# Solent Connectivity

# May 2020

## Continuous Modular Strategic Planning

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# 1.0 Executive Summary

We are pleased to present the Solent Area Connectivity study, which sets out a number of investment choices which to enable train service improvements which would accommodate forecast growth and make rail a more attractive choice for travel across and within the Solent area in future, encouraging modal-shift from the private car and assisting efforts to address local transport, development, economic and environmental issues.

This study has been completed as part of the Continuous Modular Strategic Planning (CMSP) approach adopted under the Long-Term Planning Process (LTPP). Industry partners have participated in the study which has been jointly led by Network Rail and Solent Transport.

Whilst Solent has a substantial rail network (32 stations and about 70 miles of passenger route across several lines) many local stakeholders believe it is under-utilised as a mode of travel for journeys within the Solent area, and that there is scope for rail to play a greater role in meeting the transport needs of what is one of the UK's largest urbanised areas. With a combined population of 1.3 million, Solent is the 7th largest built up area in the UK - comparable in scale to "core" cities such as Liverpool, Newcastle or Glasgow.

Solent is the largest growth area on Network Rail's Wessex route outside of greater London, with over 100,000 new homes planned to be built by the mid-2030s, as well as having several nationally important economic assets, most notably the Ports of Southampton and Portsmouth.

The Solent area has a higher than average level of reliance upon the private car, driven in part by a trend of structural, development and demographic "decentralisation" in the area since the 1980s. To date public transport networks in the area (including the rail network) have not been significantly supported to adapt to these changes. "Car dependency" and the impacts of development on a strategic highway network with little scope to expand to meet further demand growth are key problems facing the area over the coming decades, together with a need to resolve a number of issues resulting from high levels of car usage - including poor air quality and economic underperformance. There are also long-held aspirations for transformational improvements to the linkages between Portsmouth and Southampton.

This study has set out Strategic Questions for development of the rail network to support three key themes:

- rebalancing the economy;
- improving wider transport connectivity;
- planning for sustainable growth.

This study has identified where rail has potential to play a greater role in the intra-Solent travel market in future (Section 5), if developed to do so. The core priority for development of local rail services in Solent should be to better serve "medium distance" journeys within

the wider Portsmouth and Southampton city regions to their respective city centres and key employment hubs, together with improving connections between the two wider city regions.

These are already "markets" where rail has some ingredients for success: our analysis shows that in the AM peak hour, the physical speed/ journey time on existing train services is quicker than driving on about two thirds of the possible station-to - station journeys within Solent.

However, this potentially competitive position is severely undermined by the low frequency of train services at present, especially at smaller stations serving local suburbs and communities. Currently about half of the stations in Solent are served by only a basic once-hourly service. This includes numerous stations in urban/ city locations with substantial populations nearby. It is recommended that improving train frequency, rather than speed, should be the focus for development and enhancement efforts, if rail is to better meet its potential for local/sub-regional connectivity.

At present only around 2.3% of all commutes in Solent are by rail. If train frequencies could be significantly improved (to an aspirational target of 4 trains per hour at all stations) evidence presented in this study (Section 6.1) suggests rail's mode share could be doubled (or more), playing a significant role in addressing the transport challenges identified in Solent.

There is also a demand-led need to improve local rail services within the Solent area. The scale of growth that is forecast would not be easily accommodated by the current train frequency/service levels at peak times (Section 5.8). If the aspirations of some stakeholders, such as Transport for the South East, were to be realised, demand and growth would be an even larger issue needing to be addressed.

A long-list of 27 potential service improvements was initially evaluated, with a shortlist of five high-potential options progressing to timetable and economic evaluation.

Headline results of this work show that an additional 2tph via the Netley line (with either stopping or "semi fast" calling patterns) perform best against a wide range of criteria, with an additional 2tph Portsmouth-Winchester also performing well against most criteria.

Each of these options would improve city to city and local connectivity and increase frequency across the network as well as supporting the anticipated growth.

It was known from the outset of this study that the network in the Solent area has limited capability to accommodate significant extra services without additional infrastructure, and that some infrastructure interventions would be necessary to enable any of the five shortlisted options. Challenges and complexities in timetabling new services arise due to:

- The number of intermediate stations which stopping trains serve and their speed/ journey time differences compared with faster services;

- Long signalling headways covering specific parts of the route;
- Long single-track sections;
- Lack of intermediate overtaking opportunities;
- Significant scope for importing delays from adjacent corridors;
- Limited platform capacity at key stations, and capacity impacts of terminating trains- particularly at Portsmouth and Southampton.

There are some potential infrastructure interventions which have been initially assessed for engineering feasibility as part of this study and these are detailed in the next steps at the end of this Executive Summary.

The delivery of these interventions should enable improved, higher frequency rail connections across the Solent area, enabling rail to play a greater role in addressing local challenges, and support efforts to improve rail service resilience and performance. The options set out in this study would complement the Transforming Cities Fund proposals for Portsmouth and Southampton City Regions, and align with Transport for the South East's aspirations to improve rail connectivity and journey times between the main urban areas along the south coast corridor

These improvements would also substantially improve connectivity between Portsmouth and Southampton as a result of increased train frequency and opportunities for better timetabling of services. They would also improve connectivity to Southampton Airport through improving the range of connections to eastbound services at Southampton Central and/or Eastleigh.

However, achieving "transformational" change in city-to-city connectivity would require much larger higher cost infrastructure interventions, beyond the scope of this study. Improvements in the short and medium term, such as those proposed in this study, would help to grow the overall size of the city-to-city rail market (from its current low base), and in time this might start to create a stronger platform from which to develop and secure funds for large-scale interventions required for "transformational" change. Other complementary measures, such as improving access to stations (potentially following the prioritisation set out in Section 9) could also boost rail's role in the transport mix in the short to medium term.

**The next steps are to take the following forward as projects in the Rail Network Enhancements Pipeline (RNEP) process:**

- Double tracking of the Botley Line to increase capacity;
- Conversion of the current bay platform at Fareham, Platform 2, into a through platform to provide a passing opportunity at Fareham- thereby improving timetabling flexibility and resilience;

- Totton down siding electrification and level crossing closure - to allow trains to terminate at Totton instead of terminating at and occupying a through platform at Southampton Central, whilst also providing enhanced connectivity for Totton which is an under-served station. These improvements would be useful for Waterside Rail (Fawley branch line) services should local aspirations for passenger services on this route prove viable;
- Alteration of signalling for Platform 1 at Eastleigh to enable operation as a bi-directional platform, and associated layout/crossover changes- this would improve flexibility in the Eastleigh area, and greater use of the relatively lightly-used Platform 1 by southbound trains from Chandlers' Ford would help improve track/platform capacity elsewhere in the station area ;
- Reopen the disused Platform 2 at Portsmouth Harbour station to provide additional platform capacity at the station, or alternatively provide an additional platform at Portsmouth & Southsea.

**In addition, the recommendation is to work on further development in partnership with Transport for the South East and other partners on several linked strategies and plans**

***Options for the Transport for the South East's (TfSE) Outer Orbital Area Study***

In the Draft Transport Strategy for the South East (2019), TfSE emphasised the importance of developing the cross-regional passenger rail offer for journeys that avoid London in order to provide an alternative to the equivalent road journey. We are recommending that the Outer Orbital Area Study take forward and appraise the infrastructure options and the shortlisted train service options set out in this study as well as examining/developing complementary interventions covering the following:

- Line speed improvements to improve east-west journey times;
- Consistent spacing of train service intervals within the timetable;
- Optimising the mix of long-distance and stopping services;
- Increasing the volume of services between Brighton and Southampton/Bristol;
- Encapsulating the recommendations of the West Coastway study.

***Transforming Cities Fund proposals and schemes***

Further development of Solent rail connectivity schemes should aim to complement local Rapid Transit and walking/cycling network development strategies, which are funded (or are likely to be funded) in Southampton and Portsmouth city regions via the Transforming Cities Fund and any subsequent funding opportunities.

# 2.0 The Solent CMSP Study

## 2.1 Scope and Geography

The main focus of this study is use of the rail network for passenger journeys within the Solent area and opportunities to improve this, to address issues affecting local stakeholders.

The wider Solent sub-region has a population of approximately 1.3 million, in an almost continuously developed area stretching some 25 miles from Emsworth, in the east to Totton in the west. The combined population of the urbanised areas in Solent is comparable to core cities such as Liverpool, Newcastle or Glasgow and their hinterlands.

Although Southampton and Portsmouth collectively have a population of 491,000 and are the largest "hubs" for the sub-region, the demography and development of the area has become increasingly decentralised in the last four decades (see Section 3.3) with more population and development occurring outside the cities than within. Combined with a complex "rivers and harbours" geography many difficult transport challenges exist as a result of car-dependency, particularly outside the two cities- resulting in traffic congestion and environmental, economic and health impacts that this causes.

The Solent area's GVA value stood at £30.6 billion in 2017 (11.4% of output in the SE England region[1]). Solent's economy is primarily built around the marine and maritime sector, and the area's role as a strategic economic gateway with two nationally important ports. However, the Solent area has a multi-faceted economy, albeit one which has historically underperformed versus comparators. Transport issues have been identified as one significant factor contributing to this underperformance.

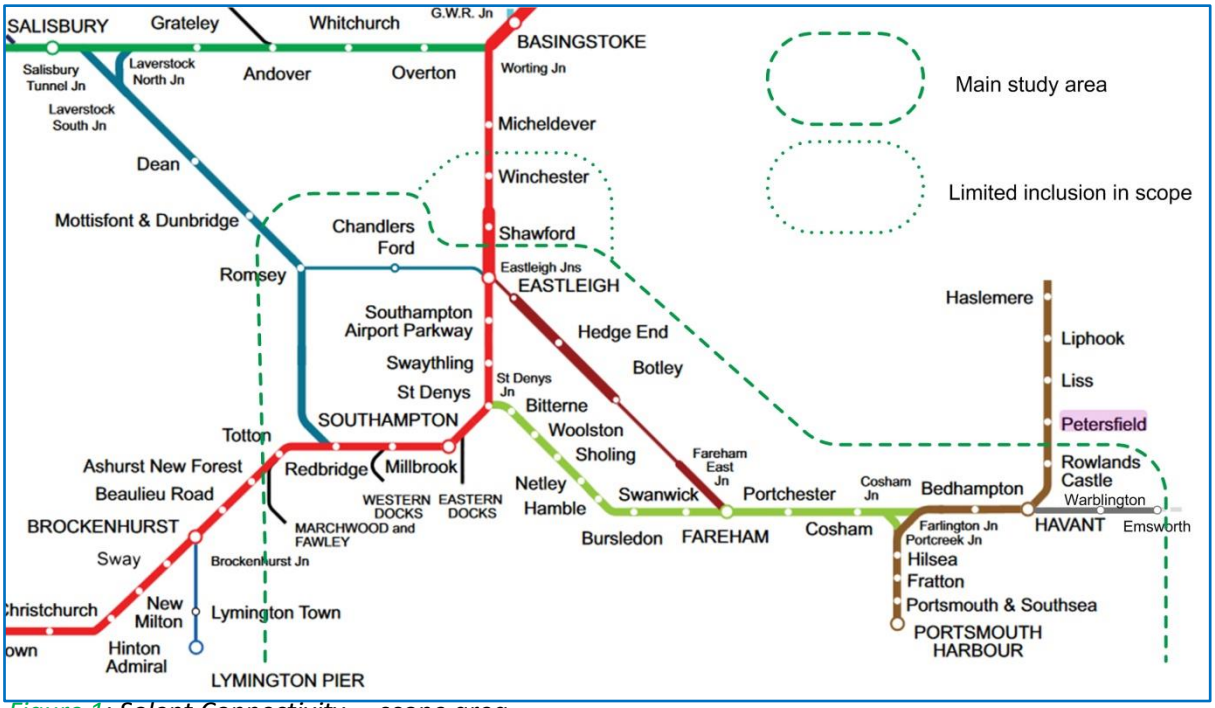



*Figure 1: Solent Connectivity —scope area*

[1] https://solentlep.org.uk/media/2743/solent-lis-emerging-evidence-base-for-prosperity-panel-review-120719-004.pdf

Figure 1 shows the focus area for the Solent Connectivity study. The Isle of Wight (and Island Line) are not included in this study as current plans for major regeneration of the Island Line are funded and are being progressed by Network Rail, SWR and other partners[2].

The Solent has a reasonably substantial rail network, with 31 stations and about 70 miles of passenger route on several lines (with a further 10 miles of lines currently only used for freight). At present, the dominant function of rail in Solent is for passenger transport to London (along the south western mainline), and for freight transport from Southampton to the Midlands/ the North. Most other passenger services are cross-boundary regional / long distance services eg to Bristol/Cardiff (GWR); to Birmingham and the North (CrossCountry); and to Brighton, Gatwick Airport, and London Victoria (Southern). There are few train services which solely or primarily serve shorter distance intra-Solent travel markets.

## 2.2 Fit with wider rail industry strategy

Greater devolution of economic planning, transport planning and decision-making means that the strategic development of the railway involves greater complexity when compared with strategies produced in the past. Network Rail's Long-Term Planning Process is called Continuous Modular Strategic Planning or CMSP.

The CMSP process aims to deliver the following outcomes:

- Explicit focus on the needs of customers (passengers and freight end-users);
- Improved engagement with train and freight operators as "voice" of these customers;
- Move away from Control Period funding to a continuous enhancements pipeline;
- More support for the needs of devolved Route businesses with Route-based plans.

The CMSP process marks a move away from undertaking large Route Studies aligned to Control Periods to an ongoing process of continuous planning that addresses more focussed "modules". A key objective for CMSP projects is to help identify how rail can serve the transport needs of specific areas and address strategic questions for those areas working in close engagement with stakeholders including Local Authorities, Local Enterprise Partnerships and Passenger/ User Groups. Outputs of CMSP studies are then intended to be carried forwards into collaborative development, funding and delivery of measures which help to address the identified issues and gaps.

Further details on the Long-Term Planning process can be found at:

https://www.networkrail.co.uk/running-the-railway/long-term-planning .

[2] https://www.southwesternrailway.com/other/news-and-media/news/2019/september/uks-oldest-train-fleet-updated-with-26m-investment-into-isle-of-wights-railway

The Solent Connectivity study is one of the first CMSP studies prepared by Network Rail's Wessex Route. The Solent area was chosen for a variety of reasons, including:

- The current Wessex Route Study provides a high- level plan for the next 20 years for the Wessex route but is mostly focused on travel into London and a need has been identified by Network Rail and its stakeholders to fill in some gaps in geographic coverage principally affecting the South Hampshire and Solent area;
- The Solent area is the largest growth area outside of Greater London on the Wessex Route, and the largest Built Up Area in the entire TfSE area, hence it is believed there may be particular opportunities for rail in this area;
- The rail network's configuration and demand/usage is quite complex in Solent, with competition for limited capacity amongst different sectors of rail service (eg freight, long distance passenger, local passenger) and some parts of the network are close to capacity already, such that they could become constraints on delivery of enhancements aimed at supporting other markets (eg improved capacity into London).

## 2.3 Governance and process

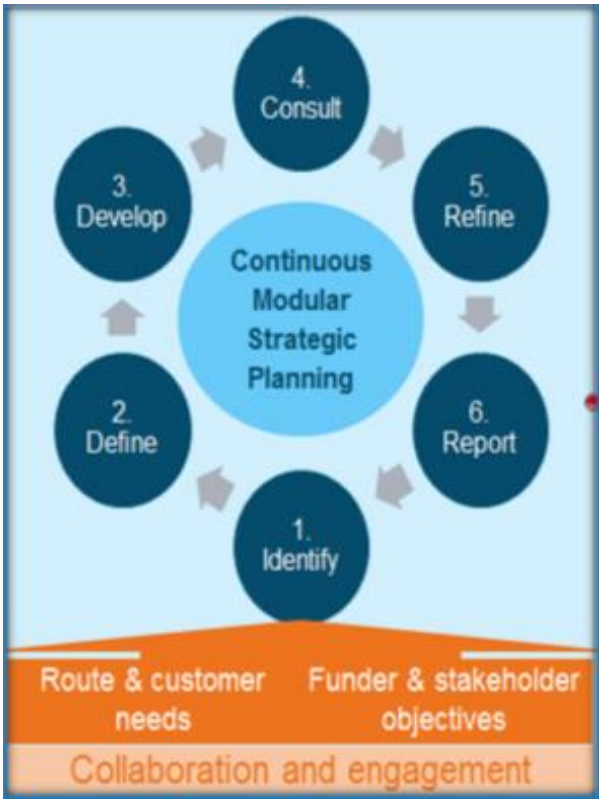



*Figure 2: CMSP Process*

The process diagram on the left summarises the CMSP process. Through collaboration with our funders and stakeholders a specific strategic need or issue (a "module") is identified and defined.

A Working Group is established with members of our stakeholder, passenger and funding groups as members. It is this group that develops the "strategic questions" the study will answer, consults and refines solutions until options and recommendations can be made.

A study document is published which presents options for funders to address these questions, and which forms the basis of Network Rail's strategy for the geographical area covered. It also informs discussions with our funders regarding the next stages of scheme development (e.g. development of business cases and entry to the Rail Network Enhancements Pipeline[3]).

[3] https://www.gov.uk/government/publications/rail-network-enhancements-pipeline

The process can lead on to or signpost to future strategic needs or issues, hence the continuous nature of the CMSP process.

The Solent area has a complex stakeholder structure including a two-tier local government structure in some areas but a Unitary local government structure in others. Organisational boundaries do not always follow geographical or settlement boundaries. Several cross-boundary partnerships have been set up (including Solent Transport and Partnership for South Hampshire/ PfSH) to seek to address these complexities.

Figure 3 (below) summarises the different roles and functions of key stakeholders that the Solent CMSP study interfaces with.

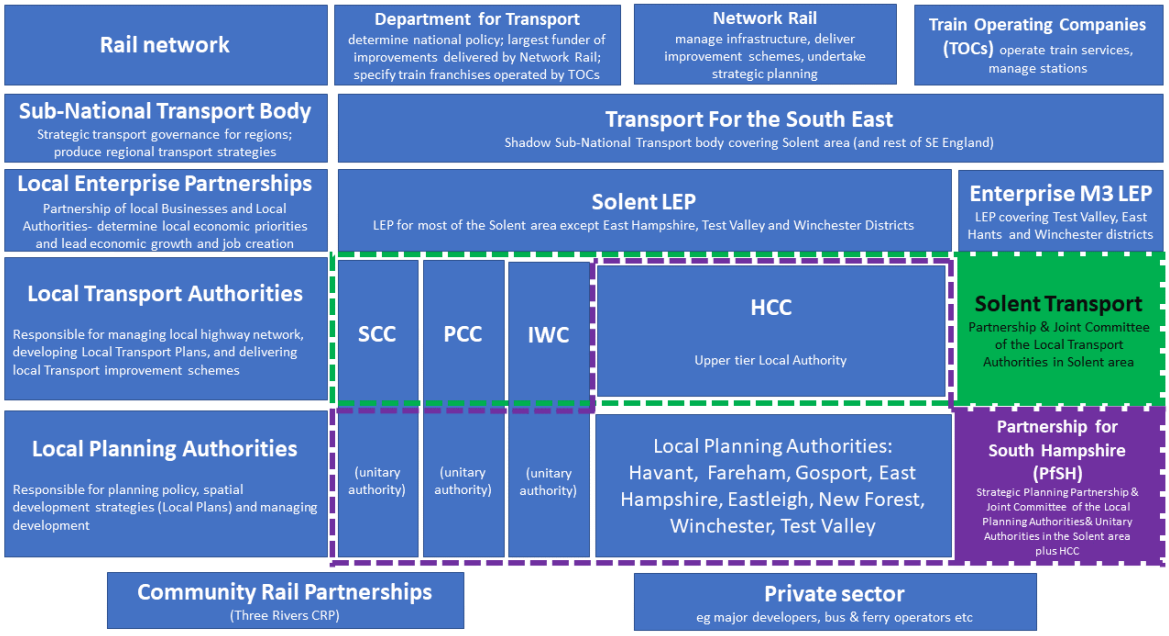



*Figure 3: Identified Stakeholders*

The following groups were set up to support development of this study and to ensure engagement with as many of the stakeholders identified above as possible:

- *CMSP Working Group:* the main stakeholder meeting, with representation from the Department for Transport, Network Rail, South Western Railway, Govia Thameslink Railway; Community Rail Partnerships, Solent Transport and its individual Local Transport Authority members; the Local Planning Authorities (District/Borough Councils) in the Solent area, and Solent Local Enterprise Partnership;
- *CMSP Technical Working Group* which undertook the technical work to answer the strategic questions, primarily consisting of Network Rail, South Western Railway, and Solent Transport.

Both groups have met approximately monthly since February 2019, and some engagement with other stakeholders, e.g. TfSE has occurred outside of these groups. As the study progressed, activity and outputs were reported upwards to several groups:

- The *Wessex System Operator CMSP Board*: internal forum where decisions made in the Working Group are agreed by the Head of Strategic Planning for the Wessex Route;
- *Route Strategy Planning Group (RSPG):* internal strategy forum for Wessex System Operator to engage with Wessex Route (and other internal) colleagues;
- *Route Investment Review Group (RIRG):* forum through which Wessex System Operator engages with rail industry partners such as train and freight operators and Rail Delivery Group (RDG).

The final part of the governance structure is the *Wessex Programme Board*. This is chaired by DfT and provides the means for Network Rail to bring forward schemes into the Railway Network Enhancement Pipeline (RNEP), such as those suggested in this CMSP. The Wessex Programme Board has been updated and consulted on the Solent CMSP study as it has progressed, and the decision on publication of the final CMSP document will be made through the Wessex Programme Board.

Figure 4 summarises the governance structure.

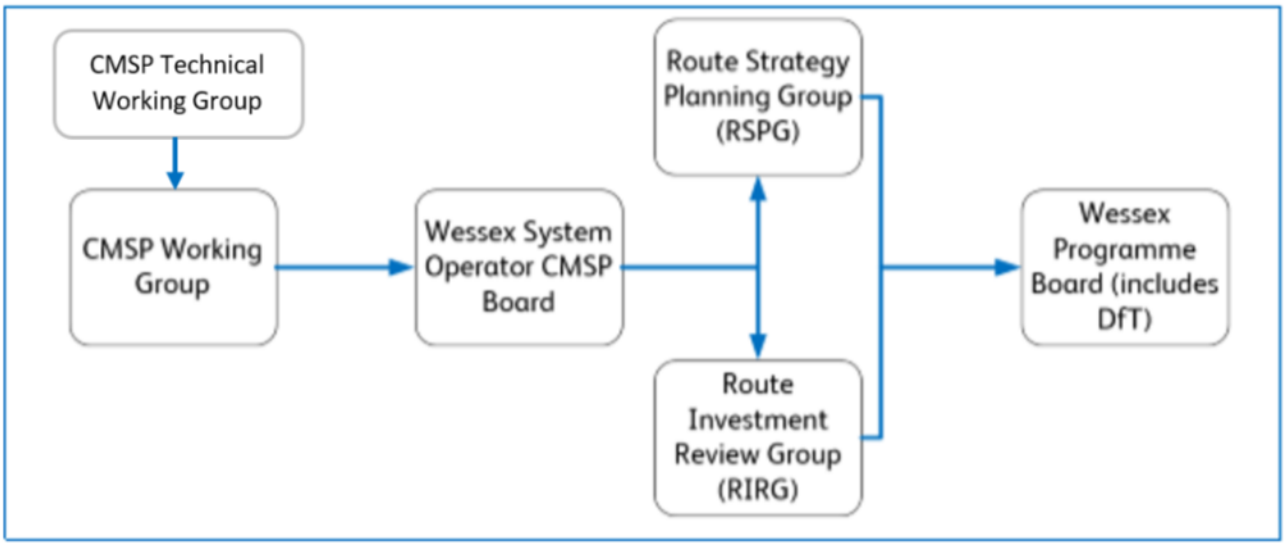



*Figure 4: Governance Structure*

# 3.0 Context and Strategic Questions

This section of the report sets out the Strategic Questions that the Solent Connectivity CMSP study set out to address and provides context for these- both at a strategic level (covering drivers such as development, economy and wider issues) and focused on the rail network serving Solent today.

## 3.1 Strategic Questions

In consultation with the CMSP Working Group and in light of the challenges and strategic themes described in the following pages the following Strategic Questions for this study were agreed:

*Table 1: Strategic Questions*

| Strategic Theme | Strategic questions |
|---|---|
| Rebalancing the economy | Q1: What does the rail freight industry require of the Solent area?<br><br>Q2: What are the are the key local travel markets that the rail network in the Solent area serves, or needs to serve in future? |
| Wider Transport Connectivity | Q3: What City to City journey time and frequency is required to be competitive with road travel between the two cities the peak and off peak?<br><br>Q4: What inhibits demand at the lowest usage stations in the Solent area, and what actions could increase usage? |
| Planning for Sustainable Growth | Q5: What level of rail service is required in order for rail to support sustainable growth and development in the large urban areas of the Solent and make a larger contribution to local efforts to enhance the public transport offer and secure mode shift away from the private car?<br><br>Q6: What is the extent of poor rail service resilience in the Solent area and how can this be addressed? |

## 3.2 Economic context

Central to the Solent's economy are Southampton and Portsmouth ports. Southampton is one of the UK's busiest ports, handling the second highest volume of container traffic (after Felixstowe), the largest volume of vehicle imports/exports, and the largest volume of cruise passengers. It is also the UK's number one port for trade with non-EU markets.

Portsmouth International Port is the other key gateway and is England's second busiest passenger port (after Dover) with numerous cross-channel ferry services which also move substantial volumes of freight between the UK and European destinations.

*Figure 5: Cruise ship event, Mayflower Park, Southampton*

Southampton International Airport is a third international gateway for the area, serving a primarily local market but with current proposals to significantly grow its current 2 million passenger per year volumes by the 2030s

The Solent area is also the main access to the Isle of Wight, with five of the six ferry routes between the mainland and the Island operating from Portsmouth and Southampton.

Collectively nearly 10 million annual passenger journeys travel through these "gateways", many of which arrive at the ports and airport by rail.

| Gateway/route | Annual passenger volume, millions | Year |
|---|---|---|
| Portsmouth International Port-cross channel ferry & cruise | 2 | 2018[4] |
| Portsmouth to Ryde (IOW) passenger ferry | 1.24 | 2018[1] |
| Southsea to Ryde (IOW) passenger hovercraft | 0.8 | 2016[5] |
| Southampton Airport | 1.99 | 2018[6] |
| Southampton to West Cowes (IOW) passenger ferry | 1.2 | 2016[2] |

*Table 2: Annual passenger journeys (in millions)*

[4] https://www.portsmouth-port.co.uk/uploads/downloads/BOOK18.pdf
[5] https://www.iow.gov.uk/azservices/documents/1190-TITF-Ferry-Assessment-FINAL.PDF
[6] https://www.southamptonairport.com/about-us/facts-figures/

| | | |
|---|---|---|
| Southampton Port- cruise | 1.9 | 2018[7] |

The Port of Southampton is a nationally important generator of rail freight demand, particularly for movement of containers and vehicles between Southampton and the Midlands/North (see Section 4.4).

There is a strong skills base in the engineering, manufacturing and research sectors (with two universities in Southampton and one in Portsmouth), presence from significant players in the finance and services sectors, and a strong visitor economy driven by natural assets such as the coastline and the New Forest and South Downs National Parks. This contributes to a significant and vibrant demand for travel to, from and within the area from a range of different users.

Despite the strengths described above, Solent's economy underperforms compared to regional (South East) and national averages. Solent's annual GVA growth between 2009 and 2017 (1%) was slower than the wider South East region (2%), and the rest of the UK (2%). In addition to having lower GVA growth than the wider South East and UK averages, the Solent is also consistently lower than regional and national levels of GVA per head.

Solent LEP's research has indicated that this underperformance is linked to several factors including a higher than average proportion of jobs in low-productivity sectors, lower education/skills attainment, and connectivity and transport issues.

Solent LEP is currently developing a Local Industrial Strategy (LIS) which will set out set out ambitious plans for the region by building on its' distinctive strengths to contribute to the goals of the UK Industrial Strategy. Solent LEP's published Emerging Evidence Base[8] (2019) summarises research, analysis and engagement that is informing the LIS and indicates the "direction of travel" for the final Strategy.

This Evidence Base identifies that Solent has strengths and opportunities to further grow in current specialisms such as marine and maritime and clean growth sectors but identifies connectivity and productivity as one of the primary weaknesses. In engagement and surveys of over 1750 individuals and businesses by the LEP, transport connectivity was raised as an area for improvement by two thirds of responses. Slow rail journey times between Portsmouth and Southampton were identified as a significant issue for business.

The Evidence Base suggests that the LIS (when published) will identify and promote changes that will help firms across a range of sectors (and particularly those where Solent is currently strong) achieve better productivity outcomes. This is likely to mean continued promotion of measures such as those identified in the LEP's Solent Strategic Transport Investment Plan (2016)- see page 26.

[7] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/844839/sea-passenger-statistics-all-routes-2018-final.zip

[8] https://solentlep.org.uk/media/2743/solent-lis-emerging-evidence-base-for-prosperity-panel-review-120719-004.pdf

## 3.3 Travel patterns and changes over time

Intra-Solent commuting is the largest intra-urban travel market in SE England outside London by a large margin[9]. 85% of commute trips starting in the Solent area are self-contained (both starting and ending within Solent). Commuting flows to London from Solent (a key market for the Network Rail Wessex Route) are a relatively insignificant part of overall travel demand with most of Solent being beyond the London commuter belt as shown in Figure 6 below and expanded upon in Section 5.1. However, connectivity with London is highly valued by stakeholders in the local economy.

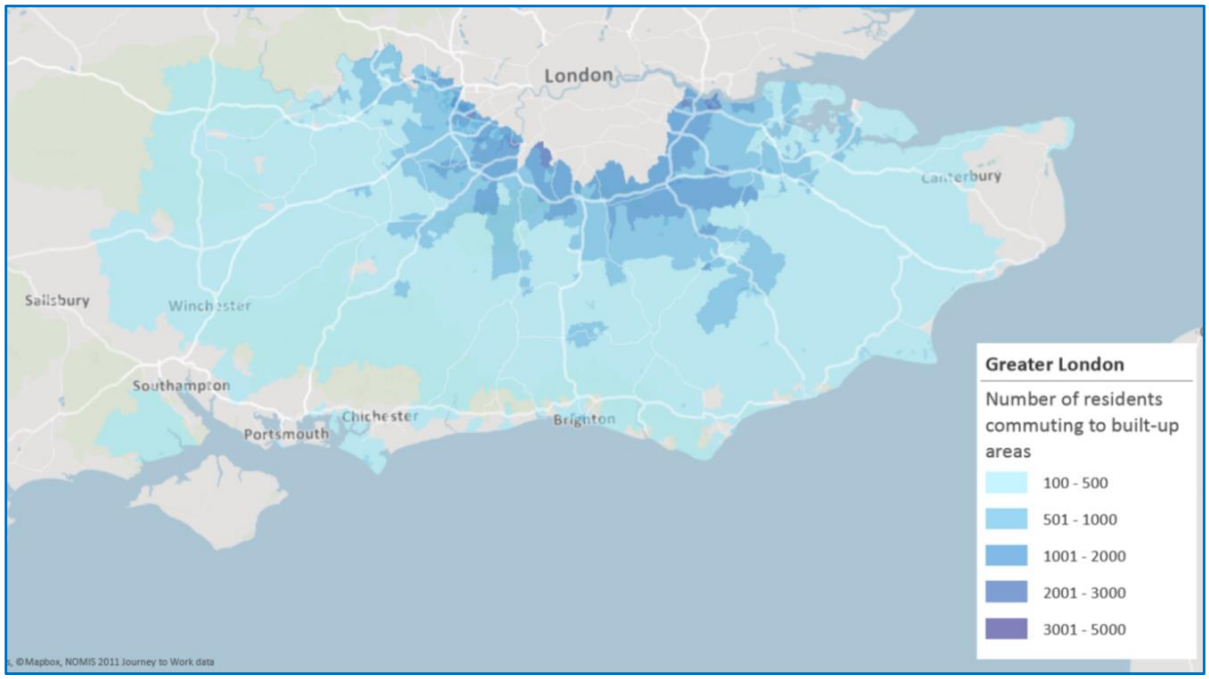



*Figure 6: Commuter Catchment of Greater London (from TfSE Economic Connectivity Review)*

Solent functions as a dual-city region, and Portsmouth and Southampton both have their own distinct travel to work areas defined by ONS[10]. The importance of out-of-city hubs for employment, retail and other generators of travel demand (in locations such as Hedge End and Whiteley) has increased as a result of development along the M27 corridor (which connects Portsmouth and Southampton). This has resulted in wholesale changes to patterns of travel demand over the last four decades.

The key underlying trends (as set out by Solent LEP analysis[11]) are:

- *Population growth has been strongest outside the two cities:* Between 1981 and 2014, population in Portsmouth and Southampton only grew by 9% and 17%, whereas growth in Eastleigh (39%) and Test Valley (30%) was higher (see also Figure 7);

[9] https://transportforthesoutheast.org.uk/wp-content/uploads/2018/07/FINAL-Economic-Connectivity-Review.pdf
[10] https://ons.maps.arcgis.com/apps/MapSeries/index.html?appid=397ccae5d5c7472e87cf0ca766386cc2
[11] https://solentlep.org.uk/media/1514/tip-final-web-version.pdf

- *Commuting self-containment within the two cities has fallen:* From 73% to 65% in Portsmouth, and from 66% to 56% in Southampton, between 2001 and 2011;
- *Self-containment of faster-growing surrounding districts is low* eg Fareham (36%), Eastleigh (37%);
- *….and these adjacent areas are exporting significant numbers of workers:* 24% of Havant residents work in Portsmouth; 20% of Eastleigh residents work in Southampton;
- *Meanwhile, newly developed employment areas on the M27 Corridor attract commuters from a wide swathe of the Solent area, including out-commuters from the two cities:* e.g. 28% of commuters to Whiteley are from Fareham; 14% are from Eastleigh; 13% are from Southampton, 12% are from Portsmouth[12]. This reflects relocation of some major employers from the city centres to these sites (eg Zurich Insurance and HSBC both moving to Whiteley, from Portsmouth city centre in 2007, and Southampton City Centre in 2014 respectively);
- *Some commuting flows out of cities now exceed the flows into the cities*: eg Southampton to Eastleigh (12,738 commuters daily) exceeds Eastleigh to Southampton (11,193 commuters daily).

In summary, travel patterns within Solent are complex, and are characterised by numerous medium-sized, multi-centric flows. Whilst each city generates its own "radial" pattern of commuting flows, these are interrupted by rivers and harbours (often creating extended, indirect routes) and a complex and growing pattern of suburb-to-suburb flows is overlaid on top.

Over time travel patterns in Solent have become increasingly decentralised- largely as a result of changes in the housing market (greater development outside the cities) and creation of new employment opportunities at locations along the M27 corridor. These changes have compounded some of the transport network issues described in Section 3.5.

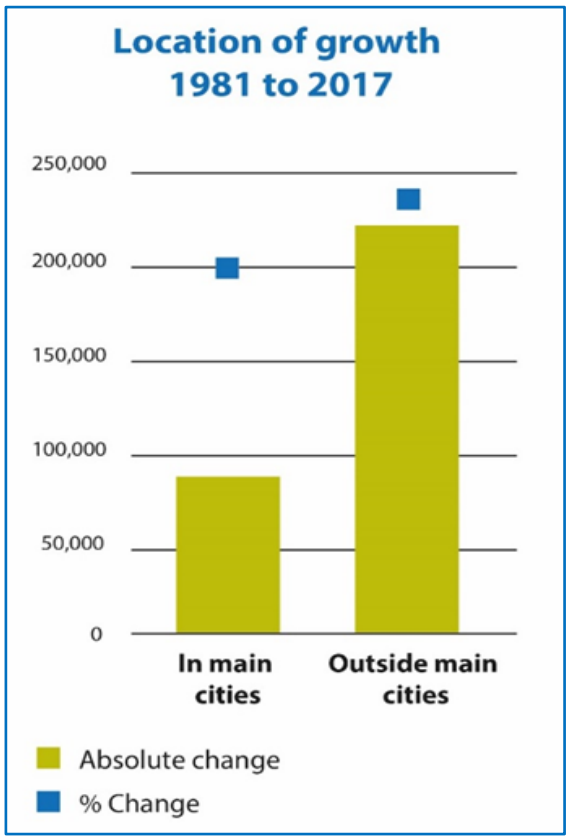



*Figure 7: Location of population growth in Solent, 1981 to 2017*

[12] https://commute.datashine.org.uk/#mode=allflows&direction=to&msoa=E02004841&zoom=12&lon=-1.2254&lat=50.9060

## 3.4 Dual-city region aspirations and city to city connectivity

Solent LEP analysis has shown that commuting flows between Portsmouth and Southampton are small, and that there is less interaction than would be expected for two cities only 20 miles apart. Despite being a similar distance apart the labour market integration between Sunderland and Newcastle is much higher than between Southampton and Portsmouth. Around 12,000 people commute between Sunderland and Newcastle (and vice versa) each day, compared to just 3,100 (75% fewer) between the Solent cities.

This low dual-city interaction is felt to be a significant economic constraint. Despite having a large urban population and conjoined urban areas, Solent functions effectively as two jobs markets. Solent LEP and other stakeholders have noted that if these two jobs markets could be merged to a single Solent job market/ travel to work area, the potential economic benefits through expansion of the labour (and "customer") market in Solent could be significant.

Unlocking greater city to city interaction is dependent on improvements to journey time, frequency and reliability. Due to current and forecast congestion issues on the strategic road network (see page 22), it appears this aspiration cannot be achieved through highway improvements. Rail improvements are therefore regularly identified by many stakeholders as being the most likely way of achieving this aspiration.

At present the balance of journey time, reliability and frequency between road and rail for travel between the cities is complex and varies according to time of day. In summary, rail journey times in the peak currently come close to or match driving times (40 to 60 minutes) but are hindered by a low frequency of two (unevenly spaced) trains per hour whilst in the off-peak, rail journey times are uncompetitive with driving for city to city journeys.

Neither road nor rail currently offer city to city peak hour journey times that come close to the 30 minute journey time, that some economists cite as being a critical commute time for achievement of agglomeration & productivity benefits within a city region.

## 3.5 Transport network issues

Solent's travel market is highly car-dependent. Whilst public transport, walking and cycling are important for certain flows and in certain localities, at an aggregate level, benchmarking work done by Solent LEP has shown that usage of private cars is higher, and usage of alternative modes is lower in Solent than in other comparable "dual city" regions.

For example, at just 8%, use of public transport to get to work in Solent is significantly below the average of other similar "dual-city" areas (13%).

This high level of car dependency is driven by and feeds- the pattern of decentralised development described in Section 3.3.

Public Transport investment has failed to keep pace with the pattern of development, and recent development in areas "unlocked" by the M27 has been primarily designed around driving. Limited public transport provision at some growth hubs e.g. Whiteley or Hedge End, forces many residents to default to car usage.


*Figure 8: Congestion on the M27*

This results in heavy use of the M27- a strategic road- for local journeys. 28% of all traffic on the M27 is travelling 5km or less[13] contributing to congestion and impeding more economically critical uses of the strategic road network (eg freight movement to the ports). This is cited as one factor contributing to the Solent area's long-term economic underperformance. One estimate suggests a £451m loss to the economy due to congestion over a decade in Southampton alone[14].

There are also numerous other negative impacts of high car dependency in Solent, including poor health due to sedentary lifestyles (around one in five adults in the Solent area is physically inactive[15]) and poor air quality due to road traffic. There are 21 Air Quality Management Areas (AQMAs) in Eastleigh, Hedge End, Bursledon and Winchester, whilst Southampton, Portsmouth and Fareham are all subject to Ministerial Directions to take action to improve air quality because air quality in parts of these areas falls below legal limits and is not forecast to improve quickly enough unless additional action is taken.

To serve planned development and mitigate forecast highway network impacts, significant investment in highway capacity is currently ongoing. Over £700m is being spent by Highways England's RIS1 programme to expand strategic road capacity in Solent, and over £200m has been committed to complementary local road network enhancements.

However, once these improvements are completed, options for further highway capacity are limited- many key routes will have been expanded as far as physical constraints (e.g. surrounding buildings, and structures such as bridges and junctions) will permit.

[13] http://www.solent-transport.com/images/reports/SRTM2010/tfsh-case-for-intervention-options-r6.pdf
[14] https://inrix.com/press-releases/inrix-reveals-congestion-at-the-uks-worst-traffic-hotspots-to-cost-drivers-62-billion-over-the-next-decade/
[15] https://fingertips.phe.org.uk/search/obesity#page/0/gid/1/pat/6/par/E12000008/ati/101/are/E06000036

This is problematic as modelling has indicated that even with major improvements, the scale of planned development will saturate the additional road capacity in many locations, resulting in a net detriment compared to the present situation. Modelling by Solent Transport and PfSH of development proposed in the 2016 PfSH Spatial Position Statement (see Section 3.6) forecast a 21% increase in highway trips in 2036 compared to 2014, and that even with significant highway improvements, average peak hour travel speeds would be 1.4% slower than the (already congested) 2014 speeds, even if very significant public transport improvements (many of which are aspirational rather than committed/funded) occurred. Figure 9 shows where the largest increases in traffic flows are forecast in future.

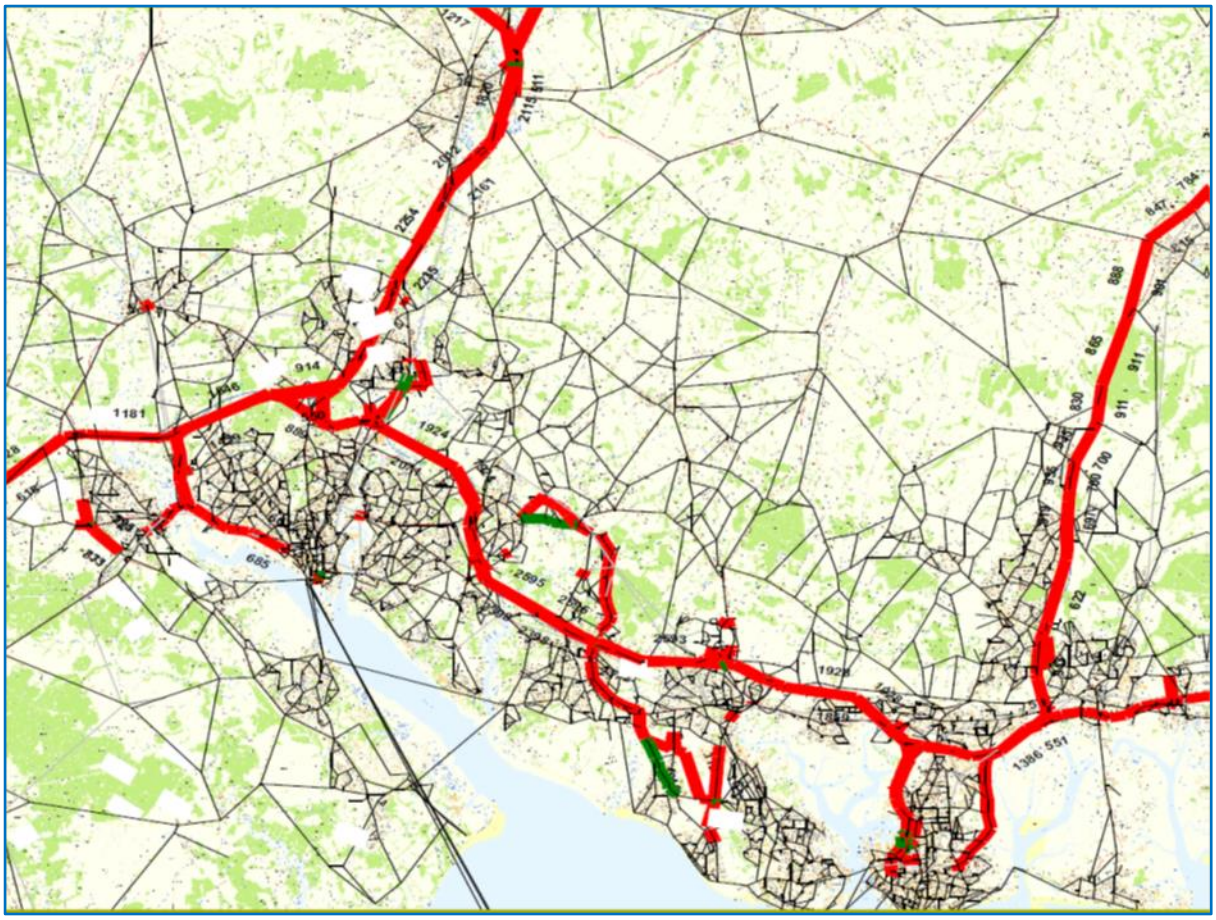


*Figure 9:* 2036 vs 2014 PM peak- forecast traffic flow increases >500 veh/hr

## 3.6 Development & spatial planning- current policies

The current PfSH Spatial Position Statement[16], adopted in 2016, indicates how housing need between 2011 and 2034 in the Portsmouth and Southampton Housing Market Areas is planned to be met across the various Local Planning Authorities. The Spatial Position

[16] https://www.push.gov.uk/wp-content/uploads/2018/05/PUSH-Spatial-Position-Statement-2016.pdf

Statement has significantly informed Local Plans which individual LPAs are now in various stages of development.

In total, around 104,000 new homes together with substantial employment growth (971,000 $M^2$ of employment floorspace) are proposed in the Spatial Position Statement to be delivered in the PfSH area to 2034.

| | 2011-34 |
|---|---|
| **Portsmouth HMA** | **41,360** |
| East Hampshire (Part) | 2,120 |
| Fareham (East) | 8,410 |
| Gosport | 3,350 |
| Havant | 9,170 |
| Portsmouth | 14,560 |
| Winchester (Part-East) | 3,740 |
| **Southampton HMA** | **50,050** |
| Eastleigh | 14,950 |
| Fareham (West) | 2,050 |
| New Forest (Part) | 3,600 |
| Southampton | 19,450 |
| Test Valley (Part) | 4,640 |
| Winchester (Part-West) | 5,370 |
| **Isle of Wight HMA** | **12,950** |
| **PUSH Total** | **104,350** |

*Table 3: Residential Development across Solent, 2011-2034 as set out in PfSH Spatial Position Statement 2016*

The PfSH authorities have adopted a "cities first" strategy, seeking to allocate as much housing delivery as possible within the two cities. Major residential development is planned in Southampton and Portsmouth City Centres, and also at Tipner in Portsmouth. Significant redevelopment of some town centres (e.g. Havant, Fareham) to accommodate residential development is also planned.

However, in total, 33% of total housing delivery is proposed in the two cities, but 67% is proposed to occur outside the cities. Much of the development outside the cities will need to be on greenfield sites because the scale of assessed housing need significantly outstrips the supply of "brownfield" sites. Some very large new communities (e.g. Welborne- 6,000 dwellings; North Bishopstoke/North East Fair Oak SGO- 5,300 dwellings) are proposed but also a significant number of smaller development sites will meet this need. Therefore, the historical pattern of decentralisation observed in the Solent is likely to continue into the future. In turn, significant additional pressure on the already overburdened highway network is forecast.

The PfSH Spatial Position Statement did not identify how housing need forecast between 2034 and 2036 could be met. PfSH are working on a refresh of the Spatial Position Statement to address this and look further ahead into the 2040s. This will need to set out a strategy for allocation of around 18,000 additional dwellings. Limited land availability in the two cities means that a majority of potential sites to meet this need are also likely to be located outside the two cities.

As well as housing development, major economic development in the area is planned in future. The ports in both cities are expanding, with up to £50m of improvements planned at

Portsmouth International Port[17], whilst ABP Southampton's 2016 to 2035 Masterplan[18] sets out an expectation of major expansion of that port (into an additional site on the Waterside) in the 2025-2035 period.

*Figure 10: University of Southampton – new Boldrewood campus*

Alongside residential redevelopment, the growth of the higher education sector in both cities is an important factor in regeneration of the cities. University of Portsmouth and University of Southampton are amongst the largest employers in each city (about 11-12% of each city's workday population) and jointly have over 50,000 students and 7,500 staff, and both have plans to grow.

University of Portsmouth has ambitious growth plans with an estimated £400m to be invested in city centre sites over the next 10 to 15 years[19], whilst the University of Southampton has plans of comparable scale. And there are proposals in Southampton city centre in particular to grow the levels of office space, creating a new employment quarter focused around Southampton Central station.

Figure 11 summarises the key locations for planned residential and economic development identified by the PfSH Spatial Position Statement 2016, and by subsequent Local Plans / Local Plan proposals.

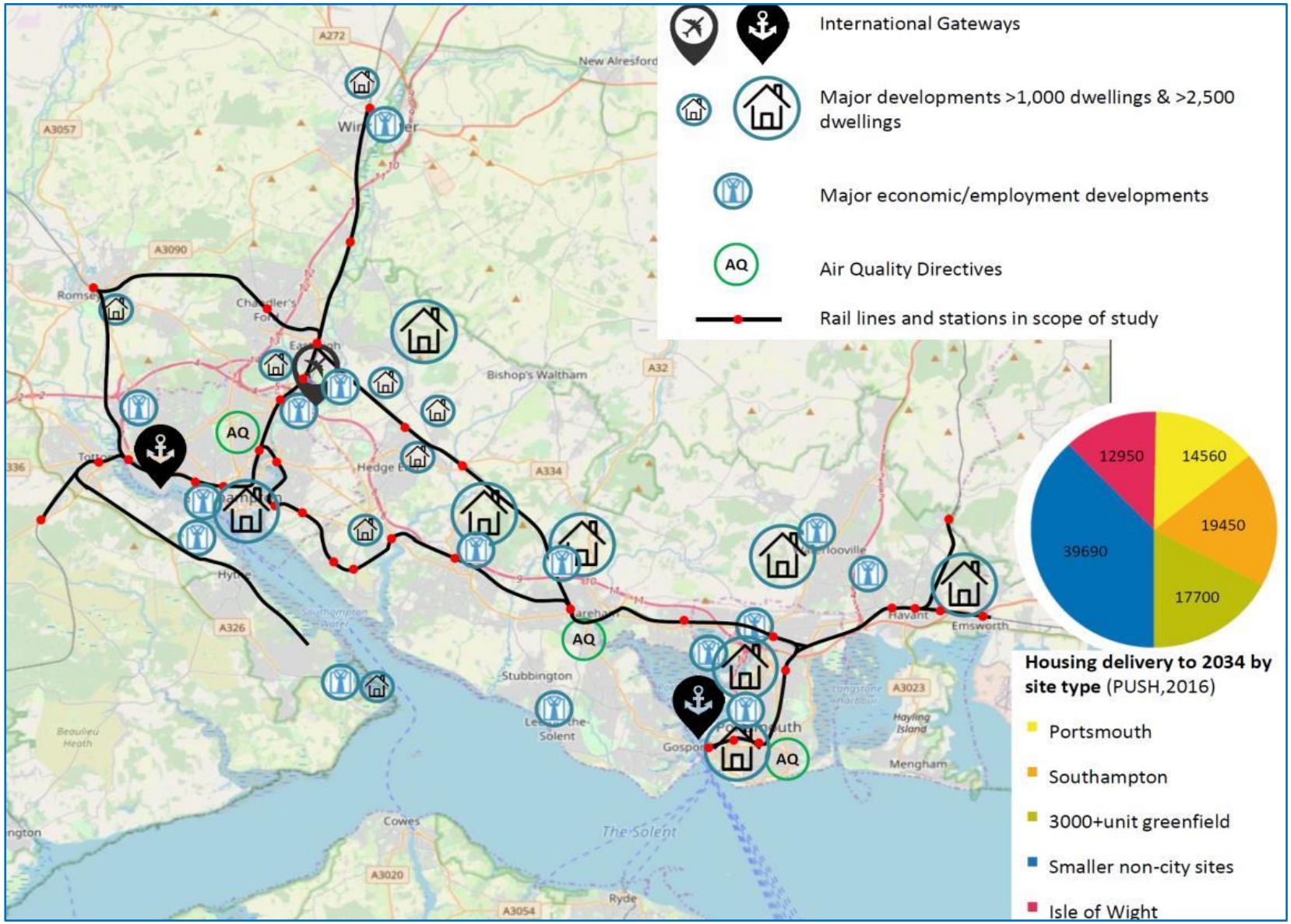
Accommodating the transport demand resulting from these current development plans, whilst also addressing current shortcomings in the transport network, is a critical challenge for partners across Solent and one where many stakeholders believe rail can and should play a much greater role.

[17] https://www.portsmouth-port.co.uk/news/uk-shipping-company-announces-rebrand-following-15m-investment

[18] http://www.southamptonvts.co.uk/admin/content/files/New%20capital%20projects/Master%20Plan%202016/Master%20Plan%202016%20-%202035%20Consultation%20Document%20Oct%202016.pdf

[19] http://www2.port.ac.uk/realising-the-vision/developing-our-campus/

*Figure 11: Location of major development and economic drivers in the study area*



## 3.7 Transport proposals and strategies

### 3.7.1 Solent LEP Strategic Transport Investment Plan (2016)

The 2016 Solent Strategic Transport Investment Plan (STIP)[20] set out Solent LEP's vision for how the various transport challenges facing the Solent sub-region could be addressed. The LEP's proposals comprised three key elements for rail and "transit":


- *Inter-city rail and airport access:* Development of fast, limited stop inter-city links between Portsmouth and Southampton via Southampton Airport (targeting journey times of 30 minutes from Portsmouth to the airport, and 40 minutes city centre to city centre) via existing or new heavy rail services, with removal of smaller station stops and transfer of these to separate metro/transit services.
- *Solent local rail/ metro transit network:* Development of a new tram-train "transit" network to serve shorter distance travel markets, with as many as six potential lines based mainly on existing rail corridors, but with some new on-street alignments to remove local services from congested parts of the heavy rail network (releasing capacity for freight and inter-city journeys) and/or to improve access to areas not well served by rail.
- *Bus rapid transit network:* This element of the Solent Transit proposal primarily consisted of development of a bus rapid transit network serving the Portsmouth City Region, building on proposals promoted by Hampshire County and Portsmouth City Councils since around 2010.

Initial economic evaluation indicated that the scale/ ambition of the "metro"/ local transit proposals, and their projected cost, meant they were unlikely to offer good value for money and consequently little further development occurred. Until commencement of this Solent CMSP study, little further study had been undertaken examining options for city-to-city connectivity. However, Portsmouth City and Hampshire County Councils have continued to progress development of the Bus Rapid Transit proposals for Portsmouth City Region and, branded as South East Hampshire Rapid Transit (SEHRT), these form the core of the Portsmouth City Region bid to DfT's Transforming Cities Fund (2019).

[20] https://solentlep.org.uk/media/1514/tip-final-web-version.pdf

### 3.7.2 Transforming Cities Fund (TCF) proposals (2019/20)

Portsmouth City Region and Southampton City Region have submitted Strategic Outline Business Cases to DfT's Transforming Cities Fund for a range of transformational local transport improvements to be delivered by 2023. Both propose transport interventions at the scale necessary to boost the productivity and sustainability of each city region.

***Portsmouth TCF proposals***

The Portsmouth Transforming Cities Fund bid[21] is primarily focused on delivery of the South East Hampshire Rapid Transit (SEHRT) bus rapid transit network, with major improvements proposed on five key corridors which pass close to major development areas and serve key local travel markets (see also Figure 12 overleaf):

- Portsmouth city centre to Havant
- Portsmouth city centre to Waterlooville
- Portsmouth city centre to Fareham
- Fareham to Gosport
- Portsmouth city centre to Ryde (Isle of Wight)

A 20% reduction on current bus journey times is targeted coupled with increased bus frequency to every 10 minutes or better, higher quality vehicles, and major improvements to interchanges and complimentary smart/multi operator ticketing measures. Improved "first/ last mile" access via walking and cycling to some interchanges is also proposed. At time of writing, the programme business case is being revised in order to secure a funding award likely to be in the £55m to £60m range.

The SEHRT corridors are primarily aimed at serving short distance flows, particularly between areas not served by railway stations (such as Waterlooville or Leigh Park in Havant) and the city centre. The SEHRT corridors pass close to and/or directly interchange with rail stations at Fareham, Portchester, Cosham, Havant, Portsmouth and Southsea and Portsmouth Harbour stations.

In particular interchange improvements likely to benefit rail are proposed at Cosham and Portsmouth city centre south (Portsmouth and Southsea station). Overall the "do maximum" Portsmouth TCF proposals would result in a 100,000 increase in the population catchment within 45 minutes travel to Portsmouth city centre by public transport. An up to 29% increase in daily public transport trips in the city region (some of this increase occurring on rail) is forecast as a result of the proposals.

[21] https://www.portsmouth.gov.uk/ext/parking-travel-and-roads/travel/transforming-cities-fund

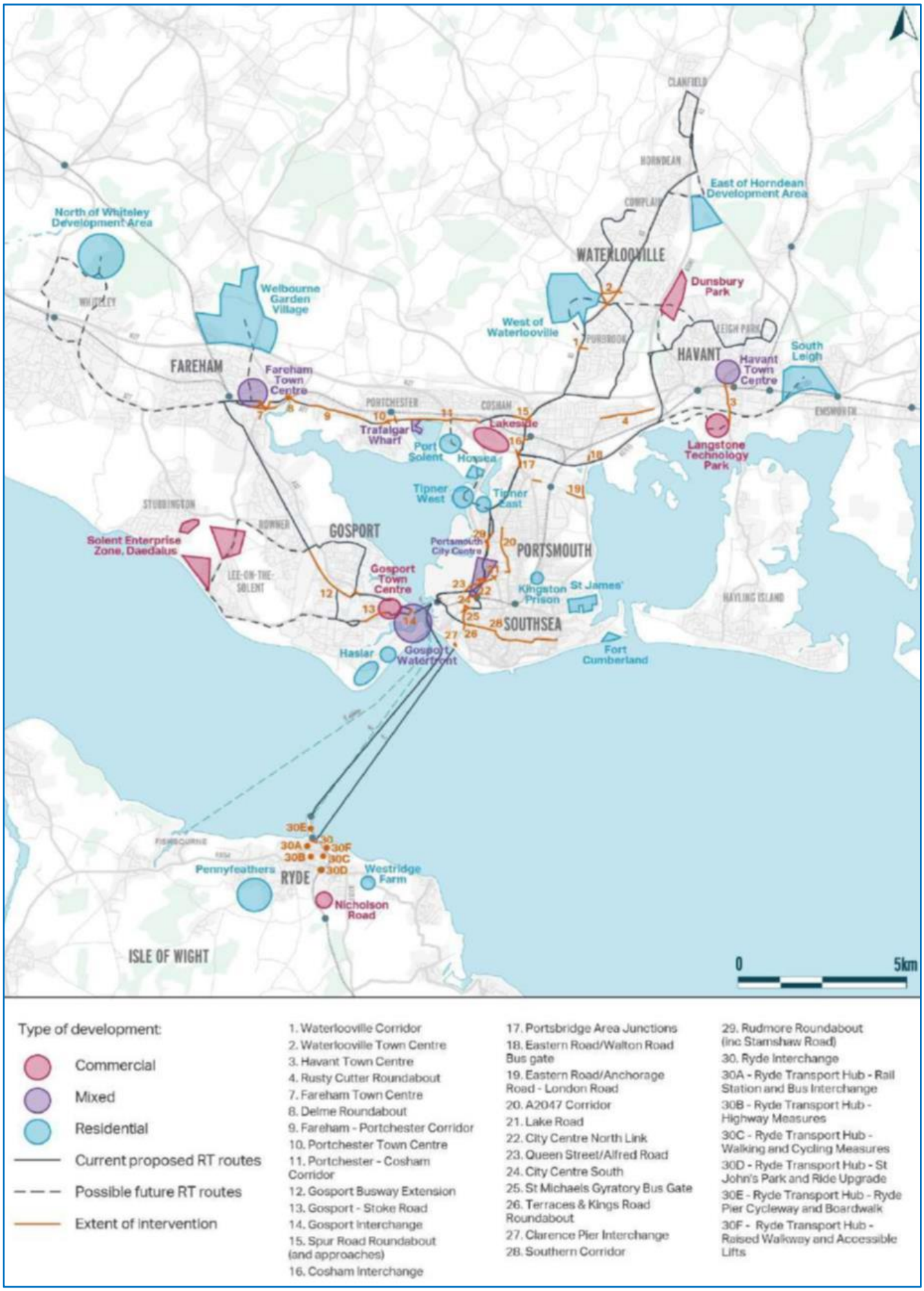



*Figure 12: Portsmouth City Region SEHRT TCF proposals*

### 3.7.3 Southampton TCF proposals

The Southampton TCF project also has a strong focus on improving shorter distance connectivity into the city centre. Southampton's plans are focused on three key themes:

Transforming Mobility, through:

- Creation of rapid bus corridors with a high level of bus priority;
- Park and Ride for the General Hospital (and city centre as a secondary destination);
- Development of several local mobility hubs in district centres and use of smart technology to better manage the highway network;
- Development of early stages of a Southampton Mass Transit System (as set out in Connected Southampton 2040[22]) including rail (with this CMSP setting out options towards achieving a 'metro' level of service).

Transforming Lifestyles, through:

- Delivery of a substantial amount of the comprehensive Southampton Cycle Network proposal, creating many high-quality cycle corridors;
- Creation of active travel priority zones in some residential neighbourhoods.

Transforming Gateways, through:

- Investment in interchanges, at Southampton Central station and through creation of station "travel hubs" to improve first/last mile connections to Swaythling, Woolston and Southampton Airport Parkway ;
- Major changes to city centre road network to create new public space and reduce the traffic- dominated feel of these areas.

The Southampton TCF programme was awarded government funding in March 2020, and a £75.9m programme of enhancements is planned to be completed by late 2023. This will focus on three key corridors (shown on Figure 13 overleaf) radiating out from the city centre.

Like the Portsmouth proposals, the Southampton TCF proposals are focused on serving shorter distance journeys, working on the basis that an improved rail offer is best placed to serve medium/longer distance travel markets in Solent.

[22] https://transport.southampton.gov.uk/connected-southampton-2040/

## The Funded TCF Programme

The funding will allow us to focus on three transport corridors between Southampton and the surrounding areas in Hampshire and in the City Centre.

The funding will be focused on three key transport corridors and the City Centre, as detailed below.

Southampton to Totton and Fawley
**£19.8m**

Southampton to Portswood, Eastleigh and Bishopstoke
**£18.1m**

Southampton to Woolston and Bursledon
**£7.4m**

City Centre
**£20.3m**

The funding also allows us to complete the cycle corridor works on The Avenue to Chandler's Ford
**£2.9m**

The numbers on the map below refer to individual schemes detailed in the table. The 27 schemes in the TCF package are all subject to further design work, consultation and approval and may change:

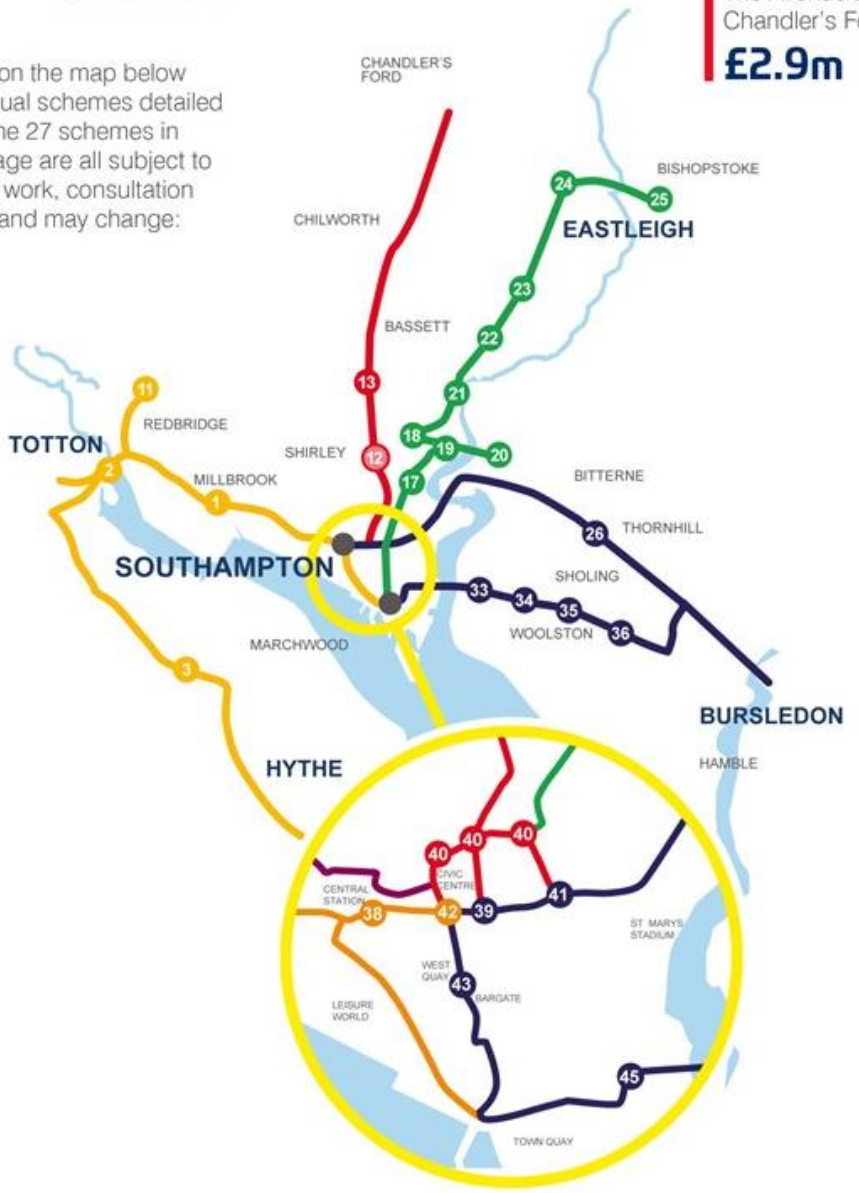



*Figure 13: Southampton City Region TCF corridors and schemes*

### 3.7.4 Transport for the South East (TfSE) Transport Strategy

TfSE plan to publish their final Transport Strategy for the South East in Spring 2020, having published a draft for consultation in October 2019[23]. The aims of TfSE align closely with Network Rail's objectives for the South East. TfSE's strategic goals are to increase the productivity of the South East; increase access to opportunities; and to protect the South East's environment. Network Rail System Operator's objectives for the South East include alleviating overcrowding and accommodate growth (economic and housing); facilitating regional growth by reducing journey times; and, encouraging modal shift. There are clear common themes in these objectives including:

- Providing connectivity and capacity to support productivity and growth;
- Delivering economic growth in a way which is environmentally responsible.

Forecast housing growth across the South East is a further key strategic challenge recognised by both organisations, as is enhancing connectivity from today's levels.

TfSE's strategy identified six journey types to which several different "intervention principles" can be applied to help achieve a desired "sustainable route to growth" scenario advocated by TfSE. The Solent CMSP's focus is primarily on what TfSE have classified as "orbital and coastal", and "Inter-urban" journeys.

The TfSE strategy identifies a significant need for improvement to orbital and coastal rail routes including in Solent, due to slow journey times resulting from compromises brought about by a mixture of types of demand and constrained infrastructure. Multiple issues and challenges across all modes on the M27/ A27/A259/Coastway Line corridor are identified, and it is stated that the "poor performance of this corridor represents a significant barrier to fostering sustainable growth along the South Coast – particularly growth that encourages more local employment in economic hubs".

The TfSE strategy states that rail investment in general is a top priority, in particular for several broad intervention types:

- Enhancements where orbital rail routes cross radial rail routes to increase the role of "orbital and coastal" rail routes;
- Deliver better inter-urban rail connectivity and also urban transit schemes (including rail based where appropriate);
- Build a consensus on a way forward for the M27/A27/A259/East Coastway/West Coastway Corridor based on a multimodal approach;
- Improve public transport access to airports (relevant to Southampton Airport);
- Improvements to the rail network to support expanding ports (e.g. Southampton).

[23] https://transportforthesoutheast.org.uk/transport-strategy/

This CMSP study explores the case for a range of rail interventions in Solent which would align with and support TfSE's Strategy.

## 3.8 Implications for rail as part of the transport mix in Solent and for this CMSP study

As a consequence of the forecast difficulties in overcoming highway congestion even with current investment in road capacity expansion, aspirations for improved dual-city connectivity appear unlikely to be achievable through road investment alone. Rail investment is viewed by many stakeholders in Solent as possibly the only way by which this high-level economic aspiration might be achievable.

Rail is also viewed as having high potential to serve some of the complex patterns of other travel flows in Solent much better than it does at present, taking a greater share of travel demand and reducing pressure/ releasing capacity on other networks to aid achievement of more sustainable growth. The impacts of traffic and car dependency are a serious issue affecting Solent, and many local stakeholders believe the rail network needs to play a greater role in tackling these. Similar views are also communicated by the emerging TfSE Transport Strategy.

At present the exact form that rail improvements could take, and the economic case for these, have not been comprehensively explored by the rail industry. However, the Solent Metro proposals set out in Solent LEP's Strategic Transport Investment Plan are one possible approach which has already been explored.

The efficacy and deliverability of the Solent local rail/ metro transit element of the Solent LEP proposals has been considered and reflected on by Network Rail and Solent Transport working with Local Transport Authorities. The consensus view reached is that the scale of population/ demand, and expense of creation of "standalone" networks or significant stretches of entirely new metro/rail alignments is unlikely to be economically viable at present in the Solent area.

In turn, this suggests that any viable Solent rail strategy must focus on maximising the potential of the existing heavy rail network and services/ rolling stock, through overcoming barriers which currently constrain capacity and service patterns and make rail unattractive to potential users.

Numerous stakeholders have identified opportunities to address known infrastructure barriers, and packages of complementary rail infrastructure improvements which enable higher frequencies and better resilience could be expected to offer good value for money and have a positive business case. TfSE's Economic Connectivity Review (2018)[24] highlighted that investment in transport corridors within Solent is likely to offer a very strong strategic and economic case when compared against other regional opportunities.

[24] https://transportforthesoutheast.org.uk/wp-content/uploads/2018/07/FINAL-Economic-Connectivity-Review.pdf

However, given the multiple other strategically important roles that the rail network in Solent serves (eg freight movement; long distance services to London etc) many of which have scope or need to be improved themselves, even if many barriers to local connectivity improvements can be overcome, trade-offs and balances between the needs of different user groups will still need to be established.

The Transforming Cities Fund bids from Portsmouth and Southampton City regions, if funded by DfT, would start development of one tier of a potential "multi-tier" rapid transit network, with high frequency bus based transit with priority over other traffic serving short local flows (typically journeys of under 10km to the city centres) and areas away from the rail network. Delivery of Bus Rapid Transit (BRT) proposed by TCF for Portsmouth and Southampton is likely to abstract some short distance trips from rail (e.g Cosham to Portsmouth) due to quicker bus travel times and higher frequency. However, it will also create opportunities to feed passengers into rail stations for longer multi-modal trips (e.g. Waterlooville – Swanwick or Southampton changing at Cosham).

The key implication is that most short distance (<~10km) flows within the core parts of the city regions are likely to be best served by BRT (and walking/cycling) rather than rail and that this strategy should not prioritise measures primarily aimed at increasing rail's market share for short "intra city" journeys.

However, a range of travel flows remains where the public transport offer requires improvement and where, if suitably improved, rail is (or with improvement could be) well placed to provide an attractive offer:

- Medium and longer distance (10km+) suburb to city centre journeys where the bus network cannot compete with driving partly due to car-oriented design and location of these suburbs, (eg Hedge End or Swanwick to Southampton, or Fareham or Swanwick to Portsmouth)
- Journeys from suburbs of one city region to centre of the other city region, eg Woolston to Portsmouth or Portchester to Southampton
- Some suburb to "out of city" employment hub journeys not finishing in city centres e.g. Swanwick to Eastleigh or Fareham to Swanwick

For all of these travel markets, the primary competitor (and current "mode of choice") is the private car. Car journeys of the types listed above are major contributors to "misuse" of the M27 by short journeys (see page 21) – providing a further strategic justification for trying to transfer these types of journey to rail. Therefore, a major focus of this study is on how different measures might improve rail's competitiveness with driving for these types of journey.

# 4. Solent's rail network: usage, trends, challenges and plans

This chapter provides:

- a review of current usage of the network in Solent and recent trends observed;
- a summary of identified stakeholder aspirations for rail in the area;
- a summary of recent and current studies and proposals informing our understanding of issues, options and proposals for enhancements affecting the network, which this CMSP takes account of.

## 4.1 Current usage and trends

Across all 31 stations in the study area there were 25.77 million entries and exits during 2018/19. This figure is 80% higher than the 13 million entries/exits in 1997/98.

The top five busiest stations within Solent in 2018/19 were:

| Station | Entries/ Exits | Additional Notes |
|---|---|---|
| **Southampton Central** | 6.66 million entries/exits | a further 1.61 million interchanges (making it the primary interchange station in Solent) |
| **Havant** | 2.32 million entries/exits | |
| **Portsmouth Harbour** | 2.10 million entries/exits | |
| **Portsmouth & Southsea** | 2.05 million entries/ exits | |
| **Southampton Airport Parkway** | 1.70 million entries/ exits | |

*Table 4: The five busiest stations within Solent in 2018/19*

Eastleigh, Fareham and Fratton were the other stations in Solent with over one million entries and exits (all having between 1.66 and 1.73 million entries. Cosham, Swanwick, Romsey and Hedge End all recorded between 0.5 million and 1 million entries and exits, making these the most heavily used of the smaller stations in Solent. All other stations (20 in total) see fewer than 0.5 million entries/ exits per year.

The London & South East RUS (2011)[25] forecast a 40% growth in all day passenger demand in Solent between 2008 and 2021. Data from ORR shows that station entries & exits in Solent actually grew by 25% between 2007/08 and 2018/19.

[25] https://www.networkrailmediacentre.co.uk/resources/london-and-south-east-rus-3

Detailed analysis of long-term usage trends (station entry and exit data) in the Portsmouth and Southampton city regions shows a clear pattern of strong and consistent annual growth in patronage from 1997 to around 2015, which has plateaued or reversed in recent years. If growth had continued at the rates seen prior to 2015, it is possible that the 40% growth forecast 2008 to 2021 in the 2011 RUS might have been achieved.

The rate of growth in patronage has been significantly stronger in Southampton city region than Portsmouth city region (Figure 14). However, once this is adjusted for population change (to give average rail journeys per capita- Figure 15) it is evident that stations in Portsmouth have had a historically higher usage per capita than stations in Southampton, and that whilst rail use per head of population has grown greatly over the last 2 decades in both cities, Southampton has slightly closed the "gap" in usage per population member.

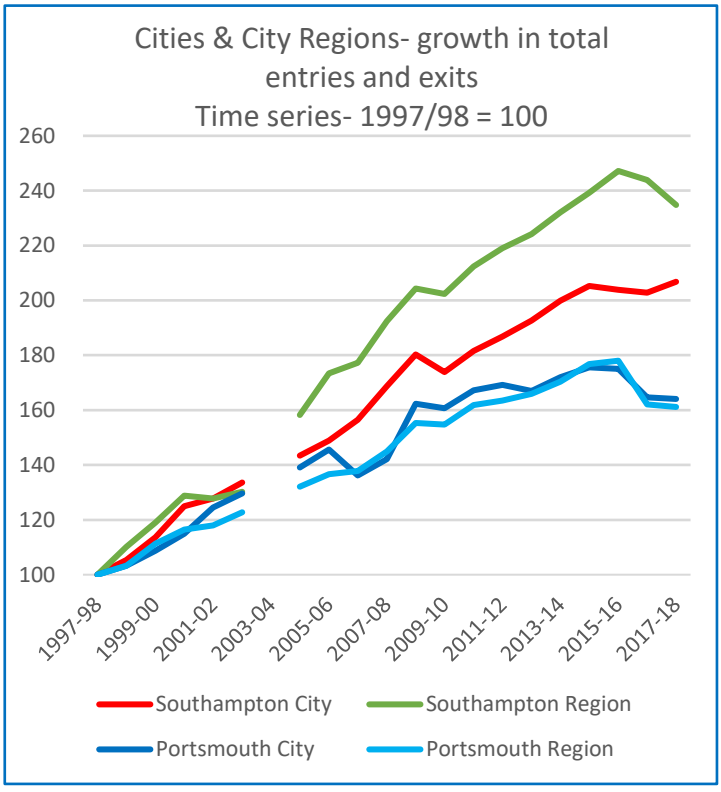



*Figure 14: Solent station entries/ exits time series 1997 to 2018*

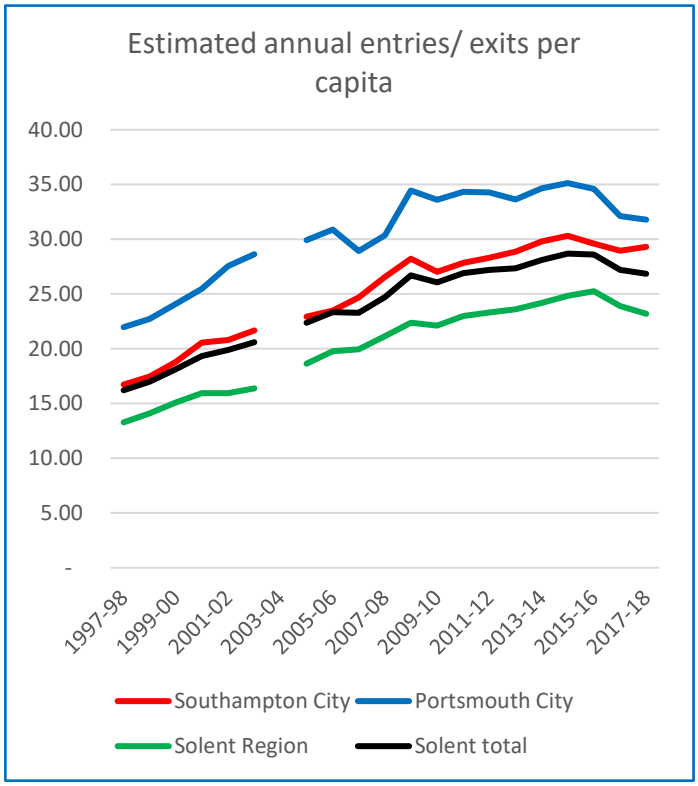



*Figure 15: Solent station entries/ exits per capita 1997 to 2018. (Nb "Solent region" refers to stations outside of Portsmouth and Southampton cities)*

Comparison of Solent-wide growth with that for the wider south east market (Figure 16) shows changes in rail usage in Solent have closely tracked trends across the wider region.

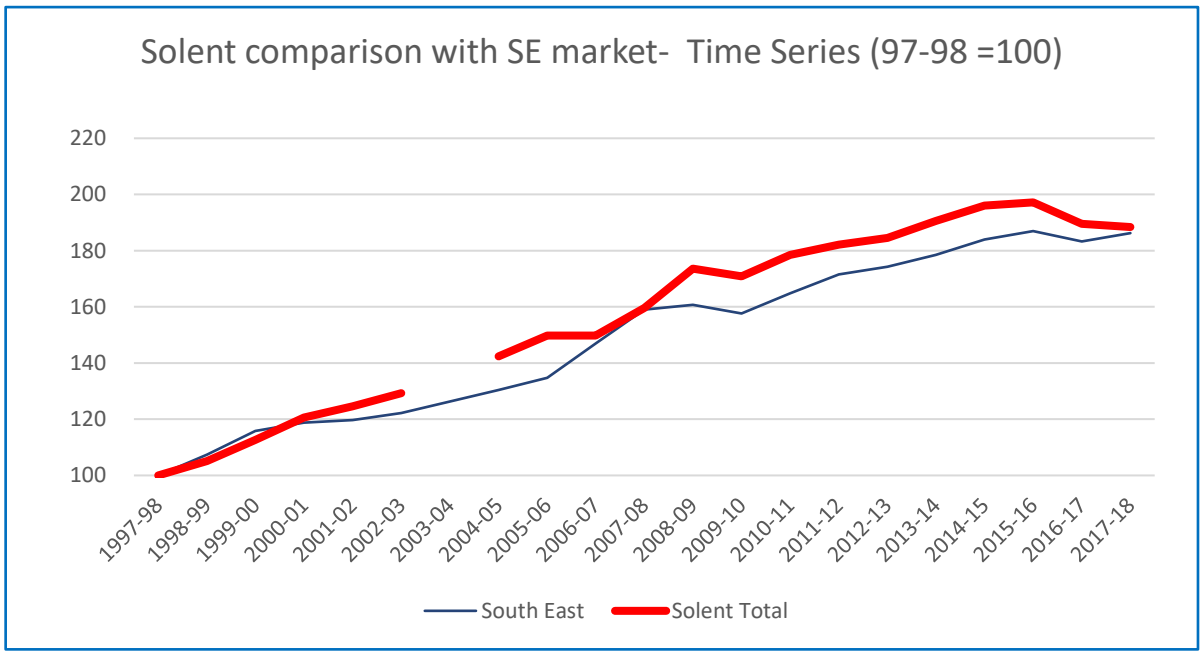



*Figure 16: Solent comparison with SE market*

Analysis of station entry/exit changes by line of route (Figure 17) indicates that usage growth has been strongest on the Botley (Fareham-Eastleigh) line, Fareham-Southampton, and at Southampton local stations, all of which have seen more than a 250% increase in patronage in the last 20 years.

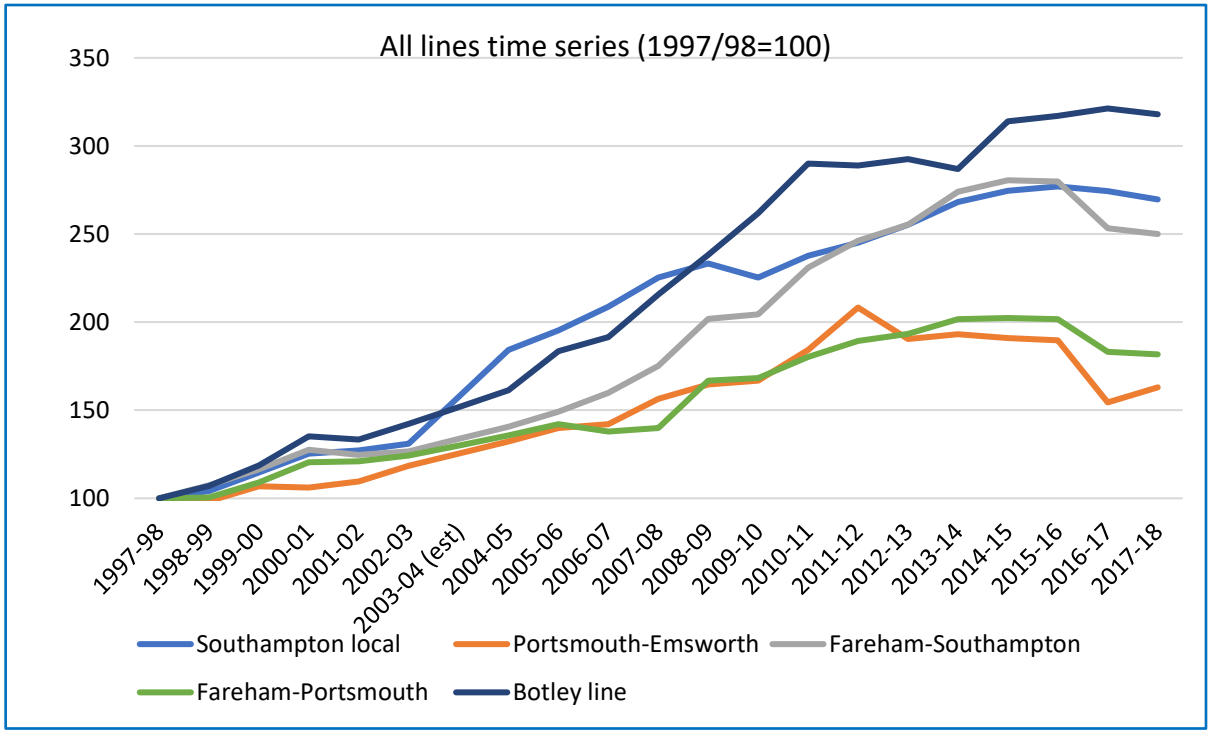



*Figure 17: Line by line changes in station entries/ exits 1997 to 2018*

Growth on the routes between Fareham and Portsmouth, and Emsworth and Portsmouth, has been lower. These patterns could reflect the following factors:

- Significant housebuilding in areas such as Hedge End and at Whiteley (possibly accounting for some Fareham-Eastleigh and Fareham-Southampton growth);
- Improved train services- eg improved Southampton local service from 2003 after opening of Chandler's Ford station; increase from 3 per hour to 4 per hour Fareham-Southampton in 2007, and Botley line peak service improvements also from 2007;
- A relative decline in employment in Portsmouth city centre and growth in employment at Whiteley and other "out of city centre" areas;
- Industrial action on Southern services in 2016/17 (declines on Portsmouth-Emsworth & Fareham-Southampton) and declining punctuality and reliability on South Western franchise services since 2011[26] dampening patronage growth generally.

## 4.2 Mode share

Rail's mode share for local commuting within Solent is low (2.3% from 2011 Census data). This significantly lower than rail's mode share across the wider TfSE area (4%) although it is actually a fairly average rail mode share when compared to other similarly sized city regions (see section 6.1).

Figure 18 overleaf shows rail mode share across the study area. Rail mode share in areas close to well-served stations in city and town centres can be 4% to 5% or higher, but in the many areas more than 1-2km from stations and also in areas closer to stations with poorer services (eg Totton, Sholing, Redbridge) rail's mode share is closer to 1% or indeed 0%.

[26] https://www.southwesternrailway.com/other/about-us/independent-performance-review

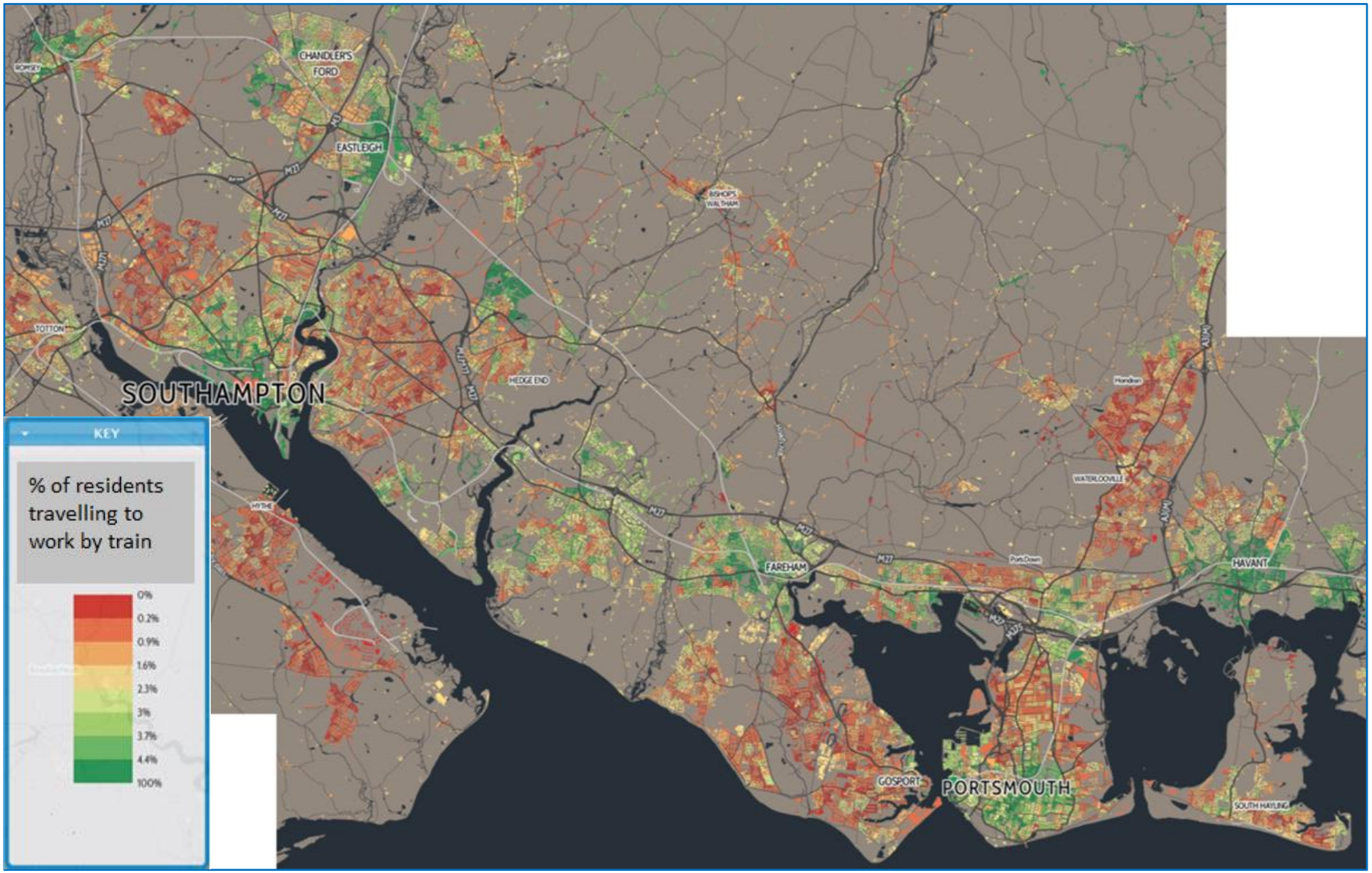



*Figure 18: Rail mode share for travel to work (Census 2011 data mapping from datashine.org.uk)*

## 4.3 Stakeholder aspirations and identified issues and opportunities

Local Stakeholders have identified a range of issues and opportunities for the railway in Solent through various reports, publication, lobbying etc over the years. Key issues as understood by Network Rail and Solent Transport are:

- The journey time between the central stations in Portsmouth and Southampton is regarded as slow and the timetable is limited;
- There is no direct rail connection between Southampton Airport and Portsmouth and the railway also does not provide direct connections between some key origins and destinations (e.g. Hedge End to Southampton);
- Timetables for some other key local flows (eg Eastleigh to Southampton) are poor considering the number of users travelling;
- Train frequency at local stations is low (and some of these stations, eg Totton, Hedge End serve large and sometimes growing settlements);
- In combination these issues mean rail is not seen as a viable alternative to driving for many journeys where it could offer an alternative;
- Some local stations have poor accessibility to and "recognition" within communities;
- Rail lines pass through but do not serve some current and/or future developed areas (e.g. Welborne; North Whiteley) and/or some lines exist but have no passenger service (e.g. Marchwood, Hythe);
- Some areas of high population are not connected to the network (Gosport and Waterlooville are the largest and 5th largest towns in the UK without a station);
- There are good regional connections from the area, but journey times are slow compared to similar cities and economic gateways in the UK and capacity on some long-distance services (GWR, CrossCountry) is poor;
- Rail freight plays a major role to and from Southampton but increasing its share of the market further is a challenge due to capacity/timetabling difficulties created by freight and passenger trains interacting;
- Some major stations such as Portsmouth and Southsea and Southampton Central provide a poor "first impression" and passenger experience;
- There is poor public transport access to Southampton Cruise terminals and the Port from the wider Solent and the airport;
- There is only limited integration between rail, bus and ferry modes (in terms of timetabling, ticketing and interchange).

## 4.4 Freight in the Solent Area

Freight movements by rail are of vital importance to the economy of the Solent area and more widely afield. Figure 19 shows the key freight commodities moved through Solent and highlights the importance of the railway between Southampton, Eastleigh and Winchester for freight at a national level.

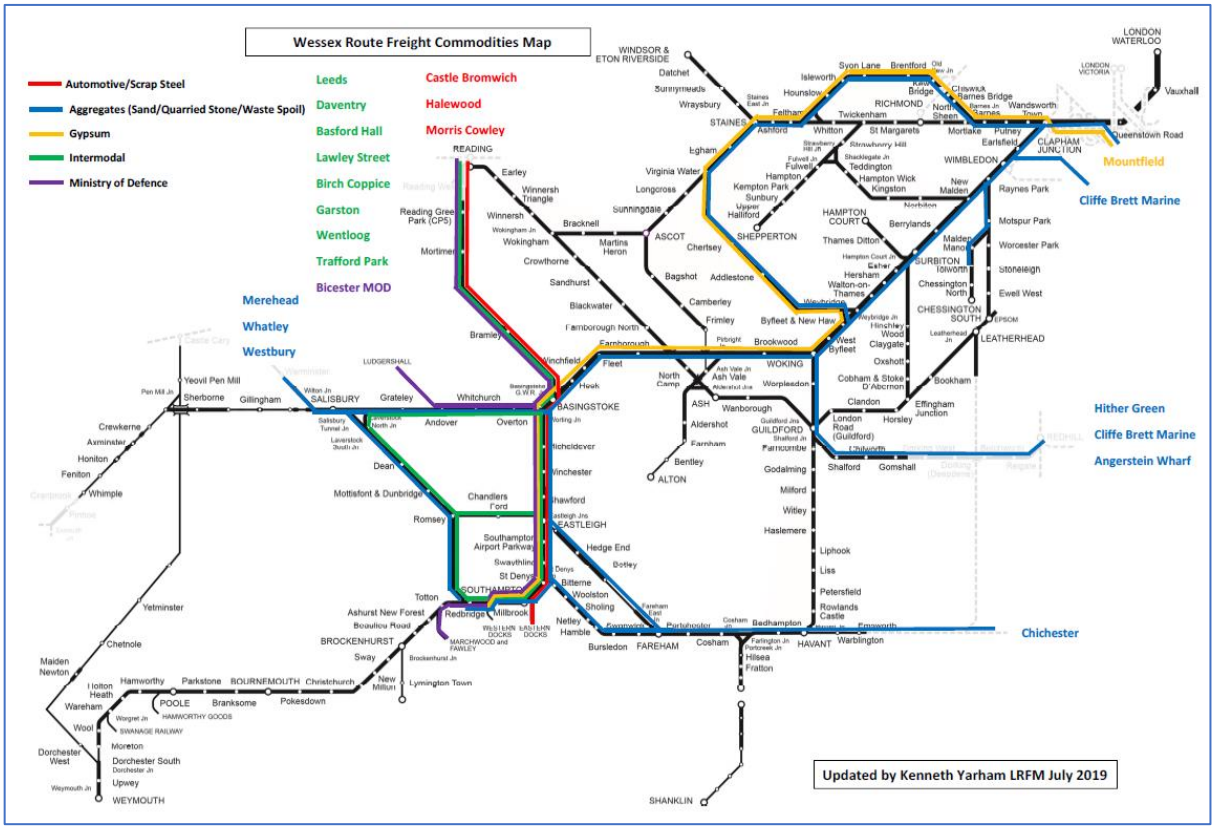



*Figure 19: Wessex Route freight commodities map*

The Port of Southampton is the second largest port in the UK for container traffic after Felixstowe and is the largest for automotive traffic.

Southampton Maritime Container Terminal is used for container traffic to the Midlands and the North with an average of 11 train movements in each direction per day. Southampton Western Docks is used for container and construction material traffic and Millbrook Freightliner Terminal is mainly used for wagon storage and maintenance.

The nearby Southampton Eastern Docks is a key centre for vehicle exports from the BMW factory at Cowley (Oxford). The BMW production line builds 1,000 cars per day of which 60% are exported via rail through Southampton.

There are also regular rail freight flows of other goods shipped via Port of Southampton including scrap metal and gypsum.

Aggregates are also important in the Solent area with Eastleigh yard being an important site for rail-related stone movement. There are also aggregates terminals at Botley and Fareham with 3 trains per week to Botley and Fareham from quarries in the west country, as well as regular through movements of aggregates to Chichester. Development and large construction projects (e.g. HS2, Heathrow expansion etc) may raise demand for aggregate movement by rail in future.

Currently there are typically 100 freight trains a day across the Wessex route, most of which travel to, from or through parts of the network in scope of this study. There are

twice as many train paths for freight in the timetable but because freight trains only run as needed (and sometimes to different destinations from one day to the next) many of these are not used every day but must still be accommodated.

Currently the maximum length of freight train to and from the Southampton area is 680 metres but there is a project ongoing to allow these to be lengthened to 775 metres allowing additional capacity per train and improved cost effectiveness of rail as opposed to other modes.

A wider workshop was held with colleagues from the freight industry, Network Rail, ORR and DfT as part of the preparation of this CMSP. Priorities for the freight industry that this study must take account of include:

- Potential remodelling and re-signalling in the Eastleigh area to allow for freight movements;
- Enhanced facilities for intermodal traffic on diversionary routes by gauge clearance and additional capacity across certain parts of the day to provide minimum 1 freight tph to the Port of Southampton, 24 hours a day seven days a week;
- Consider revision of passenger timetables based on "flighting" of services to allow greater opportunities for freight to operate;
- Maintenance or creation of cross-area paths for existing and new flows such as aggregates and construction materials.

Additionally, there are plans for a future CMSP study to specifically examine options for freight movements between Southampton and the Midlands.

## 4.5 Current network: performance and constraints

There are a number of known constraints to increasing the frequency of the rail service in the Solent area. These have been identified through analysis work carried for several previous timetable studies and strategic assessments prior to this CMSP module. These included:

- London & South East Route Utilisation Strategy (2011)[27];
- Wessex Route Study (2015)[28];
- Wellborne station pre-GRIP feasibility study (2017)[29];
- Eastleigh area connectivity report (2018)[30];
- SWR Independent Performance Review (2018)[31];
- Fawley branch study (2019, unpublished) by Network Rail on behalf of Associated British Ports and Fawley Waterside Ltd (a local developer).

[27] https://www.networkrailmediacentre.co.uk/resources/london-and-south-east-rus-3
[28] https://cdn.networkrail.co.uk/wp-content/uploads/2016/11/Wessex-Route-Study-Final-210815-1-1.pdf
[29] https://www.fareham.gov.uk/PDF/welborne/WelborneStationPre-GRIPFeasibilityStudy.pdf
[30] https://www.eastleigh.gov.uk/media/4163/tra-011a-eastleigh-connectivity-report.pdf
[31] https://www.southwesternrailway.com/other/about-us/independent-performance-review

A map showing the key constraints is shown in Figure 20.

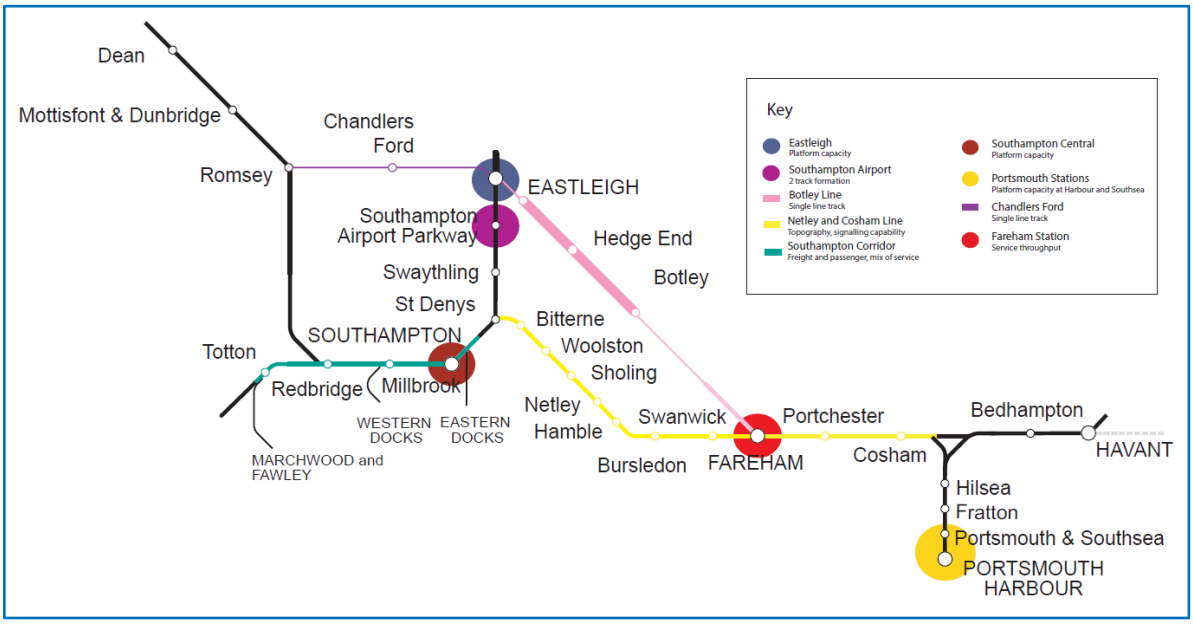



*Figure 20: Key constraints on Solent Network identified by previous studies*

### 4.5.1 Eastleigh

Eastleigh is a key junction station on the South West Main Line (SWML) where two 'cross-Solent lines' (the Botley Line and the Chandlers Ford Line) join the SWML, and where a large amount of freight traffic interacts with passenger services. It is also a significant station.

Platform capacity and the ability to efficiently reverse services at Eastleigh from the direction of Fareham mean that aspirations for an increase in service from the east side of the Solent area to locations such as Winchester and Southampton Airport Parkway may be limited. Analysis carried out in the Eastleigh area connectivity report noted that an additional 1tph service between Portsmouth Harbour and Southampton Central via the airport (with a reverse move at Eastleigh) would not be possible in all hours because of platform capacity constraints at Eastleigh. Expected growth in both freight and London-bound passenger services along the SWML through Eastleigh may exacerbate this barrier.

### 4.5.2 Southampton Airport Parkway

The two-track section between Stoneham Junction (north of Southampton Airport Parkway) and St Denys is a recognised constraint to the throughput of services on the SWML. With only one Up and one Down line there are no opportunities for faster services to overtake slower ones unless this is done to the north or south of this section. This is a particular problem through this section where there is a mix of fast and stopping passenger services as well as freight services.

The Eastleigh area connectivity report found there was some capacity available to operate an additional 1tph service (Portsmouth Harbour to Southampton Central via Eastleigh) through this two-track section. However, future increases to freight and/ or London-bound

passenger services in conjunction with any local service aspirations are likely to trigger the need for some sort of track capacity intervention through this two-track section. This constraint will be addressed through a future CMSP module focussing on Main Line capacity.

### 4.5.3 Southampton Central and Southampton Corridor

Southampton Central is a key station for long distance, local and freight services, functioning both as a through station and as a major terminus.

The corridor running from the Northam area through Southampton Central to the Totton area is complex in terms of the mix of services operating through it; with freight joining and leaving it at a number of dock locations, a Traincare depot at one end (Northam) and fast and stopping passenger services all needing to be accommodated.

Southampton Central station has only 4 through platforms that are used by both passenger and freight services, with many passenger services (particularly from the east) terminating. A fifth west facing bay platform also exists but is not currently permitted for passenger use

Terminating services in particular (and the amount of time they spend occupying the limited number of platforms) are problematic from a capacity and resilience perspective, creating a constraint on timetabling- this was identified as a barrier to operating an additional 1tph Portsmouth Harbour to Southampton Central via Eastleigh service in the Eastleigh area connectivity report.

The 2019 Fawley Branch study looked at both freight growth and a new passenger service on the Fawley Branch. This work noted the potential capacity issues on the Southampton Corridor but also suggested there was some scope for additional services to operate through it. Importantly, it also noted the capacity issues associated with terminating services at Southampton Central.

The Wessex Route Study, published in 2015, suggested that to accommodate additional London-bound services to meet demand in the period to 2043, whilst providing for additional freight and local services, would require additional platforms at Southampton Central. This study suggested such an improvement could be delivered in three phases:

- Phase One - the bay Platform 5 would be extended to provide a new through (down line) island platform;
- Phase Two - a new Platform 0 created on the Up side of the station to provide a new through up island platform;
- Phase Three - an additional through line on the Down side of the station to provide capacity for freight services to by-pass Platforms 4 and 5 that may be occupied by passenger trains.

Such a scheme would require both station buildings to be rebuilt and would increase the footprint of the station as well as taking land from current surface access (taxi ranks, bus

stops, car parks). These proposals could conceivably be developed alongside Southampton City Council's regeneration aspirations for the area. However, it is recognised that this is potentially a high cost, high difficulty approach to providing extra platform capacity.

There may be scope for other less disruptive measures to achieve similar outcomes- for example an infrastructure intervention that either allows terminating services to be moved out of the station or running terminating services beyond Southampton to terminate at a station with more platform capacity or where additional platform capacity can more easily be provided.

### 4.5.4 Single track lines: Botley Line and Chandler's Ford

The line between Romsey and Eastleigh (through Chandler's Ford) is a five mile stretch of single track that creates a constraint on timetabling.

The Botley Line is a key route for both freight (aggregate) and passenger services which also has two sections of single track (an approximately 700m single section at the Eastleigh end, and a much longer approx. 4.5 mile single section from Botley to Fareham).

The Eastleigh area connectivity report suggested that the ability to operate robust and reliable additional services on the Botley Line (either to Southampton or to Winchester and London) would be challenging without increased track capacity through double-tracking the single sections.

Aspirations for a new station near Fareham to serve the proposed Welborne Garden Village (subject to a pre-GRIP study) and/ or a station at Allington Lane between Eastleigh and Hedge End could also require removal of the single- track constraints. The pre-GRIP study recommended that any new station scheme involved realignment of track to more easily accommodate redoubling in future.

### 4.5.5 Fareham and the St Denys to Cosham corridor

The line between St Denys and Cosham is characterised by a difficult topography, particularly at the Netley end of the line where the line winds its way along the side of the Rivers Itchen and Hamble. Maximum line speed is 75mph but many sections of the line have limits of 50mph or lower due to the sinuous route and some severe speed restrictions exist at tight curves eg St Denys, Woolston, Fareham and Cosham Junction to Portcreek Junction. Scope to achieve higher line speeds (and achieve major journey time reductions) are limited by the sinuous route, although study work was previously undertaken investigating the possibility of up to 90mph running between Swanwick and Fareham. However, scope for any large time savings is very limited.

The railway all the way from St Denys to Fratton is two- track, with no overtaking opportunities anywhere on this 22 mile section of route even though the mix of fast and stopping services means that an overtaking opportunity might enable better use of potential

capacity. Indeed, all the way beyond Cosham through to Brighton on the Coastway line there are few locations where overtaking is possible, and none of these opportunities are used significantly in the current timetable. In conjunction with long signal sections (see below) this results in large restrictions on timetabling.

Two-aspect signalling that is utilised on the line also constrains improving the service provision. The Wessex Route Study, published in 2015, suggested that by reducing the signalling headways on this section from around 5 minutes to around 3 minutes capacity could be improved. This would require approximately 20 - 24 signals to be installed (10 - 12 in each direction). That study recommended more investigation into the benefit of raising line speeds to allow reduced running times to clear signals, although it was noted that scope for higher line speeds west of Fareham is very limited. The study also suggested that a solution exploiting ETCS rather than fixed signalling might be preferable.

Fareham station consists of two through platforms and a bay platform. This bay platform is little-used and presents a potential opportunity to install a passing loop through Fareham to improve capacity, operational flexibility, performance and reliability.

The SWR Independent performance review specifically identified creation of a through platform at Fareham as a measure that could mitigate delays and aid more robust delivery of additional services. The Network Rail/SWR joint Performance Improvement Centre (JPIC) has similarly identified the need for an additional passing opportunity between St Denys and Cosham to improve performance and resilience of service.

### 4.5.6 Portsmouth stations

As in the case of Southampton Central platform capacity is a barrier to operating/ terminating additional services at the Portsmouth stations.

The Wessex Route Study forecast a need by 2043 for Portsmouth stations to handle 14-15 trains per hour (compared to current capability of 11 tph). Platform capacity at both Portsmouth stations was identified as a limiting factor for increases in frequency. This study investigated several options for reopening of Platform 2 at Portsmouth Harbour and also options for an additional terminating platform at Portsmouth & Southsea. The study stated that an additional platform on its own would unlock an additional 2tph, but that other changes allowing increases to the number of parallel movements in and out of Portsmouth Harbour, or doubling the single junction into Portsmouth & Southsea were likely to also be required to provide the full 14-15tph

The Eastleigh area connectivity report also suggested that additional platform capacity may be required to operate more than a 1tph increase at Portsmouth Harbour.

Portsmouth Harbour is currently restricted by Platform 2 being out of use owing to inadequate pier strengthening beneath the platform. Portsmouth and Southsea station has both through and terminating platforms; scope for additional platforms on the high level

(through) section of line is almost zero but there may be scope for an additional terminating platform in the low- level part of the station as indicated by the 2015 Wessex Route study.

### 4.5.7 Constraints highlighted by performance and resilience workstream

To answer the performance and resilience strategic question (question 6) research, workshops and engagement were undertaken with SWR and internal Network Rail colleagues to help understand sources of poor resilience. Other outputs of this work are provided in Section 8 (performance and resilience) however the outputs regarding infrastructure constraints and their impacts on timetabling are best summarised here.

Many issues identified elsewhere in Section 4.5 were identified by industry stakeholders who participated hence many previously identified issues are repeated here.

The existing signalling system in the Southampton area will be due for replacement in Control Period 7. The planned rollout of ETCS signalling in the Southampton area may make it opportune to plan the provision of additional loops and double track sections in conjunction with the re-signalling rather than being undertaken separately with greater cost in terms of additional possessions and more disruption for passengers.

Layout and platform capacity at Southampton Central station was identified as a major issue affecting performance and resilience. The current arrangements restrict timetabling of services and also impede recovery of service during periods of disruption.

At Portsmouth Harbour it was suggested that the disused platform 2 should be reopened to cater for service enhancements, and also to assist with recovery of service during disruption. Re-signalling to make all the lines bi-directional between Portsmouth and Southsea and Portsmouth Harbour would also increase capacity and flexibility.

Platform capacity and functionality at Eastleigh was also identified as impeding flexible operation of services particularly in times of disruption.

The single-track lines at Botley and Chandler's Ford were also identified as being problematic for performance/ resilience. On the Botley line, existing signal spacings were identified as being restrictive (a solution to help address this issue was previously recommended in the 2011 London & SE RUS).

Redoubling of these lines was identified as being likely to increase operational flexibility and resilience. It is anticipated that doubling of the single line section in the Fareham area would require two additional signals to be provided.

Signalling on the Netley line was also identified as a major issue to be tackled if additional capacity/frequency is to be provided. Splitting the existing very long signal sections on the Netley line by converting Distant signals to 3 aspects with new distant to the rear would achieve this. A similar scheme was undertaken at Falmer.

It was also suggested that additional signal sections should be provided between Eastleigh and Southampton Central stations (this was also recommended in the 2011 RUS). Scope was also identified to re-signal Farlington Junction to allow movements from the Up Main to reverse towards Cosham- this could also aid resilience and flexibility.

### 4.5.7 Summary of performance and constraints

Previous studies have already identified a number of potential infrastructure barriers which may impede any significant improvements to services in the Solent area. Some suggestions for interventions were made by these studies. The interventions are:

1. Double track the Botley Line to increase capacity:
    a. Between Botley and Fareham;
    b. Between Eastleigh South Junction and Eastleigh
2. Convert the current bay platform at Fareham, Platform 2, into a through platform to provide a passing opportunity at Fareham;
3. Provide additional platforms at Southampton Central, or investigation of alternative means of providing capacity for terminating trains in this area (option at Totton investigated in this study);
4. Improvements in the Eastleigh area to aid flexibility and resilience and release platform capacity (option investigated in this study);
5. Reopen the currently disused Platform 2 at Portsmouth Harbour station to provide additional platform capacity at the station. Alternatively, provide an additional platform at Portsmouth & Southsea;
6. Signalling improvements at various locations including on the Netley line, between Southampton Airport Parkway and Eastleigh, and in the Fareham area.

Interventions 1 to 5 have been assessed for engineering feasibility as part of this CMSP study (see Section 7). The timetable analysis (Sections 6.4) has taken account of the potential for these interventions to enable the shortlisted service options (Section 6.3) and highlighted where these interventions would be necessary.

## 4.6 Other current strategies and studies

### 4.6.1 Coastway CMSP – emerging recommendations

A CMSP study looking at the West Coastway route (Havant-Chichester-Worthing-Brighton) has been conducted in parallel with this Solent connectivity study, with regular engagement between the two project teams to ensure emerging recommendations from one are considered in the other.

Emerging findings from the Coastway CMSP are that severe infrastructure constraints (particularly numerous level crossings between Havant and Brighton) prevent very significant increases in passenger service frequency or speed east of Havant without entirely

new lines of route (with options such as tram-trains on parallel routes identified as a possible solution albeit requiring much more research and evaluation). It should be noted that train frequency on the Coastway routes is already considerably superior to that in Solent. Therefore, the emerging recommendations from the Coastway study are focused around optimising currently available capacity. Recommendations with implications for the Solent CMSP are:

- Retiming of Chichester to Portsmouth and Southampton to give better 37and 23 minute intervals will require retiming of these services between Havant and Southampton and require retiming (to earlier in the hour) of the Portsmouth - Southampton all stations service, together with some Portsmouth to Waterloo services;
- Stopping of all Coastway services (ie services from Chichester/Havant) at Woolston, to improve access to this major growth area and the east of Southampton city centre;
- Creation of a new hourly path for a Brighton to Bristol service - requiring pathing through the Solent area;
- Strengthening of Coastway trains to five carriages to improve capacity;
- Creation/ maintenance of an hourly path for freight between Chichester and west via Eastleigh.

It is also noted that some of the enhancements investigated by the Coastway CMSP would benefit from or only be feasible if a capability for faster trains to overtake slower ones between Southampton and Havant was provided.

### 4.6.3 Fawley Branch and Waterside rail proposals

The Fawley branch is a railway between Totton, Marchwood, Hythe and Fawley oil refinery. The line is currently open for freight to Marchwood Military Port but not used frequently south of Marchwood. There is potential for more regular freight services to support port expansion, and a passenger service has been proposed a number of times in recent years by various groups including local stakeholders, the Association of Train Operating Companies (ATOC, now the Rail Delivery Group) in 2009, and the Campaign for Better Transport in 2019[32].

[32] https://bettertransport.org.uk/media/05-february-2019-rail-reopenings-report


*Figure 21: Waterside rail proposals (source Three Rivers CRP)*

Consultants Markides Associates have undertaken assessments of the benefits and costs of a Waterside Passenger Railway which formed the basis of a Market-led Rail Proposal Submitted to the DfT in July 2018. This proposal is being promoted by some local groups including the Waterside Community Railway campaign.

Network Rail has recently produced a timetable study on behalf of Associated British Ports and Fawley Waterside Ltd (a proposed mixed-use development at the former Fawley Power Station site) which investigated the impact of operating automotive freight from a proposed new dock site near Marchwood (Dibden Bay).

This study also examined the aspiration for a 2tph passenger service to link communities on the peninsula to Southampton. The study suggested that the freight traffic increase was feasible with some upgrades to assets on the Fawley Line. The passenger service was also deemed to be feasible but would require:

- Level Crossing upgrades/ closures;
- track upgrades to enable 60mph running;
- two new stations;
- an additional platform at Marchwood.

Passenger services on the Fawley Line are being considered as part of a wider multi modal transport study focused on the Waterside/ A326 area led by Hampshire County Council, in response to a number of proposals for future major development in the area.

This includes further feasibility assessment of infrastructure requirements for a passenger link, and the nature of services. Options being assessed include “standalone” services and also extension of several existing services terminating at Southampton through to Totton and onwards to the Waterside.

There has been engagement between HCC and its consultants, and the team preparing this CMSP study and options related to Totton service extensions and terminating/ reversing facilities at Totton have been considered with regard to potential integration with/usage by Waterside rail services should a sufficiently sound case for these proposals be demonstrated by promoters.

# 5. Demand, travel pattern and Journey Time analysis

## 5.1 Key travel markets for rail in Solent- analysis of ticketing data

Analysis of data from MOIRA (incorporating ticket sale data) is presented in Figures 22 to 24.

Figure 22 shows proportion of demand for all flows either partially or fully in the study area to or from the listed stations.

13% of demand is to/from London; 19% of demand is to/from other stations outside the study area.

44% of journeys are to/from stations close to key employment areas identified in Figure 22, of which Southampton, Winchester and Portsmouth are (by a considerable margin) the highest demand destinations. The remaining 23% of demand is also within Solent, but is to/from the large number of other mostly smaller stations in the study area which are not located adjacent to key employment areas, of which Fratton, Hedge End and Romsey are the largest contributors (not shown in Figure 22).

A key conclusion from this data is that whilst the London market is the largest individual market for rail in Solent (and because it attracts some of the highest fares it is highly important for operator revenues), for every rail journey from Solent to London, there are about five journeys between origins and destinations within Solent. Demand to/from Southampton, Portsmouth and Winchester combined is more than double that towards London.

| Station | Proportion of demand to or from station (includes flows both fully and partially within study area) |
|---|---|
| Southampton Central | 10.8% |
| Winchester | 9.2% |
| Portsmouth stations | 7.7% |
| Havant | 3.8% |
| Fareham | 3.5% |
| Eastleigh | 2.8% |
| Southampton Airport Parkway | 2.8% |
| Cosham | 1.7% |
| Swanwick | 1.2% |
| Hilsea | 0.6% |
| Chandlers Ford | 0.3% |
| London | 13.0% |
| All other study area stations | 23.0% |
| All other non-study area stations | 19.4% |

*Figure 22: MOIRA Data: breakdown of overall demand to/from study area*

| Rank | Station 1 | Station 2 | Proportion of estimated total demand for flows fully or partially in study area (Dec 2019, estimated) |
|---|---|---|---|
| 1 | London BR | Winchester | 5.1% |
| 2 | London BR | Southampton Cent | 3.6% |
| 3 | Southampton Cent | Winchester | 2.3% |
| 4 | London BR | Southampton Airp | 2.1% |
| 5 | London BR | Portsmouth & S | 1.9% |
| 6 | London BR | Havant | 1.8% |
| 7 | Eastleigh | Winchester | 1.4% |
| 8 | London BR | Fareham | 1.3% |
| 9 | Havant | Portsmouth & S | 1.3% |
| 10 | Basingstoke | Winchester | 1.1% |
| 11 | Bournemouth | Southampton Cent | 1.0% |
| 12 | Eastleigh | Southampton Cent | 1.0% |
| 13 | Hedge End | Winchester | 1.0% |
| 14 | London BR | Fratton | 0.9% |
| 15 | Fareham | Southampton Cent | 0.8% |
| 16 | Fareham | Winchester | 0.8% |
| 17 | London BR | Hedge End | 0.8% |
| 18 | Fratton | Havant | 0.7% |
| 19 | Barnham | Chichester | 0.7% |
| 20 | London BR | Eastleigh | 0.7% |

*Figure 23: MOIRA Data: top flows by volume fully or partially in study area*

MOIRA data on the largest point to point flows shows that shows that the largest passenger flows that are partly or fully in the CMSP study area (Figure 23) are dominated by travel to and from London. Eight of the ten largest flows are to London. However, Winchester and Southampton are origins or destinations for six and five of the top 20 flows respectively.

Amongst travel flows *wholly within* the study area (shown in Figure 24- all journeys beyond the study area, including to/from London are excluded) three of the top five largest flows are on the SWML between Southampton, Eastleigh and Winchester.

| Rank | Station 1 | Station 2 | Proportion of estimated total demand for flows fully in study area (Dec 2019, estimated) |
|---|---|---|---|
| 1 | Southampton Cent | Winchester | 6.4% |
| 2 | Eastleigh | Winchester | 4.0% |
| 3 | Havant | Portsmouth & S | 3.6% |
| 4 | Eastleigh | Southampton Cent | 2.8% |
| 5 | Hedge End | Winchester | 2.7% |
| 6 | Fareham | Southampton Cent | 2.2% |
| 7 | Fareham | Winchester | 2.2% |
| 8 | Fratton | Havant | 2.1% |
| 9 | Romsey | Southampton Cent | 1.9% |
| 10 | Portsmouth & S | Southampton Cent | 1.9% |
| 11 | Chichester | Portsmouth & S | 1.8% |
| 12 | Chichester | Havant | 1.7% |
| 13 | Cosham | Portsmouth & S | 1.6% |
| 14 | Fareham | Portsmouth & S | 1.6% |
| 15 | Swanwick | Southampton Cent | 1.5% |
| 16 | Southampton Airp | Southampton Cent | 1.5% |
| 17 | Portsmouth & S | Winchester | 1.4% |
| 18 | Southampton Airp | Winchester | 1.2% |
| 19 | Chichester | Fratton | 1.2% |
| 20 | Cosham | Southampton Cent | 1.1% |

*Figure 24: MOIRA Data: top flows by volume wholly within CMSP study area*

The importance of Southampton Central and Winchester as origins/ destinations is clear as 13 out of the top 20 intra-study area flows are to/ from one of these stations. Flows to/from Portsmouth make up only four of the top 20 flows. Portsmouth to Southampton is only the 10th busiest flow in the study area- just under 2% of all rail journeys in the study area are between the cities.

Also notable is that only two other flows in this top 20 are between one city region and the other (Portsmouth to Winchester [17th] and Cosham to Southampton Central [20th]). All other large flows are broadly medium distance journeys contained within each city region.

## 5.2 Key rail commuting flows - analysis of Census data

Analysis of Census 2011 travel to work data based on station catchment analysis via GIS has been undertaken and is summarised over the following pages. Census 2011 travel to work data has been used for this analysis because it directly relates to commuting, and therefore to many of the peak hour travel flows which create the greatest challenges (congestion, air quality etc) in Solent.

Figure 25 (overleaf) shows those commute flows within Solent estimated to have 100 or more daily rail commuters according to Census data. Thicker lines indicate greater demand. Directionality is not shown but can be found in Table 4.

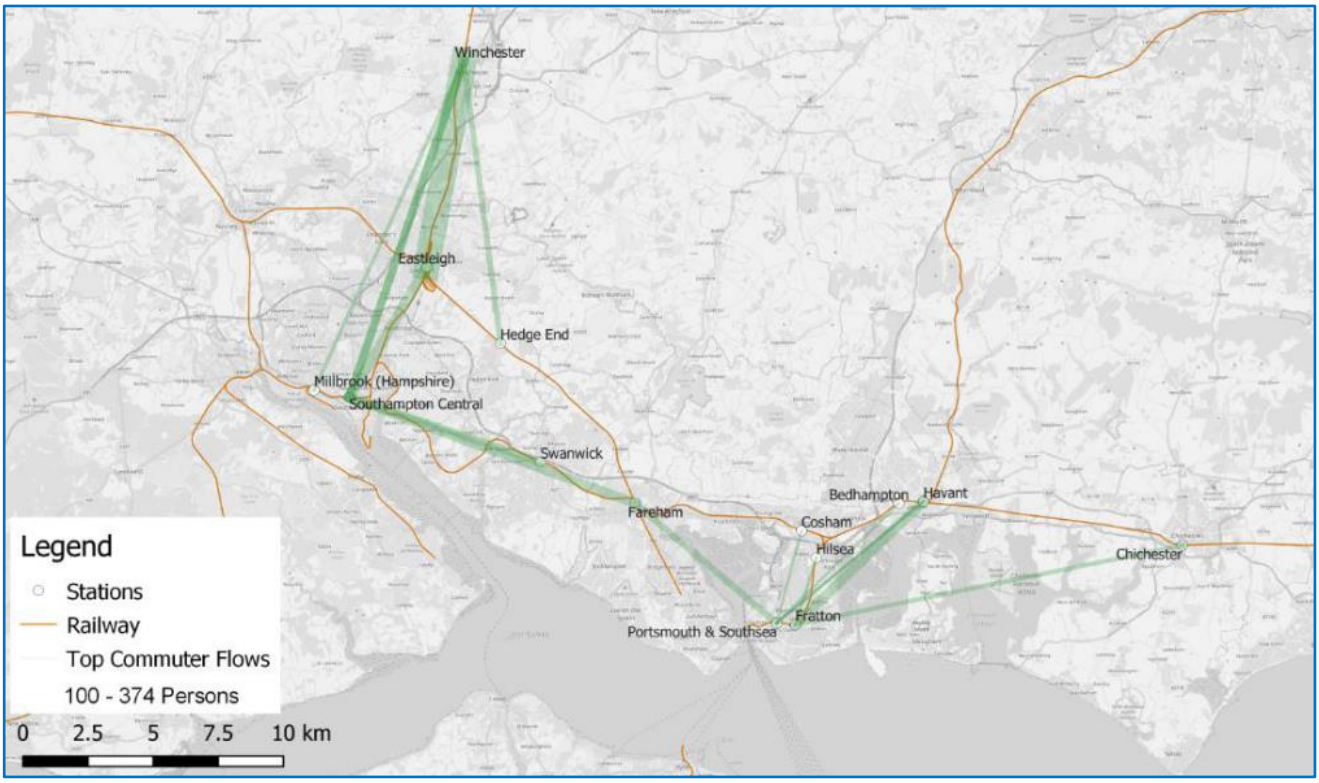



*Figure 25: largest rail commute flows in Solent (Census 2011 data)*

Southampton, Winchester and Portsmouth are the focus for the largest rail commuting flows, most of which are medium-distance commutes between outlying suburbs/ surrounding towns and the city centres. No longer distance "city-to city" or "city region to city region" flows have more than 100 daily rail commuters

Table 4 overleaf compares the top 25 rail commuter flows between stations in and near the Solent area (based on Census data) against all-modes flows between the same catchments. A comparison is also made against the ranking of these flows in the MOIRA (ticketing based) data presented in previous pages. A good degree of alignment exists between these different data sources. Where there are differences between MOIRA data and census data, likely explanations include:

- Census data covers travel to work only whereas the MOIRA data includes all journey purposes (e.g. education trips to stations near schools and colleges; leisure trips to stations near key shopping and leisure destinations);
- Where stations are very close together (e.g. Portsmouth stations and Fratton; Southampton Airport and Eastleigh) the Census data processing method used may assign passengers to a different station to those used in reality.

Only five of the top 25 rail commuting flows in Solent (Table 5) have more than 2,000 daily commuters across all modes. In comparison, the analysis found that the top 30 station

catchment to station catchment all-mode flows in Solent all have more than 2,800 daily commuters and that most of these large all-modes travel flows occur over very short distances between adjacent station catchments.

This indicates that most of the largest rail commute flows in Solent are medium to low volume all-mode flows and are mostly medium to longer distance journeys, which by their nature have lower numbers of commuters than shorter intra-urban area flows. This in turn suggests that rail's current core strengths lie in serving such medium distance flows rather than in serving larger volume but very short distance commutes or serving the long distance city-to-city market. This aligns well with the strategic role/ niches for rail identified in Section 3.8.

| Origin | Destination | Estimated rail commuters | Estimated all-mode commuters | Ranking in top 20 MOIRA Flows (see Figure 24) |
|---|---|---|---|---|
| Eastleigh | Winchester | 373 | 2,396 | 2 |
| Eastleigh | Southampton Central | 198 | 1,068 | 4 |
| Fratton | Havant | 189 | 1,778 | 8 |
| Fareham | Southampton Central | 182 | 648 | 6 |
| Southampton Central | Winchester | 172 | 549 | 1 |
| Swanwick | Southampton Central | 167 | 1,076 | 15 |
| Winchester | Southampton Central | 160 | 1,076 | 1 |
| Fareham | Portsmouth & Southsea | 151 | 1,839 | 14 |
| Hedge End | Winchester | 138 | 1,320 | 5 |
| Fratton | Chichester | 125 | 725 | 11 |
| Millbrook | Winchester | 118 | 716 | |
| Fratton | Hilsea | 107 | 3,700 | |
| Bedhampton | Portsmouth & Southsea | 106 | 1,742 | |
| Portsmouth & Southsea | Havant | 105 | 581 | 8 |
| Havant | Portsmouth & Southsea | 105 | 503 | 8 |
| Cosham | Portsmouth & Southsea | 100 | 1,901 | 13 |
| Southampton Central | Eastleigh | 93 | 591 | 4 |
| Fratton | Fareham | 91 | 1,028 | 14 |
| St.Denys | Winchester | 89 | 442 | |
| Romsey | Southampton Central | 89 | 871 | 9 |
| Fratton | Southampton Central | 87 | 298 | |
| Fratton | Cosham | 84 | 2,911 | |
| Totton | Southampton Central | 79 | 2,008 | |
| Fratton | Portsmouth & Southsea | 79 | 10,247 | |
| Chandlers Ford | Southampton Central | 76 | 1,065 | |

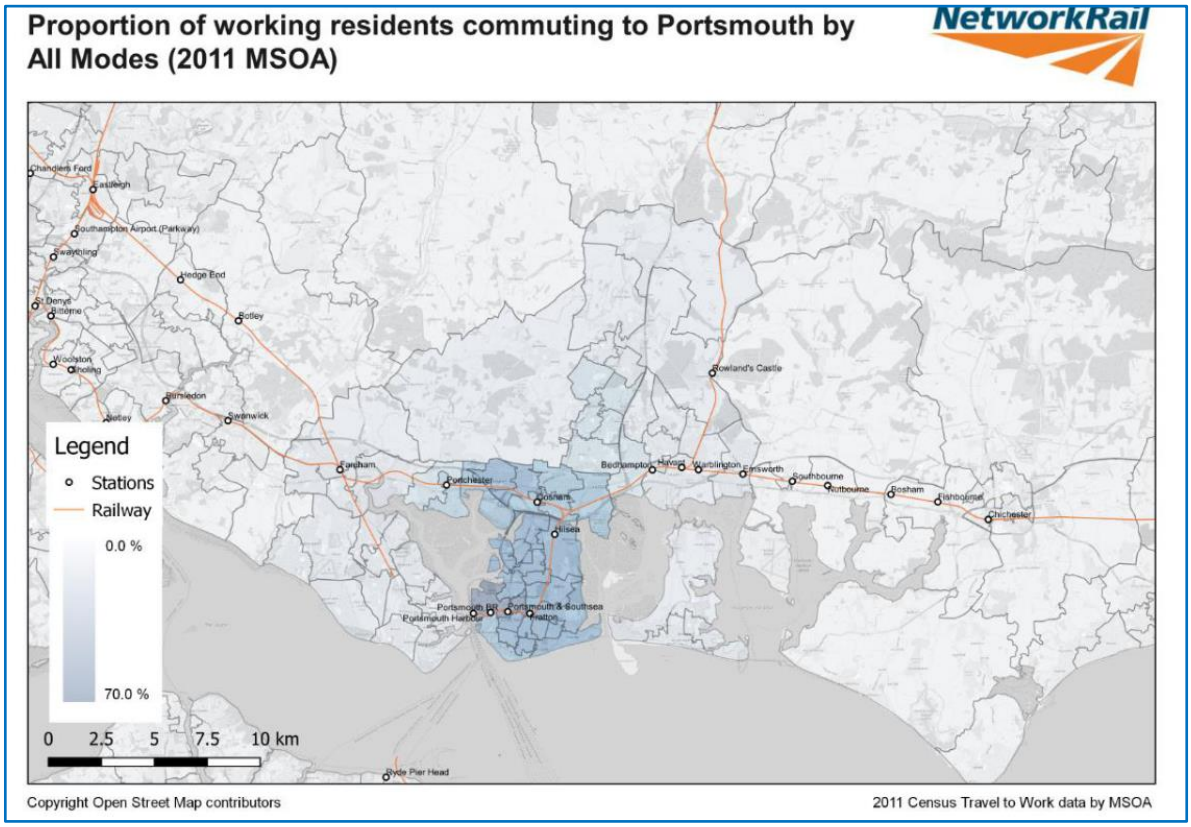
*Table 5: Census 2011 analysis- 25 largest Solent Area rail commuter flows*

## 5.3 Comparison of rail commuting flows and all-modes commuting flows into Portsmouth and Southampton

The maps in Figures 26 and 27, on the following two pages, are intended to visually illustrate the differences between patterns of all modes commuting and rail commuting into the two cities.

There are similar patterns for both cities, namely that rail's strongest market share for commuting is from suburbs and nearby towns mostly outside the city boundaries and towards the edges of each city region, particularly in the vicinity of stations with higher service frequencies.

The relationship between mode share and frequency is particularly critical to this study and is explored in more depth in Section 6.1.



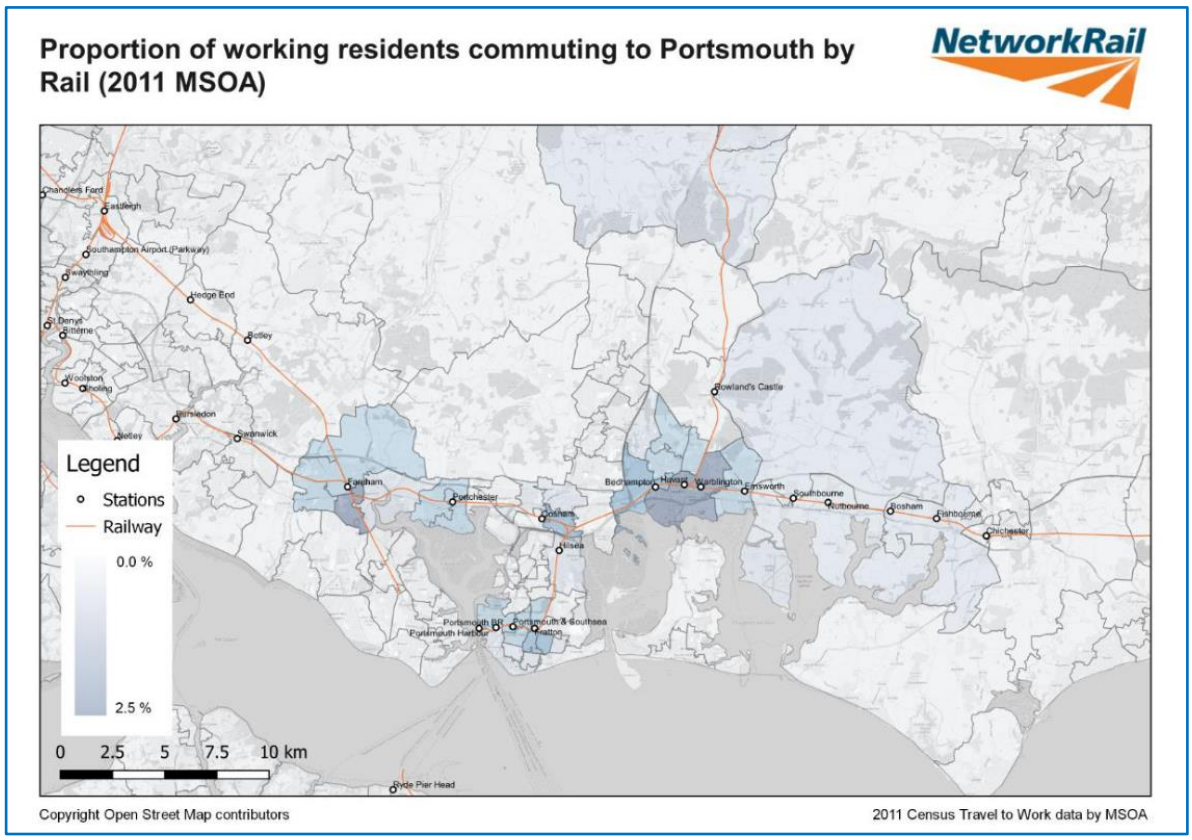
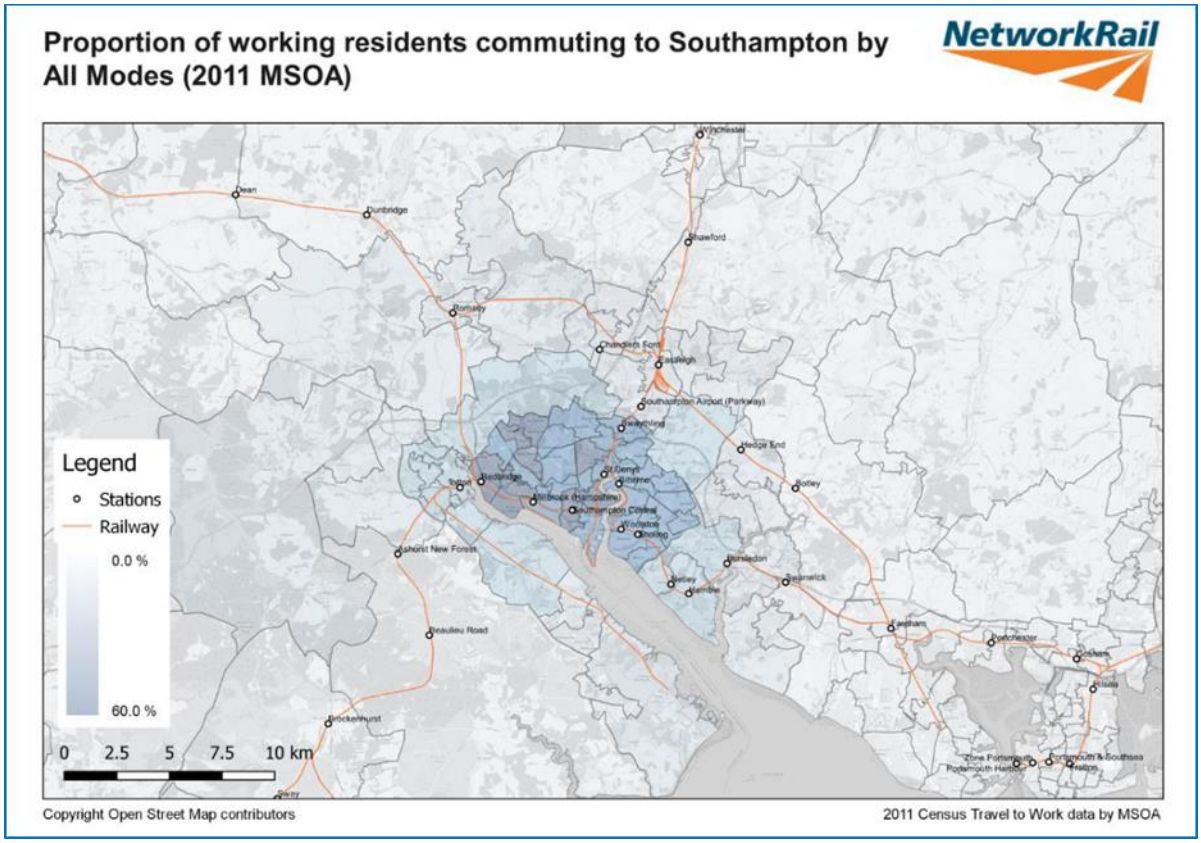




*Figure 26: Portsmouth commuter origins- rail comparison to all modes*



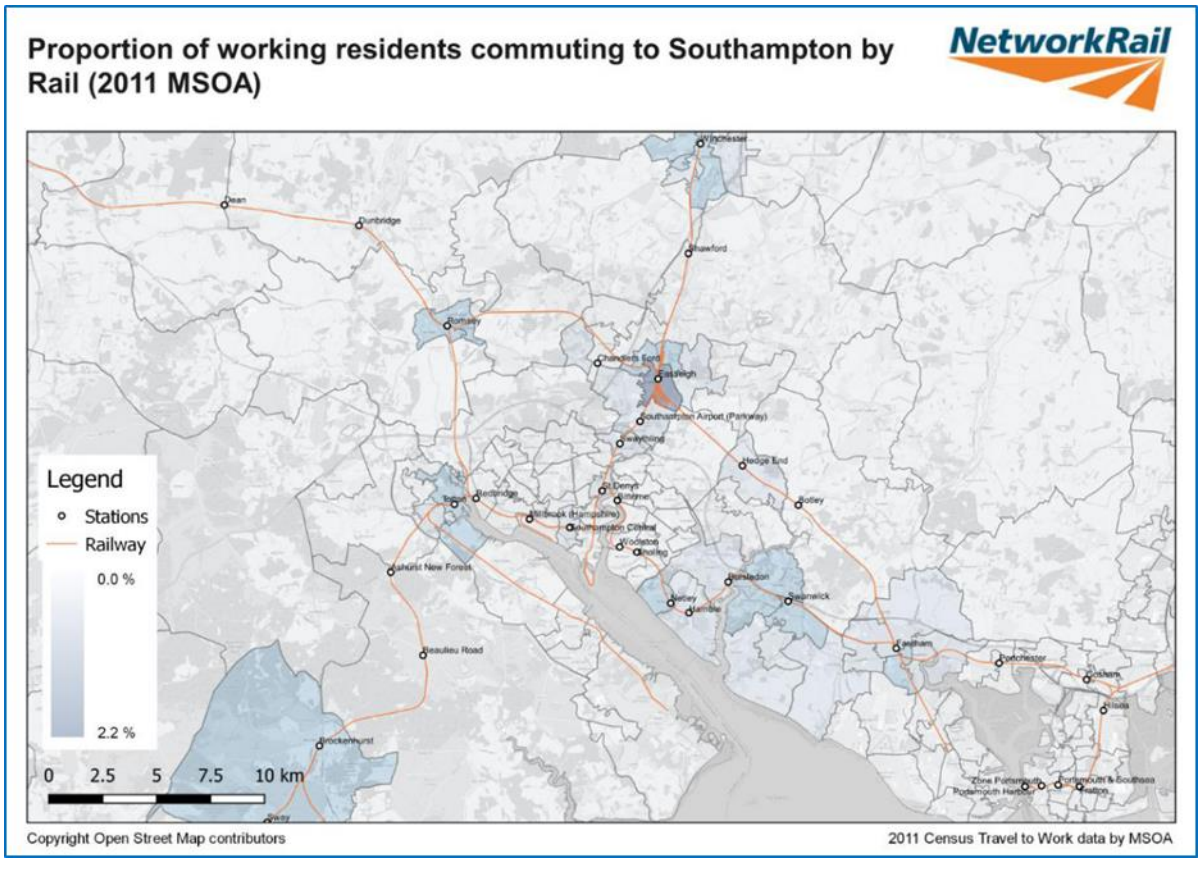




*Figure 27: Southampton commuter origins- rail comparison to all modes*

## 5.4 Comparison of rail's competitiveness with driving for commuters

This section summarises analysis undertaken to aid understanding of how and where the rail offer in Solent could be developed to improve its competitiveness with driving. This analysis is focused around comparison of journey times between rail and driving.

Journey times and Generalised Journey Times (GJT) (actual journey time plus average wait time- determined by how frequent a train service is) are some of the largest determinants of transport users' mode choice.

A spreadsheet tool used for assessment of a long-list of potential train service changes (see Section 6.2) enabled comparison between driving journey times and rail actual and GJTs for both the AM peak, and the off peak.

Out of 363 station to station journeys in Solent that were analysed, current rail journey times are equal to or faster than driving on:

- 238 station to station pairs in the AM peak (65% of all possible journeys);
- 161 station to station pairs in the off peak (44% of all possible journeys).

However once wait times (a product of train frequency) are included to give Generalised Journey Time (GJT), rail is only quicker than driving on:

- 23 station to station pairs in the AM peak (6% of all possible journeys);
- 13 station to station pairs in the off-peak (3% of all possible journeys).

These results support an assertion that train frequency, not physical speed/ journey times, are a key issue holding rail back from competing more effectively with driving for journeys in and around Solent.

Forecast increased traffic congestion and lower traffic speeds by 2036 only improves rail's competitiveness slightly, and suggests that the rail industry cannot rely on deteriorating driving conditions to "push" more users to rail:

- AM peak rail actual journey time equal to or faster than driving on 255 station to station pairs (70% of all possible journeys, vs 65% today);
- Rail GJT in the AM peak equal to or faster than driving on 30 station to station pairs (8% of all possible journeys, vs 6% today).

Testing via the tool indicated that if Solent Transport's aspirational 4tph frequency (see Section 6.1) was achieved at all stations which don't currently have this level of service by 2036 (and no other improvements, e.g. new direct links or accelerated journey times were made) rail GJT would become equal to/ faster than driving on:

- 133 flows in the AM peak (37% of O-D pairs);
- 61 flows in the off-peak (17% of O-D pairs).

This suggests that with suitable interventions, rail could compete effectively with driving on six times as many intra-Solent station to station journeys as it does today- or, put another way, rail may be able to position itself as an attractive alternative to driving for nearly 40% of the travel markets it is able to serve in Solent – compared with only around 5% today.

The analysis undertaken sought to identify which station to station flows could most benefit from increased frequency, by identifying the largest "gaps" between rail GJT and car journey times. This analysis suggested improved train frequency could most benefit:

- stations on the Botley line to Fareham, Eastleigh and the Portsmouth area;
- smaller stations between Fareham & Southampton (e.g. for journeys such as Sholing-Swanwick or Hamble-Swanwick, as well as to Southampton Central);
- smaller stations on the Southampton local service, e.g. St Denys to Eastleigh;
- at some stations serving more outlying areas e.g. the New Forest and the Test Valley.

Most of the stations where the largest "gaps" exist are served only hourly at most times. This indicates that higher frequency links from local stations to the main city centre/ employment hub area stations would improve rail's competitiveness versus driving.

## 5.5 Portsmouth to Southampton connectivity

Specific analysis was undertaken to inform how to address this strategic question.

The overall size of the city to city market is small- only 1384 daily commuters between Portsmouth and Southampton and 1671 daily commuters between Southampton and Portsmouth by all modes (2011 Census). Only 1-2% of workers in one city live in the other. Rail's share of the city to city commuting market is small (9%-18%) as shown in Figure 28.

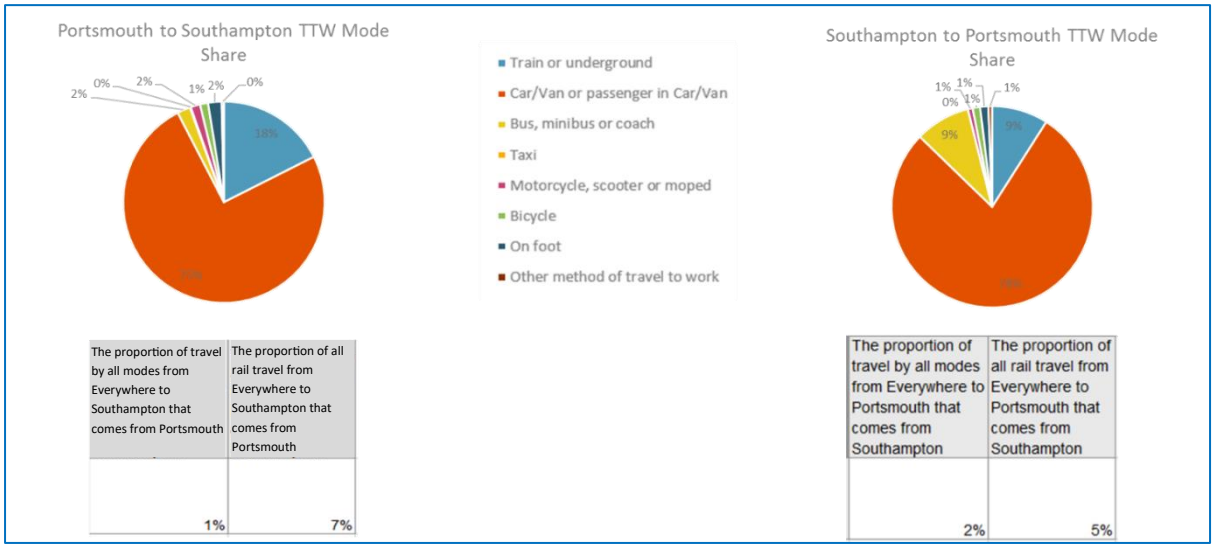



*Figure 28: Portsmouth to Southampton and Southampton to Portsmouth mode share (Census 2011)*

Rail is used by significantly more Portsmouth residents commuting to Southampton than vice versa. This may reflect differences in the cities road networks which may make driving (or bus use) into Portsmouth more attractive for Southampton residents:

- Portsmouth has a motorway connection direct from the M27 most of the way to the city centre (M275) which, whilst still subject to congestion in the peak hours, provides relatively fast access to the city centre and enables fairly quick journeys on the final leg of the X4 fast bus service from Fareham/ Southampton;
- In comparison, access routes into Southampton city centre from the east are lower capacity single/dual carriageway local roads (no direct motorway connection) and are subject to greater levels of congestion (which the X4 bus route from Fareham/ Portsmouth makes a lengthy diversion in Woolston to avoid in the morning peak).

Comparison of rail and road journey times/ GJTs was undertaken to better understand the what would be required for rail to significantly improve its offer for city-to-city journeys.

Figure 29 plots the size of commuting flows against rail GJT and car journey times for several town/city pairs comparable in size and distance apart to Portsmouth and Southampton. The number in the brackets shows the distance by road miles between the cities, and the size of the dots represent the size of the working (commuting) population for each city pair, relative to that of the Portsmouth – Southampton (PMS-SOU) commuting flow.

City pairs above the diagonal line have rail GJTs which are slower than driving, whilst those below the dashed diagonal lines have rail links which are quicker than driving. The further to the top right of chart a city pair is, the poorer its overall road/rail connectivity in terms of journey times.

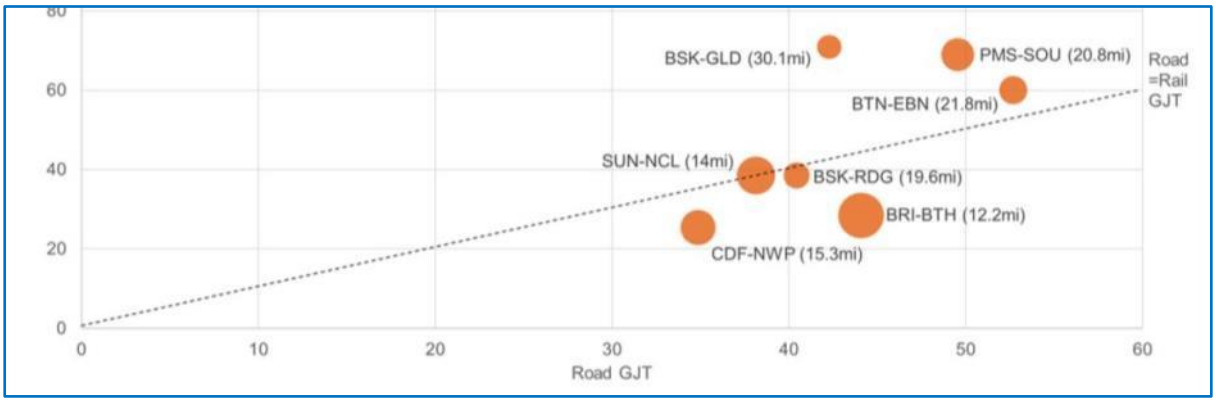



*Figure 29: Comparison of city pair road and rail GJTs and commuter numbers*

This analysis shows that the Portsmouth to Southampton rail frequency/journey time combination is significantly slower than driving and compares poorly with most other city pairs in the analysis. Notable observations include:

- Portsmouth to Southampton rail GJT is similar to that between Basingstoke and Guildford (BSK-GLD) even though Basingstoke and are 50% further apart and have no direct train services;
- Compared to Brighton to Eastbourne (BTN-EBN), rail GJT from Portsmouth to Southampton is around 10 minutes slower despite being only 1 mile less distance;
- Bristol to Bath (BRI-BTH) and Cardiff-Newport (CDF-NWP) have significant rail GJT advantages over driving, as a result of being shorter distances apart and being linked together by relatively high speed (90-100mph) mainlines with high frequency services (4 to 8tph): quite different to rail routes in Solent;
- Sunderland to Newcastle (SUN-NCL) and Basingstoke to Reading (BSK-RDG) are connected by lower speed rail lines which are somewhat more comparable to PMS-SOU but have greater frequency (6tph and 3 to 4 tph respectively) – this delivers rail GJT parity with driving and in the case of BSK-RDG, a rail GJT that is over 40% better than PMS-SOU over a similar "crow fly" distance.

The analysis found that additional train frequency would bring Portsmouth to Southampton rail connectivity closer to GJT parity with driving. One extra hourly train would improve rail GJT by around 10 minutes (to approximately 60 minutes) and two extra hourly services would improve GJT by around 15 minutes (to approximately 55 minutes), bringing rail GJT much closer to road journey times (just under 50 minutes) than it is today.

However, achieving a rail GJT that is equal to or significantly better than driving would require either unrealistically greater frequency and/ or major improvements to train speeds and journey times (or both):

- If rail journey times are not improved, very high frequencies (at least every 10 minutes, or perhaps even greater frequency) would be needed for rail to match road for city to city journeys and would still only be competitive for some users at peak times;
- If average rail journey time was reduced to 40 minutes (fastest possible journey time today, achieved only by not calling at most intermediate stations), a train approximately every 5 to 15 minutes would be required for rail to match driving;
- If average rail journey time was reduced to 30 minutes (likely to require entirely new sections of line to be achievable), a train approximately every 15 to 20 minutes would be required for rail to match driving between the cities.

## 5.6 Low Use Stations: Analysis

The final area of demand data analysis concerned low usage stations (defined as <150,000 entries and exits per year). 12 stations in the study area fall into this category and usage at many is unexpectedly low given their locations in or close to significantly urbanised areas. Most of these stations are served by only one train per hour at most times.

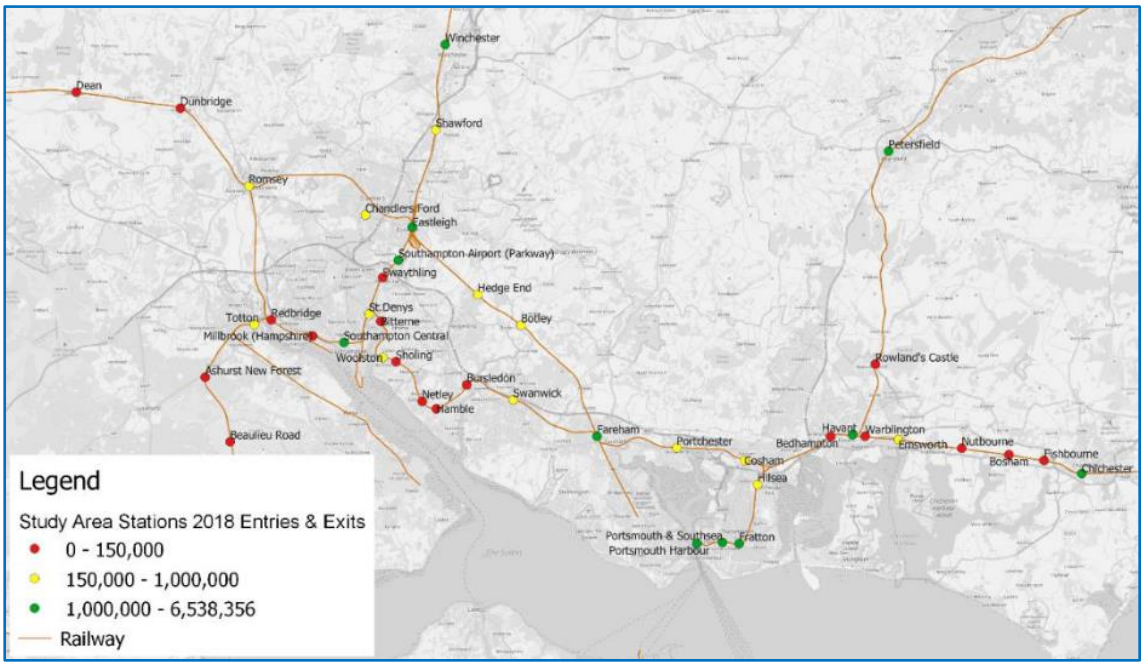



*Figure 30: low usage stations in and near the study area*

Investigation was undertaken searching for correlations between different demographic factors in the catchment of five of these 12 low usage stations, seeking to identify any specific factors that might cause the low usage.

This found that there was weak or no correlation between most factors examined and station usage, including factors that might have been expected to influence rail demand (such as population within a station catchment, or numbers of residents commuting by bus).

It was suggested that the low usage of some stations may be because although they are near developed areas, they have smaller populations within convenient walking distance.

However, the major finding was around frequency and journey time at the low usage stations. At all five stations in the analysis, rail GJT was significantly slower than road journey times for travel to key destination stations- reflective of low train frequencies.

Once waiting for a train is included, rail journey times to city centre stations were in many cases double that of the equivalent road journey, even though the actual journey times for users once on board a train (even on the local stopping trains calling at these smaller stations) are often very comparable to driving.

Users flagged low train frequency as an issue in surveys undertaken by Three Rivers Community Rail Partnership at several low use stations, although reliability and punctuality have also been suggested as key improvements desired by users of these smaller stations.

Therefore, train frequency improvements at these smaller local stations are likely to be required if usage at these local stations is to be raised (and better use of these potentially valuable transport assets is to be made)- although these need to be complemented with supporting measures including “first/last mile” access improvements, and working through the planning system to locate new development closer to these stations to increase the population within a walking catchment.

## 5.7 Current travel patterns and demand: conclusions

Some key conclusions can be drawn based on the evidence on pages 55 to 62. These are:

- Whilst London is the largest individual destination for rail journeys to/from Solent, 68% of all journeys in the study area are "internal" trips within Solent, with Southampton and Winchester being particularly major origins/destinations (and Portsmouth somewhat less so);
- Most of the largest rail flows in Solent are medium distance journeys within each city region and there is little large-scale interaction between the two city regions. Portsmouth to Southampton makes up under 2% of all rail journeys in the area;
- Census data analysis largely backs up the above interpretation of MOIRA data;
- Rail's core strengths appear to be in serving medium distance suburb/nearby town to city flows rather than in serving larger volume but very short distance intra-city flows or serving the longer distance city-to-city market. It is suggested that service development priorities should reflect this (which may mean a preference for "semi fast" or "skip stop" services which seek to balance medium distance connectivity and journey times in preference to serving shorter distance local flows);
- Although many local stakeholders are critical of rail journey times in Solent, on-train journey times are actually equal to or faster than the equivalent driving journey on nearly two thirds of station to station journeys at peak times. However once wait times (resulting from often low train frequency) are factored in, rail is uncompetitive with driving on the vast majority of the travel flows it can serve;
- There is strong evidence supporting the assertion that train frequency, not physical speed/ journey times, are the key issue that need to be addressed by options developed in this CMSP study;
- If train frequency could be boosted significantly, rail's ability to compete with driving on journey time and offer an alternative to the private car in the study area would likely improve considerably;
- Regarding Portsmouth to Southampton rail services, there is evidence that this connectivity is poor compared to similar city pairs. Rail's competitive position versus driving for Portsmouth-Southampton journeys is also currently poor;
- There is scope to significantly improve generalised journey times between the two cities if additional train frequency can be provided, but that this alone will not quite enable rail to match typical driving journey times;
- The combined frequency and train journey time improvements needed to make rail travel between the cities faster than driving looks to be realistically unachievable;
- Analysis of low usage stations has also drawn a conclusion that low train frequency is likely to be a major reason for perceived under-use of these stations, and that train frequency improvements at these smaller local stations, complemented by supporting measures including "first/last mile" access improvements, may help to increase usage and relevance of these stations.

These conclusions have helped inform the development and assessment of train service intervention options presented in Section 6.

## 5.8 Future Demand Growth - baseline

A forecast of growth in passenger demand driven by changes external to the railway (eg development and population changes) to 2050 has been prepared.

The forecast is based around estimates of changes to train loadings resulting from estimated growth rates at each station in the study area. Base year train loading data (counts of number of passengers on each train service arriving/departing each station) was provided by operators for autumn 2018 and /or spring 2019.

The methodology used captures demand arriving from within a 60km radius (ie excludes London) into Southampton and into Portsmouth city centre stations in the AM 3-hour peak and 1 hour high peak (0800-0859) and applies this to estimate growth rates for each individual train service in the current timetable for five future years.

Two scenarios have been prepared:

- A central DfT-compliant growth scenario:
    - Based around National Trip End Model (NTEM) forecasts of growth in all trips based on national projections of population, employment, housing, car ownership;
    - Housing & Employment growth is taken from published and adopted Local Plans;
    - EDGE model is utilised to estimate resultant growth in demand for rail travel.

- An "aspirational" stakeholder growth scenario with methodology as per scenario 1 but with additional development proposals in the planning system but not yet in published and adopted Local Plans applied on top of EDGE demand;
    - Solent Transport provided details of development proposals and phasing assumptions that are in draft Local Plans or at an advanced stage in the planning process (hence are viewed by local stakeholders as being likely to occur - but which do not appear in the DfT NTEM data due to not yet being committed);
    - This dataset and approach were also used by Solent Transport and its Member authorities in the modelling of Transforming Cities Fund proposals to account for expected but un-committed development, developed jointly with PfSH;
    - Demand from a total of 18,123 additional new dwellings above that in the NTEM forecasts was added.

Tables 6 and 7 show the forecast changes in rail passenger demand into each city, for each scenario. These growth forecasts indicate slightly stronger growth is forecast into Portsmouth than into Southampton prior to 2050, but growth levels by 2050 are equal. The aspirational growth scenario gives a 13% to 19% uplift in demand by 2036 versus the central forecast.

| Growth from 2018 to: | Average forecast growth in passenger demand<br><br>Central Scenario | Average forecast growth in passenger demand<br><br>Aspirational Scenario |
|---|---|---|
| **2026** | 12% | 14% |
| **2031** | 24% | 27% |
| **2036** | 29% | 33% |
| **2041** | 37% | 41% |
| **2050** | 52% | 58% |

*Table 6: Forecast high peak demand changes into Portsmouth*

| Growth from 2018 to year | Average forecast growth in passenger demand<br><br>Central Scenario | Average forecast growth in passenger demand<br><br>Aspirational Scenario |
|---|---|---|
| **2026** | 12% | 13% |
| **2031** | 18% | 21% |
| **2036** | 21% | 25% |
| **2041** | 29% | 33% |
| **2050** | 52% | 57% |

Table 7: Forecast high peak demand changes into Southampton

### 5.8.1 Comparison to TfSE Transport Strategy forecasts

These growth rates have been compared against rail growth forecasts in TfSE's draft Transport Strategy. Our central and aspirational growth forecasts for 2050 are significantly higher than TfSE's 2050 base "do nothing" forecasts (estimated 27% growth in overall rail journeys vs 2018, and 20% growth in rail journeys internal to the TfSE area).

However, our forecasts are much lower than those set out in TfSE's preferred "Sustainable route to growth" scenario, which envisage growth by 2050 (versus a 2018 base) of:

- 165% growth in rail journeys across the TfSE area;
- 202% growth in rail journeys internal to the TfSE area (such as intra-Solent journeys).

In four of the five scenarios considered by TfSE a 50% or greater increase in rail demand on the Portsmouth-Southampton corridor was forecast, with over 150% increase in rail demand between the cities by 2050 in three out of five scenarios[33].

[33] See Figures 7.2 to 7.6 in TfSE Scenario forecasting technical report https://transportforthesoutheast.org.uk/wp-content/uploads/2019/10/Scenario-forecasting-technical-report.pdf

The TfSE preferred scenario forecast the impact of a transformational range of policies securing large modal shift from driving to active modes and public transport, including:

- Concentration of new development in large urban areas;
- Introduction of road pricing;
- Rail and bus fare reduction of 50%;
- Doubling of (private) vehicle operating costs;
- Reduction in all rail (and bus/active travel) GJT by 30%- stated as being likely to require significant interventions on both radial and orbital rail routes.

The TfSE preferred scenario suggests that several times more growth in rail demand (than the primarily development-driven forecasts we have prepared) might occur should "stretching" policy levers be used to radically alter user behaviours and choices.

### 5.8.3 Impact of Growth forecasts on 2050 peak hour train loadings

The demand growth forecasts in Tables 6 and 7 have been applied to current peak hour train loading counts and capacities to provide the capacity/ crowding maps in Figures 31 and 32.

These maps assume that despite growth, capacity is unchanged from today (no improvements to train frequency or length). They are also an average of all train services between each adjacent station pair- masking variations in loads between individual services.

For peak hour travel into Portsmouth, standing passengers are forecast along much of the Netley line (Woolston to Fareham) as well as between Fareham and Cosham/Hilsea. Most Netley line stations are served by only one train in the high peak hour which is forecast as being overloaded as a result of the 52% increase in demand by 2050.

Figure 31 suggests average train loadings will be lower and crowding less of an issue from Hilsea inwards to Portsmouth although this is as a result of busier trains from Fareham direction being averaged out by quieter ones from Havant.

The largest crowding issues on journeys towards Portsmouth–which are forecast to be severe- are between Eastleigh and Fareham (which again at present is served by just one high peak hour train).

For peak hour travel towards Southampton (Figure 32), significant/ severe crowding is forecast between Fratton and Cosham and also on the mainline at stations between Eastleigh and Southampton and between Totton and Southampton. This reflects the limited capacity provided by the two-carriage DMUs used on many local services around Southampton (which already suffer from overcrowding in the high peaks).

Forecast loadings between Fareham and Southampton are high but not in excess of capacity. Because no services between Fareham and Eastleigh continue to Southampton, no loading forecasts are provided for the Botley line.

In all five of TfSE's 2050 scenarios, volume of rail passengers on the Portsmouth-Southampton corridor is forecast to exceed existing capacity, with over 150% more passengers than seats in the preferred "Sustainable route to growth" scenario[34].

In summary, the baseline and the aspirational (but potentially likely) growth forecasts both indicate that the current train service patterns/ capacity will be over capacity and suffering from crowing in the peak hours by 2050 with passengers subject to overcrowding in some cases over quite significant distances/ journey times. The forecasts indicate crowding issues start to become significant by the early 2030s. If rail is to provide an attractive alternative to driving, these outputs indicate that more capacity is likely to be required, particularly on high peak Southampton-Portsmouth, Eastleigh-Portsmouth and Southampton local services.

If significant policy changes triggering larger scale modal shift such as those being proposed in the TfSE transport strategy were to occur, the need to provide large increases to rail capacity to serve greater demand in Solent would become even more pressing.

These outputs demonstrate that growth in demand as a result of committed and likely development (and other factors) is likely to exceed current capacity on Solent rail services at peak times- providing a further driver for investigation of options to improve capacity and service levels in future.

[34] See Figures 7.13 to 7.18 in TfSE Scenario forecasting technical report https://transportforthesoutheast.org.uk/wp-content/uploads/2019/10/Scenario-forecasting-technical-report.pdf

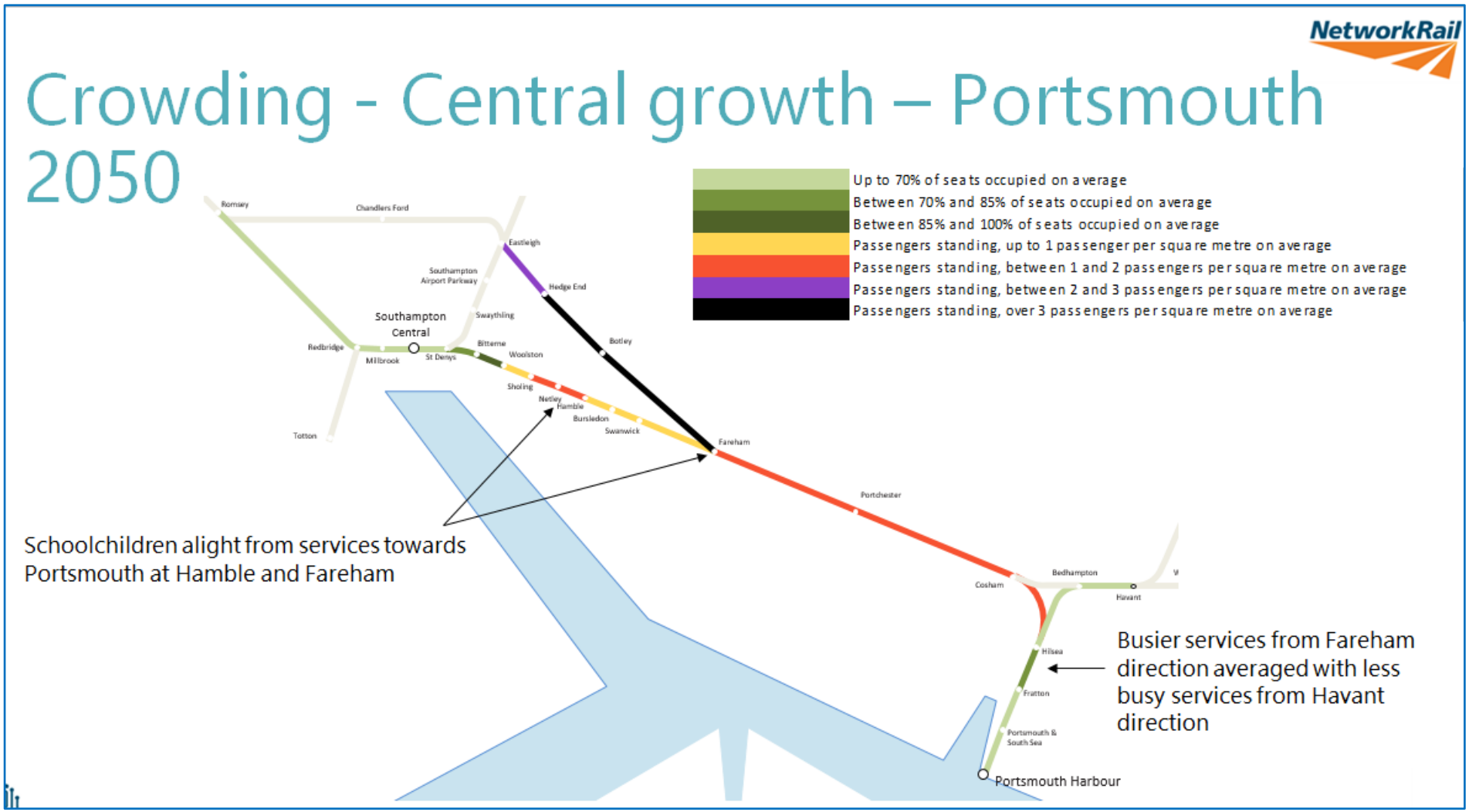



*Figure 31: Commuting into Portsmouth-2050 central growth volume/capacity forecast*

*Based upon a map designed by Andrew Smithers © 2017 www.projectmapping.co.uk and reproduced with permission*

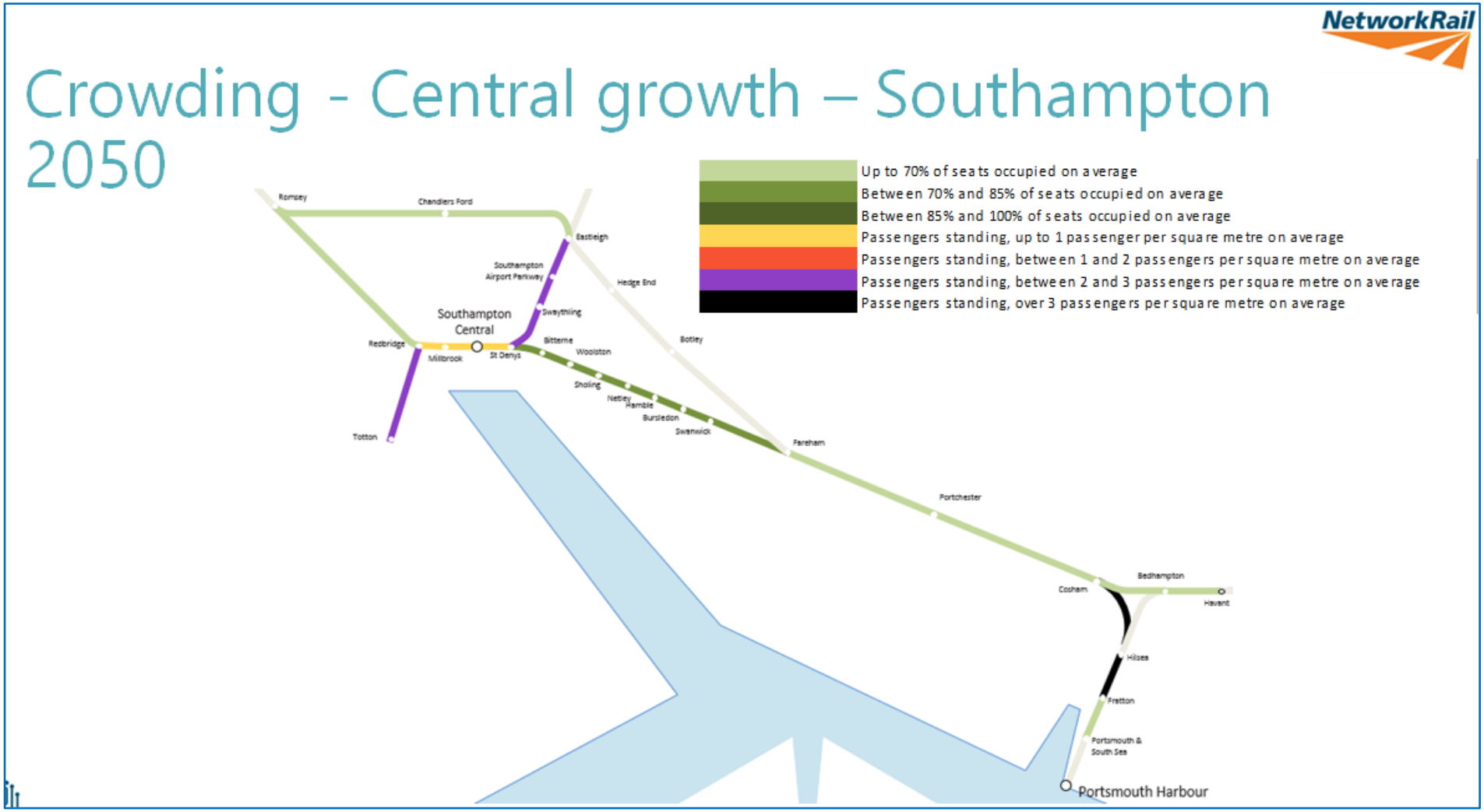



*Figure 32: Commuting into Southampton-2050 central growth volume/capacity*

*Based upon a map designed by Andrew Smithers © 2017 www.projectmapping.co.uk and reproduced with permission*

# 6. Development and testing of train service options

This section summarises the process by which options for improved train services aimed at enhancing rail's "offer" for travel in Solent were devised and tested to inform. This process, and the options tested, sought to work in line with the conclusions set out on page 63 regarding rail's strengths, weaknesses and opportunities in the Solent market.

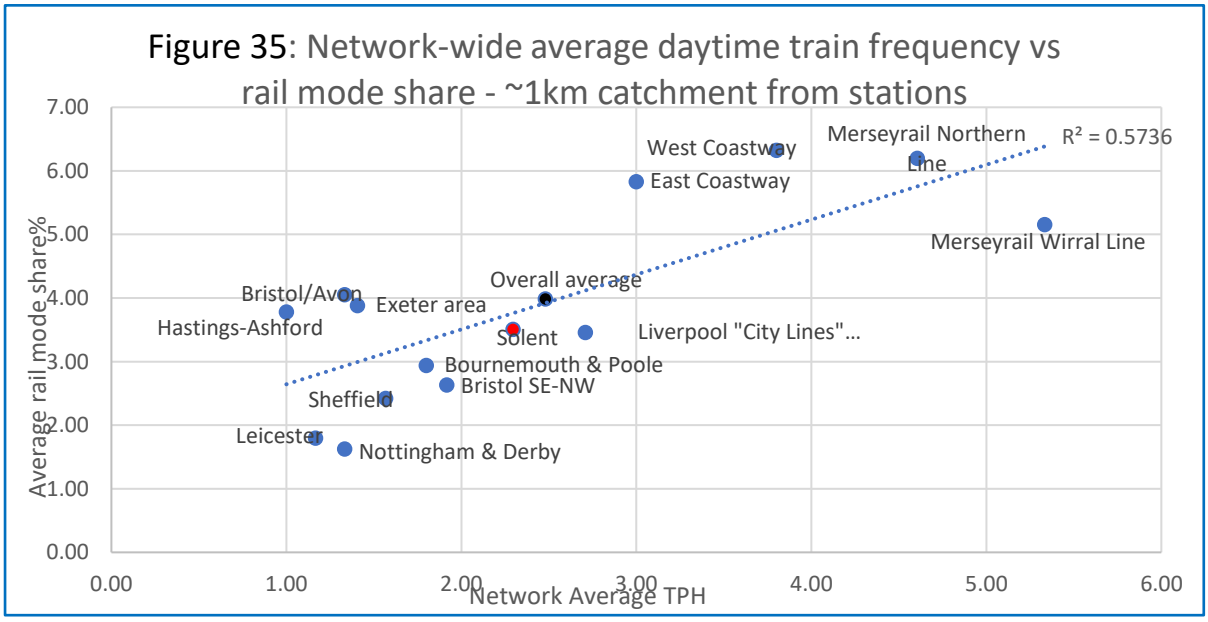
## 6.1 Research informing train frequency targets

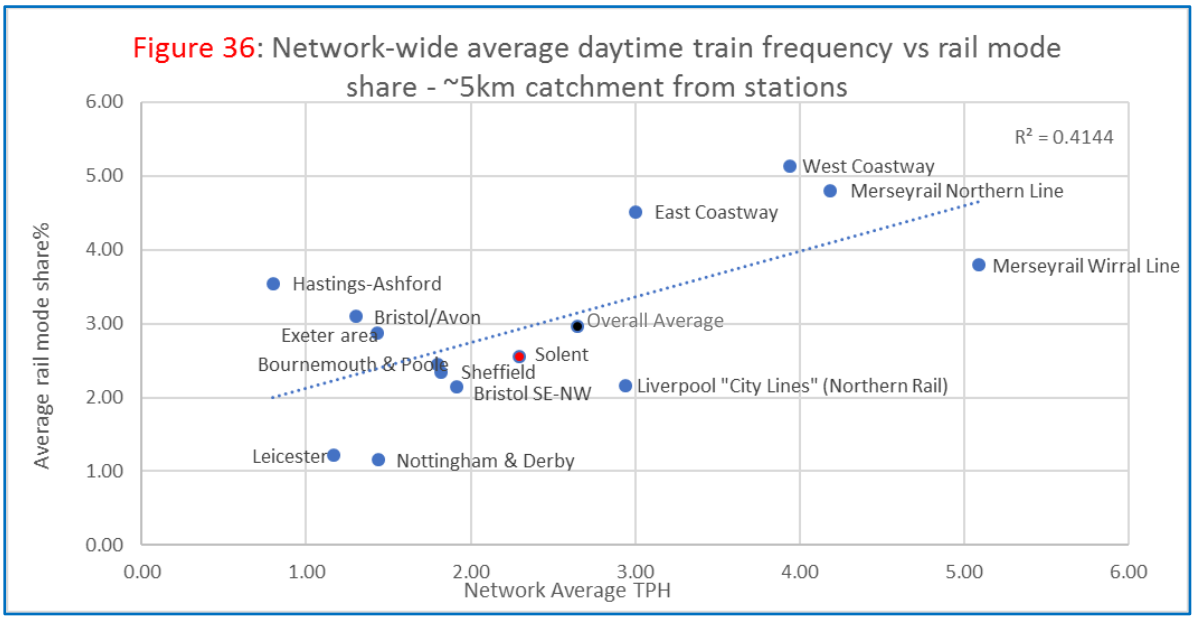
To help answer Strategic Question 5 ("*What level of rail service is required…*"), Solent Transport analysed Census 2011 data to establish the relationship between rail mode share and train frequency at a sample of 294 stations across 13 cities/ city regions.

A positive correlation between train frequency and rail's overall mode share for commuting was found within a "walking" catchment (c. 1km radius from station) and a wider catchment (average c. 5km radius from station).

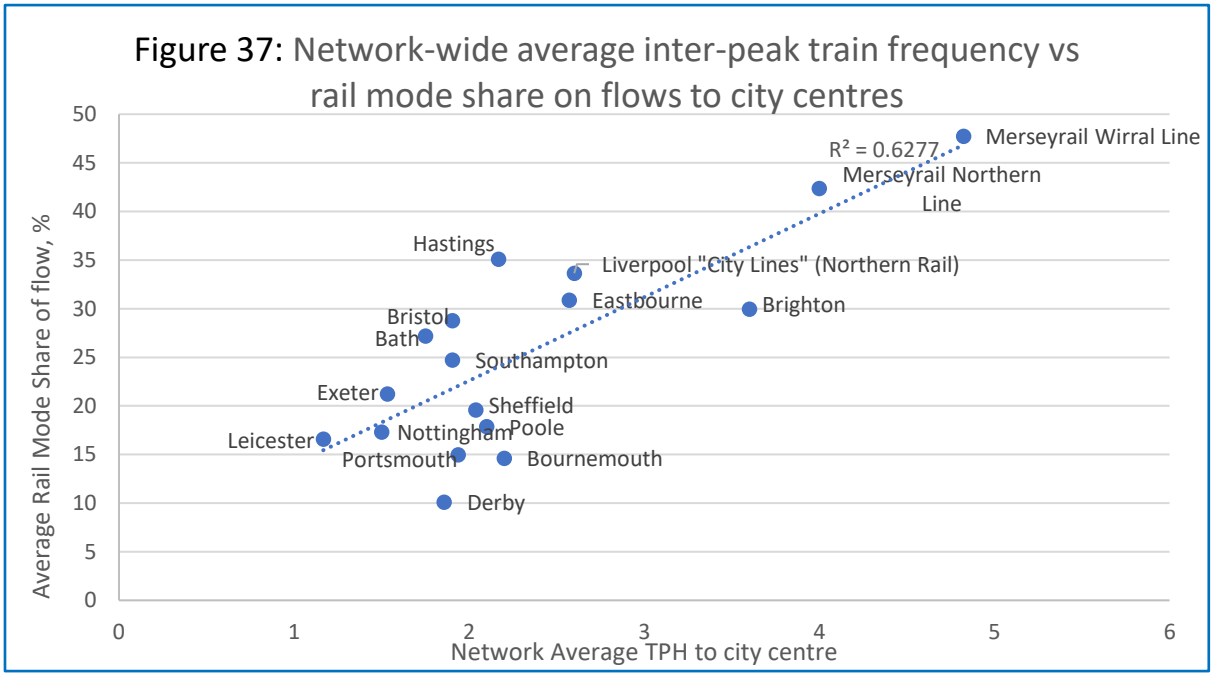
At an individual station level, the relationship between frequency and mode share is clear but variable, but at a "city region" network level, it appears that train frequency and rail mode share are strongly correlated. R-square values of 0.41 to 0.57 indicate train frequency may be the key determinant of rail mode share (the R-square value is a statistical measure that indicates the proportion of the variance for a dependent variable [in this case rail mode share] that is explained by an independent variable [in this case, train frequency].

Figures 35 and 36 show the relationship between average train frequency across the network serving these urban areas in England, and rail's mode share of commuting trips, for the different sized catchments.





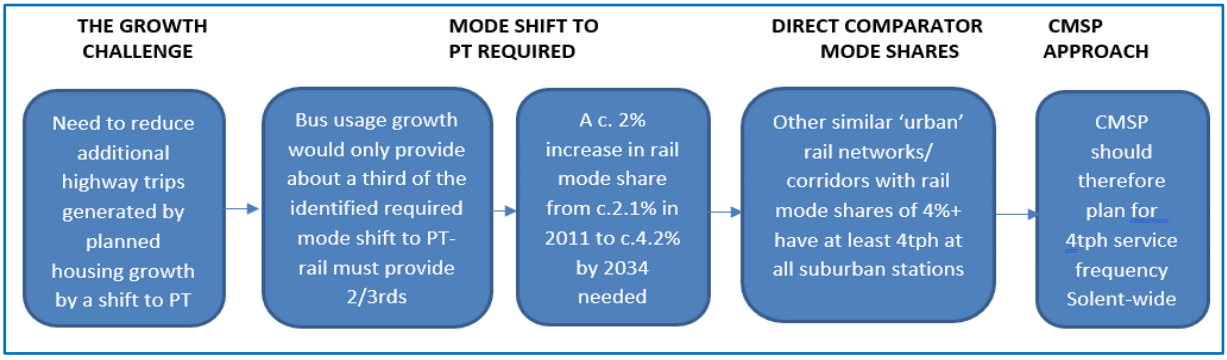

At a network-wide level, the rail network in Solent is currently an "average" performer in terms of mode share and train frequency. Some networks (e.g. East and West Coastway, Merseyrail) where the average station is served by typically 1 to 1.5 more trains per hour than Solent exhibit approximately double the rail mode share of Solent (around 5% mode share in a wide 5km catchment, versus 2.3% in Solent). This rises to over 6% mode share in the smaller ~1km "walkable" catchments around stations (versus 3.5% in Solent).




Additional analysis was undertaken into the relationship between train frequency and rail mode share on flows into city centres, Figure 37. Again, a clear positive relationship was found: a once-hourly service might typically secure 10% to 15% of a suburb to city centre flow, but a four train per hour frequency might typically gain a 40% to 45% share of such a flow. This evidence suggests that a key objective for development of the rail offer in Solent

should be to set a train frequency target for the network which will assist with securing mode shift.

It was agreed that a key objective would be to increase frequency levels to generate significant modal shift, and in turn to investigate how this could be achieved. The diagram below summarises the basic reasoning used to determine this target.




Consideration of planned growth in Solent, and previous modelling of its impacts, indicates that a two-percentage point increase in rail's overall mode share across Solent appears to be a reasonable target to help mitigate impacts of development more sustainably. Achieving this will need to mostly be driven by growth in rail use amongst the circa 40% of Solent residents living within reasonable catchments of stations. The evidence presented here suggest that a four train per hour frequency at all stations in Solent is likely to be required to achieve this mode share target.

Therefore, the train service assessment process has worked on the basis of an aspirational target of 4tph across the network- although it was recognised from the outset that the many other demands on the rail network mean it will be very difficult to achieve such a frequency at some stations.

## 6.2 High level testing of train service options

A spreadsheet based tool was created to undertake high-level testing of a "long list" of potential train service options. The following pages provide a summary. The tool enabled analysis of rail's relative attractiveness and competitiveness with driving on a total of 363 travel flows within Solent, from the areas around 30 origin stations across the Solent area, to the areas around 12 stations in Solent which are located near to major employment areas. These "focus" stations/ areas were:

- Portsmouth city centre, Southampton city centre, Winchester, Havant, Fareham, Eastleigh, Hamble, Swanwick, Chandlers Ford, Southampton Airport Parkway, Hilsea, St Denys.

The tool gave the ability to quantify the effect of different rail service interventions, eg changes to train frequency, journey times etc- showing how these could alter the balance of competitiveness of rail compared to driving. It used census data on station catchment population and size of each travel flows to estimate the potential scale of the benefit/ disbenefit of different changes to the rail offer.

### 6.2.1 Assessment of "long list" of service interventions

A long list of 27 potential train service changes (all overlaid on top of the current service pattern) was developed and tested via the spreadsheet tool. These are summarised in the table below.

| Option | Brief description | Tested calling points |
|---|---|---|
| **1a** | 1tph extra hourly Portsmouth-Southampton-Totton stopping service | All stations Portsmouth-Southampton-Totton |
| **1b** | 2tph extra Hourly Portsmouth-Southampton-Totton stopping service | All stations Portsmouth-Southampton-Totton |
| **1c** | 3tph extra Hourly Portsmouth-Southampton-Totton stopping service | All stations Portsmouth-Southampton-Totton |
| **1d** | 2 tph extra Ports -Soton-Totton, but semi-fast skip stop arrangement | 3tph at Totton, Southampton Central, Swanwick, Fareham, Cosham, Fratton, Portsmouth stations<br><br>2tph all other stations |
| **1e** | 3 tph extra Ports -Southampton-Totton, but semi-fast skip stop arrangement | 2tph at Totton, Southampton Central, Swanwick, Fareham, Cosham, Fratton, Portsmouth stations<br><br>1tph all other stations |
| **1f** | 1tph Portsmouth-Southampton super express | Portsmouth stations, Fratton, Fareham, Southampton Central only- super fast service |
| **1g** | 2tph Portsmouth-Southampton super express | Portsmouth stations, Fratton, Fareham, Southampton Central only- super fast service |
| **1h** | 2tph Portsmouth-Southampton in 30 mins | Portsmouth stns/Fratton non-stop to Southampton Ctl in 30 mins |
| **2a** | 1tph Portsmouth-Southampton - Totton via Eastleigh (fast) | Portsmouth stns, Fratton, Cosham, Fareham, Hedge End, Eastleigh, Airport Parkway, Southampton Central, Totton |
| **2b** | 1tph Portsmouth-Southampton – Totton via Eastleigh (stopping) | All stations |
| **3a** | 1tph extra Romsey to Totton via Eastleigh | All stations |
| **3b** | 2tph extra Romsey to Totton via Eastleigh | All stations |
| **4a** | Solent Loop concept (1tph) | 1tph Clockwise- all stations Totton- Southampton-Eastleigh-Fareham-Southampton<br><br>1tph Anticlockwise – all stations Totton-Southampton-Fareham-Eastleigh-Southampton |
| **4b** | Solent Loop concept (full 2tph) | 2tph Clockwise- all stations Totton- Southampton-Eastleigh-Fareham-Southampton |

| Option | Brief description | Tested calling points |
|---|---|---|
| | | 2tph Anticlockwise – all stations Totton-Southampton-Fareham-Eastleigh-Southampton |
| **5** | Assumption of time savings achieved on the existing service pattern | No change to calling patterns; journey time reductions at:<br><br>- 1-minute time saving for all services Fratton/Hilsea-Cosham<br>- 1-Minute time saving for all services Swanwick-Fareham<br>- 2-Minute time saving on fast services only, Swanwick/Fareham- Southampton Central<br>- 1-minute time saving Eastleigh-Winchester |
| **6a** | Extra 1tph Waterloo-Portsmouth via Eastleigh (fast) | Calling Winchester, Eastleigh, Hedge End, Fareham, Cosham, Fratton, Portsmouth |
| **6b** | Extra 1tph Waterloo-Portsmouth via Eastleigh (stopping) | Calling all stations except Shawford |
| **6c** | Extra 2 tph Waterloo-Portsmouth via Eastleigh (1 fast, 1 stopping) | Patterns as above, 1tph 6a + 1tph 6b |
| **6d** | Extra 2 tph Waterloo-Portsmouth via Eastleigh (both stopping) | Calling all stations except Shawford |
| **7a** | Extra 2tph Winchester-Totton (fast) | Winchester, Airport Parkway, Southampton Central, Totton |
| **7b** | Extra 2tph Winchester-Totton (semi-fast) | Winchester, Eastleigh, Airport Parkway, Southampton Central, Totton |
| **7c** | Extra 2tph Winchester-Totton (stopping) | All stations Winchester-Totton except Shawford |
| **8a** | Extra 1tph Havant-Southampton – Totton (stopping) | All stations Havant-Southampton-Totton |
| **8b** | Extra 2tph Havant-Southampton-Totton (stopping) | All stations Havant-Southampton-Totton |
| **8c** | Extra 1tph Havant-Southampton-Totton (fast) | Havant, Cosham, Fareham, Swanwick, Southampton Ctl, Totton |
| **8d** | Extra 2tph Havant-Southampton-Totton (fast) | Havant, Cosham, Fareham, Swanwick, Southampton Ctl, Totton |
| **9** | Extra 1tph Havant-Eastleigh-Southampton-Totton | Havant, Cosham, Fareham, Hedge End, Eastleigh, Airport Parkway, Southampton Ctl, Totton |

*Table 8: 27 potential train service changes*

Results from the spreadsheet tool were extracted for both the full range of 363 origin destination pairs, and for a sub-set of 74 "priority" flows (flows with large current and/or forecast future volumes of commuters, and where rail generalised journey times are currently substantially slower than driving- ie flows with the greatest opportunity or need to improve the rail offer). Each train service option described in Table 8 was ranked from "greatest benefit" to "least benefit" against the following outputs from the tool:

- Rail vs drive time: percentage of flows where rail GJT is no more than 10 minutes slower than driving (assessed for all flows and for "priority" flows);

- "Commutability" (percentage of flows where rail GJT is 30 minutes or less) (assessed for all flows and for priority flows);
- Potential total time saving per day in person-hours (assessed for all flows and for priority flows);
- Percentage reduction in network-wide GJT (assessed for all-flows and for priority flows).

The charts overleaf show some of these outputs:

- potential net time savings per day for each option for all 363 flows (Figure 38);
- potential net time savings per day for the 74 priority flows, with a breakdown of benefits by destination (Figure 39).

Table 8 shows the overall ranking of the 27 options that was output from the process.

| Intervention | | Rank |
|---|---|---|
| **1c** | PMS-SOU-TTN 3tph stopping | 1 |
| **4b** | Solent Loop 2tph | 2 |
| **1e** | PMS-SOU-TTN 3tph skip stop | 3 |
| **8b** | HAV-SOU-TTN 2tph stopping | 4 |
| **1b** | PMS-SOU-TTN 2tph stopping | 5 |
| **4a** | Solent Loop 1tph | 6 |
| **1d** | PMS-SOU-TTN 2tph skip stop | 7 |
| **2b** | PMS-ESL-SOU-TTN 1tph stopping | 8 |
| **8a** | HAV-SOU-TTN 1tph stopping | 9 |
| **3b** | ROM-ESL-TTN 2tph stopping | 10 |
| **1a** | PMS-SOU-TTN 1tph stopping | 11 |
| **6d** | WIN-ESL-PMS 2tph stopping | 12 |
| **7c** | WIN-SOU-TTN 2tph stopping | 13 |
| **9** | HAV-ESL-SOU-TTN 1tph fast | 14 |
| **6c** | WIN-ESL-PMS 1tph stopping + 1tph fast | 15 |
| **3a** | ROM-ESL-TTN 1tph stopping | 16 |
| **2a** | PMS-ESL-SOU-TTN 1tph fast | 17 |
| **6b** | WIN-ESL-PMS 1tph stopping | 18 |
| **8d** | HAV-SOU-TTN 2tph fast | 19 |
| **6a** | WIN-ESL-PMS 1tph fast | 20 |
| **7b** | WIN-SOU-TTN 2tph semi fast | 21 |
| **8c** | HAV-SOU-TTN 1tph fast | 22 |
| **7a** | WIN-SOU-TTN 2tph fast | 23 |
| **5** | JT savings on existing service patterns | 24 |
| **1f** | PMS-SOU 2tph super express | 25 |
| **1g** | PMS-SOU 1tph super express | 26 |
| **1h** | PMS-SOU 2tph m+ 30 mins JT | 27 |

*Table 8: ranking of the "longlist" of service options*

**Figure 38: Potential net time savings in person-minutes per day**

All 363 flows within study

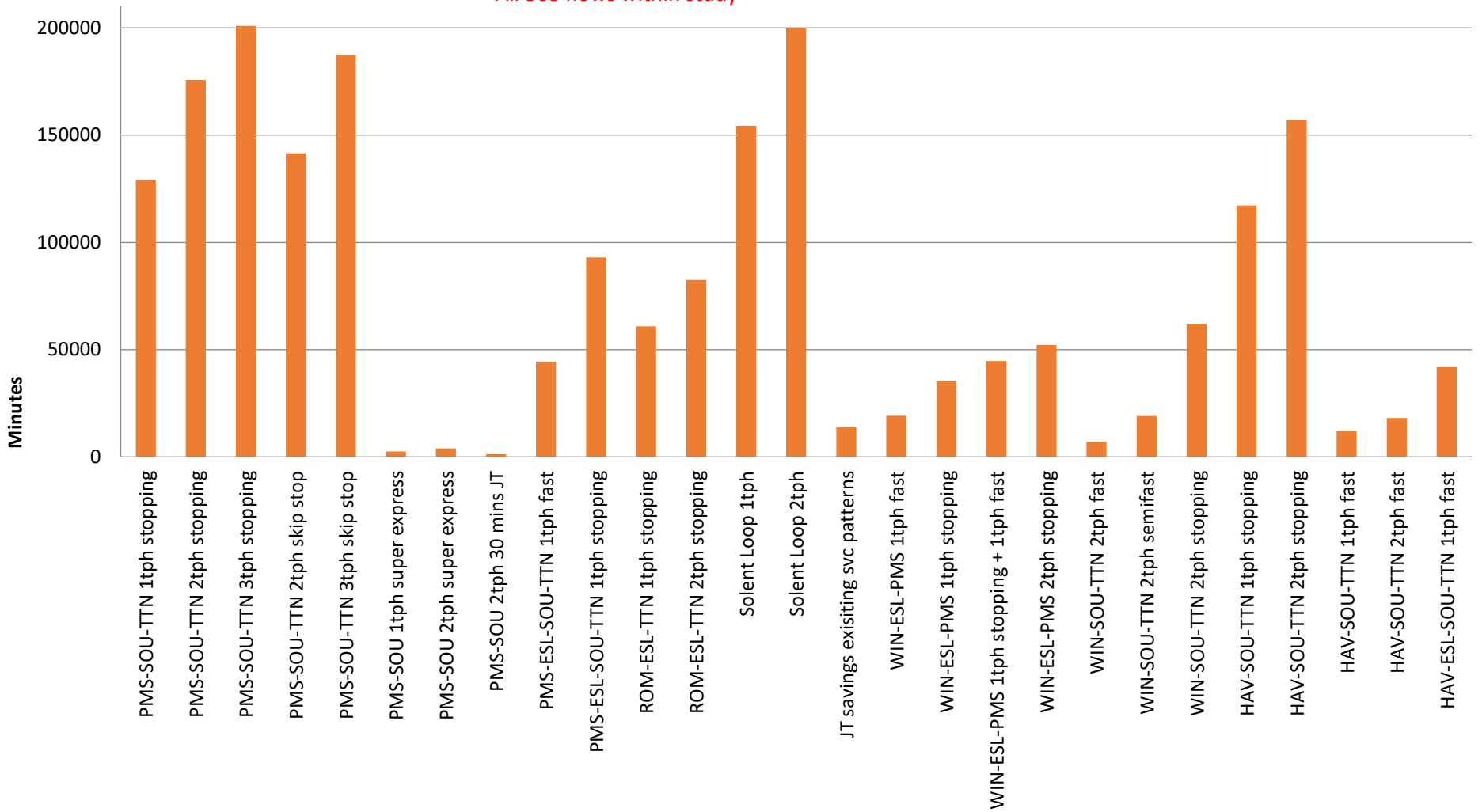
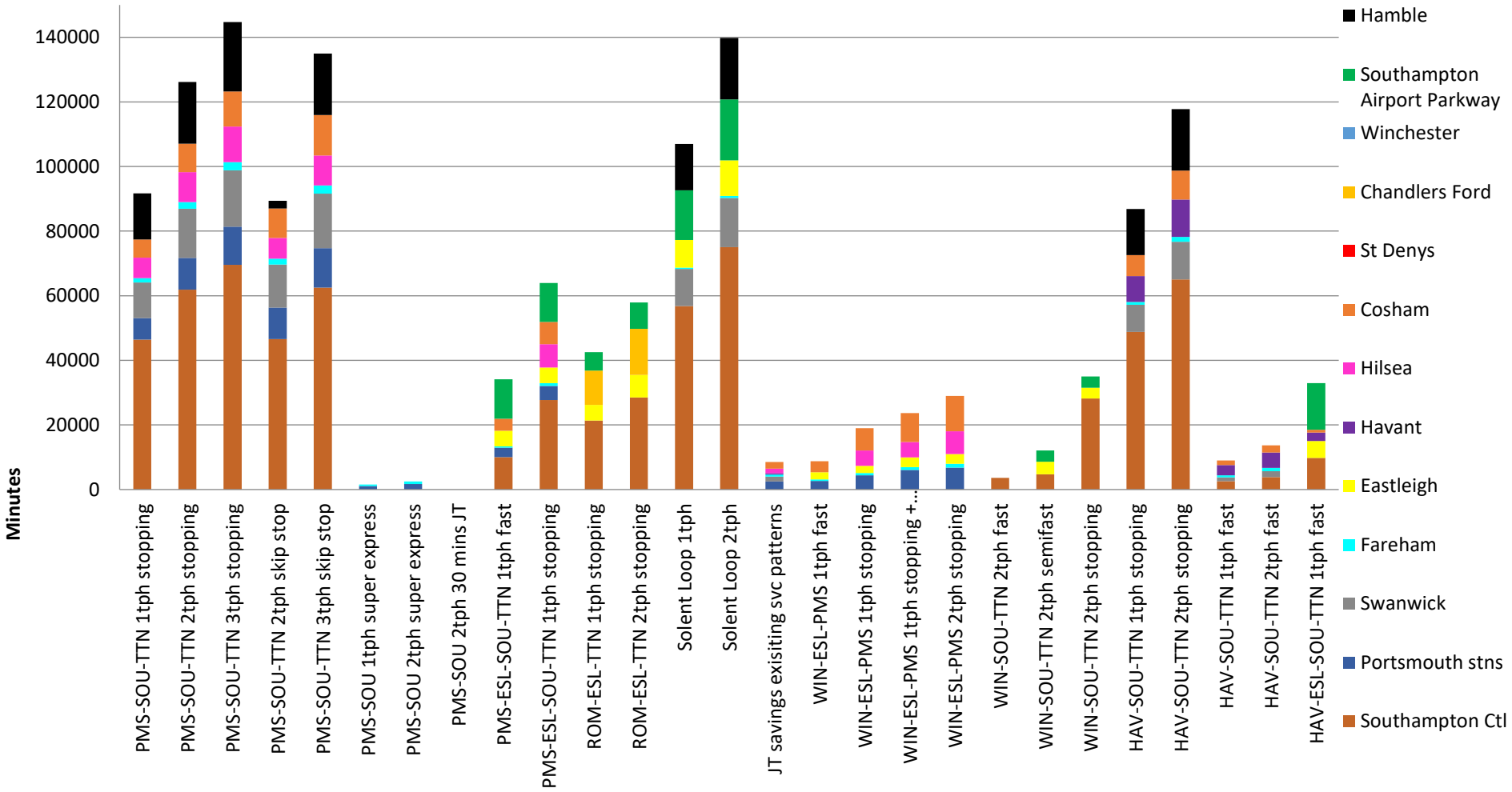


**Figure 39: Priority flows only- potential net time savings in person-minutes per day: by destination station**



## 6.3 Shortlisting of train service options

The next stage of the process was to create a shortlist of train service options to take forwards to the next stages of the assessment process. The long-list of options was prioritised by sifting across four categories by the working group:

- the broad scale of infrastructure intervention likely to be required to enable the service change
- the strength of strategic narrative for making the service change
- the results of the data analysis described on pages 72 to 77; and
- the strength of stakeholder aspirations for the service change.

Red/amber/green ratings were given for each category, then the options were sorted by overall score. A shortlist of 5 options emerged from this sifting process and subsequent discussion, to be taken forward for timetable analysis.

The following options (all additional to the current timetable) were shortlisted by the working group:

- Option 1: 2tph 'Solent Loop' services
- Option 2: 2tph skip-stop between Portsmouth, Southampton, Totton and beyond (could be Bournemouth, New Forest or Waterside)
- Option 3: 2tph all-stations between Portsmouth, Southampton, Totton and beyond (could be Bournemouth, New Forest or Waterside)
- Option 4: 1tph all-stations between Havant, Eastleigh, Southampton & Totton
- Option 5: 2tph (1tph all-stations and 1tph skip-stop) between Winchester, Eastleigh, and Portsmouth & Southsea

Outline timetable modelling was undertaken for each option (described in Section 6.4). This has enabled identification of infrastructure measures required to make each option deliverable. "Order of magnitude" economic appraisal has also been undertaken for each of the five options shortlisted (outputs presented in Section 6.5).

Table 9 (overleaf) shows the effect of each option on train frequency at stations in the study area when combined with emerging recommendations from the Coastway CMSP study.

*Table 9: Changes to train service frequency resulting from Options 1 to 5*

| Station | TPH- Baseline | TPH- Baseline+ Coastway CMSP Option 1 | Typical TPH per direction with option + Coastway CMSP recommendations *(italic text indicates additional tph)* | | | | |
|---|---|---|---|---|---|---|---|
| | | | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 |
| Portsmouth H. | 6 | 6 *c* | 6 | 8 *(+2)* | 8 *(+2)* | | 8 *(+2)* |
| Portsmouth & S. | 8 | 8 *c* | 8 | 10 *(+2)* | 10 *(+2)* | | 10 *(+2)* |
| Fratton | 8 | 8 *c* | 8 | 10 *(+2)* | 10 *(+2)* | | 10 *(+2)* |
| Hilsea | 3 | 3 *c* | 3 | 4 *(+1)* | 5 *(+2)* | | 4 *(+1)* |
| Cosham | 5 | 5 *b,d* | 5 | 7 *(+2)* | 7 *(+2)* | 6 *(+1)* | 7 *(+2)* |
| Portchester | 3 | 3 | 3 | 4 *(+1)* | 5 *(+2)* | 4 *(+1)* | 4 *(+1)* |
| Fareham | 5 | 5 *b,d* | 7 *(+2)* | 7 *(+2)* | 7 *(+2)* | 6 *(+1)* | 7 *(+2)* |
| Swanwick | 3 | 3 *b* | 5 *(+2)* | 5 *(+2)* | 5 *(+2)* | | 3 |
| Bursledon | 1 | 1 | 3 *(+2)* | 2 *(+1)* | 3 *(+2)* | | 1 |
| Hamble | 1 | 1 | 3 *(+2)* | 2 *(+1)* | 3 *(+2)* | | 1 |
| Netley | 1 | 1 | 3 *(+2)* | 2 *(+1)* | 3 *(+2)* | | 1 |
| Sholing | 1 | 1 | 3 *(+2)* | 2 *(+1)* | 3 *(+2)* | | 1 |
| Woolston | 1 | 3 *a (+2 v baseline)* | 5 *(+2)* | 4 *(+1)* | 5 *(+2)* | | 1 |
| Bitterne | 1 | 1 | 3 *(+2)* | 2 *(+1)* | 3 *(+2)* | | 1 |
| St Denys | 2 | 2 | 4 *(+2)* | 2 *(+1)* | 4 *(+2)* | 3 *(+1)* | 2 |
| Southampton C. | 9 | 9 *b,d* | 11 *(+2)* | 11 *(+2)* | 11 *(+2)* | 10 *(+1)* | 9 |
| Millbrook | 1 | 1 | 3 *(+2)* | 2 *(+1)* | 3 *(+2)* | 2 *(+1)* | 1 |
| Redbridge | 1 | 1 | 3 *(+2)* | 2 *(+1)* | 3 *(+2)* | 2 *(+1)* | 1 |
| Totton | 1 | 1 | 3 *(+2)* | 2 *(+1)* | 3 *(+2)* | 2 *(+1)* | 1 |
| Swaythling | 1 | 1 | 3 *(+2)* | 1 | 1 | 2 *(+1)* | 1 |
| Soton Airport Pk. | 5 | 5 | 5 *(+2)* | 5 | 5 | 6 *(+1)* | 5 |
| Eastleigh | 3 | 3 | 3 | 3 | 3 | 4 *(+1)* | 5 *(+2)* |
| Chandlers Ford | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Romsey | 3 | 3 *d* | 3 | 3 | 3 | 3 | 3 |
| Hedge End | 1 | 1 | 3 *(+2)* | 1 | 2 | 2 *(+1)* | 3 *(+2)* |
| Botley | 1 | 1 | 3 *(+2)* | 1 | 2 | 2 *(+1)* | 3 *(+2)* |
| Bedhampton | 2 | 2 *c* | 2 | 2 | 2 | 3 *(+1)* | 2 |
| Havant | 8 | 8 *b,c,d* | 8 | 8 | 8 | 9 *(+1)* | 8 |
| Warblington | 2 | 2 *c* | 2 | 2 | 2 | 3 *(+1)* | 2 |
| Emsworth | 4 | 4 *c* | 4 | 4 | 4 | 5 *(+1)* | 4 |
| | | | | | | | |
| Network avg TPH | 2.5 | 2.6 *+3% vs baseline* | 3.9 *+52%* | 3.4 *+32%* | 3.8 *+49%* | 3.2 *+26%* | 3.1 *+22%* |
| Ports-Soton direct TPH | 2 | 2 | 2 | 4 *(+2)* | 4 *(+2)* | 2 | 2 |
| Portsmouth-Southampton approx. GJT[35] | 80 mins | 80 mins | 80 mins | 65 mins *-19%* | 70 mins *-12%* | 80 mins | 80 mins |
| Direct connectivity improvements | | | High (i) | Moderate (ii) | Moderate (ii) | High (iv) | Low |

[35] No adjustment based on MOIRA data to account for uneven frequency applied to these GJT estimates. At present the MOIRA adjusted city to city GJT is 69 minutes

Key to annotations in Table 9:

a) Emerging Coastway CMSP recommendations include option to call two Southern services per hour at Woolston. This is reflected in these TPH estimates.
b) Emerging Coastway CMSP recommendations include proposals for retiming of 2x Southern Coastway services (and linked retiming of SWR Portsmouth-Southampton stopping train) to provide more even spacing in timetable of some existing east-west services at Southampton Ctl, Swanwick, Fareham, Cosham, Havant
c) Emerging Coastway CMSP timetabling study identified potential for proposed Brighton to Chichester stopping service to be extended via all stations to Portsmouth to serve future demand growth but not recommended for immediate implementation. If implemented, this would deliver an extra 1TPH at all stations within study area between Emsworth and Portsmouth
d) Emerging Coastway CMSP timetabling study identified a possible path for an additional Brighton to Cardiff service, however it has not been established if this service could be provided west of Southampton. If it was implemented, it would provide an additional 1tph at Havant, Cosham, Fareham & Southampton Ctl.

i) Many new direct connections created by option 1, eg Hedge End-Southampton; Southampton Airport-Swanwick etc
ii) New direct connections from Totton to east of Southampton created by option 2
iii) New direct connections from Totton to east of Southampton created by option 3
iv) Many new direct connections created by option 1, eg Hedge End-Southampton; Southampton Airport- Cosham & Havant; Totton-Hedge End & Fareham etc

Table 9 shows that all the shortlisted options would provide improvements compared to the baseline, but that there are various trade-offs between the options:

- Options 1 and 3 come close to achieving the aspirational 4tph network wide average frequency
- Option 2 provides the greatest enhancement in city to city connectivity but with less uplift in average train frequency
- Options 1 and 4 provide the largest improvements in direct links between stations, but neither improve city to city connectivity

It is noted that none of the tested options would provide direct improvements for Chandler's Ford and Romsey.

## 6.4 Timetable modelling of shortlisted options

Initial timetable analysis has been undertaken to identify at a high level the feasibility of each of the five recommended timetable options.

The work has looked at a 'standard hour' train plan and work has not been undertaken on an all-day timetable. If the decision to initiate is taken, then further work should look at an all-day plan.

The following key assumptions have been adopted for the analysis:

- 2019 Timetable Planning Rules including minimum dwells, margins, turnaround, engineering and pathing allowances utilised
- Class 450 sectional running times for the additional services
- Base infrastructure as per the 2019 Sectional Appendix

The below is a review of the 5 shortlisted options and identification of the current infrastructure gaps. Table 10 shows the infrastructure likely to be required to support each of the timetable options.

Option 1: 2tph 'Solent Loop' services:

Initial timetable work suggests it is not possible to operate this service pattern without significant investment in the infrastructure (over and above that identified in this study). This will require an additional 4 paths per hour into Southampton Central which is not possible on either the 2 track Southampton tunnel or the flat junction at St Denys. The infrastructure alterations at Eastleigh, and on the Netley corridor will help, but do not address the issue of access to Southampton Central.

Option 2: 2tph skip-stop between Portsmouth, Southampton, Totton and beyond (could be Bournemouth, New Forest or Fawley):

Initial timetable work demonstrates it is possible to operate an additional 2 trains per hour along the Netley line with a skip-stopping calling pattern provided investment is made in the infrastructure as outlined in Table 10. Owing to the current distribution of services the interval between services is not an even twenty minutes. To provide a better service interval it is recommended the current all stations service also become a skip-stop service so there are 3 skip-stop services per hour operating along the route (in addition to the fast services) with calls distributed to ensure at least 2tph service at all stations.

Option 3: 2tph all-stations between Portsmouth, Southampton, Totton and beyond (could be Bournemouth, New Forest or Fawley) :

Initial timetable work suggests it is not possible to operate this as an even-interval service pattern within the current timetable structure and/or without significant investment in the

infrastructure. The stopping services are much slower than the fast services so would need to be overtaken between Fareham and Southampton Central, which is not possible even with a Fareham passing loop. Infrastructure improvements plus a full timetable recast with a revised distribution of fast services may allow the operation of 2 additional stopping trains per hour, however, that has not been examined by this study.

However, it may be possible to operate 2 additional stopping services per hour along the route but not even intervals.

Option 4: 1tph all-stations between Havant, Eastleigh, Southampton and Totton:

Initial timetable work suggests it is possible to operate this service provided investment is made in the infrastructure. At Havant the service will need to continue beyond the Solent are to either the West Coastway or the Portsmouth Direct routes. Neither timetable work nor an understanding of infrastructure constraints has been undertaken on these routes as part of this study but the emerging Coastway CMSP study sets out options for enhancements east of Havant.

Option 5: 2tph (1tph all-stations and 1tph skip-stop) between Winchester, Eastleigh, and Portsmouth & Southsea:

Initial timetable work suggests it is possible to operate these services provided investment is made in the infrastructure. Winchester itself remains a constraint and it may be beneficial to extend these services beyond Winchester to terminate, although no timetable work has been conducted on this.

Table 10 overleaf sets out the infrastructure interventions required to support each scheme

*Table 10: Infrastructure changes required to enable the 5 shortlisted train service options*

| **Infrastructure measure** | **Required by this timetable option?** | | | | |
|---|---|---|---|---|---|
| | **Option 1: Solent Loop** | **Option 2: Portsmouth – Southampton - Totton**<br>**2tph skip stop** | **Option 3: Portsmouth – Southampton - Totton**<br>**2tph all stops** | **Option 4: Havant - Eastleigh – Southampton - Totton**<br>**1tph all stops** | **Option 5: Portsmouth - Eastleigh - Winchester**<br>**2tph extra** |
| **Portsmouth additional terminating platform** | | Y | Y | | Y |
| **Fareham passing loop** | | Y | Y | Y | Y |
| **Botley Line redoubling** | Y | | | Y | Y |
| **Eastleigh P1 bi-di** | Y | | | Y | Y |
| **Totton reversing siding** | Y | Y | Y | Y | |
| ***Netley line signalling*** | Y | Y | Y | | |
| ***St Denys Junction*** | Y | Y | Y | Y | |
| ***Eastleigh-St Denys corridor interventions*** | Y | | | Y | |
| ***Portsmouth-Portcreek signalling*** | | Y | Y | | Y |
| ***Eastleigh reversing platform 4*** | Y | | | Y | Y |

## 6.5 Order of magnitude economic appraisal of shortlisted options

An "order of magnitude" economic evaluation of each of the 5 shortlisted options has been conducted by Network Rail's economic analysis team. This evaluation represents the value of the additional services on top of the existing timetable as at December 2019, over a 60 year appraisal period.

Values are rounded, in £million, and are 2010 present values. The appraisal is high-level and does not include any capital or operational costs, which would be needed to operate these services

| | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 |
|---|---|---|---|---|---|
| | 2tph Solent Loop | 2tph skip stop PMH-SOU-TTN | 2tph stopping PMH-SOU-TTN | 1tph stopping HAV-ESL-SOU-TTN | 2tph mixed PMH-WIN |
| 60 year journey time savings (£m PV) | £90m | £80m | £100m | £30m | £80m |
| 60 year revenue (£m PV) | £40m | £10m | £20m | £10m | £40m |
| 60 year reduction in non user benefits (£m PV) | £10m | £10m | £10m | £0m | £10m |
| Net change in passenger journeys (2019 equivalent) | 1,300,000 | 500,000 | 600,000 | 600,000 | 1,300,000 |
| Net change in passenger miles (2019 equivalent) | 4,100,000 | 4,800,000 | 5,400,000 | 1,900,000 | 5,000,000 |
| Average journey distance, miles | 3.1 | 9.6 | 9 | 3.1 | 3.8 |
| Car diversion factor (proportion of these journeys estimated to have been abstracted from private road modes) | 34% | 34% | 34% | 34% | 34% |
| Estimated road mileage saved (miles) | 1,400,000 | 1,600,000 | 1,800,000 | 200,000 | 1,700,000 |

*Table 11: Order of magnitude appraisal of the 5 shortlisted options*

- Options 2 and 3 seem to encourage longer distance journeys than the other options (average additional journey length of 9 miles vs. 3 miles for others)
- Options 1 and 5 encourage more additional journeys than the other options

# 7. Development and assessment of infrastructure interventions

This chapter sets out high level work undertaken to examine the feasibility and design options for six of the infrastructure interventions identified in the timetable analysis (Section 6.4) as being required for many of the shortlisted train service options.

## 7.1 Totton Goods Loop

Totton station is located approximately 3m 24ch west of Southampton Central station on the Bournemouth Main Line (ELR: BML2). Immediately west of Totton station, the Fawley Branch Line (ELR: TTF) branches from the Bournemouth Main Line to the south (Down) side at Totton Junction East. The two lines run parallel for approximately half a mile before diverging at Totton Junction West. The Bournemouth Main Line has two tracks – the Up Main and the Down Main – in this area; the Fawley Branch Line has a single reversible line with a loop – the Goods Loop – situated between Totton Junction East and Totton Junction West. A set of engineering sidings – the Down Sidings – branch off the Goods Loop line.

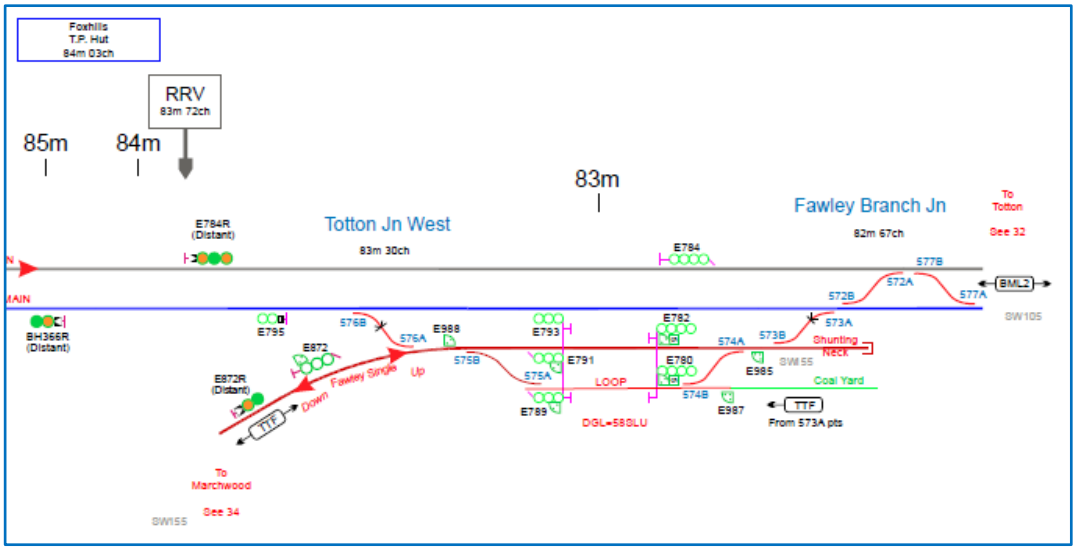



*Figure 40: Current layout at Totton Junction*

The Up Main and Down Main lines are currently electrified at Totton with 750V DC third rail equipment, as are the two cross-overs (572A/B and 577A/B points) between Totton station and Totton Junction East. All the equipment is ordinarily fed from Redbridge Substation (located approximately half a mile east of Totton) and paralleled at Foxhills Track Paralleling Hut (TPH) (approximately one and a half miles west of Totton). The Up Main line forms electrical section E079; the Down Main line and 'floaters' feeding the two cross-overs form electrical section E080. The adjacent substations are Redbridge to the east and Ashurst to the west.

The proposed option would introduce five new DC conductor rails: four short 'floaters' (approximately 9m in length) adjacent to 573A/B and 574A/B points and one to provide DC

traction current to a section of the Goods Loop line of Totton Sidings. This conductor rail will be approximately 285m in length, commencing no closer than 760mm to the points machine of 574B point and terminating 265m beyond E780 signal (comprising of 20m signal standback and the 245m maximum train length), and located in the 'six-foot' between the Goods Loop and Up/Down Fawley lines. All five conductor rails will be electrically connected in a 'daisy-chain' formation and fed from the adjacent Down Main conductor rail (electrical section E080) via a Track Isolation Switch (TIS).

This would enable EMUs to set back behind E780 signal and reverse direction. A similar movement is believed to already be undertaken by non-electric stock operated by the SWR franchise. This would mean that South Western Railway or Southern EMUs can clear the platforms at Southampton Central when changing directions rather than blocking a platform. The proposed option can be accommodated within the existing NR land boundary. It should be noted that Totton Sidings are believed to currently be used for the shunting of engineering trains and freight traffic to Marchwood Military Port. The introduction of the new third rail would increase the risk of electrocution to staff undertaking any ground-based activities and access/egress from trains in the sidings.

## 7.2 Portsmouth Stations

It is anticipated that additional platform capacity at Portsmouth will unlock capacity for additional trains to terminate in the area as well as provide additional operational flexibility. Additional platforms at both Portsmouth Harbour and Portsmouth and Southsea were assessed for feasibility.

### 7.2.1 Portsmouth Harbour

Portsmouth Harbour station is the terminal station of the WPH2 line (Woking Junction to Portsmouth Harbour) with the rail termination noted at 45miles 36 chain with four operational platforms numbered 1, 3, 4 and 5; Platform 2 is not operational. The low mileage end of Platform 1 is set approximately 80m further into the station area than the other platforms.

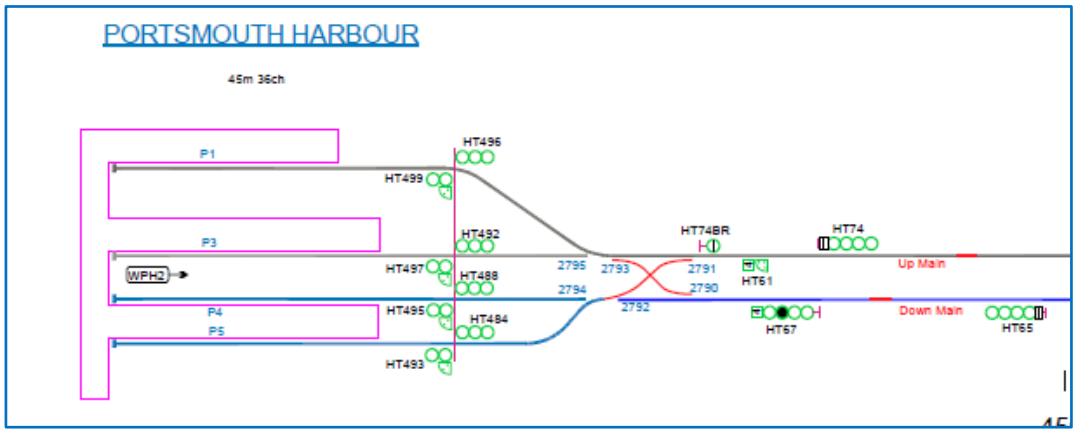



*Figure 41: Current layout at Portsmouth Harbour*

Track is noted to be primarily jointed throughout the areas noted during a site visit though more details will be required at later design stages. A brick viaduct with normal ballasted formation is used on the station approach but the main station is built on a steel structure over the sea (refer to civils section for details) with concrete slab track.

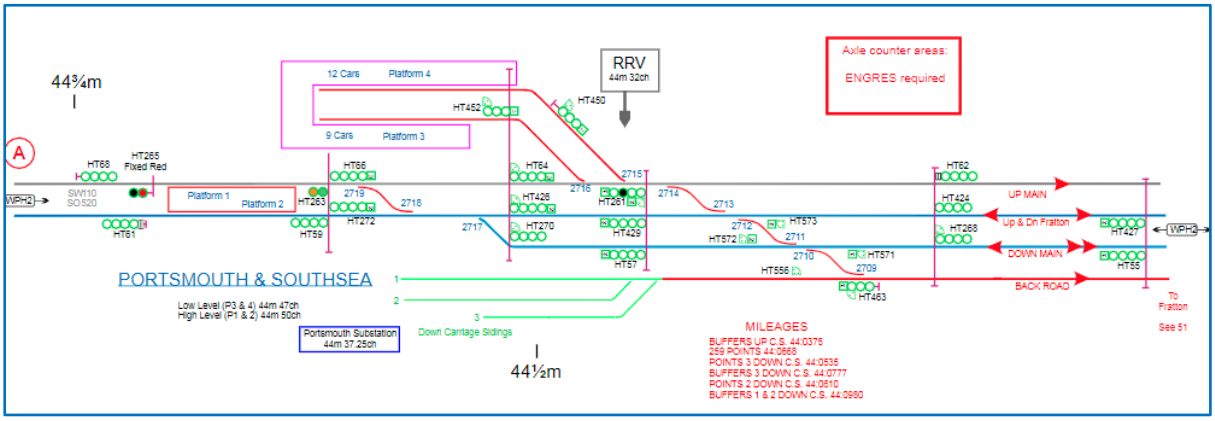
The main station was built and operated with five platforms but Platform 2 was taken out of use in the early 1990's, the slab track replaced by metal grating and other ancillary equipment. A new signal gantry was installed in the vicinity of the original Platform 2 track bed near the ramps of platforms 2 to 5. Three options were developed in order to bring Platform 2 back into use, varying in complexity. They are summarised in Table 12 overleaf.

| Option | Operational Impact | Engineering Considerations | Land Take | Platform Length | Structural Modifications |
|---|---|---|---|---|---|
| **1** | • Scissors crossover relocation will result in significant additional time travelling in wrong direction decreasing number of trains per hour capacity.<br>• Parallel moves not possible between Platforms 4 and 5. | • Signalling gantry would have to be modified.<br>• Down line turnout radius reduces to 164m. | • None | • Reduction of approximately 15m on Platforms 2/3. In order to achieve a compliant track layout going into Platform 2. | • Minor alterations to Platform 2/3 and 4/5.<br>• Local strengthening and refurbishment of pier superstructure likely to be required underneath Platform 2/3 as a minimum.<br>• Pier substructure may also require strengthening if not already carried out. |
| **2** | • Scissors crossover position is retained so no change to existing situation. | • Signalling gantry would have to be modified.<br>• Down line turnout radius reduces to 164m. | • None | | |
| **3** | • Scissors crossover relocation will result in significant additional time travelling in wrong direction decreasing number of trains per hour capacity.<br>• The additional 3rd line would mitigate scissors crossover relocation by enabling parallel moves between Platforms 4 and 5. | • Signalling gantry would have to be modified.<br>• Down line turnout radius reduces to 164m.<br>• Significant alteration to viaduct. | • Approx. 530m2 | | |

*Table 12: Summary of Portsmouth Harbour options*

### 7.2.2 Portsmouth and Southsea

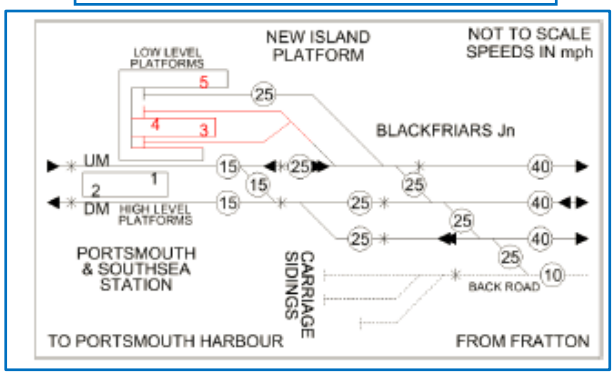
As all options at Portsmouth Harbour involve shortening current platforms, an alternative location for an additional platform capacity was investigated at Portsmouth and Southsea station. Portsmouth and Southsea currently has 4 platforms, two terminating platforms (the low level) and two through platforms (the high level). The high level platforms are built on a viaduct which continues over Commercial Road. Due to the complexities associated with this location, no additional platforms were considered on the high level.



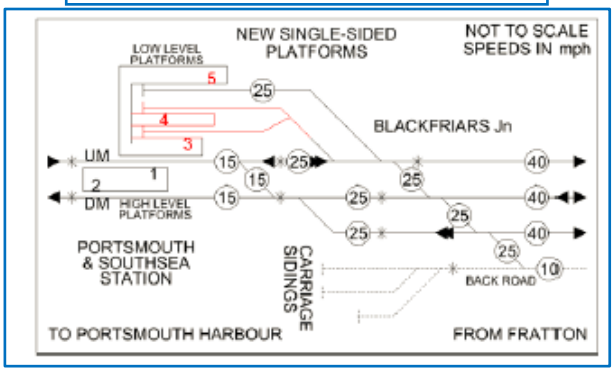

The low level used to have additional platforms, but these have slowly been reduced over the years. Now only two platforms remain. The layout is complex due to the layout of the platforms and the access requirements from the sidings; the ladder arrangement is known as Blackfriars Junction which provides access to from the stabling sidings to all platforms off the Back Road.

Two options were considered to improve capacity at the low level. The two options are similar in nature and make use of the existing available width between the existing Platform 3 structure and land boundary. There is sufficient width for the addition of a new island platform between the current platforms (Option 1) or a new single face platform (Option 2). Both options would require a reduction in length of the current Platform 3/4, but this is offset by the addition of an extra platform.

**Option 1**




**Option 2**



## 7.3 Eastleigh P1 Crossover

Currently, Platform 1 at Eastleigh can only be accessed in the 'Up' direction (towards London.

Three options were examined to achieve the objective of a bi-directional Platform 1.:

- Option 1 was considered the simplest method of doing this and minimises the operational impact. The main risk is the integration of the new crossover into the existing track geometry which is thought to be on a transition – this will need further investigation.
- Options 2 and 3 would enable a higher speed crossover and would involve the crossovers being installed in a more desirable location from a track and maintainability perspective. However, ultimately this would be quite detrimental operationally and mean significant time travelling in the wrong direction therefore these options are not considered preferred.

## 7.4 Botley Line Redoubling

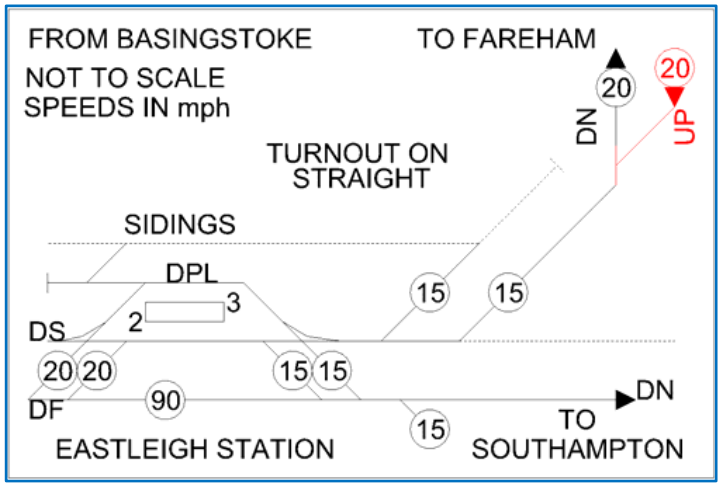
The Botley Line between Eastleigh and Fareham is single track for much of its length with multiple tunnels and overline structures. During construction of the line and particularly the tunnels, there were numerous issues with flooding and subsidence. Part of the Fareham tunnel collapsed in 1841 meaning that the tunnel was split in two (Fareham Tunnel No.1 and Fareham Tunnel No. 2). Reconstructing both the Tapnage and Fareham tunnels to achieve double tracking would be very challenging therefore they have remained single line in the options outlined below.

Three layouts have been proposed in order to achieve double tracking from Eastleigh West to Eastleigh South junction and from Botley to Fareham. These layouts are outlined below.

### 7.4.1 Layout 1

***Eastleigh West Junction to Eastleigh South Junction***

Initial reviews of the Eastleigh West Junction layout note the overall compact and complex track layouts off and around the main passenger routes and the adjacent yard areas, plus the tight radius curve that projects south-east off the existing 15mph Down Slow connecting turnout.

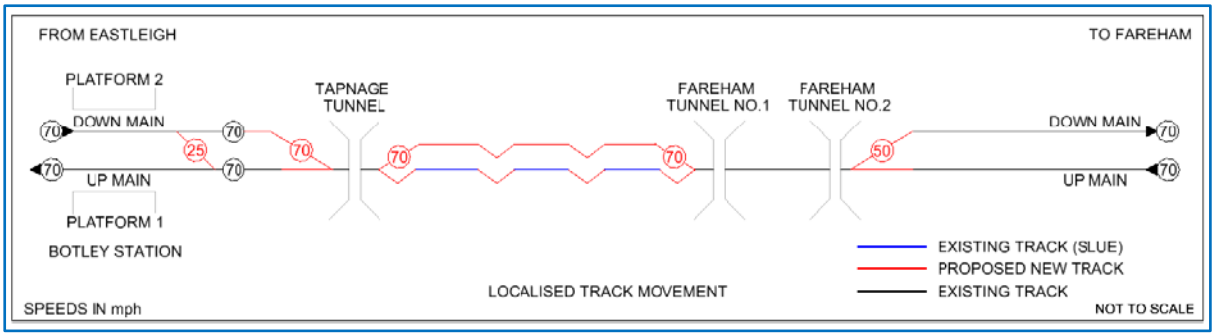


This option looks to maintain the existing junction and curve layout and install a new turnout as far north as possible on the existing straight alignment; the new turnout would be off the Down Line into a new Up Main track bed. This means that a short section of the single track will remain at the Eastleigh West Junction end of this route.

At the Eastleigh South Junction end a new crossover will replace the existing turnout for connections between the Siding Line and Depot Lines. With the track doubled there is no practical use for a 40mph connection at this location, therefore a new 25mph crossover is considered viable but is noted as a tight fit in the available space.

***Botley to Fareham***

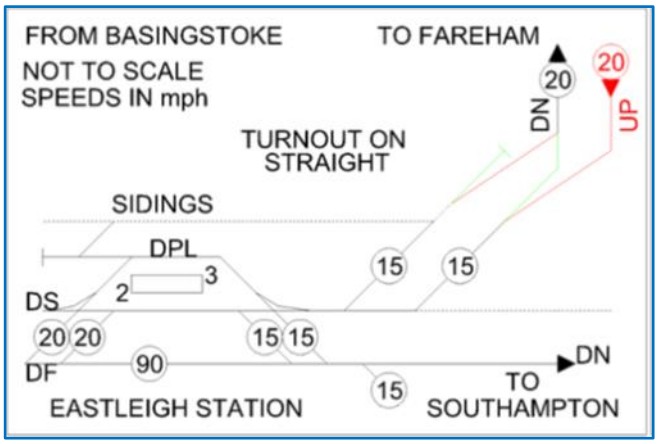
To re-double the Botley to Fareham section would some local movement of existing track on to a new track formation to accommodate both lines through areas of tight clearance (such as bridges and tunnels). As noted above, it is not feasible to reconstruct the two tunnels and therefore passage through them will remain as single track.




## 7.4.2 Layout 2

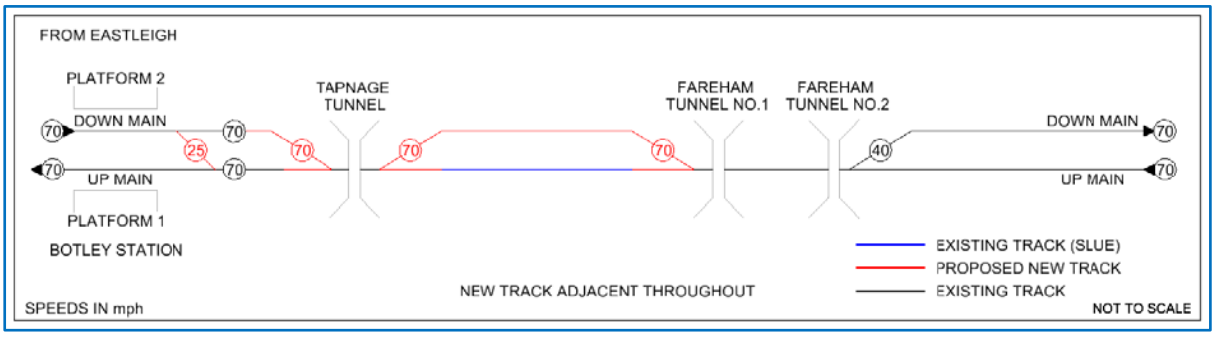
***Eastleigh West Junction to Eastleigh South Junction***

From Eastleigh, this layout utilises the headshunt at Eastleigh Yard as a new line (down carriage siding no.1). Both lines link to the existing BML1 down slow meaning that the whole section becomes double-track (unlike in Layout 1). This arrangement gives greater flexibility than Layout 1 by reducing the length of the single line section, however, the existing headshunt would need removal and/or relocation. As in Layout 1, Eastleigh South Junction would need to be replaced.




***Botley to Fareham***

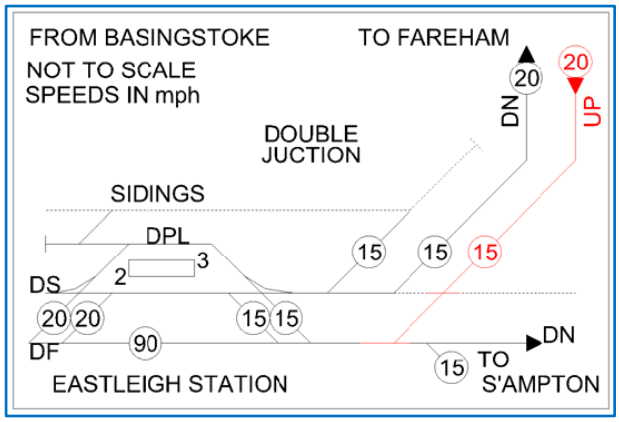
Between Tapnage Tunnel and the Fareham Tunnels this option looks to maintain the existing track geometry as existing and design a new track parallel to the existing track. This option will require nine structures to be fully or partially replaced. Four of these nine will also require widening.




## 7.4.3 Layout 3

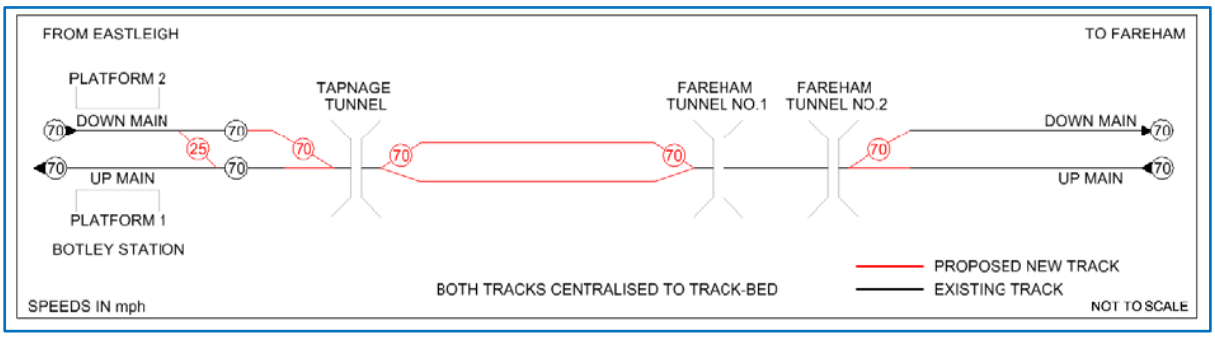
***Eastleigh West Junction to Eastleigh South Junction***

This layout involves building a new connection that connects the line to Fareham to the Down Fast towards Southampton. This enables parallel moves from Platforms 2/3, creating improved operational flexibility. This is the most flexible option operationally; however, it should be noted that providing this layout will prevent the placement of one of the options for an Up Fast to Down Main crossover proposed to provide Down direction moves from Platform 1 at Eastleigh (see Section 7.3).




***Botley to Fareham***

This option looks to design the route with both tracks aligned centrally to the track-bed, as per the original arrangement when the route was constructed.

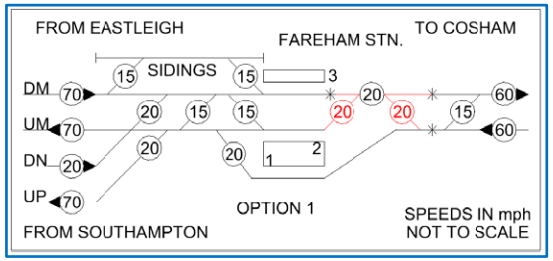
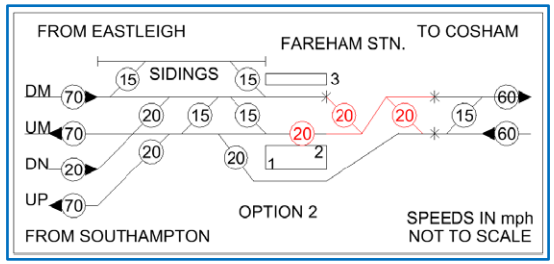
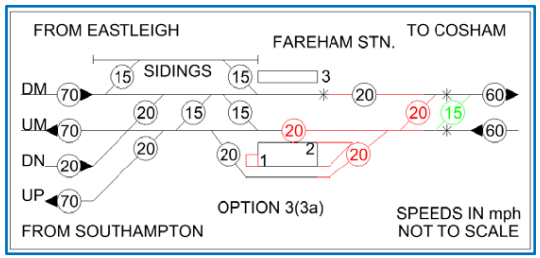


## 7.5 Fareham Platform 2

Fareham station currently has three platforms. Platforms 1 & 3 are through platforms with Platform 2 being a terminating platform. The Avenue Underbridge, located to the south of Fareham station, is a twin deck bridge which carries the two through tracks over the A27. Owing to the limited space available on both bridge decks, at least one of the decks must be replaced in order to enable Platform 2 to become a bi-directional through platform.

Three options have been proposed at Fareham station to enable a bi-directional through Platform 2 with 2 sub-options. Option 1a would achieve compliant track geometry but necessitate land take to the south of the station. Options 1 & 2 would only require potentially one half of Avenue Road Underbridge to be replaced. However, both options would have non-preferred track radii (unless land is purchased as per Option 1a) and would not increase overall platform length. Parallel movements would not be possible with these arrangements either.

Option 3/3a is considered to be most appropriate to be taken forward for estimating purposes – while it requires a full bridge rebuild with bespoke design it achieves compliant track geometry and potentially a full 250m platform length. In addition, it is recommended to assess an opportunity in later stages which would be a further evolution of option 3a – by extending the line through Platform 1 south of the new crossover to enable parallel running. It would however be necessary to purchase the same land as identified in option 1a to create the space for this third track. Further details can be found in the table below.

| Fareham Option | Summary | Engineering Considerations | Land Take | Platform 2 Length | Structural Modifications |
|---|---|---|---|---|---|
| **1/1a**<br>  | • New turnout from Down Main to Platform 2 south of the station.<br>• New Up facing crossover | • Land take and earthworks required under option 1a.<br>• Potentially only half (East Span) of the Avenue bridge needs to be replaced.<br>• Track radius is below that which is normally acceptable and just above exceptional values. | • Option 1 – none<br>• Option 1a - 2,568m$^2$ | • Existing, 195m | • Potentially only half (East Span) of the Avenue bridge needs to be replaced. |
| **2**<br>  | • New turnout from the Platform 2 line to the Down Main south of the station.<br>• New Up facing crossover south of the station. | • Potentially only half (East Span) of the Avenue bridge needs to be replaced.<br>• Track radius is below that which is normally acceptable and just above exceptional values. | • None | • Existing, 195m | • Potentially only half (East Span) of the Avenue bridge needs to be replaced. |
| **3/3a**<br>  | • Up Main is now through Platform 2.<br>• New turnout from the new Up Main to Platform 1 | • Track geometry values are compliant. | • None – however, there may be an opportunity to have a similar land take to option 1a but enable parallel train movements. | • Option 3 – Existing, 195m<br>• Option 3a - 250m | • Full replacement of Avenue overbridge, bespoke design required. |

# 8 Operational, Resilience and Performance

In order to gain a greater understanding of the operational challenges affecting the Solent area lines, a workshop with representatives of Network Rail and South Western Railway was held, focusing on rolling stock, infrastructure, timetabling issues and the challenges faced at times of perturbation. Analysis of Public Performance Data (PPM) for train service groups in the Solent area and review of other relevant information has also been undertaken.

## 8.1 Infrastructure and timetabling

The infrastructure and timetabling points identified through the workshop and other engagement has been summarised in Section 4.5.

## 8.2 Rolling stock

Most of the existing rolling stock used by SWR are the relatively modern classes 444 (5 car) and 450 (4 car) EMUs, with Portsmouth to London services also operated by older Class 442 units. Many SWR services to/from London operate in multiple as 8,10 or 12 car trains (and are longer than the platforms at some stations they call at). The Portsmouth to Southampton and other local services are mostly operated as single electric units. SWR also use two car Class 158 diesel units on the Salisbury-Romsey route which serves smaller stations in the Southampton area.

Southern services between Southampton Central/Portsmouth Harbour and London Victoria use relatively modern four carriage Class 377 stock, as does the Southampton to Brighton service. Some Portsmouth to Brighton services are also operated by these trains, but some are operated by the much older three-carriage Class 313 units which are close to end of life. The Coastway CMSP study has identified a need to lengthen Coastway services to five or possibly six carriages in future to address forecast capacity issues. If implemented, this is likely to require changes from the current rolling stock in use.

Other operators in the area (GWR and CrossCountry) use various types of diesel multiple units, mostly in three, four and five carriage formations.

Routine use of longer trains than today on local services (for example five carriages in length) would appear not to be problematic at most stations in the study area except potentially Hamble, Swaythling and Chandler's Ford which only have platforms capable of accommodating four carriages (see Figure 42). Selective Door Opening is available on most trains to overcome issues posed by short platforms however.

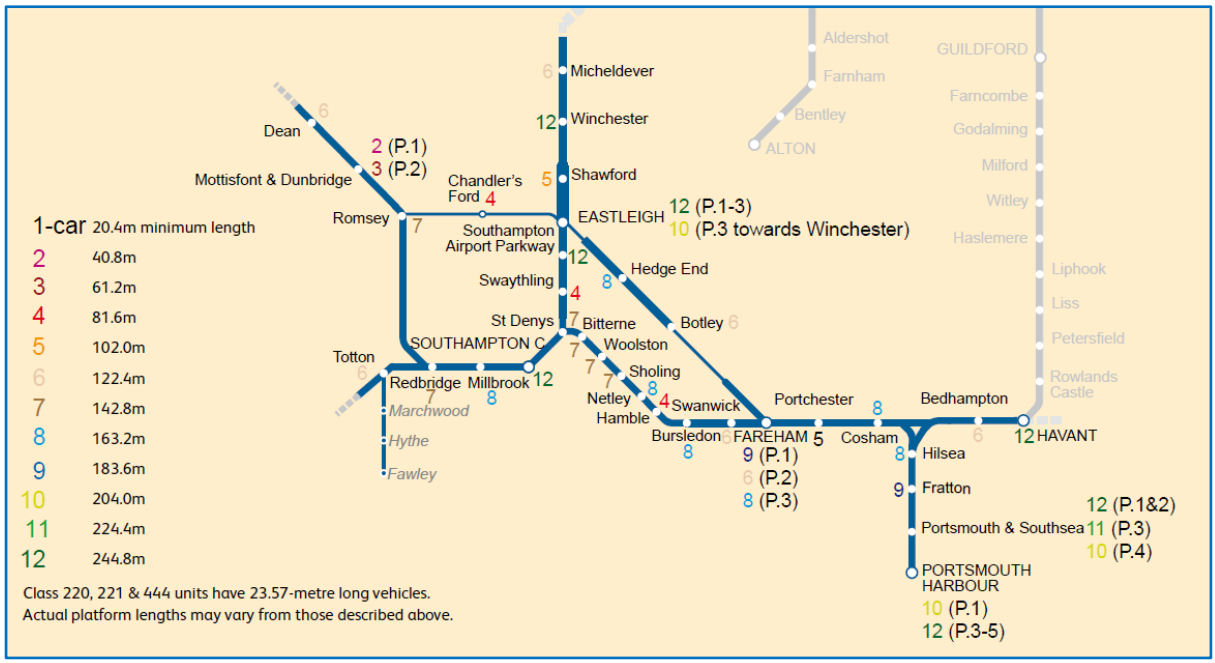



*Figure 42: Platform lengths in the study area*

If operation of additional services in the Solent area is planned (as recommended by this CMSP study), then additional rolling stock will be required. Options could include new-build trains, or cascade of older units. It is noted that current renewal of the London suburban fleet by SWR means that substantial numbers of young (Class 707) to mid-life (Class 458) third rail, five-carriage EMUs, which might be suitable for local services in the Solent and/or Coastway areas, are expected to go off-lease in the next few years. Other operator's fleet renewals may also create suitable opportunities.

New rolling stock may offer improved facilities for passengers in terms of additional seating, quieter ambiance and be potentially more environmentally friendly in terms of traction (electrification, alternative fuels or bi-modes). Proposed passenger services on the Fawley line would require additional diesel or bi-mode trains (unless the Fawley branch was electrified). Bi-mode trains could also offer environmental advantages in areas where diesel trains run over third rail (e.g. on the Salisbury-Romsey-Southampton Local service) –a relevant consideration given the air quality issues in Southampton.

Rolling stock changes also raise the question of depots and stabling capacity. Currently the existing SWR electric fleet is based and maintained at Northam depot, with additional electric depots at Fratton & Bournemouth. Diesel trains are based and maintained at Salisbury.

Recent expansion of SWR's fleet has created some challenges regarding overnight "stabling" space requiring additional carriage sidings and which has also been identified by the Holden report as a source of some negative impacts on resilience (see also Section 8.4). Any expansion of train fleets for additional Solent area services may require identification of additional depot/stabling space.

## 8.3 Resilience

The single-track sections on the Botley line and between Eastleigh and Romsey are major challenges in times of disruption. Late-running services over these sections of line can create delays for services in the opposite direction, and it is difficult to recover the timetable without impacting on other services or creating lengthy gaps by turning services short of their destination. They also limit the capability of these lines as diversionary routes when other routes are closed.

During scheduled engineering works affecting the Southampton Central area, London Waterloo to Southampton services often terminate at Southampton Airport Parkway instead of going through to Weymouth. This is partly because of the difficulty in facilitating rail replacement transport at Southampton Central whereas Southampton Airport Parkway station is close to the M27 Motorway. However, the signalling system does not allow trains to terminate/ turn around at the airport under normal operations or in times of unexpected disruption, and as there are only 2 lines and 2 platforms at Southampton Airport Parkway, operation of this station as a terminus even during planned disruption was raised by the workshop as being restrictive.

Opportunities to terminate services short of Portsmouth or Southampton Central are also quite limited. Suitable turnaround locations are limited to Havant, Fareham, Eastleigh, Winchester and Fratton, however use of these locations for terminating trains short of their destination during unscheduled disruption, without disrupting other services, may be awkward due to limitations on platform capacity and/or lack of turnback sidings (to hold terminated trains off the main lines/away from the platforms) at most locations.

Winchester is notable in that it does have a turnback siding north of the station, and this siding, as well as being useful during planned or unplanned disruption, is also used for scheduled turn-round of several PM peak hour services each day, thus enabling a better local service from Winchester towards Eastleigh, Southampton and Totton at busy times.

## 8.4 Performance information

Analysis was undertaken of Public Performance Measure (PPM) data for Train Operating Companies and service groups that are most relevant to journeys in Solent:

- SWR South Hampshire Locals service group (includes Portsmouth-Southampton and Salisbury-Romsey);
- SWR London to Portsmouth and London to Weymouth (combination of both these service groups- covers local connectivity provided by these London routes);
- GTR Southern Coastway service group (covers services further west but includes Havant-Portsmouth and Havant-Southampton services);
- GWR Cardiff to South Coast service group (covers Portsmouth to Cardiff service, which provides the fastest link between Portsmouth & Southampton).

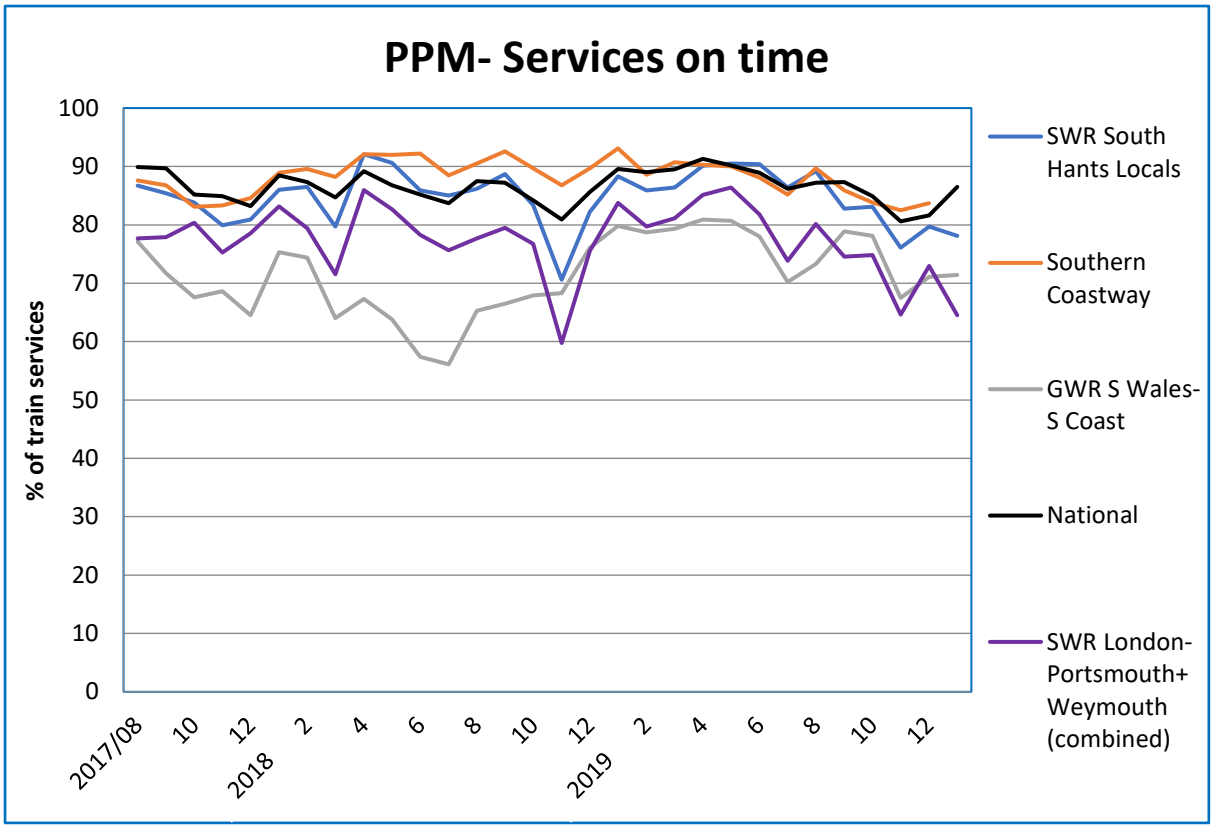



*Figure 43: PPM- services on time*

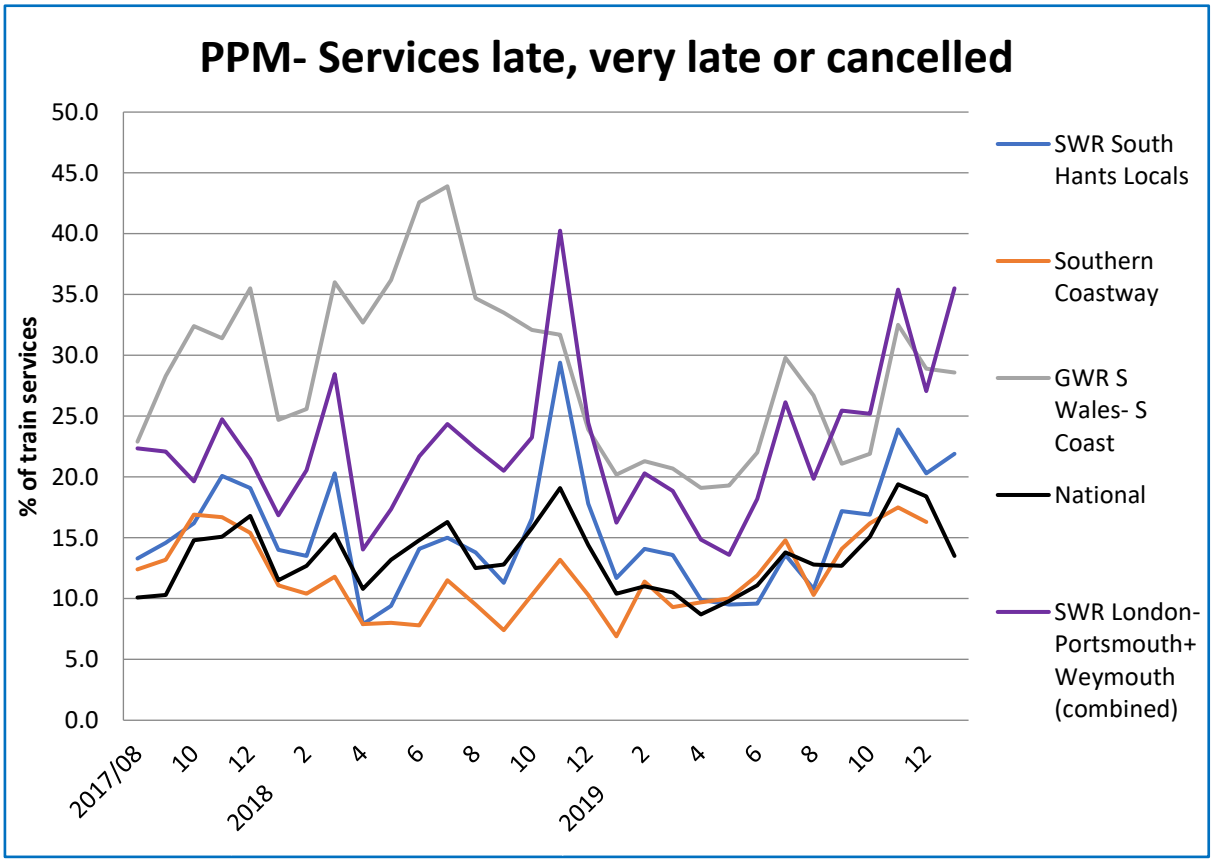



*Figure 44: PPM- services late, very late or cancelled*

PPM is the percentage of trains that arrived less than 5 minutes late at route destination. It has been supplemented since April 2019 with new more granular "on time" statistics but PPM has been used for this analysis due to the longer time series of data available and ready data availability for service groups relevant to Solent.

Monthly PPM data[36] between August 2017 and December 2019/ January 2020 for the selected service groups, compared against national averages shown in the charts in Figures 43 and 44.

Key points from this data are:

- Punctuality of the SWR South Hampshire Locals services and Southern Coastway services is better than the other service groups, with on average 84.7% and 88.2% of trains classified as on time across the time period analysed. These services are broadly equal to or better than the national average punctuality performance;
- Punctuality of the SWR London services is consistently poorer, averaging 80.1% of trains on time over the time period (below national average);
- Punctuality of the GWR Cardiff to South Coast service group is the poorest, averaging 71.3% of services on time across the time period and well below the national average punctuality, but showing signs of improvement during 2019.

These statistics indicate that the shorter distance Solent area services (SWR local services; medium distance Southern services towards Brighton) are consistently more punctual than longer distance services running to/from London or the west.

Performance of the London services will be influenced by complex issues affecting performance in the London area (see Section 8.5) impacting quality of service provided for local journeys in Solent.

The poor performance of the GWR Cardiff-South Coast services means that the fastest Portsmouth to Southampton links are amongst the least reliable services in the study area. Interventions such as the identified additional through line at Fareham could assist with improving reliability of these services by allowing late running trains to avoid becoming stuck behind slower stopping services and becoming further delayed.

The other key conclusion from this data is that any enhanced service provision in Solent is likely to be more reliable if provided via short distance local services, as opposed to being provided as part of longer distance services e.g. to London or Bristol.

## 8.5 SWR Independent Performance Review

In 2018 SWR commissioned an independent review of performance on the network, chaired by Sir Michael Holden[37]. This study examined all aspects of performance on the wider South Western network to establish why it had declined significantly since 2011.

[36] Monthly PPM data sourced from Trains.im processing of Network Rail data, and from GTR published PPM data by route
[37] https://www.southwesternrailway.com/other/about-us/independent-performance-review

This report established that in terms of performance and reliability, the South Hampshire local services operated by SWR were amongst the operator's best performing service groups and were the top performer across the SWR network for right time arrivals (at 66%). All service groups have experienced a downturn in performance since 2011, but the worst falls affected longer distance services rather than shorter journeys such as local trains within Solent.

Causes of the declining performance were largely linked to issues in central and greater London rather than in Solent, together with organisational, operational and management changes. However, specific findings relevant to this CMSP study included:

- Congestion and small delays, together with reactionary delays ("knock on" delays to other trains as a result of congestion, late starts etc following an initial incident) were key drivers of the performance deterioration. This is reflective of a lack of spare capacity at critical points on the network contributing to a lack of resilience, and a general need to consider improved capacity, capability and flexibility at key locations such as junctions and stations, including those in the Solent area;
- Fareham station, and the opportunity to add a third through line/platform at this location, was specifically identified as being likely to help mitigate delays and more robustly enable additional Southampton to Portsmouth services.

# 9 Access to stations

## 9.1 Introduction

This study is primarily concerned with identifying opportunities for improved rail service patterns to meet future demand and stimulate mode shift to rail (enabling sustainable development in Solent), but access to and from rail stations is a key part of any rail journey.

Whilst train journey times are already faster than driving for many station to station journeys in Solent (and improved train frequencies could help rail to capitalise on this existing advantage), if journeys to/from stations are inefficient or inconvenient for many users, these advantages could be negated.

Improved access to stations can save users time, money, and hassle- all of which may be important factors which can help "tip the balance" in favour of using rail.

Additionally, many types of station access improvement may be deliverable more quickly and at lower cost than some of the infrastructure interventions outlined in Chapter 7 which are required to enable additional frequency on rail services themselves.

### 9.1.1 Purpose of this chapter

This chapter provides some evidence which is intended to help prioritise development of and funding applications for station access improvements across the Solent area, assisting decision making about where limited resources for access improvements might be used to best support the rail service improvement options identified in this strategy.

It does not provide a detailed review of existing access options at each station, or provide a compendium of local issues. Neither does it set out any recommendations for specific schemes at specific stations. It is intended solely to help guide stakeholders and the industry as to where effort for improvements might be most beneficial.

## 9.2 Access to stations: summary of current knowledge base

Many stations in Solent have Travel Plans (which have undertaken access surveys), and surveys of user access to stations has been undertaken by Three Rivers Rail Partnership at stations they have adopted. Some of these surveys (together data from many other stations across the UK) are summarised in the Rail Delivery Group's Station Travel Plans publications and data38. Figure 45, reproduced from the Station Travel Plans data analysis report39 , sets out the average and range of mode shares for access to/from a sample of 30 stations (three of which were in the Solent Connectivity study area).

[38] https://www.rdg.clients.webx.solutions/our-services/about-my-journey/station-travel-plans/stp-docs.html
[39] https://www.rdg.clients.webx.solutions/our-services/about-my-journey/station-travel-plans/stp-docs.html?task=file.download&id=469762519

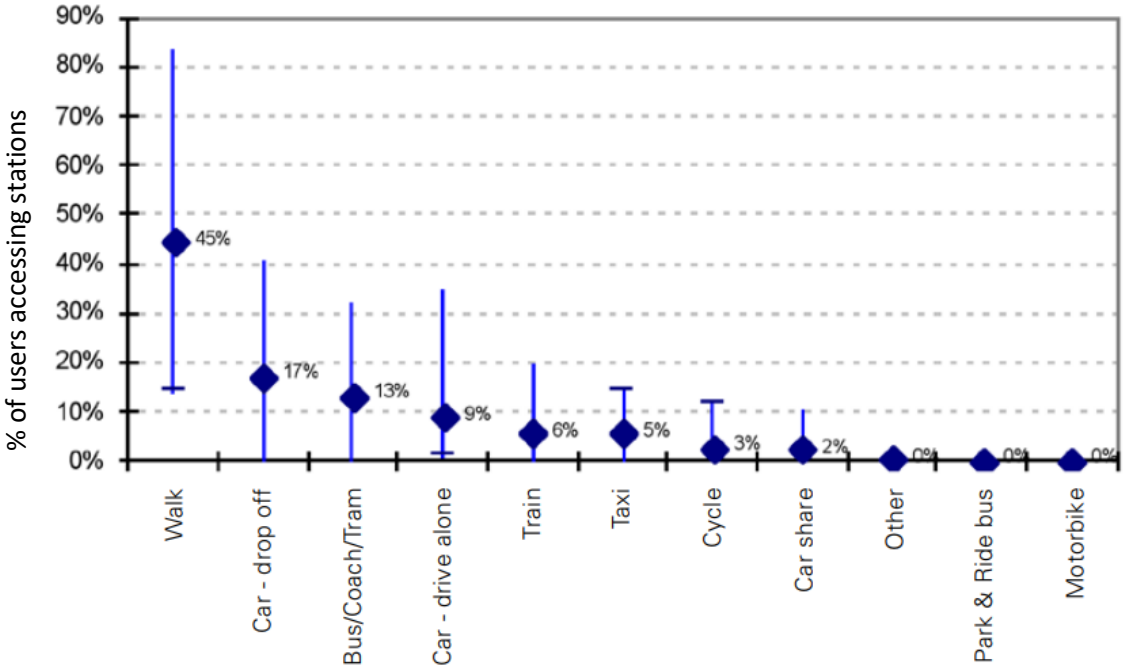



*Figure 45: ATOC/RDG analysis of mode share for station access for different modes*

Walking to the station is by a large margin the most important mode of access at most stations (often accounting for more than half of all passengers). Three out of four rail users travel to / from stations either on foot, by car as a passenger, or by bus. On average, only around one in ten rail users drive to and park at the station, and around 3% cycle. However there are large local variations in these averages (as indicated on the chart) reflecting different local circumstances.

This indicates that for most stations, access improvements should focus on walking routes, pickup/drop-off areas, and bus interchange in order to benefit the largest number of users.

However car parking and cycling facilities are also important considerations: data analysis undertaken for this study estimates that around 22,000 new dwellings (out of around 91,000 planned to 2034) are planned within 1km of rail stations in Solent. Therefore around 75% of planned new dwellings will be beyond a reasonable walking distance/time of a rail station.

A more attractive rail offer is therefore likely to (and will need to) draw in users from a wider catchment, over distances where walking is not a viable mode of travel. For some, access by bus may be an option, but for many, use of personal rather than public transport may be preferred. Therefore increases in numbers of users driving to some stations in Solent is likely, unless an active intervention to make other modes more attractive becomes available- meaning pick up/drop off and car parking provision improvements may be needed at some stations, but also based on current usage patterns and data options other multimodal options could be promoted as an alternative, as growth in car usage around stations comes with its own transport challenges.

However there is also great potential for increased levels of cycling to stations from these catchments located beyond 1km from stations. As cycling is typically around three to four times faster than walking, a 2km cycle to a station is likely to take a similar time to a 500m walk, and also is not greatly slower than driving in congested traffic conditions. In countries where high quality cycle infrastructure is universal (eg the Netherlands), cycling to stations is commonplace- for example, 42% of rail passengers in the Netherlands access the station by bike[40] and 15% of Dutch Railways shared bike system (OV-Fiets) users indicated that their rail and cycle journey had replaced a previous car journey[41]. Another significant benefit of cycling to stations is the much lower land requirement to provide large quantities of parking (compared to car parking or pick up/drop off areas). As many stations in Solent are hemmed in by existing development this is an important consideration. However, to achieve a large scale growth in cycling, a step change in cycling infrastructure will be needed to convince many potential users that this is safe travel choice. Cycle route schemes to be delivered through Transforming Cities Funding in Southampton and Portsmouth together with and other recent & current cycle infrastructure schemes are an early step towards developing this level of provision in some parts of Solent.

Some evidence of the influence of cycle facility provision on numbers of rail users cycling to stations is illustrated in Figure 46 overleaf, which shows changes in numbers of cycle parking stands and parked bikes recorded at Southampton Airport Parkway between 2005 and 2016. In 2010, cycle parking was expanded at the station, and in 2011 a new cycle path was created better connecting the station to a nearby new-build urban extension development that was constructed from 2009 to 2015. These measures supported substantial growth in cycling to the station, with further parking capacity added between 2014 and 2016 which was followed by further recorded growth in numbers of parked cycles.

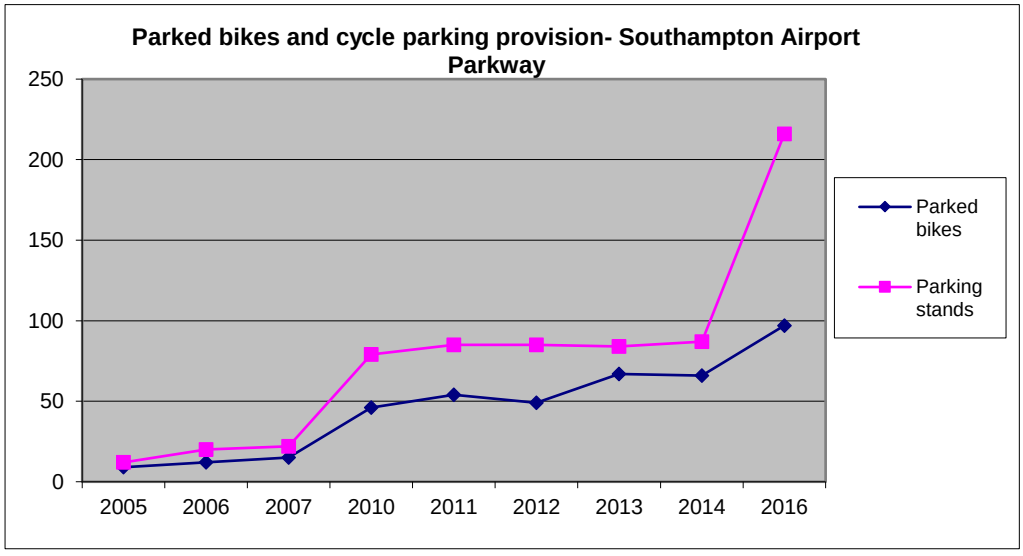



*Figure 46: Trends in cycle parking and parked bikes at Southampton Airport Parkway station*

[40] KiM. (2014). Mobiliteitsbeeld 2014, 183. https://doi.org/978-90-8902-124-3 (Dutch)
[41] https://link.springer.com/article/10.1007/s11116-019-10061-3#Fn2

Similar trends have been observed elsewhere: nationally, Rail Delivery Group observed an increase in cycling to stations of nearly two-thirds over three years whilst a programme of cycle facility improvements was implemented.

## 9.3 Benefits of improved access to stations

As noted above, improvements to station access & travel facilities may be required at some locations to address impacts on communities around stations that could result from significant increases in rail passenger numbers (as this study/strategy seeks to achieve). This includes avoiding creating parking issues on nearby roads or addressing safety issues (e.g. at road crossings) as a result of heavier use of routes to/from stations.

However, these improvements can also help to improve the competitive standing of rail and hence its attractiveness to users. The ways this can be achieved are several-fold and include:

- *Reduced monetary costs*: if free/low cost modes (e.g. walk, cycle) can be used to get to/from the station this can help make rail a more financially attractive option than driving and parking;
- *Reduced actual journey times:* more direct walking and cycling routes may offer time savings (e.g. through avoiding long detours, such as to cross railways & major roads). Similarly, new , faster, or more frequent bus routes; better located bus stops; and more convenient pick up/drop off locations can provide actual journey time reductions to/from the station. Even conveniently located cycle parking or better laid out entrances and forecourts can generate small journey time savings;
- *Reduced perceived journey times:* as well as actual journey times, a range of other influences on journey quality and convenience can alter the user's perception of how long a journey takes. Qualitative improvements such as a pleasant waiting environment for an onward bus, or a wide rather than a narrow pavement beside a busy road may translate into perceived improvements in journey times to/from the station which may affect people's choice (or not) to use the train.

Some wider evidence on the perceived journey time benefit of quality improvement measures, particularly for buses, is set out in in the Department for Transport WebTAG advice. The table below summarises WebTAG's values for several potential improvements to bus stops & interchanges, and the accompanying perceived time savings expected to occur as a result of the improvement. Benefits of similar journey quality-focused interventions in and around stations are likely to be similarly valued by rail users.

| Improvement Feature | WebTAG Databook M3.2.1 Time Saving (Bus Users Generalised Minutes) |
|---|---|
| **Audio Announcements** | 1.22 |
| **CCTV at Bus Stops** | 3.70 |
| **Climate Control** | 1.24 |

| | |
|---|---|
| **New Bus Shelters** | 1.08 |
| **New Interchange Facilities** | 1.27 |
| **On-Screen Displays** | 1.90 |
| **RTPI (at bus stops)** | 1.47 |
| **Simplified Ticketing** | 0.84 |

There is a significant evidence base showing wider economic benefits resulting from the types of types of transport intervention which could improve access to stations. Walking and cycling schemes generally provide high value for money, with Benefit Cost Ratios (BCRs) often exceeding 4:1[42], largely due to the health benefits of higher levels of walking and cycling. Bus improvement schemes also generally offer what DfT define as "medium" to "high" value for money. An example in Solent is the Eclipse Bus Rapid Transit route from Fareham to Gosport (via Fareham station) which has delivered a BCR of between 1.9 and 6.943. And station accessibility schemes, such as those delivered through Access for All funding to improve accessibility for rail users with mobility difficulties, have been demonstrated to deliver an average BCR of 2.4:1[44] with some individual schemes achieving far higher returns.

In summary, there is ample evidence that improved quality access routes, interchange and onward travel facilities for travel to/from the station can translate into user time savings of potentially several minutes (actual or perceived) - helping to improve rail's competitiveness versus driving, and/ or helping to offset any competitive disadvantages. And that these types of scheme can deliver significant wider economic benefits to their local area, complementing the strategic economic benefits that rail enhancements can secure.

## 9.4 Evidence to support prioritisation of station access schemes

Table 13 overleaf sets out data for each station in Solent which can help strategically guide decisions about development and funding of station access improvements. The information shown is:

- *Total entries/exits 2018/19:* size of the current station user base;
- *Estimated ratio of inbound to outbound users:* this is based on census analysis of residential and workplace populations in each station's catchment. This figure is the number of passengers estimated to make "inbound" trips to this station (travelling to this station for travel to work) for every "outbound" passenger (a resident living in the station catchment, starting journeys at this station to travel elsewhere). This is

[42] https://www.sustrans.org.uk/media/4472/4472.pdf
[43] https://transportknowledgehub.org.uk/case-studies/south-east-hampshire-brt/
[44] https://www.itf-oecd.org/sites/default/files/docs/benefits-improving-access-uk-rail-network.pdf

important because whilst some access needs are constant across all types of stations (e.g. walking routes), access needs of "inbound" users may differ from those of "outbound" users in a number of ways, including:

  - Outbound passengers are more likely to cycle or drive to a station because they have a car/bike available at home (whereas arriving "inbound" passengers clearly will not have these options available to them)- potentially making car & cycle parking more important at those stations serving primarily residential catchments;
  - As "Inbound" passengers will not have their own personal transport for the onward journey from the station to their end destination (eg nearby workplaces, shops etc), availability of a wider range of onward travel modes (eg provision of cycle hire, better bus networks, taxi provision etc) may be more important at stations with high numbers of "inbound" users.

- *Rail vs drive AJT difference:* This is the difference between average train journey times and average driving journey time (AM peak) from this station to 13 key stations in Solent. Positive numbers (red shaded boxes) indicate rail journey times from this station are on average slower than driving, whilst negative numbers (green shaded boxes) indicate rail journey times are on average faster;
- *No of rail flows within +/-5 mins of driving; and No of rail flows 5+ mins faster than driving:* These columns indicate how many of the train journeys from this station to the 13 key stations are either similar to the AM peak driving time or are substantially faster;
  - This information should help enable informed decisions about where access improvements (which might save users a few minutes travel time) could make the most difference in improving the journey time competitiveness of rail travel compared to driving;
- *Estimated new dwellings within 2km by 2036, and Significant new employment development within 2km?* These fields show number of committed new dwellings within a 2km distance of the station (indicating whether resident population in the station catchment is likely to grow significantly in future), and whether any major employment development is proposed nearby (which may drive increases in inbound commuting to this station);
- *Any access improvement proposals at present?* This briefly summarises whether access options to/from each station may benefit from current major funding bids and programmes (e.g. Portsmouth & Southampton TCF, or developer led proposals).

| Station | Total entries/exits 18/19 | Est. ratio of inbound to outbound travel | Type of access to station/ journey likely to be more important | Rail vs drive AJT difference | No of rail flows within +/- 5 mins of driving | No of rail flows 5+mins faster than driving | Estimated new dwellings within 2km by 2036 | Significant new employment development within 2km? | Any access improvement proposals at present? |
|---|---|---|---|---|---|---|---|---|---|
| Ashurst New Forest | 153670 | 1.6 | Inbound | 3 | 4 | 4 | 0 | | No |
| Bedhampton | 129136 | 0.6 | Equal | 7 | 4 | 0 | 973 | | No |
| Bitterne | 85280 | 0.4 | Outbound | -2 | 7 | 4 | 1390 | | On an SCR TCF corridor- cycle + bus improvements planned nearby |
| Botley | 156754 | 1.5 | Equal | -1 | 4 | 4 | 4860 | | Botley bypass, N. Whiteley link roads (and cycle links) pass nearby-improve access to new developments nearby. N. Whiteley new bus routes will pass near station |
| Bursledon | 60754 | 0.6 | Equal | -4 | 6 | 4 | 669 | | Cycle improvements on A27 near station to be delivered by SCR TCF |
| Chandlers Ford | 207192 | 0.9 | Equal | -1 | 7 | 1 | 155 | | SCR TCF-bus improvements on nearby route |
| Cosham | 925066 | 1.6 | Inbound | -10 | 4 | 8 | 133 | Yes | PCR TCF- plans for SEHRT interchange improvements and improved bus services |
| Eastleigh | 1665426 | 1.3 | Equal | -2 | 5 | 6 | 482 | | SCR TCF to deliver local mobility hub in Eastleigh town centre, improved cycle access to south and local bus improvements |
| Emsworth | 349556 | 0.6 | Equal | -5 | 7 | 1 | 2272 | | No |
| Fareham | 1701386 | 0.9 | Equal | -14 | 3 | 10 | 3000 | Yes | Further improvements to Eclipse BRT to Gosport being delivered by PCR TCF |
| Fratton | 1735300 | 0.4 | Outbound | -8 | 4 | 8 | 4438 | | PCR TCF - Cycle route improvements proposed nearby |
| Hamble | 111232 | 2.4 | Inbound | 7 | 6 | 5 | 251 | | HCC Hamble Lane strategy- cycle/ped route improvement proposals plus proposed station car park/ drop off area |
| Havant | 2326412 | 2.1 | Inbound | -3 | 8 | 2 | 1312 | | Proposals to replace ped bridge at west end of station |
| Hedge End | 522492 | 0.7 | Equal | -5 | 2 | 6 | 4004 | | No |
| Hilsea | 338306 | 1.1 | Equal | -5 | 4 | 8 | 149 | | No |
| Millbrook (Hants) | 39474 | 1.3 | Equal | -2 | 6 | 3 | 489 | | On an SCR TCF corridor- cycle + bus improvements planned nearby |
| Netley | 91130 | 0.3 | Outbound | -4 | 6 | 5 | 251 | | No |
| Portchester | 347572 | 0.6 | Equal | -9 | 2 | 9 | 690 | | On a PCR TCF corridor- SEHRT bus improvements planned nearby |
| Portsmouth & S'sea | 2053186 | 2.5 | Inbound | -8 | 4 | 8 | 4438 | Yes | Variety of bus (SEHRT), ped, cycle & interchange proposals at city centre south proposed in PCR TCF |
| Portsmouth Hbr | 2100528 | 0.6 | Equal | -8 | 4 | 8 | No data | | On a PCR TCF corridor- SEHRT bus improvements planned nearby |
| Redbridge | 43996 | 1.0 | Equal | -1 | 8 | 1 | 867 | Yes | On an SCR TCF corridor- cycle + bus improvements planned nearby |
| Romsey | 520856 | 0.8 | Equal | -1 | 7 | 3 | 1791 | | No |
| Rowlands Castle | 130970 | 0.4 | Outbound | n/a | n/a | n/a | No data | | No |
| Sholing | 109134 | 0.2 | Outbound | 0 | 6 | 5 | 2688 | | On an SCR TCF corridor- cycle + bus improvements planned nearby |
| Soton Airport Pkwy | 1700314 | 1.3 | Equal | 4 | 4 | 2 | 1181 | Yes | On an SCR TCF corridor- cycle + bus improvements planned nearby and "travel hub" planned at station |
| Soton Central | 6664714 | 2.9 | Inbound | -9 | 4 | 9 | 2150 | Yes | SCR TCF to deliver enhanced multi-modal transport interchange on the south side |
| St Denys | 279642 | 1.0 | Equal | -9 | 4 | 7 | 729 | | SCR TCF to deliver active travel zone (walking & cycling improvements) in area |
| Swanwick | 641148 | 1.0 | Equal | -5 | 6 | 6 | 3915 | Yes | "Swanwick Parkway" proposals- improved ped+cycle access to station from north side of M27. New North Whiteley bus network serving station (developer commitment) |
| Swaythling | 116106 | 0.5 | Outbound | 7 | 3 | 3 | 2040 | Yes | SCR TCF-travel hub planned at station |
| Totton | 291220 | 0.7 | Equal | 5 | 5 | 2 | 580 | | On an SCR TCF corridor- cycle + bus improvements planned nearby |
| Warblington | 27790 | No data | No data | n/a | n/a | n/a | No data | | No |
| Woolston | 148444 | 0.3 | Outbound | 0 | 6 | 5 | 2688 | Yes | On an SCR TCF corridor- cycle + bus improvements planned nearby, interchange improvements at station |

*Table 13: Factors influencing station enhancement priorities in Solent*

## 9.5 Summary of key points

Green shading in Table 13 indicates greater presence of potential "success" factors justifying investment in station access improvements (e.g. rail journey times faster than driving on many flows; higher station usage levels; higher levels of future development in the vicinity).

The information in the table suggests that the greatest benefit from station access improvements in Solent might be achieved at some of the better-used stations serving town/city centres and growing communities, including Swanwick, Fareham, Southampton Central, Cosham, Portsmouth stations and Fratton, and Hedge End.

However, the table could also be used to support other strategic approaches- for example there may be justification to prioritise access improvements at stations where rail journey times are slightly less competitive than driving for many journeys within Solent, in order to try to offset rail's slight disadvantage in terms of journey time. Stations which such an approach might prioritise could include Southampton Airport Parkway, Botley and Woolston (where there is large amounts of development planned nearby but local train journey times are slower on average than driving), and/or Havant, Emsworth and Redbridge (stations from which many local rail journeys are within +/- 5 minutes travel time of the equivalent car journey).

## 9.6 Conclusions

This chapter has set out the importance and benefits of improvements to station access. Whilst the Solent Connectivity Study is primarily focused on improving rail services (particularly through increased frequency, to reduce generalised journey times), the journey to and from the station is also important and there is scope for achievement of actual or perceived journey time improvements which could compliment and support rail service improvements. These schemes often provide significant wider economic benefits by themselves.

The data set out in Table 13 can be used to support strategic decisions about station access improvements across the area and some suggestions on approaches to this are set out above. Different funding opportunities may have different objectives and taking a flexible approach is likely to be needed (for example, funding accessible to Community Rail Partnerships often aims to improve the situation for less-well used stations with lower user bases, whereas funding focused more explicitly on economic development is likely to seek the greatest overall benefit per pound spent).

Just a small percentage of any rail investment secured for Solent, if used for station access improvements, would help to maximise the value and benefit of investment in service improvements.

# 10. Emerging Strategic Advice

The Study has demonstrated that there is a strategic case for improving upon the current low frequency of services across the Solent area. In addition to the current loadings during the peak periods, significant future growth is also forecast under 3 potential scenarios (edge, aspiration and TfSE) which will create a requirement for change.

The scope of the CMSP questions, confirmed with stakeholders, covered a number of areas focused on a wider understanding of the constraints and opportunities within the existing infrastructure and beyond.

The study had an overriding constraint that services to London should not be impacted if additional services were proposed. The existing timetable should be the basis for any change and because the existing infrastructure has many constraints, therefore infrastructure would need to be provided to support extra services.

Analysis indicated that the low mode share for rail in the Solent Area is primarily driven by the low frequency of the train service rather than being directly associated with journey times, which has been a focus in the past.

The aspiration is to seek to provide up to 4tph network wide across the Solent area. With limited infrastructure change it is likely that the level of service could get close to this aspiration. Based on evidence from other UK city regions, the frequency enhancement resulting from the best-performing shortlisted options (giving 3.4 to 3.8 tph network wide average) would create opportunities to generate a significant modal shift from private car.

Testing of five shortlisted Train Service change options, including testing of connectivity benefits (Section 6.3), timetable modelling (6.4) and high level economic evaluation (6.5) indicate that options 2 and 3 (additional 2tph via the Netley line with stopping or “semi fast” calling patterns) appear to perform best against the full range of criteria. Option 3 (2 extra stopping services per hour) comes very close to achieving the 4tph network-wide target and may provide slightly greater economic benefits, but appears to be more difficult to timetable (even with infrastructure interventions) and also provides less improvement to Portsmouth-Southampton connectivity than Option 2. Both these options appear to address the strategic questions best, out of the shortlisted train service options.

Options 1 and 5 (“Solent Loop” service, and additional 2tph Portsmouth-Eastleigh-Winchester respectively) are noted as performing well in many aspects of the high level economic evaluation, but neither option delivers a Portsmouth to Southampton connectivity benefit and Option 1 is unlikely to be feasible to timetable, even with infrastructure interventions. Option 5 looks to be more feasible, with appropriate infrastructure enhancements.

Frequency improvements can help City to City connectivity by providing more opportunities to travel each hour, reducing average wait times. Some of the shortlisted options would provide a 10-20% reduction in total journey time. Whilst these improvements would substantially improve City to City rail connectivity, a challenge remains to match road journey times in the off peak. However, these proposals would help to improve rail's competitiveness in the peak commuting periods, particularly in the Portsmouth to Southampton direction.

The City to City market is small compared to other local flows. The wider Solent Corridor beyond the cities is a key growth area for employment and housing and development in these out-of-city areas will be key in influencing future demand and journey patterns. Service options identified through this study would service these developing markets.

The analysis of the low usage stations has shown limited correlation to any specific cause other than low frequency of service. If implemented, the options identified in this study provide the opportunity to address this issue.

Options identified in this study would also dovetail with and support proposed/committed major improvements to local transport in Portsmouth and Southampton city regions through the Transforming Cities and Future Transport Zone funds.

# 11. Next steps

**The next steps are to take the following forward as projects in the Rail Network Enhancements Pipeline (RNEP) process**

- Double tracking of the Botley Line to increase capacity;
- Conversion of the current bay platform at Fareham, Platform 2, into a through platform to provide a passing opportunity and at Fareham- improving timetabling flexibility and resilience;
- Totton siding electrification and level crossing closure - to allow trains to terminate at Totton instead of terminating at and sitting in a platform at Southampton Central, whilst also providing enhanced connectivity for Totton which is an under-served station;
- Alteration of Platform 1 at Eastleigh to a bi -directional platform, and associated layout/crossover changes- this would improve flexibility in the Eastleigh area, and greater use of the relatively lightly-used Platform 1 would help to free up capacity at Platforms 2 and 3;
- Reopen the disused Platform 2 at Portsmouth Harbour station to provide additional platform capacity at the station, or alternatively provide an additional platform at Portsmouth & Southsea.

**In addition, the recommendation is to work on further development in partnership with Transport for the South East**

TfSE's Draft Transport Strategy for the South East (2019) emphasises the importance of improving cross-regional and "orbital" rail journeys on corridors that avoid London to create viable alternatives to the equivalent road journey.

We are recommending work in partnership with TfSE to further develop shortlisted options for local connectivity improvements within this study, including considering how they can contribute to the following sub-regional issues:

- Improve east-west journey times;
- Provide consistent service intervals within the timetable;
- Optimising the mix of long-distance and stopping services;
- Increasing the volume of services between Brighton and Southampton/Bristol;
- Encapsulating the recommendations of the West Coastway study.

# Glossary

| Term | Description |
|---|---|
| **AM Peak** | The peak morning travel period between 07:00 and 10:00. |
| **BRT** | Bus Rapid Transit - a high-quality bus-based transit system that delivers fast, comfortable, and cost-effective services at metro-level capacities. |
| **CCTV** | Closed-Circuit Television |
| **CMSP** | Continuous Modular Strategic Planning – Network Rails' long term planning process. |
| **Coastway** | Relates to the West Coastway, which is the line connecting Brighton with Southampton Central. The East Coastway refers to the rail line east of Brighton along the Sussex coast. |
| **DC** | Direct Current – used to denote the 3rd rail electric traction power system used in Network Rail's Southern Region. |
| **DMU** | Diesel Multiple Units – standard diesel powered passenger rolling stock units |
| **ELR** | Engineer's Line Reference – this is a three alpha, or four alpha-numeric, code used to uniquely identify a section of track on the main-line railway of Britain. |
| **ETCS** | European Train Control System – this is the signalling and control component of the European Rail Traffic Management System (ERTMS); often referred to as "digital signalling" or "in-cab signalling". |
| **EMU** | Electric Multiple Unit – standard electric powered passenger rolling stock units. |
| **GJT** | Generalised Journey Time - this is a function of journey time, plus service interval, plus interchange penalties. |
| **GTR** | Govia Thameslink Railway – a Train Operating Company (TOC). |
| **GRIP** | Governance for Railway Infrastructure Projects – the project management methodology used by Network Rail. |
| **GVA** | Gross Value Added – is the measure of the value of goods and services produced in an area, industry or sector of an economy. |
| **GWR** | Great Western Railway – a Train Operating Company (TOC). |
| **High Peak Hour** | The high peak hour is usually the busiest hour in the AM Peak. For London-bound services this is arrivals at the Terminus between 08:00 and 08:59. |

| Term | Description |
|---|---|
| **JPIC** | Joint Performance Improvement Team – A performance improvement taskforce set-up between Network Rail and the TOCs in the Network Rail Wessex Route. |
| **LEP** | Local Enterprise Partnership – these are voluntary partnerships between local authorities and businesses, set up in 2011 by the Department for Business, Innovation and Skills to help determine local economic priorities and lead economic growth and job creation within the local area. |
| **LTTP** | Long-Term Planning Process – Network Rail's process for strategic planning that includes the CMSP programme. |
| **Mode share** | The amount of the transport market held by a specific transport mode, such as rail. |
| **MOIRA** | A demand forecasting model used by Network Rail. |
| **MSOA** | Middle Layer Super Output Area (MSOA) – is a geographic area. Middle Layer Super Output Areas are a geographic hierarchy designed to improve the reporting of small area statistics in England and Wales. |
| **NTEM** | National Trip End Model – forecasts the growth in trip origin-destinations (or productions-attractions) up to 2051 for use in transport modelling. |
| **ORR** | Office of Rail and Road - is the independent safety and economic regulator for Britain's railways and monitor of Highways England. |
| **Path** | A validated set of timings for a train. |
| **PM Peak** | The peak evening travel period between 16:00 and 19:00. |
| **PPM** | Public Performance Measure - is a measure of the punctuality and reliability of passenger trains in Britain. |
| **PV** | Present Value - is the current value of a future sum of money given a specified rate of return. |
| **RDG** | Rail Delivery Group - brings together the companies that run Britain's railway into a single cross-industry team. Provides a voice for passenger and freight operators. |
| **RNEP** | Railway Network Enhancement Pipeline – the funding process for railway enhancements that are not funded through discretionary funding. |
| **RTPI** | Real Time Passenger Information – relating to the provision of real time information at bus stops and railway stations. |
| **RUS** | Route Utilisation Strategy – one of the precursors to the CMSP process. |

| Term | Description |
|---|---|
| **S&C** | Switches and crossings – these are moveable sections of track that guide trains from one track to another and allow them to cross paths. |
| **Semi fast** | A semi-fast service is a service that does not call at every station between two locations (as in the case of a stopping service), but equally does not call at a very limited number of stops (a fast service). |
| **Skip stop** | A service pattern that means not all stops are called at between two locations. Another service will often pick up the stations "skipped" by the other service. This efficiently uses available capacity and improves journey times. |
| **SOBC** | Strategic Outline Business Case – the first business case level in the Railway Network Enhancement Pipeline (RNEP) process. |
| **SWML** | South West Main Line – the line running between London Waterloo and Weymouth. Also know by the ELRs BML1, BML2 and BML3. |
| **SWR** | South Western Railways – the main Train Operating Company (TOC) which runs services in the Solent area. |
| **TCF** | Transforming Cities Fund – The Transforming Cities Fund aims to improve productivity and spread prosperity through investment in public and sustainable transport in some of the largest English city regions. |
| **TfSE** | Transport for the South East – a Sub-National Transport Body intended to provide strategic transport governance at a much larger scale than existing local transport authorities. |
| **TIS** | Track Isolation Switch – used to turn off the electric current in a particular section of the rail network. |
| **TOC** | Train Operating Company – the passenger rail operators that have franchises allowing them to operate trains over a defined area or set of routes. |
| **TPH** | Trains per hour – the number of trains in any given hour. |