Fishguard Harbour</b>										
Retain existing services to Fishguard beyond the current funding period	2	0	-1	1	1	1	0	2	<b>0.75</b>	<b>Shortlisted:</b> Passenger numbers have increased following the introduction of the extra services and the retention of these trains would enable the market to further increase
Amend the existing timetable to progress towards a regular interval timetable	2	0	-2	1	1	1	0	2	<b>0.63</b>	<b>Shortlisted:</b> Efficiency savings elsewhere may need to be identified to help to make the financial / economic case which forms parts of a regular interval east of Whitland. Proposal will need to generate growth from other factors to produce a robust business case
Examine the role for new station at Wolfs Castle	1	0	-2	-1	1	1	1	1	<b>0.25</b>	<b>Not recommended:</b> This station also serves a relatively small catchment. Improvements at Fishguard & Goodwick and Clarbston Road likely to generate a stronger financial case. In contrast with the station proposals for the Pembroke / Milford Lines, there are fewer operational constraints on this route.
Continue promoting links to Fishguard for ferry users	1	0	0	0	0	1	2	2	<b>0.75</b>	<b>Shortlisted:</b> The existing boat - train connections would need to be retained regardless of the other service changes introduced
Fishguard Harbour to Clarbston Road Shuttle	-1	0	0	-1	0	0	0	0	<b>-0.25</b>	<b>Not recommended:</b> The Line attracts a high proportion of longer distance trips which would be inconvenienced by the introduction of a shuttle.
Role for north – south rail services from Fishguard to Milford Haven or Pembroke Dock	-1	0	-3	0	2	1	1	1	<b>-0.25</b>	<b>Not recommended:</b> insufficient demand to justify the introduction of direct services, particularly as rail would primarily serve the A40 / A4076 corridors and compete with local bus routes
<b>Spatial Themes – Heart of Wales Line</b>										
Promote additional tourist trips to the Brecon Beacons National Park	1	0	0	0	1	1	2	2	<b>0.88</b>	<b>Shortlisted:</b> The potential benefits of this proposal are linked to the scale of the marketing, the complementary initiatives to boost the economy and the possible timetable changes.
Review the scope to modify the timing of the first and last trains	2	0	1	0	0	0	0	2	<b>0.63</b>	<b>Shortlisted:</b> Scope to improve services and hence boost demand will be dependent on the implementation of other timetable revisions. The timing of services needs to be more convenient for commuting / business trips
Examine the opportunities for frequency improvements, including new shuttle services	2	2	-1	2	1	1	0	1	<b>1.00</b>	<b>Shortlisted:</b> the introduction of new shuttle services would help to transform connectivity between the principal stations on the Heart of Wales Line, although this proposal must be linked to the wider economic strategy to help make the case for these improvements.
Examine the role to boost rolling stock capacity	0	1	-1	0	0	1	0	1	<b>0.25</b>	<b>Requires further analysis:</b> Low frequency on the line suggests that increase in frequency should be examined ahead of increasing capacity of existing services. The scope to boost capacities will be dependent on the rolling stock cascade that will affect other routes

Table 4.2 (cont): Summary of the Results from the High Level Sifting Tool

Proposal	Assessment Criteria									Recommendation and Supporting Comments
	1	2	3	4	5	6	7	8	Ave.	
<b>Spatial Themes – New Corridors</b>										
Examine the feasibility of introducing new rapid transit corridors to complement heavy rail	2	2	2	2	1	1	1	1	1.50	<b>Shortlisted:</b> the characteristics of rapid transit technology may be more suitable to improve connectivity between the major employment centres and the population catchments for the Swansea travel to work area. The most suitable technology for each corridor will be influenced by the potential current and future demand, together with the opportunity to deliver priority measures to achieve fast journey times.
Upgrade freight routes for new passenger trains: Gwaun-cae-Gurwen	-2	0	-2	-2	1	0	0	1	-0.50	<b>Not recommended:</b> Alignment would serve a limited population catchment east of Ammanford, and existing journey times by rail are already slow compared with other modes.
Upgrade freight routes for new passenger trains: north of Neath	-2	0	-2	-2	1	0	0	1	-0.50	<b>Requires further analysis:</b> Population catchments adjacent to the Cwmgwrach and Onllwyn alignments are limited and a heavy rail solution would be competing with road corridors that allow faster journey times. Access to Swansea is a further constraint. However, the development of a rapid transit corridor may offer benefits as an alternative solution.
<b>Spatial Themes – Strategic Interventions</b>										
Improved surface access links to Heathrow Airport	3	3	2	3	3	2	3	3	2.75	<b>Shortlisted:</b> a new western rail link to Heathrow will help to transform surface access from West of England and South Wales and encourage more sustainable movement patterns. Funding has been committed, but SWWITCH will need to work collaboratively with other stakeholders to ensure possible services from South Wales.
High speed rail to West of England and South Wales	3	3	2	3	3	2	3	3	2.75	<b>Shortlisted:</b> This proposal would significantly reduce journey times and alleviate existing network capacity constraints affecting the GWML. This could enable alternative services to be introduced. SWWITCH would need to be lobby with SEWTA and other stakeholders adjacent to the M4 corridor
Freight landbridge to Southern Ireland	2	2	1	1	2	0	1	0	1.18	<b>Requires further analysis:</b> A fixed link between South West Wales and Southern Ireland will help to transform connectivity for freight traffic. The decision to construct this link will be dependent on various external factors to help make the economic case for investment

As noted above, the outputs from the initial appraisal indicates a number of proposed new stations are not recommended for more detailed analysis as part of subsequent phases of this study. There are a number of contributory factors for this outcome:

- Relatively high car ownership levels;
- Overlap with existing railway stations which affects the potential opportunities to generate new trips;
- Extended journey times for existing rail passengers. This issue could also create other operational impacts, for example, if there is insufficient turnaround time at the terminus thus requiring additional rolling stock.

Although the high level sifting tool shortlisted the proposals for new rapid transit corridors serving Swansea, the feasibility of developing these routes will require further analysis. Different types of rapid transit technology could be introduced to serve each radial corridor towards Swansea, with the choice of technology used dependent on a number of factors including the number of trips per hour, the characteristics of the corridor, the opportunities to deliver priority measures to segregate services from other traffic. The choice could range from the introduction of further bus priority corridors using FTR vehicles (similar to the Route 4 between Morriston Hospital and Swansea University), trolley buses, or some form of light rapid transit network. The latter solution would only be viable to support the busiest corridors. Guidance prepared by the Commission for Integrated Transport (Affordable Mass Transit) provides some useful indicators to determine the optimal choice of technology for each corridor. A detailed assessment to determine the optimal rapid transit solution for each corridor is outside the scope of this project.

The interface with freight interventions has been examined separately, since the selection criteria used to evaluate passenger services is not particularly relevant for the former. Although there is relatively limited interface between passenger and freight at present, some of the opportunities to boost rail freight could be affected by changes to passenger services. The network capacity constraints, along with revised passenger and freight services, could trigger a requirement for additional infrastructure to support the higher number of trains. As a result, understanding the trigger point when additional capacity would be required is an important consideration. The line to Milford Haven is most likely to be affected by these changes. Although the Heart of Wales Line would offer a useful diversionary route between South West Wales and the Midlands / North Wales particularly if the number of other freight services increased, the scale of infrastructure improvements needed to support regular services is unlikely to be cost effective. Although there is some spare capacity available, some could be absorbed following proposed changes to the passenger services.

#### **4.4 Outputs from the High Level Sifting Tool**

Using the results from the high level sifting tool, the shortlisted proposals will be examined in more detail. Understanding the potential implications of the Base Case service scenario will form one of the initial tasks to be addressed. The discussion in Chapter 3 highlighted the potential uncertainties regarding the Base Case service specification. Whilst it may be unlikely these issues will be fully resolved during the timescales of this commission, understanding the wider implications of these timetable options will be advantageous, since the opportunities to deliver service improvements west of Swansea in a cost effective manner could be influenced by this analysis.

The shortlisted options will be appraised to understand the potential benefits and costs. The indicative themes presented in Chapter 4 will be developed into more detailed service specifications, and then evaluated using MOIRA and other economic appraisal tools to determine whether there is a value for money case. A phased delivery plan comprising short, medium and long term interventions will be produced. The short term interventions will feature measures to 2018 to provide consistency with the estimated timescales of electrifying the GWML to Swansea, the medium term will include 2018 to 2023, with the longer term post 2023. This will ensure there are a series of interventions that could be delivered in each time period, depending on costs and scheme complexity.

The remainder of this report presents the recommendations for the short, medium and long term SwwITCH rail strategy in Chapters 5, 6 and 7 respectively.

## **Short Term Interventions**



## 5 Short Term Interventions

### 5.1 Generic Themes

The short term proposals that could be delivered within the next five years are described below. The limited rolling stock availability and requirement for incremental funding means the scope to deliver significant improvements during this period is fairly limited. However, there is a large amount of preparatory work needed to evaluate the proposed revisions to the timetable specification that would be implemented during the medium term period. In addition, there are also several opportunities to implement measures which would complement the rail service changes and help boost the existing rail travel market in advance of the forthcoming service changes. The short term package of measures could be delivered independently of these timetable revisions.

#### Scheme Development

Whilst the study outlines proposals to improve the current service specification, it is recognised that further analysis will be required to refine these in conjunction with other rail industry stakeholders. For example, the operational performance impacts of the proposed timetable will need to be evaluated in response to the proposed changes affecting turnaround times at Swansea, Milford Haven, Pembroke Dock and Fishguard. In particular, the existing Rules of the Plan specified by Network Rail will need to be revised to support the revised service pattern, so the potential risks associated with these changes would need to be evaluated. Although the proposed timings are significantly reduced compared with the current operating patterns, the operational risks will need to be assessed (potentially using Railsys software) to demonstrate the assumptions are robust. Operating trains to the west of Swansea in a self-contained manner should help to minimise the risks of delays. These changes would need to be considered in conjunction with the overall timetable revisions, for example, the introduction of a self-contained service pattern west of Swansea which should help to minimise the scope for delays that may be associated with cross-Swansea services. In addition, the scope to further refine the timetable if a package of line speed improvements were delivered also needs to be examined. This assessment would need to be completed collaboratively with Network Rail to identify the potential locations, and then determine if there is a value for money case.

Actions to be addressed:	<ul style="list-style-type: none"> <li>• Refine the existing timetable specification</li> <li>• Work collaboratively with Network Rail to assess the scope to amend the timetable</li> </ul>
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#### Timetable Specification

The baseline analysis highlighted several examples of trains which were poorly timed and prevented convenient travel opportunities to / from Swansea which coincided with business or commuting travel. For example, there are no arrivals in Swansea from the Pembroke Dock or the Heart of Wales Lines before 09.00, whilst the Milford Haven, Pembroke Dock and Heart of Wales Lines have no departures between 17.00 and 18.00.

There may be scope to secure a small number of diesel units following completion of electrification schemes in North West England by 2016. The timescales for the GWML and Valley Line electrification mean spare units will not be cascaded until at least 2019. As a result, there may be scope to procure diesel rolling stock following the electrification of selected routes which may enable these timetable gaps to be addressed within a shorter timescale. A small number of Class 14X units may become available (the Class 15X units are likely to be retained by authorities in the North West) which could offer an interim solution to help address some of the timetable gaps noted above. The deployment of Class 14X units would only provide a temporary solution, since the modifications to make these trains compliant with Disability Discrimination Act legislation is unlikely to be affordable.

Assuming additional rolling stock could be identified, extra funding would need to be secured to cover the incremental operating costs incurred by these service changes. The procurement of additional rolling stock will help to boost the existing travel market in advance of other timetable changes. The number and type of units available would determine the level of funding support required.

Actions to be addressed:	<ul style="list-style-type: none"> <li>• Assess the business case for additional services to address some of the timetable gaps</li> <li>• Examine the scope to procure extra units cascaded by other electrification schemes as an interim measure before 2018 / 2019</li> </ul>
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## Rolling Stock Strategy

Although the short term options to procure additional rolling stock are relatively limited, analysis to define the future rolling stock strategy should be considered during this time period. The rolling stock strategy needs to take account of the following factors:

- Revisions to the Manchester to West Wales service which could influence the availability of Class 175s;
- The likelihood that Class 14X units will not continue in operation beyond 2020, since the costs of ensuring these units are compliant with DDA legislation is likely to be prohibitively expensive;
- There is no current prospect of new diesel trains being built for the UK rail network, except for the 'bi-mode' IEP trains;
- Uncertainty if cascaded or new build EMUs will operate possible services between Bristol and Swansea.

The following summarises the recommended features of the future rolling stock strategy:

- Retention of a small number of Class 175 units to operate trains between Swansea and Milford Haven. The specification of a higher quality unit would be consistent with the importance attached to this service. Stakeholders will need to lobby to retain at least four of the 2-car units available (plus a spare) to ensure some of these trains are retained in South West Wales. The requirement for additional facilities including power sockets for the Class 175s which would be primarily aimed at business passengers is reduced if the maximum journey time is reduced to 2 hours, rather than the 4-5 hours from West Wales to Manchester;
- Refurbished Class 150s for the trains to Pembroke Dock and Fishguard from Swansea, plus the Heart of Wales Line. The current internal layout of these units is not particularly conducive for longer distance trips, but these could be modified to improve passenger comfort (alternative seating and internal layout) at a similar timescale to the DDA revisions which must be completed before 2020. This option provides a framework for stakeholders to specify their internal requirements for the Class 150s, including space for luggage, provision for storing cycles and the availability of tables. Stakeholders will need to lobby for funding to support these revisions to be included within the next franchise agreement.

Actions to be addressed:	<ul style="list-style-type: none"> <li>• Retention of a sub-fleet of Class 175s to operate the Milford Haven services</li> <li>• Package of measures to improve the internal layout for passengers using the Class 15X units</li> </ul>
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## Station Improvements

The Interim Report confirmed a package of station improvements at Carmarthen and Swansea using investment from the National Station Improvements Programme (NSIP) has been delivered, whilst funding for enhancements at Port Talbot Parkway has been secured. Stakeholders are currently developing schemes for station improvements at Pembroke Dock, Milford Haven, Llanelli and Neath. These proposals have reached various stages of feasibility through the Network Rail GRIP cycle, and it is recommended that stakeholders continue to progress these schemes and secure the funding. Some of the busiest stations within the SWWITCH area will benefit from these proposals.

The feasibility of improving some additional stations in the SWWITCH area should be examined. For example, the scope to deliver improvements at Tenby, Pembrey & Burry Port, Whitland, Skewen, Llansamlet and Briton Ferry should be examined. These stations currently attract at least 100 trips per day, and there is potential to increase the usage of some stations in response to the timetable changes proposed for the medium term. The scale of works must be tailored in accordance with the footfall using each station to ensure the improvements represent value for money. The package of measures could include better passenger information or measures to encourage integration with the nearby bus services, enhanced waiting facilities or extra car parking spaces. An audit of existing facilities should be completed to identify the opportunities at individual stations. For example, the package of improvements

could include real time information at stations to inform passengers of the actual arrival time. Other requirements could include availability of car park, minimum station facilities, and DDA compliant access between the platforms. It is assumed the requirement for further improvements at Gowerton is limited, given the recent works as a result of the track doubling.

Actions to be addressed:	<ul style="list-style-type: none"> <li>• Audit of facilities at stations with at least 100 trips per day to identify potential enhancements which may offer value for money</li> </ul>
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### Modal Integration

The interface between rail and the local bus networks should serve two different perspectives depending on the geographic catchments served. Within the larger population centres, buses can fulfil an integral role to help extend the station catchments beyond the usual 800m, particularly if there are buses operating every 10 minutes from stops adjacent to the station. Promoting bus – rail integration can reduce the pressure on car parking availability at the busiest stations.

In rural areas, buses should be promoted as part of an integrated public transport network, helping to complement rail services rather than competing directly. Ensuring the timing of the bus and rail services is complementary to maximise the travel opportunities is an integral consideration to help reduce overall waiting times. For each railway station in the SWITCH area, a review of the adjacent local bus services that could help to expand the catchment or fulfil a complementary role would be advantageous. The potential success of this initiative will be influenced by the availability of integrated tickets between the bus and rail operators. This will require detailed dialogue with bus operators to assess the feasibility.

The availability of car parking at railway stations also needs to be considered. Initial discussions with Arriva Trains Wales indicated that Carmarthen and Haverfordwest stations experience the most severe shortage of parking availability. ATW is currently discussing the feasibility of extending these sites with stakeholders at present. Other car parks may need to be extended during the short to medium term, but these are a lower priority. Expanding the number of spaces at stations located close to the strategic road network may become more important to help grow the overall rail market.

Actions to be addressed:	<ul style="list-style-type: none"> <li>• Audit of existing bus routes which operate adjacent to stations, or identification of services which fulfil a complementary function</li> <li>• Assessment of stations which require additional parking spaces to support future growth</li> </ul>
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### Ticketing Initiatives

As noted above, more flexible ticketing between bus and rail operators would support modal integration. Progression towards a fully integrated ticket system covering rail and all local bus operators would provide a system which is accessible and simple to use. A single ticket which could be used on both bus and rail services would help to achieve this objective especially if the costs were lower compared with buying individual tickets. Although some informal partnerships have been established between bus and rail operators, a more comprehensive system is likely to be reliant on participation with other stakeholders. For example, the role of smartcards to provide a technical platform would be advantageous.

Actions to be addressed:	<ul style="list-style-type: none"> <li>• Support the development of a Smartcard to integrate rail and bus services using a single ticket</li> </ul>
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### Land Use Strategy

The discussion in Chapter 3 of the Interim Report describes some of the potential housing and employment growth that could be delivered during the next 10 years. Although the discussion highlighted that several development sites were adjacent to existing railway stations, there may be further scope to refine the spatial strategy to concentrate a higher number of new houses and jobs within 800m of a railway station. Examining the scope to align the spatial

strategies for Carmarthenshire, Pembrokeshire, Neath Port Talbot and Swansea more closely with these nodes should be examined. The concentration of new houses and jobs close to railway stations will help to strengthen the case for rail. The identification of these opportunities is critical, since the lead time to deliver the expected growth is fairly lengthy.

Actions to be addressed:	<ul style="list-style-type: none"> <li>Examine the scope to accelerate development proposals which are located adjacent to a railway station, and increase the scope for development opportunities adjacent to stations</li> </ul>
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## Marketing Campaign

The marketing and branding of rail services helps to maximise the potential benefits from the proposals described above. The SWWITCH Regional Travel Plan co-ordinator could promote rail services as part of their wider responsibilities to encourage sustainable regional travel and wider travel planning issues. Whilst there is a range of examples of marketing for the rail network east of Carmarthen that could be used to promote services to Swansea, Cardiff and other destinations, it may be advantageous to review the features of advertising campaigns adopted by other rail networks serving predominantly rural areas. For example, reviewing best practice with other rural routes including the West Highland Line or the Far North Lines in Scotland could help to attract new passengers. For example, there may be scope to brand services west of Swansea as SWWITCH which would raise the profile following the timetable changes to be delivered in the medium term.

Some components of the short term strategy are focussed on feasibility studies to inform the development of the medium term proposals, modal integration or ticketing initiatives would benefit from an effective marketing or branding campaign. For example, reinforcing the rail offer to a range of leisure passengers including tourists to South West Wales as their mode of travel on holiday or for weekends away, or journeys during their holidays, plus the ferry passengers to Pembroke Dock and Fishguard, will help to fill spare off-peak capacity. The latter will be dependent on several other factors including the convenience of other rail services to South West Wales, competition with low cost airlines from Cardiff and Bristol to Southern Ireland and the availability of complementary rail links from the Rosslare for onward journeys.

Furthermore, the scope of the marketing campaign could be extended if additional rolling stock is procured. This would create the opportunity to promote the alternative travel opportunities now available, for example, the introduction of earlier and / or latter journeys to / from Pembroke Dock or the Heart of Wales Line.

Actions to be addressed:	<ul style="list-style-type: none"> <li>Develop marketing campaigns to promote leisure travel and trips to the ferry ports</li> <li>Review the scope to promote additional travel opportunities if additional rolling stock is secured</li> </ul>
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## 5.2 Spatially Specific Themes

### Retention of the Fishguard Trains

Funding has been secured from the Welsh Assembly Government for a three year trial to operate a further five daily trains to / from Fishguard Harbour. The additional trains coupled with a new station at Fishguard & Goodwick have helped to boost patronage using the Line to 45,300 trips in the 12 months to November 2012 compared with the previous year. The North Pembrokeshire Transport Forum has conducted a number of surveys to understand the characteristics of the additional passenger journeys. These surveys have highlighted the importance of the new services for social inclusion, enabling passengers to access shopping, retail and education opportunities in Carmarthen and stations further afield. It is assumed the Welsh Government will be conducting a detailed analysis of the economic benefits associated with these trains to assess the value for money case for these services once the three year trial is closer to being completed. Assuming this economic appraisal is positive, it will make a strong case to retain the funding for these additional trains in the next franchise.

Actions to be addressed:	<ul style="list-style-type: none"> <li>Continue promoting the new services to Fishguard to ensure there is a strong economic case for these service improvements.</li> </ul>
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**Development of a Complementary Rapid Transit Strategy**

Whilst rail is generally effective at moving passengers between the larger catchments centres, some railway stations can be poorly located in relation to employment areas. For example, one of consequences of the regeneration schemes in central Swansea has been the shift of the main employment areas away from the railway station. As a result, the High Street railway station is now relatively poorly located in relation to the main employment sites and other major trip generators in the city centre. This means rail is less able to attract these passengers. Furthermore, the coverage of the rail network means some radial corridors into Swansea are not suitable to be developed for rail.

In response to these issues, rapid transit corridors can play a critical role complementing the existing rail network. There is an existing high frequency rapid transit link from Swansea University to Morriston Hospital via the city centre which is operated by FTR vehicles. Priority measures have been introduced in the city centre to ensure reliable journey times. Whilst the FTR service stops adjacent to High Street station, there is scope to market this service more prominently. Furthermore, there may be scope to introduce further rapid transit links which makes use of these city centre priority measures and could then be extended to serve other radial corridors to / from Swansea. This proposal would serve several functions:

- the development of other corridors would ensure Swansea railway station becomes better connected to other parts of the city centre, ensuring rail is attractive for a wider choice of journeys;
- the extension of the rapid transit network could complement the rail network by serving other radial corridors;
- linking other major catchments that are not rail served to the nearest stations.

As noted in the Interim Report, a number of possible technologies are available to support these objectives ranging from bus based systems to light rail or metros. The preferred choice of technology will be dependent on the number of trips to be served and their distribution. Bus based solutions are more suited if the number of trips to be served is lower, or journey patterns are more dispersed. Significantly higher passenger numbers will be needed to justify the rail based systems. Swansea Nine Lines is promoting a light rail network serving corridors towards the Mumbles and corridors to the north of Swansea. Whilst the introduction of this technology could improve connectivity between these catchments and central Swansea, its suitability and relevance for individual corridors needs to be reviewed. Passenger numbers using each corridor need to be examined to determine the service pattern and whether there is sufficient demand to justify the higher costs associated with a rail based technology, for example, light rail.

The opportunities to improve connectivity between Gorseinon and the rest of the Swansea Bay City Region need to be examined. There are stakeholder aspirations to open a new railway station for Gorseinon, but the opportunities to serve this travel market using alternative solutions should be examined since the catchment is equidistant from the line to Llanelli and the Swansea District Line. Consequently, the scope for alternative rapid transit solutions should be examined. For example, the trade-off between a rapid transit link to Gowerton for a connection to the railway station versus a link to central Swansea via the A484 / A483 should be examined.

The potential timescales, feasibility, costs and benefits associated with individual rapid transit corridors need to be examined to determine whether there is a business case. The complexity of delivering the necessary priority measures could vary for the individual corridors and this may influence the overall timescales. As a result, further feasibility work is needed to determine these core assumptions and help to identify which corridors are the most important.

Actions to be addressed:	<ul style="list-style-type: none"> <li>• Review the feasibility of rapid transit corridors serving the busiest radial corridors in Swansea , plus the scope to improve connectivity within the city centre</li> <li>• Use the results from the initial analysis to determine the priorities</li> </ul>
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**Infrastructure Requirements**

There are a number of infrastructure schemes that would support journey time reductions during the short term:

- **Level crossing improvements:** changes to the level crossings on the Pembroke Dock Line west of Tenby would help to reduce journey times between Pembroke Dock and Swansea. These savings would deliver some small journey time savings and would help to complement the package of measures proposed for the medium term. Network Rail is examining the business case to address these constraints and funding has been ring fenced to deliver improvements, subject to demonstrating value for money.

In addition to the level crossing improvements proposed for the Pembroke Dock Line that would be delivered in the short term, there are a number of infrastructure schemes that require feasibility work to be completed to support the medium term timetable proposals:

- **Re-signalling and capacity improvements at Swansea station:** the South West Wales rail network is due for re-signalling prior to the completion of the GWML electrification in 2018. In addition to replacing the infrastructure on a like-for-like basis, some incremental enhancements will be necessary at Swansea as part of the re-signalling. To create sufficient capacity for the 3tph to / from Carmarthen, improvements at Swansea Loop East Junction would be required. Rather than doubling this junction to provide improved operational flexibility, it may be preferable to deliver extra crossovers that would allow parallel independent moves, so arrivals or departures can take place on the Carmarthen and Cardiff routes. Although the timetable is not predicated on this operational flexibility, it would ensure the timetable is more operationally resilient. Further more detailed work is needed to evaluate the case for an extra platform at Swansea (although there is a disused one which could be reinstated). Stakeholders will need to lobby for these works to be completed at Swansea in parallel with the GWML electrification;
- **Other signalling improvements:** In addition to the measures described above at Swansea station, other revisions to the signalling infrastructure will be required. A scheme to eliminate token exchanges at Whitland and Tenby, plus approach control for trains approaching Carmarthen would be required to achieve the journey time savings that would allow a single unit to operate on the Pembroke Dock branch line. This would be a standalone scheme delivered independently of other proposals. Stakeholders will need to lobby to ensure the scheme is delivered prior to the introduction of this alternative timetable, but the business case for the re-signalling could potentially be strengthened by the rolling stock savings that would accrue;
- **Depot Strategy:** a dedicated depot is being constructed to support the IEP trains that will be maintained at Swansea. As a result, Landore depot which is currently used to maintain the High Speed Train fleet will no longer be required. Some jobs could transfer to the new IEP depot, but there is potential for some skilled engineering jobs to be lost. With a reduced likelihood that diesel trains operating to / from Swansea then being extended to Cardiff, this could create an opportunity to use Landore as a depot to maintain these trains. This proposal would help to maintain the engineering workforce in the Swansea area and minimise the potential mileage that would be incurred if trains were instead maintained in Cardiff.

Actions to be addressed:	<ul style="list-style-type: none"> <li>• Lobby Network Rail to ensure the infrastructure enhancements are delivered in a timely manner which complements the wider rail strategy for SwwITCH</li> </ul>
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### 5.3 Scheme Prioritisation

The short term package of proposals covers a variety of measures, covering feasibility assessments, station improvements, marketing, review of the current land use strategy, measures to improve integration between rail and other modes. With a varied package of schemes proposed for the short term which should attract a range of funding sources and require participation from a range of stakeholders, further more detailed discussions are required to ascertain the scope of improvements and the opportunities for third party funding contributions. The scope to attract third party funding may influence the prioritisation of these short term measures.

## **Medium Term Interventions**



## 6 Medium Term Interventions

### 6.1 Introduction

With the exception of a small number of diesel units, the scope to procure extra rolling stock to improve the existing timetable during the short term is very restricted. As a result, the majority of timetable changes are likely to be delivered from 2018 onwards to coincide with the completion of various electrification schemes. This allows an opportunity to further grow the rail market, and strengthen the case for delivering service improvements. The following summarises the proposals for each corridor, and the potential dependencies to be acknowledged. The Carmarthen / Milford Haven trains offer cross-Swansea journey opportunities, whilst there are some convenient connections between the London and Pembroke Dock trains. However, with some Fishguard services terminating at Clarboston Road or Carmarthen, other connections are less convenient. The following summarises the themes:

- GWML - both long distance and local services;
- Swansea to Milford Haven, Pembroke Dock and Fishguard Harbour
- Swansea District Line;
- Further expansion of the complementary rapid transit network
- Heart of Wales Line;
- Infrastructure requirements;
- New stations;

Tables 6.1 and 6.2 summarise the proposed medium term timetable for the SWWITCH area, with the remainder of this chapter describing the underlying assumptions and dependencies.

### 6.2 London to Swansea

As noted in the Interim Report, this corridor (plus the line to Fishguard Harbour and Pembroke Dock) forms part of the TEN-T corridor and hence has strategic importance. Network Rail has developed an indicative timetable for the revised services between London, Cardiff and Swansea following the GWML electrification. This broadly mirrors the existing pattern with two trains per hour between Cardiff and London with one service per hour extended to Swansea. However, there are reduced journey times, particularly east of Cardiff, plus changes to stopping patterns. Timings from London to Swansea are expected to be reduced to about 2 hours 45 minutes. This is about 15 minutes faster versus the current timetable. Two trains per hour are expected to operate from Swansea in the morning, with a similar frequency back to Swansea during the evening. This may reflect the intention that the trains will be maintained overnight in a depot that will be built next to Swansea station. One service is shown starting from Carmarthen in the morning and returning in the evening, which will require a bi-mode train as the line west of Swansea towards Llanelli is not proposed for electrification.

It is understood a fleet of 18 electric trains and 32 bi-mode trains will be procured to operate the 2tph between London and South Wales, 2tph between London and Bristol Temple Meads via Bath and 2tph between London and Bristol Temple Meads via Parkway, plus other services to the Cotswolds and the South West. However, this total will be insufficient to exclusively operate services to South Wales and Bristol using electric traction, so some trains will need to operate using bi-mode power. Ensuring there is sufficient capacity for passengers if 5-car bi-mode trains are deployed will be critical at specific times of the day to support commuting flows to / from Cardiff.

The indicative timetable shows the first train from London reaching Swansea at 0831. However the last train for London leaves Swansea at 1825 (this is also the last London train from Cardiff). This departure is about two hours earlier compared with the current timetable and may need to be revised as part of subsequent revisions. This may discourage business travel including visitors from the London area and international travellers using Heathrow airport, particularly if making connections at Swansea. It is recommended that SWWITCH ensure there are later evening trains in the finalised timetable. The daytime hourly train from London arrives at Swansea shortly after departure of the previous train to London, resulting in a layover time of about 55 minutes. This minimises the risk of delays on the outward journey from London will result in the return journey being delayed, but it does mean that London trains effectively occupy one platform at Swansea for the whole of the daytime period. The timing and service pattern assumptions are used to develop the future SWWITCH service pattern as shown in Table 3.1.

Actions to be addressed:	<ul style="list-style-type: none"> <li>• Ensure IEP timetable between Swansea and London delivers journey time and capacity benefits and jointly lobby with SEWTA for an extended operating period</li> </ul>
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**Table 6.1: Summary of the High Level Timetable Specification (Westbound)**

Origin	Swansea	Bristol TM	Swansea	London	Swansea	Bristol TM	Swansea	Bristol TM	Swansea	Swansea	London	Swansea	Bristol TM
Destination	Fishguard Harbour	Swansea	Carmarthen	Swansea	Milford Haven	Swansea	Pembroke Dock	Swansea	Carmarthen	Llandoverly	Swansea	Milford Haven	Swansea
Cardiff Central		12:06		12:41		12:44		13:06			13:41		13:44
Bridgend		12:27		13:01		13:11		13:27			14:01		14:11
Port Talbot		12:40		13:13		13:29		13:40			14:13		14:29
Neath		12:48		13:20		13:37		13:48			14:20		14:37
Swansea arr		13:01		13:31		13:51		14:01			14:31		14:51
Swansea dep	13:01		13:15		13:36		13:59		14:15	14:24		14:36	
Llanelli	13:19		13:31		13:53		14:18		14:31	14:45		14:53	
Carmarthen	13:53		13:58		14:23		14:48		14:58			15:23	
Haverfordwest					14:59							15:59	
Milford Haven					15:16							16:16	
Fishguard	14:46												
Tenby							15:32						
Pembroke Dock							15:58						

**Table 6.2: Summary of the High Level Timetable Specification (Eastbound)**

Origin	Pembroke Dock	Swansea	Milford Haven	Swansea	Fishguard Harbour	Swansea	Carmarthen	Llandoverly	Swansea	Milford Haven	Swansea	Carmarthen	Swansea
Destination	Swansea	Bristol TM	Swansea	London	Swansea	Bristol TM	Swansea	Swansea	Bristol TM	Swansea	London	Swansea	Bristol TM
Pembroke Dock	08:04												
Tenby	08:32												
Fishguard					09:07								
Milford Haven			08:42							09:42			
Haverfordwest			08:57							09:57			
Carmarthen	09:20		09:34		10:02		10:10			10:34		11:04	
Llanelli	09:45		10:02		10:27		10:34	10:46		11:02		11:27	
Swansea arr	10:05		10:20		10:46		10:55	11:05		11:20		11:49	
Swansea dep		10:13		10:25		10:53			11:13		11:25		11:53
Neath		10:25		10:36		11:05			11:25		11:36		12:05
Port Talbot		10:34		10:43		11:13			11:34		11:43		12:13
Bridgend		10:51		10:55		11:25			11:51		11:55		12:25
Cardiff Central		11:13		11:15		11:45			12:09		12:15		12:45

### 6.3 Cardiff to Swansea

#### Frequency and Journey Time Improvements

The committed electrification is expected to reduce journey times between Swansea and Cardiff by about 4 minutes which will deliver faster journey times to / from the intermediate stations between Cardiff and Swansea. Rail can play a positive role in helping to reduce car dependency on the core Swansea to Cardiff corridor. Electrification will help to enhance this further, although the measures described in Chapter 2 Short Term Measures are also required to fulfil a complementary role.

Outside the AM peak period towards Swansea, the existing 2 hourly frequency of the local trains is inadequate. Departures every 60 minutes are required to improve the attractiveness of services from these stations. The preliminary work completed for the Welsh Assembly Government indicated this timetable change would boost frequencies could generate a positive economic business case. These frequency improvements would ensure major employment proposals including the energy park at Baglan are delivered in a manner which encourages more sustainable manner travel patterns. It would also reduce the reliance on the M4 corridor as a mode of access. In addition to the delivery of new jobs at Baglan, the construction of new housing in Port Talbot and Greater Neath will further help to boost demand and make the case for an hourly stopping services between Cardiff and Swansea, given the competitiveness of rail versus the parallel M4.

#### Interface with Other Services

This timetable specification would also support 2tph between Cardiff and Maesteg, assuming a passing loop is provided on the Maesteg branch. It is assumed this service would call at all stations between Cardiff and Bridgend, allowing Swansea trains to run non-stop between these stations on this section. The timetable allows approximately two paths per hour for freight, but (as today) daytime freight trains between Cardiff and Swansea will have to spend time waiting in loops and/or divert off the main line.

Assuming the Manchester to West Wales service was replaced by electric trains as discussed in Chapter 1, the revised timetable of the stopping service mean these two EMUs would occupy a second platform at Swansea except between about xx.20 and xx.35 each hour. Trains arrive about 30 minutes apart at Cardiff, hence offering potential to continue towards Bristol Temple Meads at an even service interval. Some wait time at Cardiff should be incorporated into the timetable to ensure services operate in a robust manner given the relatively short turnarounds at Swansea. If the stopping train from Cardiff and Swansea is extended to Bristol Temple Meads, some wait time has been assumed at Cardiff which would allow trains to follow the London service to Swansea.

Actions to be addressed:	<ul style="list-style-type: none"> <li>Develop the business case collaboratively with Welsh Assembly Government, Network Rail and the train operators for an hourly stopping service between Cardiff and Swansea to support housing and employment growth that could be located close to intermediate stations</li> </ul>
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### 6.4 Role of Swansea Interchange

As discussed above, it is assumed the hourly through train between Manchester and West Wales will be amended to terminate at Cardiff Central. An hourly electric service would be introduced to Swansea to compensate. With cross-Swansea trains potentially removed following the completion of the GWML electrification, Swansea is expected to become a more important interchange serving the SWWITCH area. The proposed timetable will mean trains arriving or departing at Swansea from Cardiff must have convenient connections towards South West Wales. This will help to minimise the perceived inconvenience to passengers that would result from the removal of the through journey opportunities. A consolidated summary of the connections is shown in Table 3.1. It demonstrates the proposed service frequencies west of Swansea provide convenient connections to services arriving and departing from Neath. The proposals for the individual corridors are described below.

The remainder of Chapter 3 summarises the timetable revisions proposed for routes west of Swansea. Although a core option has been presented, there is relatively limited scope to identify alternative proposals. For example, a combination of network capacity constraints, an overarching theme to improve rolling stock efficiency and an aspiration to cut overall journey times means the scope for delivering alternative measures is relatively limited.

## 6.5 Swansea to Milford Haven

### Enhanced Passenger Services

The Milford Haven trains serve most of the major catchments west of Swansea including Llanelli, Carmarthen, Haverfordwest and Milford Haven. This offers an opportunity for this service to form the 'spine' of the timetable specification west of Swansea. Connectivity between Swansea and these major population settlements could be improved by refining the current timetable specification. With a mixture of 2 or 3-car trains at certain times of the day (primarily to alleviate overcrowding on some services between Cardiff and Manchester), proposals to boost frequencies are likely to have a larger impact on demand than simply lengthening the existing services. Journey times between Swansea and Milford Haven could be reduced by about 5 minutes as a result of removing the intermediate request stops west of Whitland from selected services, whilst an hourly frequency would cut overall waiting times for passengers. The timetable changes resulting from the frequency revisions need to take account of the following considerations:

- there is a departure between 17.00 and 18.00 for commuters and business passengers to Haverfordwest and Milford Haven;
- there are convenient travel opportunities to Carmarthen and Haverfordwest around 08.30, plus departures during the evening peak.

These changes will help to make rail more competitive versus the parallel A40 / A48 / M4 corridor. To support the proposed frequency improvements, a package of complementary measures would be needed. The delivery of short term initiatives including marketing, ticketing, station improvements and modal integration will help to boost passenger numbers prior to 2018 before the timetable changes are introduced. The planned housing and employment growth proposed for sites adjacent to the corridor will need to be delivered in a timely manner to help make the case for the frequency improvements. In addition to the employment growth in Swansea, the creation of new jobs as part of the Haven Waterway Enterprise Zone will help to generate two-way travel patterns, with commuting and other trips towards Milford Haven. The concentration of housing to locations in Milford Haven, Haverfordwest plus Carmarthen and Llanelli would also help to support these growth forecasts. There may be potential to promote Whitland as a park and ride serving South Ceredigion and the catchment around Cardigan. The A478 provides convenient access from parts of North Pembrokeshire to Carmarthen and Swansea and this would help to further expand the catchment using the Milford Haven line.

### Rolling Stock Requirements

Four units will be required to operate an hourly train between Swansea and Milford Haven, but the type of diesel units will need to be determined. There is currently a mixture of 2 and 3-car Class 175 units operating between West Wales and Manchester, but some of the 2-car units could be retained in South West Wales to operate the hourly service (the 3-car units are likely to be deployed between Cardiff and Manchester in response to the higher loadings). The Class 175s have a maximum speed of 100mph which would be beneficial if line speed improvements were delivered. However, the lease costs for these units will be higher compared with alternatives, whilst the opportunity to deliver line speed improvements will be constrained by the requirement for trains to pass each other at Haverfordwest.

The analysis presented in the Interim Report indicated rolling stock with 75mph capability would still offer similar journey times given the current line speeds west of Swansea. As a result, Class 150 or similar units could be operated, but the current quality of these units is relatively poor for passengers making journeys of 90-120 minutes. As part of the revisions needed to support the DDA requirements, there may be scope to alter the internal seating layout to ensure it is more suited to longer distance trips with extra legroom and tables to complement the existing 2+2 layout.

### Freight

With 4,000 people employed in and around the Haven Waterway; tourism and the port are the two main employers/prime drivers in Pembrokeshire. An Economic Impact Report was completed in 2012. In response to the importance of this employment node, the Welsh Government and Pembrokeshire County Council in conjunction with the port are keen to promote its economic significance given its status as an Enterprise Zone. The stakeholder

aspirations include opportunities for increased freight traffic to / from Milford Haven and a number of options have been identified as set out below:

- import of energy related material to replace coal at selected electricity generating stations. Estimates prepared in 2010 indicated that 25-30 million tonnes might be required, with Milford Haven potentially supplying up to 12m tonnes. The port could supply power stations in the Midlands and as far as Nottinghamshire and the Trent Valley with raw materials. Although energy related material was originally supported by the Government as an important component of the future energy policy, the availability of Government subsidies to provide the necessary infrastructure has recently declined sharply in terms of value and duration. If the quantity of energy related material was reduced, it would make the investment case to support energy related material at Milford Haven weaker. The opportunities for major (400MW and above) plants are unlikely to be clarified before 2014 and may be dependent on wider energy policies. Milford Haven does have plenty of land available for stockpiling energy related material and reduce risks in the supply chain. This resilience is essential to power stations and investors. If Milford Haven was used to import 12m tonnes per day, this would equate to about an hourly freight train path per day in each direction;
- Other potential development opportunities include a new freight-only RoRo service which will complement the Irish Ferry services and serve Portugal, Spain, South-West France. This will enable transshipment of wheeled cargo, swap-bodies and containers to/from Ireland via the existing Irish Ferry and also road and, possibly, rail connections into the UK. The timescales will be dependent on the economic recovery, although with the SWITCH area served by the European TEN-T route from Europe to Ireland, it is worthy of consideration. Further rail network capacity may be required to support this growth;
- Other potential traffic was discussed including for example the export of cars from say Land Rover or the handling of containers, since Milford Haven is close to the West Midlands than the current ports.

The current two-hourly passenger service would allow freight to run in the daytime, even though it mostly operates at night. An hourly daytime freight path in each direction would require an extra passing loop between Clarbeston Road and Herbrandston Junction which is assumed to be located at Johnston in the indicative timetable. An alternative solution might be to modify the track layout at Haverfordwest to allow a freight service and a passenger train in one direction to pass another passenger service in the other direction. If a step-change in freight traffic was introduced relating to the potential flows for energy related material or the new RoRo service, incremental capacity enhancements would be required to support these flows, for example, doubling the route between Milford Haven to Clarbeston Road.

Actions to be addressed:	<ul style="list-style-type: none"> <li>• Support the delivery of a package of land use measures which will boost patronage and help to strengthen the case for an hourly service and confirm the rolling stock strategy</li> <li>• Identify the infrastructure requirements needed to support incremental freight growth and maintain a robust operational timetable for passenger services</li> </ul>
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**Stations**

There are several potential locations for a new station. The feasibility of these proposals is described in section 3.12 along with other potential new halts that would be located on other corridors.

**6.6 Swansea to Pembroke Dock**

**Timetable Revisions and Infrastructure Requirements**

The Interim Report highlighted the importance of summer tourist traffic using this Line, with passenger numbers about 40% higher in the summer compared with the winter. The Line provides connectivity from Tenby and Pembroke plus a series of smaller settlements to Carmarthen and Swansea, The main themes for this corridor are focussed on measures to improve the efficiency of resources. The current journey time between Whitland and Pembroke Dock is about 60 minutes given the delays incurred at several level crossings between Tenby and Pembroke Dock. As a result, the two-hourly service which operates has an inefficient rolling stock deployment. The current track layout and operating assumptions mean trains wait for nearly an hour at Pembroke Dock before returning towards Swansea. AECOM’s 2008 timetable study concluded that infrastructure enhancements and/or



higher performance trains would be needed to reduce the journey times between Whitland and Pembroke Dock to be less than two hours. Discussions with Network Rail indicate a number of infrastructure measures could be introduced that would deliver a journey time of about 55 minutes which would help to improve efficiency:

- **Elimination of the long wait at Tenby:** This is currently needed either to await the arrival of a train in the other direction (no longer necessary as service trains do not pass at Tenby in the proposed timetable) or for the driver to work the single line token instruments (this constraint is assumed to be eliminated in Network Rail's projected signalling upgrade);
- **Level crossing changes:** Removing the requirement to stop at three level crossings. Network Rail is already in discussion with Pembrokeshire to eliminate this operating practice which would help to reduce journey times;
- **Higher line speeds:** Works to track and level crossings to increase the current 50mph limit up to the 75mph maximum speed for the Sprinter and Pacer units, where this is technically feasible and the trains are able to attain this speed. The restrictions at Narberth, Tenby and Pembroke would require major works to raise line speeds, and hence are not included;
- **Signalling:** The signalling upgrade will also remove the need for drivers to hand in and collect tokens at the signal box located just east of Whitland station. This currently dictates that trains arriving from Pembroke and Swansea must be several minutes apart. This affects the flexibility of the timetable.

This package of measures is expected to deliver an average saving of around 5 minutes in each direction without reducing the number of stops. This proposal assumes a turnaround time of about 5 minutes at Pembroke Dock and similar gap at Whitland. A performance buffer at Carmarthen has been included in the timetable to ensure a more resilient timetable. If a skip-stop calling pattern was introduced to help cut journey times and increase the performance buffer, the smaller intermediate stations including Lamphey or Manorbier would only be served every 4 hours. This is unlikely to be acceptable to stakeholders.

With an end-to-end journey time of about 2 hours 5 minutes, the timing constraints at Whitland mean it is not possible for the Pembroke Dock train to reach Swansea in time to form the next service. Most Pembroke Dock trains only call at Pembrey & Burry Port and Llanelli east of Carmarthen, so there are no significant journey time savings to be achieved if other stops were omitted. Alternatively, if the Pembroke Dock services were operated to / from Carmarthen, this would result in a long layover. As a result, the timetable specification envisages trains from Pembroke Dock are interworked with the Heart of Wales lines services as described below.

### Rolling Stock

A mixture of Class 14X and 15X units currently operate between Pembroke Dock and Swansea. It is unlikely that the Class 14X fleet will be retained beyond 2020 in response to the likely costs of making this fleet compliant with the DDA requirements. Stakeholders will need to ensure all services are operated by a Class 15X fleet, with the internal layout modified to suit longer distance journeys. These changes could be funded as part of the forthcoming franchise replacement process.

### Opportunities for Charter Trains

The potential opportunities for tourist trains could also be improved following the timetable changes. With the revised passenger service to / from Pembroke Dock no longer using the Tenby loop, there is a possibility of charter trains passing other trains at this location. These charter trains would have to follow the passenger services about 45 minutes behind the outward service train to reach the loop at Tenby before the service from Pembroke Dock returns. The charter train could terminate at Tenby or continue to Pembroke Dock (sidings are available in both places). Timings would depend on the characteristics of the train used. This charter path exists every two hours, matching the service train, but consecutive charters must operate four hours apart if running to Tenby or six hours if these trains continue to Pembroke Dock.

### Summer Saturday Through Trains to London

There are two High Speed Train services in each direction serving Pembroke Dock on summer Saturday. Although bi-mode IEP trains could be deployed to retain these connections, it is uncertain whether these vehicles which are longer than HSTs would be able to operate via the Narberth tunnel. If a cost effective solution is not available to

address this technical constraint, an alternative rolling stock solution will need to be identified that provides adequate capacity to meet the levels of demand, with conveniently timed connections at Swansea.

### Freight Opportunities

Development activity across the former alignment to the port at Pembroke Dock is likely to prevent the opportunities to develop rail freight. Consequently, it is not necessary to make passive provision for future rail freight using the Pembroke Dock Line.

Actions to be addressed:	<ul style="list-style-type: none"> <li>Review potential timetable changes to assess the operational resilience and improve rolling stock efficiency</li> <li>Confirm package of rolling stock modifications using a standard fleet of Class 15X units</li> </ul>
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## 6.7 Swansea to Fishguard

### Enhanced Passenger Services

The retention of the current Fishguard services forms the main stakeholder aspiration for the short term period. In the medium term, timetable enhancements which form part of a regular two-hour interval are proposed. This makes best use of rolling stock and crew resources and would form part of a 3tph frequency between Carmarthen and Swansea. Some of the opportunities to grow the passenger market identified for the Milford Haven line are also relevant for the Fishguard corridor, including housing growth in Pembrokeshire and employment opportunities in Carmarthen and Swansea.

A regular interval timetable will help to generate additional passengers from Fishguard & Goodwick. In contrast with the current timetable which features irregular timings which terminate at a number of stations, the proposed timetable would extend all services beyond Clarbston Road or Carmarthen to Swansea to deliver a more passenger friendly timetable. Arrival times at Swansea would offer convenient connections to a range of destinations across South Wales and beyond. This service proposal will build on the recent growth achieved by the newly opened station at Fishguard & Goodwick, and represents a significant improvement compared with the current service pattern. Since the journey times to Fishguard are shorter compared with the timings to Pembroke Dock, the departure times to / from Swansea are slightly revised to minimise turnaround times at Fishguard.

### Connectivity for Ferry Passengers

Trains are assumed to layover at Fishguard for about 20 minutes. The feasibility of serving the daytime ferry connections to / from Rosslare has been examined. The proposed timings shown in Tables 3.1 and 3.2 would provide about 30 minutes to alight from the 12.30 ferry from Rosslare, with an allowance of about 100 minutes for foot passengers to check-in time. Operating a dedicated boat-train service which arrives at Fishguard about 13.25 and departs shortly afterwards to improve connections has been examined as a sensitive test as part of the scheme appraisal. The overnight ferry sailings would be served by a dedicated train, since there are fewer operational and rolling stock constraints affecting these services.

### Rolling Stock

Similar to the proposals for Pembroke Dock, a fleet of Class 15X units should be procured for the Fishguard route. The internal layout should be modified with additional luggage racks and extra legroom to ensure they are suitable for longer distance passengers to Swansea.

Actions to be addressed:	<ul style="list-style-type: none"> <li>Review the proposed timetable in relation to the timing of the daytime boat trains</li> <li>Confirm package of rolling stock modifications for a standard fleet of Class 15X units</li> </ul>
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## 6.8 Other Services West of Swansea

In addition to the 2tph between Carmarthen and Swansea which are extended to Milford Haven (hourly), Pembroke Dock (2-hourly) and Fishguard (2 hourly), an hourly shuttle between Swansea and Carmarthen is also proposed which would fulfil the following functions:

- **Additional capacity:** the shuttle will provide additional capacity, especially during the peak periods given the forecast growth likely to affect services west of Swansea;
- **Improved connectivity:** this shuttle is expected to operate using a limited stop calling pattern to help reduce journey times and enable rail to compete more effectively with car using the A48 / M4 corridors towards Swansea. The timing of these shuttles will provide a convenient connection to the hourly fast train towards Cardiff and Bristol;

Assuming a limited stop calling pattern was adopted, this service could be operated by just two units. Whilst it would be advantageous to further reduce the journey times between Milford Haven and Swansea by removing the stops at Ferryside, Kidwelly and Gowerton, these stops can be accommodated in this service schedule without affecting the feasibility of connection times at Swansea for the London trains or requiring extra units if turnaround times were too short. The proposed shuttle between Carmarthen and Swansea would require additional units if journey times were extended to incorporate stops at these intermediate stations. The various network capacity constraints west of Swansea prevent an even interval service pattern from being introduced.

Actions to be addressed:	<ul style="list-style-type: none"> <li>• Confirm the Carmarthen shuttle to complement other service changes west of Swansea</li> <li>• Secure 2 units to operate this service and confirm package of rolling stock modifications for a standard fleet of Class 15X units</li> </ul>
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## 6.9 Heart of Wales Line

### Measures to Boost the Economy

A separate economic study has been commissioned to examine the economic potential for the HoWL. The four services per day fail to serve the existing catchment adequately, but the economic case for delivering a revised timetable will be dependent on achieving an economic strategy which encourages additional commuting, business and leisure trips. In addition to the greater likelihood of commuting to trips to / from Swansea if faster, more conveniently timed trains were introduced, the proximity to the Brecon Beacons National Park and the attractiveness of intermediate towns including Llandeilo, Llandovery and Llandrindod Wells as tourist destinations should help to boost the travel market.

### Revised HoWL Service Pattern

The Heart of Wales Line (HoWL) services include some through trains beyond Swansea to Newport. The GWML electrification should mean all HoWL services are revised to start / terminate at Swansea. However, the current timings indicate northbound HoWL trains depart from Swansea towards Shrewsbury via Llandrindod Wells shortly after the southbound train has arrived. If the cross-Swansea journey opportunities were revised, the majority of turnaround times at Swansea would need to be revised since they are not compliant with Network Rail timetable planning rules assuming trains would then operate as self-contained trains.

In addition to these timing constraints, there are a number of limitations affecting the current timetable, including the competitiveness of rail journey times versus car, and the inflexible timing of rail services for commuters and business passengers to / from Swansea or further afield. The opportunity to better serve catchments at the southern end of the route has been examined, including the scope to support faster, more frequent trains. Issues affecting stations north of Cynghordy are outside the SWITCH study area and not directly considered here. It is envisaged the number of through trains per day between Swansea and Shrewsbury via Llandovery calling at all stations would be reduced compared with the current timetable. However, this trade-off should be examined as part of a wider HoWL study. The limited stop services to / from Llandovery could be extended north towards Shrewsbury if a business case can be demonstrated for the other improvements.

The proposed solution is to interwork the HoWL and Pembroke Dock services. In response to the timing constraints affecting the latter route, services would otherwise layover at Swansea for 1hr 45 minutes, departing shortly before the next Pembroke Dock train arrives. With the Milford Haven and Fishguard trains having reasonably short turnarounds, there would be no possible benefits from inter-working these services. In contrast, inter-working with trains serving the HoWL allows more services to operate at the southern end of the route.

## Operational Issues

The proposed timetable provides a regular arrival and departure from Swansea every two hours, timed to provide a reasonable layover after the Pembroke Dock arrival and before the next departure. The availability of two extra services deployed on the HoWL would enable additional services to operate to / from Llandoverly using a skip-stop calling pattern to improve the journey time competitiveness of rail versus other modes. Services operate to Llandoverly at 2 hourly intervals, although there is an additional early morning service from Llandoverly which offers a 08.05 arrival at Swansea. There is also a later evening northbound service from Swansea to Llandoverly. A separate unit operates back and forth between Swansea and Shrewsbury every six hours which means the frequency of through trains are reduced from four to three per day. This trade-off is needed to support stations which offer potential for growth. The proposed timings are shown in Table 3.3.

**Table 3.3: Heart of Wales Line Service Timings**

Direction	Station	Timing								
Northbound	Swansea		06:24	08:24	10:24	12:24	14:24	16:24	18:24	20:24
	Llanelli		06:44	08:44	10:44	12:44	14:44	16:44	18:44	20:44
	Llandoverly		07:42	09:34	11:34	13:42	15:34	17:34	19:42	21:34
	Shrewsbury		10:14			16:14			22:14	
Southbound	Shrewsbury		05:19			11:19			17:19	
	Llandoverly	06:55	07:45	09:55	11:55	13:45	15:55	17:55	19:45	
	Llanelli	07:48	08:48	10:48	12:48	14:48	16:48	18:48	20:48	
	Swansea	08:05	09:05	11:05	13:05	15:05	17:05	19:05	21:05	

### 6.10 Rolling Stock Requirements

Table 3.4 compares the number of units assumed if the current timetable is retained, albeit with no cross-Swansea trains operating versus the proposed timetable.

**Table 3.4: Summary of the Rolling Stock Requirements**

Service	Do Minimum Timetable	Proposed Timetable
Cardiff – Swansea Locals	7	8
Swansea – Milford Haven	3	4
Swansea – Pembroke Dock	4	4
Swansea – Fishguard Harbour	2	2
Swansea – Llandoverly / Shrewsbury	2	4
<b>Total</b>	<b>18</b>	<b>22</b>

Source: AECOM estimate

Actions to be addressed:	<ul style="list-style-type: none"> <li>Prepare a business case to secure the additional rolling stock units following the completion of the electrification schemes in South Wales and elsewhere</li> </ul>
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Table 3.5 summarises the impact of the timetable proposals for a sample of flows to highlight the benefits from the package of measures comprising journey time reductions, frequency improvements on selected routes and improved connections at Swansea.

**Table 3.5: Impact of Service Proposals on Selected Flows**

Flow	Summary of Timetable Changes
Cardiff - Swansea	Frequency of local trains increased to hourly with an overall frequency of 3tph, with trains departing at regular intervals
Fishguard – Swansea	Clockface service every 2 hours, with all trains operating to / from Swansea.
Milford Haven – Swansea	Clockface service pattern with departures every hour
Pembroke Dock – Swansea	All trains operate to / from Swansea, with improved journey times, operating every 2 hours
Llanelli – Cardiff	Service frequency between Llanelli and Swansea increased to 3 per hour (plus a fourth HoWL shuttle every 2 hours), with convenient connections at Swansea to Cardiff
Carmarthen – London	Hourly Milford Haven trains provide convenient connections at Swansea to / from the London services
Neath – Bristol	Frequency of stopping service increased to half-hourly, which delivers 2tph to Bristol serving the M4 corridor
Skewen - Bridgend	Regular hourly service to / from Skewen throughout the day

Source: AECOM timetable proposal

### 6.11 Swansea District Line

Some stakeholders in the SWITCH area have aspirations to divert some trains via the Swansea District Line to help deliver faster journey times between stations west of Llanelli to Port Talbot, Bridgend, Cardiff, Newport and Bristol / London. There are two westbound passenger services per day operating via the SDL (the 10.57 Cardiff Central to Fishguard, and the 18.30 Manchester to Carmarthen) plus two eastbound trains (05.03 Carmarthen to Manchester and the 13.29 Fishguard Harbour to Gloucester). These services operate via the SDL for driver route knowledge. Diverting trains via the SDL could reduce journey times by about 7 minutes, although this benefit is increased if trains have a longer layover at Swansea. The SDL is close to the M4 between junctions 46 and 47 which could create an opportunity for a strategic park and ride, as well as supporting the development opportunities at Felindre.

The Interim Report used LENNON data to estimate the number of cross-Swansea trips that would benefit from faster journey times if services were diverted via the SDL. A total of 350,000 trips per annum in both directions are making cross Swansea journeys who would benefit from the faster journey times, which equates to about 50 trips per hour in each direction. There are a number of potential factors which could influence the scope for regular direct services via the SDL:

- **Number of potential interchanges:** Nearly 50% of these cross-Swansea trips have a destination beyond Cardiff, so a possible train service pattern to serve these journeys would need to be identified. If passengers still needed to interchange at another intermediate station rather than Swansea, the benefits of diverting passengers via the SDL could be reduced;
- **Journey times:** the estimated current journey time saving from using the SDL is about 7 minutes. However, the retention of diesel traction east of Port Talbot would mean some of the journey time savings that would be achieved by electric units towards Cardiff will be lost, thus weakening the benefits;
- **Impact on other services:** the draft timetable specification is based on 3 trains per hour between Swansea and Carmarthen, with some services extended to Milford Haven, Pembroke Dock and Fishguard. The connections at Swansea are timed to offer convenient onwards connections towards Bristol Temple Meads or London via Cardiff Central for longer distance trips. If one of the hourly services was diverted via the SDL, this would remove one of the connecting services each hour at Swansea. This would be a major dis-

benefit, as Swansea and Neath are the two busiest stations in the SWWITCH area. Swansea attracts nearly 7,000 passengers per day, with a further 2,600 daily passengers using Neath. The total for Neath is nearly 75% higher than the third busiest station (Port Talbot Parkway) which emphasises the importance of the two largest stations in the SWWITCH area. Diverting an existing hourly service via the SDL would not support the employment and housing growth aspirations for the Swansea Bay City Region. Although some flows would benefit from direct journey opportunities, for example, Cardiff to Carmarthen and Llanelli, MOIRA indicates these improvements would be offset by a loss of journeys between Swansea or Neath to Cardiff or Bristol. Overall, the net change in revenue if an existing hourly service was diverted by the SDL is a loss of £230,000 per annum;

- **Operating costs and the GWML electrification business case:** An hourly diesel service would need to operate via the SDL and continue east beyond Port Talbot. This would reduce the overall business case for the GWML electrification in response to the increased operating costs. The higher operating costs would exacerbate the revenue loss described above;
- **Scope for overlaying an additional service:** A wholly new service could be introduced via the SDL between Llanelli and Cardiff. The other frequency improvements west of Swansea suggest the case for extending trains beyond Llanelli is likely to be weak. East of Port Talbot, the capacity increases offered by the proposed 4-car electric units negates the requirement for additional services to support the planned growth. The incremental revenue generated by this extra service is just £305,000 per annum, compared with operating costs of about £7-8m per annum;
- **Conclusions:** Although the revenue forecasts for a new service could be strengthened by the inclusion of park and ride trips diverting from the M4 if a parkway station was constructed on the SDL, this service is still unlikely to be financially viability. Furthermore, the loss of connectivity between Cardiff and Neath / Swansea would reduce current revenues if an existing service was diverted and have a detrimental impact on housing and regeneration proposals.

## 6.12 Proposed New Stations

Several new stations were shortlisted following the application of the high level sifting tool as discussed in the Interim Report, with four stations examined in more detail. Although new stations can help to improve accessibility, the potential negative impacts from longer journey times for existing passengers or a less efficient service pattern must be carefully considered.

- **Templeton:** Pembrokeshire County Council has aspirations to re-open a station at Templeton to serve the residential catchment between Narberth and Kilgetty, as well as serving some of the major tourist attractions in this part of Pembrokeshire. If the station was delivered using a similar approach to the recently opened halt at Fishguard & Goodwick, the capital costs could be in the region of £650,000-£700,000 and this would help to strengthen the economic case. However, a new station on the Pembroke Line would present a number of operational challenges. A proposal to reduce the journey time of a return service between Whitland and Pembroke Dock has been identified, but the extra journey time that would be incurred if trains stopped additionally at Templeton would affect the viability of this timetable. Further infrastructure improvements to reduce journey times or a review of the role of some intermediate stations would be needed to support the extra stops at Templeton;
- **St Clears:** this station could serve the rural catchment in west Carmarthenshire between Whitland and Carmarthen and help to improve accessibility. The scope to modify the Milford Haven trains to call additionally at St Clears is restricted, since this would affect the connections with the London trains at Swansea. Whilst there should be scope for alter the Fishguard and Pembroke Dock trains to accommodate an extra stop at St Clears, this would extend journey times for other passengers to Swansea. A business case prepared by consultants on behalf of Carmarthenshire County Council suggests 15,100 trips per annum would be lost as a result of the extended journey times. The capital costs to deliver a twin platform station at St Clears would range from £2.4m to £2.7m which is significantly higher than the proposed halt at Templeton or the new station at Fishguard & Goodwick which was delivered for about £650,000-£700,000 in 2012. With the incremental revenues exceeding the ongoing operating costs, the benefit cost ratio of the

central case is about 1.8 (medium value for money), although the high growth scenario generates a BCR of 2.2;

- **Cockett:** a new station serving the residential catchments adjacent to the A483 corridor west of Swansea is proposed. Whilst the station serves a large residential catchment, and there would be scope to modify the Pembroke Dock, Fishguard and Carmarthen trains to call additionally at Cockett, this proposal has a number of limitations. Firstly, the station would be constructed on the double track section and an overbridge would be required to provide DDA access. This would significantly increase costs. The opportunities to generate higher revenue yields and journey time savings from new passengers may be limited, due to its proximity to Swansea. As a result, the economic case for a new station appears relatively weak. A rapid transit link serving the A483 west of Swansea would be more suitable for this travel market;
- **Landore:** This station could serve the Liberty Stadium north of Swansea city centre, as well as the neighbouring catchment. The stopping trains between Cardiff and Swansea could be modified to call at Landore, with some longer distance trains calling on match-days. The potential revenue benefits from football fans making longer distance trips would form an important part of the economic case, although the station would need to generate other trips on weekdays to destinations other than Swansea to help boost revenue yields. However, the capital costs associated with constructing a twin platform in this location, particularly given the technical complexity of linking the station with its neighbouring catchment given the height differences will be significant. Similar to the proposal for Cockett, a rapid transit link that connects the catchment with the city centre is likely to represent a more affordable solution.

### 6.13 Further Development of a Complementary Rapid Transit Strategy

In addition to the short term proposals to develop a complementary rapid transit strategy which would primarily serve radial corridors to / from Swansea city centre, there is a further opportunity to expand this proposed network. As noted in the Interim Report, the opportunities to introduce a regular heavy rail passenger service via the Cwmgwrach and Onllwyn freight-only lines are limited. Existing line speeds will be low, resulting in slow journey times, whilst there is no direct access to Swansea High Street station (trains would need to reverse twice). If the coal traffic to Onllwyn ceased which would enable a former rail corridor to be reinstated. There may be an opportunity to convert this corridor, plus the link to Cwmgwrach to support rapid transit. This would deliver an attractive public transport solution for the A465 / A4109 corridors to Swansea, with an alignment adjacent to the A483 Fabian Way used to access the city centre. An individual business case would need to be prepared to examine the feasibility of this proposal.

Actions to be addressed:	<ul style="list-style-type: none"> <li>• Examine the feasibility of a new rapid transit corridor serving the Cwmgwrach and Onllwyn corridors if the existing coal traffic ceases.</li> </ul>
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## **Long Term Interventions**





## 7 Long Term Interventions

### 7.1 Introduction

The long term strategy includes a number of possible schemes that could be delivered from 2023 onwards. Many of these proposals are likely to be delivered significantly after this timescale in response to the complexity and potential cost of these long term strategic interventions. The successful implementation of these proposals will require SWWITCH to work collaboratively with Welsh Assembly Government, the Department for Transport, SEWTA and numerous other stakeholders including those in the Bristol area, as well as the wider M4 corridor towards London. A collaboration approach to lobby for these improvements and demonstrate there is a strong economic business case for this investment will be required.

### 7.2 Improved Surface Access Links to Heathrow Airport

As part of the HLOS2 funding announcement in July 2012, funding for a new heavy rail link from Heathrow Airport to the GWML near Slough was confirmed and is expected to be delivered by 2021. The £500m scheme will cut journeys by up to 30 minutes ensuring passengers from South Wales and the West of England are not required to travel via London Paddington to access the Airport. Improved access to Heathrow will make the Airport more attractive for investment by new businesses. The likely service pattern using this link is yet to be finalised, but this will need to take account of the capacity improvements at Reading station and the frequency improvements to be delivered as part of the GWML electrification. SWWITCH will need to lobby with SEWTA to ensure a direct service to Heathrow is introduced from South Wales. Although the direct trains to Heathrow Airport may start / terminate at Cardiff, passengers from the SWWITCH area could still benefit from the new link. Journeys from Swansea, Neath and Port Talbot, plus the other stations in the SWWITCH area would benefit from reduced journey times. Demonstrating the economic value of improved rail links from South Wales will be critical to help make the case for this new service to Heathrow Airport. Stakeholders in South Wales will be competing with other local authorities in Bristol, Cotswolds and the South West to secure new direct services to Heathrow. The capacity restrictions on the GWML means a strong evidence based argument will be essential.

Actions to be addressed:	<ul style="list-style-type: none"> <li>Lobby collaboratively with other stakeholders including SEWTA for a direct service to Heathrow Airport from South Wales following the completion of the new link from Slough</li> </ul>
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### 7.3 High Speed Rail to South Wales and West of England

A new high speed corridor to the west of England was identified by the 'New Lines' study completed by Network Rail in 2008. More recently, High Speed 2 has announced proposals for a 'Y' shaped network from London to Birmingham (to be delivered by 2026), with extensions to Manchester and Leeds completed by 2032/33. The transformational journey times expected will improve connectivity between the major population centres served by high speed rail. Furthermore, it is expected that benefits for the 'classic' (existing) network will also accrue, since the service pattern for some long distance trains may be revised. The benefits generated from these service changes will reinforce the economic importance of links to these selected cities.

Since the completion of the New Lines study, relatively limited work has been undertaken to examine the technical feasibility and the business case for a new high speed rail link to the West of England and South Wales. The electrification of the GWML, the revised timetable following the introduction of the IEP trains (along with the potential for 140mph operation on parts of the route) and the new western link to Heathrow Airport, will deliver a step change in connectivity for the major catchments served by the M4 corridor. However, the economic benefits could be further increased by the construction of a new high speed rail link to ensure investment that would otherwise be located adjacent to railway stations served by the GWML is not diverted to other corridors.

SWWITCH and the other stakeholders served by the GWML will need to closely monitor the capacity available. This will ensure the necessary feasibility and business case work is completed in a timely manner if there is a potential requirement for further improvements to complement the package of measures proposed for the medium term.

#### **7.4 Possible Land-bridge to Southern Ireland**

A proposal for a new fixed link crossing between Fishguard and Rosslare represents a long term objective which would strengthen freight connections to Europe. The additional freight traffic generated would require substantial investment in new infrastructure to support this proposal, although the existing capacity constraints affecting the Severn Tunnel would need to be resolved. Whilst the scheme would generate substantial economic benefits both for South West Wales and South East Ireland, the environmental impacts would need to be carefully evaluated in response to the additional demand. To maximise the benefits, rail capacity in South West Wales would need to be boosted, with the scope of proposals determined in due course. For example, it could trigger a requirement for improved signalling, track doubling or other capacity enhancements or electrification from Swansea to Fishguard. This scheme would transform connectivity between South Wales and Southern Ireland, so SWWITCH would need to work collaboratively with a range of stakeholders in developing the business case for the proposition and assess its technical feasibility.

#### **7.5 Further Incremental Electrification**

In the longer term, there may be opportunities to expand the coverage of the electrified network which would help to improve operational flexibility. There are two main themes to extend the existing electrification. For example, the network west of Swansea could be electrified or other in-fill schemes east of Newport. A business case for further electrification west of Swansea should be reviewed periodically if underlying assumptions are updated.

Alternatively, extending the electrified network beyond the GWML could create further opportunities for through services to / from Swansea. For example, the routes via Chepstow, Shrewsbury and Taunton may be electrified during Control Periods 6 or 7 (to 2029) which may enable a wider range of electric trains to serve Swansea, Neath and Port Talbot.

#### **7.6 Upgrading the Rapid Transit Network**

The short and medium term proposals for the rapid transit network were described in Chapters 2 and 3. In the longer term, there may be scope to upgrade the busiest corridors to support a higher capacity technology, for example, replacing the bus based routes with a light rail corridor. However, these upgrades are only likely to be relevant for a very small number of the busiest corridors in response to the higher operating costs, and the investment needed to deliver light rail. A complementary land use strategy will also be required to align development patterns and help build the case for investment for the higher capacity technology.

## **Appraisal of the Business Case**

## 8 Appraisal of the Business Case

### 8.1 Introduction

An appraisal has been completed on the proposed timetable to determine a benefit to cost ratio for the proposals which require a number of infrastructure upgrades as the proposed timetable has been designed to fit around the constraints affecting the existing network. The appraisal collates the forecast revenue and economic benefits with the changes in operating costs. The timetable has been designed to make better use of the existing fleet so the increase in operating costs is relatively modest given the additional train miles. The suitability of the short term proposals should be examined using individual business cases to assess the potential benefits and costs associated. The following sections describe the input assumptions and methodology to develop the appraisal.

### 8.2 Revenue Forecasts

Revenue and demand forecasts have been calculated using MOIRA, which is a standard rail industry methodology for forecasting rail demand and revenue which takes account of changes to the timetable. Arriva Trains Wales supplied the most up to date version of MOIRA, which contains ticket data for the year to March 2013 and the May 2013 timetable. MOIRA calculates changes to revenue and demand based on changes in generalised journey time (GJT). An elasticity of -0.9 is applied to the proportional change in journey time and this ratio is applied to the base demand. However, the Passenger Demand Forecasting Handbook (PDFH) recommends a higher elasticity is applicable if the percentage change in GJT exceeds 20%, as the lower elasticity tends to underestimate the revenue impact for transformational changes in journey time. An elasticity of -2.0 has been made to flows if the percentage change in journey time exceeds 20%.

A Do Minimum scenario was created which includes the proposed IEP timetable between Swansea, Cardiff, Bristol and London since this represents the timetable that is expected to be in place by 2018. Electric services between Swansea / Cardiff and Bristol are assumed to operate in the Do Minimum. An hourly service is expected to operate between Bristol Temple Meads and Swansea via Cardiff Central, with a limited calling pattern between Cardiff and Swansea. A second hourly service operates between Bristol and Cardiff, with trains continuing to Swansea every two hours calling at the local stations west of Bridgend. Current timings west of Swansea are unchanged in the Do Minimum, with the only cross Swansea trains comprising the boat-trains to Fishguard and the Carmarthen to London trains.

The Test timetable incorporates the proposed frequency improvements west of Swansea. There is a progression towards a standard pattern timetable based on a two-hourly pattern. East of Swansea, the frequency of local trains between Cardiff and Swansea is increased to hourly. The Test timetable was compared against the Do Minimum using MOIRA, so changes resulting from introduction of IEPs between South Wales and London, plus the new electric services to Bristol and splitting trains at Swansea were not included in the forecast revenue.

Table 8.1 presents the forecast change in revenue and demand between the base and test timetables. The figures shown are total National Rail. The overall change to the rail industry is shown, rather than the impacts for one particular operator. The totals shown in Table 5.1 include the uplifts applied to flows which are expected to experience a 20% reduction in generalised journey time or more. The proposed timetable is expected to generate an additional £1.9m to the rail industry per annum, with an additional 600,000 journeys. The average yield per passenger is £3.18 based on existing fare yields which are then revised thereafter in accordance with RPI+1%.

**Table 8.1: Change in Revenue and Journeys – Test versus Do Minimum Timetable**

National Rail	Revenue (£'000s)	Journeys ('000s)
Base Timetable	5,964,700	968,429
Test Timetable	5,966,609	969,029
Difference	1,909	600

Source: AECOM analysis of ATW MOIRA, 2012 Q3 prices

Table 8.2 shows the top ten changes in annual revenue resulting from the proposed timetable. Llanelli to Swansea is the largest single revenue flow affected by the timetable changes and reflects the frequency improvements to be delivered (£273,000 increase). With relatively short journey times between Llanelli and Swansea, the introduction of 3tph has a larger impact on the GJT compared with other longer distance flows. Of the top ten changes, six are between stations west of Swansea. Other significant changes include Llanelli to Carmarthen (£95,000), Carmarthen to Haverfordwest (£73,000) and Carmarthen to Swansea (£67,000). The impact of the frequency improvements for local trains between Cardiff and Swansea is also shown with a £128,000 increase for Pyle to Cardiff, whilst Skewen to Swansea increases by £33,000 per annum. There are also cross-Swansea flows which benefit from the timetable changes, including Haverfordwest to London (£47,000) and Carmarthen to Cardiff (£38,000). The revenue benefits for Neath and Port Talbot resulting from the electric services and improved connectivity to Cardiff, Bristol and London is not shown in Table 8.2 since these benefits are assumed to occur in the Do Minimum.

**Table 8.2: Top Ten Revenue Increases – Test versus Do Minimum Timetable**

	Flow	Base £'000s	Test £'000s	Change £'000s
1	Llanelli-Swansea	373	646	273
2	Pyle-Cardiff BR	173	301	128
3	Llanelli-Carmarthen	130	225	95
4	Haverfordwest-Carmarthen	88	161	73
5	Carmarthen-Swansea	337	404	67
6	Total London-Haverfordwest	486	533	47
7	Fishguard Hbr-Swansea	44	88	44
8	Whitland-Carmarthen	51	94	43
9	Carmarthen-Cardiff BR	512	550	38
10	Skewen-Swansea	25	58	33

Source: AECOM analysis of ATW MOIRA, 2012 Q3 prices

A small number of flows are expected to be affected by a drop in revenue as a result of the timetable changes. The timetable revisions affecting the Heart of Wales Line is one of the contributory factors for this reduction, given the proposed reduction in through services between Swansea and Shrewsbury from 4 to 3 per day in each direction. However, these changes are offset by the introduction of the semi-fast shuttle services between Llandoverly and Swansea that should significantly improve connectivity between the largest stations at the southern end of the route. Furthermore, the removal of the stops at Clunderwen and Clarboston Road from the Milford Haven trains has resulted in some small losses (this stations are served by the Fishguard trains instead to retain a two hourly frequency). Table 8.3 presents the results.

**Table 8.3: Top Ten Revenue Decreases – Test versus Do Minimum Timetable**

	Flow	Base £'000s	Test £'000s	Change £'000s
1	Church Stretton-Shrewsbury	155	145	-11
2	Clunderwen-Haverfordwest	15	8	-7
3	Craven Arms-Shrewsbury	107	101	-6
4	Llandrindod-Shrewsbury	28	24	-4
5	Knighton-Shrewsbury	20	17	-4
6	Clarboston Road-Haverfordwest	4	2	-2
7	Clunderwen-Cardiff BR	43	41	-2
8	Clunderwen-Total London	46	44	-2
9	Clunderwen-Carmarthen	17	16	-2
10	Llandrindod-Swansea	22	20	-1

Source: AECOM analysis of ATW MOIRA, 2012 Q3 prices

### 8.3 Underlying Growth

The Interim Report summarised the two growth scenarios developed. The ‘central’ scenario is based on growth forecasts presented in the Wales Planning Assessment and the Route Utilisation Strategy for Wales, whilst the ‘high’ growth scenario extrapolates recent growth trends for the first five year period, with more conservative assumptions thereafter. Table 8.4 summarises the growth forecasts for the two scenarios for 2018 and 2023, with a weighted average of the growth rates incorporated in the appraisal.

**Table 8.4: Central and High Growth Rates versus 2013**

Year	Central				High			
	Milford Haven	Heart of Wales Line	Pembroke Dock	Swansea – Cardiff	Milford Haven	Heart of Wales Line	Pembroke Dock	Swansea – Cardiff
2018	9%	1%	9%	6%	28%	7%	21%	31%
2023	18%	1%	18%	13%	45%	15%	34%	51%

Source: AECOM calculation. Growth rates for Milford Haven also include Fishguard Harbour route

### 8.4 Operating Costs

The additional operating costs of the new services have been calculated based on the differences between the Do Minimum and Test timetables. The costs are sub-divided into three categories: mileage, lease and staff costs. The following describes the assumptions to calculate each set of costs:

- **Lease costs:** for each service, the number of units required to operate the proposed timetable was estimated. This took account of frequencies and end-to-end journey times. Three types of unit have been assumed, each with different costs. Services west of Swansea are assumed to operate using two car 75mph DMUs (Class 150 or similar) except the Swansea to Milford Haven service which would continue to operate using two car 100mph DMUs (Class 175 or similar). The Swansea to Cardiff/Bristol service is assumed to operate using four car 100mph EMUs (Class 321 or similar). Lease costs per unit were estimated using assumptions collated as part of previous AECOM project work but are averages and not specific to any operator;
- **Staff costs:** based on the number of units, the number of train drivers and conductors was calculated which takes into account shift pattern, leave and training requirements. Staff costs plus an allowance for pensions and other costs were included;
- **Mileage based costs: the daily train mileages were calculated using MOIRA.** The total mileage was then used to estimate in-house maintenance costs, fuel and Network Rail variable track access charges.

The requirement for four additional units (1xEMU, 2x75mph DMU, 1x100mph DMU) results in an extra lease cost of just over £1.12m per annum. Although four extra units are required, this increase represents a relatively small proportion of the overall total, since the timetable has been designed to make more efficient use of the existing fleet. The change in staff costs are linked to the requirement for four extra units, with similar efficiency savings being achieved. Mileage costs represent the largest increase, in response to the additional train miles operated. The total operating cost is about £6.24m per annum (2010 prices), with the results shown in Table 8.5.

**Table 8.5: Summary of Estimated Change in Annual Operating Costs**

Cost Component	Base	Test	Difference
Mileage Based	£22,246,051	£25,999,568	£3,753,517
Lease	£7,678,512	£8,801,616	£1,123,104
Crew	£7,863,700	£9,231,300	£1,367,600
<b>Total</b>	<b>£37,788,263</b>	<b>£44,032,484</b>	<b>£6,244,221</b>

Source: AECOM calculation

## 8.5 Infrastructure Costs

A number of infrastructure improvements will be required to support these proposals, including improvements to the level crossings on the Pembroke Dock branch, signalling improvements at Whitland and Tenby and track layout changes approaching Swansea station from the west. The main features are described below:

- **Level crossings:** Network Rail and Pembrokeshire County Council are examining the feasibility of improving several level crossings between Tenby and Pembroke Dock. Journey times are extended given the requirement for the train stop allowing the driver to observe whether it is safe to proceed. These improvements would deliver faster journey times, and together with the package of signalling improvements described below, this would enable rolling stock to be deployed more efficiently. It is recommended the business case to deliver these improvements is progressed, with Network Rail funding potentially available;
- **Upgraded signalling:** there is also a requirement to upgrade part of the signalling system west of Swansea. In particular, there are constraints at Whitland which requires the train driver to leave the train and walk to the signal box to exchange tokens with the signaller. The tokens give permission for a train to occupy a section of single track. This procedure takes several minutes to complete. There are also signalling constraints at Carmarthen. The removal of these constraints, along with the changes to the level crossings described above, would deliver rolling stock efficiency benefits and reduce journey times.
- **Revised track layout at Swansea station:** to support the proposed service frequencies approaching Swansea from the west, a revised track layout will be required. This would create more flexibility in the network and increase capacity by allowing more than one train to move in or out of the station at the same time. This flexibility will be required when the additional services are introduced at Swansea to maintain reliability. The forthcoming Port Talbot West re-signalling programme could provide a cost effective opportunity to deliver these changes in a cost effective manner. It is understood Network Rail is finalising their proposals for the re-signalling programme during the next couple of months, so it is strongly recommended SWWITCH liaise with the infrastructure provider to ensure these requirements are taken into account when developing the overall scheme.

At this stage, scheme costs have yet to be prepared for the above proposals. Sensitivity tests have been presented to understand the impact of including some of the capital costs into the overall economic business case.

## 8.6 Economic Appraisal

An economic appraisal was prepared to assess the business case for the proposed timetable changes in accordance with appraisal guidance (WelTAG, which is based on WebTAG guidance for economic appraisal). The appraisal covers a 60 year period with an assumed start year of 2018. All costs are adjusted to 2010 prices. The appraisal takes into account user and non-user time savings, environmental benefits, accident reduction benefits, revenue impacts, costs and taxation impacts.

There are two stages to the appraisal; the calculation of the Present Value of Costs (PVC) and the Present Value of Benefits (PVB). The scheme impacts are then brought together in a summary version of the Analysis of Monetised Costs and Benefits (AMCB) table to identify the scheme Benefit to Cost Ratio (BCR). The PVC captures all costs associated with the project, which in this case are the operating costs. Infrastructure investment costs would also be considered in this section, with the earlier sections describing the infrastructure upgrades required. However, a range of tests have been carried out to assess what impact various investments would have on the BCR. The PVB captures the benefits associated with the scheme, which have been converted into monetary format using value of time figures that vary by journey purpose. The PVB includes travel time savings, reductions in noise, pollution and accidents. Changes to indirect tax revenue (which captures lost tax revenue to the government through less fuel being sold to motorists who have switched to rail) are also captured. Growth rates have been applied to the demand and revenue estimates to forecast over the entire 60 year appraisal period. The BCR is calculated by dividing the PVB by the PVC.

Table 8.6 shows the results. Assuming the high growth scenario, the results of the appraisal demonstrate a strong economic BCR of 2.19. Achieving this high growth scenario is a fundamental factor that contributes to the results of the business case, since the results from the central growth scenario indicate a BCR of just 1.47 would otherwise be realised if more pessimistic growth assumptions occurred.

**Table 8.6: Results of the Economic Appraisal (60 year)**

	Central Growth	High Growth
<b>PVC</b>		
Operating Costs	108,979,975	108,979,975
Infrastructure Costs	0	0
<b>Total PVC</b>	<b>108,979,975</b>	<b>108,979,975</b>
<b>PVB</b>		
Revenue	39,710,944	58,186,910
Time Savings	121,528,162	178,366,035
Noise	196,368	294,728
Local Air Quality	2,492	3,002
Greenhouse Gases	987,344	1,472,500
Accidents	2,613,688	3,877,109
Indirect Taxation Revenues	-4,353,291	-7,346,759
<b>Total PVB</b>	<b>160,685,707</b>	<b>234,853,526</b>
<b>BCR</b>	<b>1.47</b>	<b>2.16</b>

Source: AECOM calculation

Sensitivity tests have been completed to calculate the impact of including various infrastructure costs in the appraisal. Table 8.7 illustrates the impact on the BCR if different levels of capital expenditure are assumed. This investment is assumed to occur in the opening year (2018). This indicates the BCR remains relatively strong even if schemes cost reach £20m, with a BCR of 2.04.

**Table 8.7: Sensitivity Tests – Impact of Capital Investment on the BCR**

Investment	BCR
£0m	2.16
£5m	2.08
£10m	2.01
£20m	1.89

Source: AECOM calculation

## 8.7 Revenue Shortfall

Comparing the additional costs of operating the new service with the additional revenue generated reveals a shortfall. There will be difference of between £3-4million per year over the first ten years of operation. This is at the higher end of the range in the early years of the service but as demand grows, the shortfall reduces. This has been calculated based on the high growth scenario and assumes that fares will increase at the rate of RPI+1%.



## **Conclusions and Recommended Next Steps**



## 9 Conclusions and Recommended Next Steps

### 9.1 Main Findings

The SWWITCH Rail Strategy describes a series of recommendations to be completed during the short, medium and long term. There are a number of tasks to be delivered collaboratively with stakeholders during the next five years which will help to maintain the recent growth trends achieved on several routes. The delivery of the short term actions will provide a framework to continue the recent success stories achieved, helping to attract additional passengers in advance of the major timetable improvements to be delivered in the medium term. As stated in the appraisal chapter, maintaining the recent growth trajectory which has been achieved over the last five years will be critical to achieving the longer term growth needed to support a positive economic business case. Figure 6.1 illustrates the short term delivery for schemes to be progressed during the period to 2018.

Figure 9.1: Package of Short Term Proposals for SWWITCH

	2013	2014	2015	2016	2017
<b>Scheme Development</b>					
- Swansea station capacity improvements					
- Other infrastructure works to support future service changes					
- Review of the land use planning strategy					
- Timetable development and operational assessment					
- Station improvements					
- Modal integration					
- Marketing strategy and ticketing initiatives					
- Delivery of level crossing improvements					
- Retention of extra Fishguard trains					
- Procurement of extra rolling stock					

Although many of the medium term interventions are dependent on securing the required additional rolling stock, there are a number of preparatory tasks that need to be completed to ensure the service improvements are delivered in a timely manner once the extra units become available. Engaging with Network Rail to describe the likely revisions to the track layout adjacent to Swansea station should be completed in a timely manner, since there is opportunity as part of the wider Port Talbot re-signalling programme. The proposed changes at Swansea station could be implemented in a cost effective manner if these changes can be incorporated as part of the wider re-signalling programme. SWWITCH will also need to conduct a more detailed assessment of the timetable proposals to ensure it can be delivered robustly. Discussions with Welsh Assembly Government will also be required. Extra rolling stock will need to be secured, whilst additional funding support will be required compared with the current situation, even though the proposals represent good value for money in economic terms.

Many of the longer term proposals will require a watching-brief, with SWWITCH liaising with other stakeholders as necessary to demonstrate their support for these strategic improvements. SWWITCH may need to contribute to the compilation of an evidence base which helps to reinforce the economic importance of these proposals.

### 9.2 Identifying and Mitigating Potential Risks

In developing the rail strategy for the SWWITCH area, the consultants have invited participation from stakeholders as part of a workshop and then consulted with Network Rail to obtain informal feedback regarding the emerging proposals and the interface with the Long Term Planning Process, there are a range of issues to be addressed.

- **Swansea station:** as part of the Port Talbot re-signalling programme, there is an opportunity to deliver a package of incremental capacity improvements as part of the wider infrastructure changes. SWWITCH has a relatively short time period to engage with Network Rail and specify the capacity requirements to support

future service development to / from South West Wales. Engaging with Network Rail at this stage of scheme development should ensure these works are delivered in a cost effective manner;

- **Timetable development and operational robustness:** a package of proposals has been defined to improve connectivity west of Swansea. More detailed analysis is needed to evaluate the operational impacts of the timetable proposals, particularly as revisions to Network Rail's operating regime will be required. The application of Railsys software will also be required to assess these proposals. SWWITCH will need to commission further consultancy work to evaluate these potential risks;
- **Other infrastructure works:** a package of other infrastructure works is required to support the wider timetable changes, for example, signalling improvements at Carmarthen and Whitland. SWWITCH will need to engage with Network Rail and other stakeholders to prepare a compelling business case for these improvements, particularly as a potential reduction in rolling stock operating costs will help to contribute to a robust business case. This business case will need to be compelling, since there may be competing resources available to complete these works;
- **Developing the rolling stock strategy:** SWWITCH and other stakeholders will need to specify their future rolling stock strategy to support the proposed timetable changes. For example, there is potential to retain some of the higher specification Class 175 units that operate between Manchester and West Wales for the service between Swansea and Milford Haven, although these will incur higher lease costs and the 100mph capability is not required given the line speeds west of Swansea. Alternatively, a package of improvements to the existing Class 15X fleet could be introduced. An alternative seating layout could be introduced to improve passenger comfort, with the measures potentially delivered at a similar timescale to the DDA modifications. SWWITCH will need to ensure the incremental funding for this rolling stock strategy is included in the next franchise by demonstrating the economic benefits that would be generated from the extra investment;
- **Demonstrating a robust economic case:** the analysis in Chapter 5 highlighted the proposals would generate good value for money, assuming a high growth scenario was achieved. A package of short term measures is proposed and this will help to generate additional demand during the short term period to ensure the current growth trajectory is maintained. If passenger numbers increase at a slower rate, for example, the changes in passenger numbers were comparable to the forecasts prepared as part of the Wales RUS, this would have a detrimental impact on the overall business case and could mean the overall scheme fails to offer good value for money. As a result, the implementation of the short term package of measures will be essential to achieve these outcomes.

## Appendix A Supplementary Datasets



## Appendix A Supplementary Datasets

**Table A1.1: Total Annual Journeys using the Pembroke Dock Line**

Sector	Journeys	%
Swansea	20,739	11%
East of Swansea to Cardiff	21,148	11%
West of Swansea (Gowerton to Whitland)	59,172	30%
Heart of Wales Line (Bynea to Shrewsbury)	373	0%
West of Whitland to Milford Haven & Fishguard Harbour	517	0%
West of Whitland to Pembroke Dock	51,637	26%
Beyond Cardiff	43,767	22%
<b>Total</b>	<b>197,353</b>	<b>100%</b>

Source: AECOM analysis of MOIRA data

**Table A1.2: Total Annual Journeys to/from Milford Haven and Fishguard Harbour Lines**

Sector	Journeys	%
Swansea	34,210	12%
East of Swansea to Cardiff	56,537	21%
West of Swansea (Gowerton to Whitland)	59,581	22%
Heart of Wales Line (Bynea to Shrewsbury)	563	0%
West of Whitland to Milford Haven & Fishguard Harbour	20,171	7%
West of Whitland to Pembroke Dock	438	0%
Beyond Cardiff	102,688	37%
<b>Total</b>	<b>274,188</b>	<b>100%</b>

Source: AECOM analysis of MOIRA data

**Table A1.3: Total Annual Journeys using the Heart of Wales Line**

Sector	Journeys	%
Swansea	27,532	19%
East of Swansea to Cardiff	6,533	4%
West of Swansea (Gowerton to Whitland)	11,973	8%
Heart of Wales Line (Bynea to Shrewsbury)	89,083	61%
West of Whitland to Milford Haven & Fishguard Harbour	199	0%
West of Whitland to Pembroke Dock	123	0%
Beyond Cardiff	10,378	7%
<b>Total</b>	<b>145,821</b>	<b>100%</b>

Source: AECOM analysis of MOIRA data

**Table A1.4: Total Annual Journeys – Screenline Between Pembrey & Burry Port & Llanelli**

<b>Sector</b>	<b>Journeys</b>	<b>%</b>
Swansea – West of Swansea	145,449	23%
Swansea – Milford Haven / Fishguard	34,210	5%
Swansea – Pembroke Dock	20,739	3%
East of Swansea – West of Swansea	90,756	14%
East of Swansea – Milford Haven / Fishguard	56,061	9%
East of Swansea – Pembroke Dock	20,114	3%
West of Swansea (internal)	76,600	12%
West of Swansea – Heart of Wales Line	934	0%
West of Swansea – Milford Haven / Fishguard	6,743	1%
West of Swansea – Pembroke Dock	8,023	1%
West of Swansea – Beyond Cardiff	86,232	14%
Heart of Wales Line – Milford Haven / Fishguard Harbour	496	0%
Heart of Wales Line – Pembroke Dock	202	0%
Milford Haven / Fishguard – Beyond Cardiff	70,091	11%
Pembroke Dock – Beyond Cardiff	18,836	3%
<b>Total</b>	<b>635,486</b>	<b>100%</b>

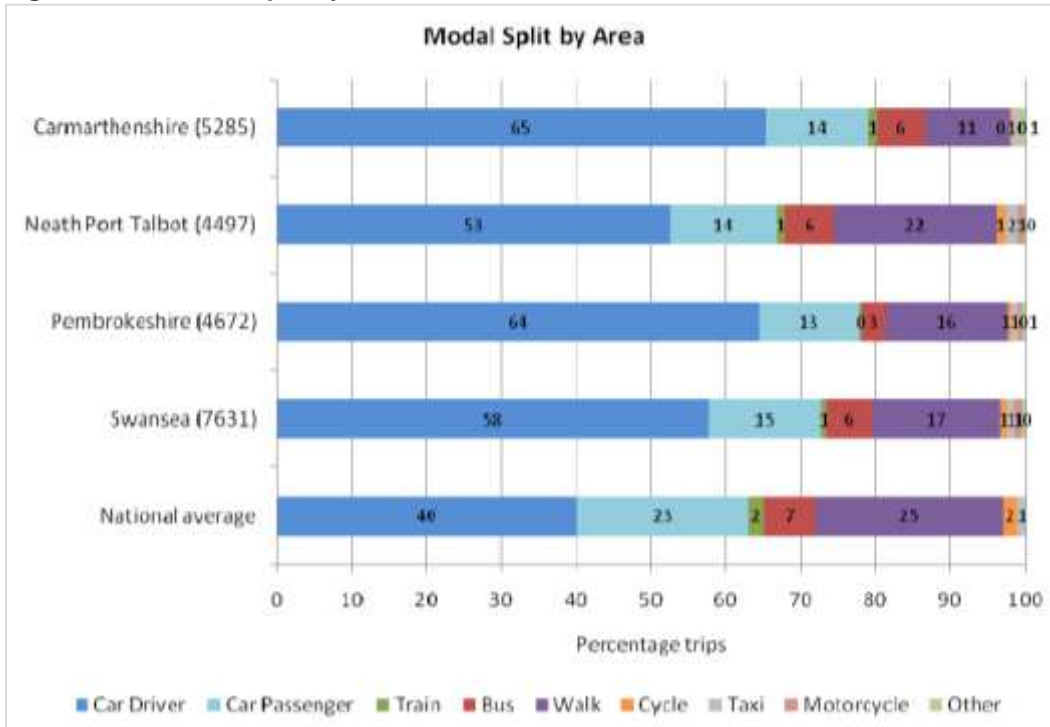
Source: AECOM analysis of MOIRA data

**Table A1.5: Total Annual Journeys – Screenline Between Baglan and Port Talbot**

<b>Sector</b>	<b>Journeys</b>	<b>%</b>
Swansea – East of Swansea	388,760	34%
Swansea – Beyond Cardiff	133,984	12%
East of Swansea (internal)	228,804	20%
East of Swansea – West of Swansea	161,567	14%
East of Swansea – Heart of Wales Line	3,092	0%
East of Swansea – Milford / Fishguard Lines	53,473	5%
East of Swansea – Pembroke Dock Line	8,682	1%
East of Swansea – Beyond Cardiff	22,120	2%
West of Swansea – Beyond Cardiff	82,969	7%
Milford / Fishguard Lines – Beyond Cardiff	59,484	5%
Pembroke Dock – Beyond Cardiff	3,047	0%
<b>Total</b>	<b>1,145,952</b>	<b>100%</b>

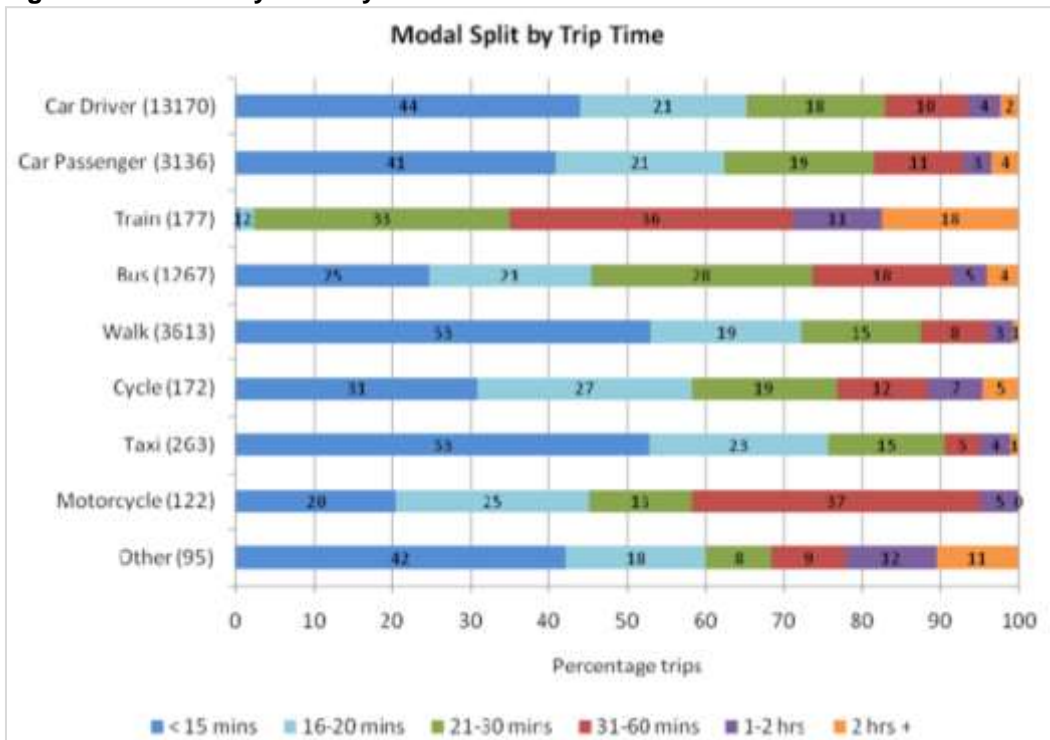
Source: AECOM analysis of MOIRA data

**Figure A1.1: Modal Split by SWWITCH Area**



Source: AECOM analysis of household interview surveys conducted within the SWWITCH area

**Figure A1.2: Journey Time by Mode in SWWITCH Areas**



Source: AECOM analysis of household interview surveys conducted within the SWWITCH area

## Appendix B Glossary





## Appendix B Glossary

- **Control Period:** Network Rail's scheduled investment in maintenance, renewals and enhancements is specified for five year Control Periods (Control Period 5 is between 2014 and 2019, with CP6 for the following five years)
- **Gauge clearance:** gauge clearance refers to the physical size of units permitted to use each route
- **Great Western Main Line:** the line from London Paddington to South Wales via Reading, Bristol Parkway, Cardiff Central, Port Talbot Parkway, Swansea and Milford Haven;
- **Guide to Railway Investment Programme (GRIP):** Network Rail's phased programme to develop and deliver infrastructure schemes. GRIP 1 illustrates the initial feasibility work for a scheme, whilst GRIP 5 represents the most detailed design stage prior to construction. GRIP stages 6-8 cover the construction period;
- **Local Term Planning Process:** LTPP is an evidence based study led by Network Rail that consists of a set of Market Studies and Route based Studies, identifies the economic factors that will influence changes in demand over the next 10 to 30 years, considers recent significant changed planning context within industry by assessing gaps between existing capacity and future demand.
- **MOIRA service group:** each group of services within MOIRA is allocated a unique four digit revenue code, for example, passengers boarding trains between Milford Haven and Swansea are allocated to 4320. MOIRA is a demand forecasting programme used by the Welsh Government and train operators to estimate the impact of timetable changes to
- **National Station Improvement Programme:** Network Rail has awarded funding to stations to deliver a programme of station improvements, with the scale of improvements dependent on the level of existing constraints and the number of passengers using the station;
- **Network Rail Working Timetable:** this illustrates the timing points at stations and junctions to the nearest 0.5 minute and includes timings for freight trains;
- **Rolling Stock - Class 14X unit:** this includes Class 142 or 143 units. These units use former bus chassis and as a result offer relatively poor passenger comfort given the noise and relatively low operating speeds;
- **Rolling Stock - Class 15X unit:** these units include 2-car Class 150s or 1-car Class 153s. These units have a maximum speed of 75mph and are unsuitable for long inter-urban journeys with the internal seating layout contributing;
- **Rolling Stock - Class 175 unit:** these units typically operate between Manchester and Carmarthen / Milford Haven. Operating speeds are up to 100mph, and units are air conditioned;
- **Rolling Stock – High Speed Train:** the units have been reconfigured with high density seating to accommodate passenger numbers on the busiest section. Operating speeds are up to 125mph, and units are air conditioned;
- **Rolling Stock – Intercity Express Programme train:** new electric or bi-mode trains (electric units with a diesel motor) that will be introduced on the GWML from 2018.
- **Route availability:** Route availability relates to the system of grading track and structures and the weight of trains permitted. The higher the RA number, the heavier the freight trains permitted to operate;
- **Route Utilisation Strategy:** replaced by the LTPP described above. As part of the RUS process, Network Rail used baseline data and examined the potential changes affecting the railway to assess the requirement

for potential service enhancements and examine whether there is an economic business case for these changes.

- **Screenline:** a screenline records the total number of trips passing each part of the network. Analysis of trips crossing a notional screenline enables the distribution of trips to be reviewed in more detail, for example, a screenline between Baglan and Port Talbot can be used to understand the number of trips to Swansea or journeys to stations west of Llanelli to understand the cross-Swansea travel market;
- **Skip-stop calling pattern:** refers to a train service that only calls at selected stations, for example, trains which call at Neath between Port Talbot Parkway and Swansea. Usage of the intermediate stations does not justify all trains calling, so these trains adopt a skip-stop calling pattern;
- **Time period:** the AM Peak refers to the period between 07.00 and 10.00 on weekdays, whilst inter-peak services represent trains between 10.00 and 16.00.