Waterside Rail Study

Final Report

Hampshire County Council

June 2013

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Halcrow

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Halcrow Group Limited
Lyndon House, 62 Hagley Road, Edgbaston, Birmingham
B16 8PE
tel 0121 456 2345 fax 0121 456 1569
halcrow.com

Halcrow

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1.A	Feb 2013	Draft Final Report	Ruannan Law	David Crockett	Richard Sanderson
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Contents

Executive Summary

Halcrow have been commissioned by Hampshire County Council to undertake a GRIP 3 assessment of the proposed reinstatement of the Waterside Rail line for passenger service operation.

The scheme would involve the development of the line and the construction of two new stations at Hounsdown and Hythe, as well as the reinstatement of the old station at Marchwood.

The work builds on a previous GRIP 2 report undertaken for the Council in 2011/12. The principal difference between the pieces of work is the increased level of detail undertaken at GRIP3, and the key output at GRIP 3 being the shortlisting of a single option for detailed design.

The GRIP 2 work considered a number of service options, hourly and half hourly shuttles from Hythe to Southampton, as well as a through running service to Chandlers Ford. These options were considered in developing the analysis.

This report provides a summary of the Waterside GRIP 3 Rail Study. Four key areas are covered in the report:

- Timetable and Operational Analysis
- Infrastructure Requirements and Costs
- Environmental Appraisal
- Socio-Economic Analysis

Timetable and Operational Analysis

The timetable analysis identifies two key findings. The first is that to operate efficient rolling stock diagrams, it is necessary to increase the line speed for passenger services to 45mph. With this in place it is possible to operate hourly or half hourly shuttles between Hythe and Southampton, but through running services to Fareham or Chandlers Ford do not appear to fit well with the current services.

Infrastructure Requirements and Costs

To provide the service requires three stations, improvements to the track and signalling upgrades to accommodate increased line speeds. For the Half hourly option a passing loop is also required at Hounsdown Station. The overall cost for the hourly service is £7.2m and for the half hourly service £11.0m.

Operating costs for the service are in the region of £1.25m for the hourly option and £2.0m for the half hourly.

Environmental Appraisal

Initial environmental appraisal highlights the need to consider the New Forest national park in the next stages of scheme development, but notes that no new construction is expected within the park itself. New Station development is expected largely within rail boundaries, and no specific issues have been identified at this high level stage of the appraisal.

Socio-Economic Analysis

The scheme has a central case BCR in the range of 0.7 to 1.1 for the half hourly shuttle, with the hourly option being between 0.4 and 0.8. Key sources of scheme demand come from existing public transport modes in bus and ferry. It is the need to account for such loss of revenue in the economic case, plus the overall relatively low level of demand that is affecting the BCR. Note to receive funding from the DfT, schemes typically have BCR's above 2.0, and it is estimated that demand would have to increase from around 1150 trips per day to 2550 per day.

The key difference between the outcome of the GRIP 2 study, which has a BCR of around 2.0, and the GRIP 3 work is the following:

- Scheme cost estimates increased by around 40% in recognition of increased signalling costs, and the need to relay the track.
- Scheme Demand is similar, but improved modelling allows a more robust identification of the demand sources and the loss of bus and ferry revenue needs to be including the in the economic case.
- Scheme benefits have been reduced in the central case as a result of confirmation from the DfT that Option Values should not be included. That confirmation alone reduces the GRIP BCR to around 1.4

Next Steps

The analysis has shown that for a relatively modest (in rail industry terms) capital investment, it is possible to develop passenger services plus three new stations on the Waterside line. However, the latent demand in the area, overlayed with existing good provision of public transport (bus / ferry) in the area, is not sufficient to support the service. Should rail services be a strong priority, one of the other public transport modes would need to be sacrificed, and that has a host of political ramifications associated with it.

1 Introduction

1.1 Project Brief

A GRIP 2 feasibility study was undertaken by Atkins in 2011 on behalf of Hampshire County Council, investigating the potential for reintroducing passenger services on the Waterside Line.

This study further develops the GRIP 2 findings to a GRIP 3 level investigation, including:

- Timetable and Operational Analysis;
- Infrastructure Requirements and Costs;
- Environmental Appraisal; and
- Socio-Economic Analysis.

The Council considers the following to be the objectives that the proposed scheme should provide:

- An hourly passenger service between Hythe and Southampton Central, entailing the re-introduction of passenger trains on the freight-only section between Hythe and Totton;
- Station locations that will easily facilitate access by pedestrians and cyclists at Hythe and Marchwood. All facilities must be DDA-compliant and consistent with existing SWT standards;
- Provide a new halt at Hounsdown; and
- Provide drop-off and parking facilities to enable kiss & ride and park & ride trips at Hythe and Marchwood, plus secure cycle storage arrangements.

1.2 Structure of the Report

This report is outlined as follows:

Chapter 2 – Transport Problems

Chapter 3 - Option Development

Chapter 4 - Timetable and Operational Analysis

Chapter 5 - Infrastructure Requirements and Costs

Chapter 6 – Environmental Issues

Chapter 7 - Demand Forecasting

Chapter 8 – Socio-Economic Analysis

Chapter 9 –GRIP 2 to GRIP 3 – What's changed

Chapter 10 - Summary and Recommendations

2 Transport Problems

2.1 Background

The Waterside is a residential and industrial area in New Forest District and the road route towards Southampton along the A326 and through Totton suffers from considerable traffic congestion.

There is a good level of bus service linking the Waterside communities to Southampton and a foot ferry service from Hythe to Town Quay, Southampton. Rail passenger services operated along the Fawley branch line from 1925 to 1966 providing a direct rail link between Fawley, Hythe, Marchwood and Southampton.

The line is still in use as a freight-only railway running from a junction with the main line in Totton providing access to Marchwood port and Fawley. The reintroduction of passenger services to the line is a long-standing aspiration of the County Council and Transport for South Hampshire

2.2 Transport Issues

The TfSH model suggests there are around 2000 AM peak trips from the Waterside area to the key destination for residents of Southampton. Of these, the vast majority travel by car along the A326, A33 and A35. The TfSH model highlights congestion at a number of points along this route both now and in the future. Specific concerns lie with:

- The A326 / A35 junction in the Totton area, and the;
- The M271 / A35 / A33 junction.

There are also a number of more minor junction delays not flagged by the model where access from the Waterside area towns on the A326 can be difficult at peak times.

Such traffic problems cause problems for both car based and bus based passengers in the morning peaks in particular.

The alternative option is use of the Hythe Ferry. This operates a half hourly service throughout the day from Hyther Pier to Town Quay in Southampton.

Map 1: Study Area

2.3 Transport Growth

TfSH model suggests that there will be limited growth in the corridor given the focus of new housing and employment land for the region being away from the Waterside area per se. That said, TfSH modelling does highlight that the problems at existing identified junctions will get worse as a result of traffic growth across the wider, and hence travel times by highway based modes from the Waterside area will increase in the future.

A rail option for residents of the Waterside area would therefore seem to offer a potential solution to increased journey times from the catchment into Southampton. It is that potential that will be explored in the rest of this report.

3 Option Development

3.1 Introduction

This chapter identifies the rail options for investigation during the study.

3.2 Initial GRIP 2 Study

The proposals outlined in the initial study by Atkins in 2011 included connection of Hounsdown, Hythe and Marchwood to Southampton Central by the reintroducing passenger services to the Waterside Rail Line. Overlayed with this were options for through running services via Romsey. In developing these services, the resulting major infrastructure requirements included:

- New stations at Hounsdown and Hythe;
- Station reinstatement and platform extension at Marchwood; and
- Resurfacing of existing west-facing bay platform at Southampton Central.

3.3 Operational Feasibility

Potential service options have been developed in this study, to understand the feasibility and viability of service frequency and route options. Four service options have been investigated using Railsys simulation, with respect to their operational viability. The four options are:

- Option 1: Hourly Shuttle Service between Southampton and Hythe
- Option 2: Half-hourly Shuttle Service between Southampton and Hythe
- Option 3: Extending existing Salisbury-Romsey services to include Hythe
- Option 4: New Fareham to Hythe service
- Options were also considered with existing Waterside line speeds of 30mph and with increased speeds of 45mph.

The results of these operational investigations have supplied potential service frequencies and routes, against which the existing rail network infrastructure can be assessed.

3.4 Underlying Infrastructure Assumptions

Two infrastructure options for the Waterside Line have been investigated in this study to reflect the potential levels of service along the line (hourly and half-hourly). However both options have considered the following assumptions:

- Station platforms to accommodate a 3-car 158 unit;
- Car parking facilities;
- Shelter to be provided;
- Disability Discrimination Act (DDA)-compliant access;

- Provision of Long-Line Public Address (LLPA) system, Charging Information System (CIS), Closed-Circuit Television (CCTV) and Help Points; and
- Fencing.

4 Timetable and Operational Analysis

4.1 Introduction

This chapter describes the findings of the assessment of the operational implications of reinstating a passenger train service along the freight-only branch line (which runs from Totton Yard to Fawley) as far as a new station at Hythe. In the GRIP 2 study, a number of passenger service options were suggested. This chapter reviews four service options with respect to their operational viability, including:

- **Option 1**: Hourly Shuttle Service between Southampton and Hythe
- **Option 2:** Half-hourly Shuttle Service between Southampton and Hythe
- **Option 3:** Extending existing Salisbury-Romsey services to include Hythe
- **Option 4:** New Fareham to Hythe service

The assessments have been carried out using RailSys which is a sophisticated railway network simulation package. Certain assumptions have been made with respect to infrastructure enhancements such as:

- the raising of the line speed on the Fawley branch from 30mph to 45mph as far as Hythe;
- two trains per hour (tph) operation;
- the construction of a passing loop at the proposed location of Hounsdown station; and
- all Hythe trains would call at Millbrook, Redbridge, Totton (all existing stations), Hounsdown (new), Marchwood (re-opened) and Hythe (new).

RailSys has been used for the assessment because it is possible to model the updated infrastructure to accurately reflect the impact of signalling, speed limits, new point work etc. on the performance of the train service. The timetable variants can then be assessed with respect to potential conflicts at critical locations and measures taken to remove these where feasible to create a viable train plan.

4.2 Timetable Planning

4.2.1 Base timetable

The timetable used as the basis for overlaying new Hythe services is the December 2011 (2012) SX Timetable.

This includes all long term plan (LTP) freight paths for all days so that any new passenger service is tested against what could run on any weekday. Freight services often run on a more ad hoc basis than passenger services, dependent upon demand and specific customer requirements. The LTP timetable includes all scheduled freight paths agreed between the freight operators and Network Rail; although not all of these may be in use every day, for the proposed passenger timetable to have validity it is important to know which freight schedules may need to be adjusted in order to incorporate the new services.

4.2.2 Timetable planning rules

All timetables are planned with respect to a Network Rail document called the Timetable Planning Rules which provides essential information such as line headways (minimum intervals between successive trains), junction margins, mandatory timing points (locations at which trains must be timed), signal box opening hours etc. The study for the Waterside project has been undertaken in conjunction with the 2012 Timetable Planning Rules.

Current operational rules include the following:

Headways (minutes)	**Down**	**Up**
Eastleigh to Redbridge	2 - Fast	2 - Fast
	2½ - Slow	2½ - Slow
Redbridge to Totton	3 - Fast	3 - Fast
	3½ - Slow	3½ - Slow
Totton to Brockenhurst	5 - Fast	5 - Fast
	5½ - Slow	5½ - Slow

Junction Margins

Redbridge

First Movement	**Second Movement**	**Margin**
Between all movements (except as below)		3
Up Bournemouth Line train	Down Romsey Line Train	1½

Totton

First Movement	**Second Movement**	**Margin**
Between all movements (except as below)		3
Down Main Line Train	Up train from Fawley Loops	2

4.2.3 Permissive working in Southampton platforms

For the proposed passenger operations to work in Southampton Central Station, without the need to reintroduce platform 5 as a passenger platform, use is made of the permissive working facility in Southampton. Permissive working is defined in the railway Rule Book (Section TW1/12) as follows:

12.1 Definition

Permissive working allows more than one train at a time to be on the same line in a:

- *block section*
- *signal section*
- *dead-end platform line.*

Permissive working is authorised on all four platforms at Southampton and the middle two platform faces, two and three, are used by a number of terminating services from the east such as the hourly Southern Railway Brighton to Southampton service and some Cross Country trains.

The platforms are capable of accommodating 13 coach trains and the Southern services will typically be formed of four-car (class 377) trains and the Cross Country services will be typically four- or five-car (class 220/221 Voyager) trains. Therefore, there is adequate provision for the platforms to accommodate three-car (class 159) trains whilst they are occupied by other trains terminating from the east.

4.2.4 Timetable planning constraint

As the headway list above shows the headway changes at Totton (if travelling west) from three minutes to five minutes (for fast trains) but Totton is not a mandatory timing point in the timetable for fast trains which means that the last location against which non-stop trains are timed is Redbridge. However, the junction at Totton will become a much more frequently used asset if the Waterside passenger service is reinstated and the need to time trains accurately at Totton will become important to ensure that the junction margins are correctly planned.

RailSys calculates the time at which a train passes modelled locations to the accuracy of a second regardless of whether the train has a mandatory timing point at the particular locations so for this planning exercise, the calculated time at the junction is used as the basis for planning the separation of following trains (headways) or for crossing trains (junction margins).

It is recommended that if the Waterside line is to become a regularly used passenger line, that Totton is made a mandatory timing point for all passenger trains, not just those which make a call at the station.

4.2.5 Proposed dwell times

For the purposes of this study, all timetable variants are based on the assumption that the minimum dwell time at stations served by class 159 units is 30 seconds, except at principal stations such as Southampton where the overall applied minimum of two minutes is retained.

4.3 Rolling Stock

All new train services (point to point running times) are based on the use of a three-car class 159 diesel multiple unit (DMU). These are the DMUs currently in use with South West Trains so the logic was to assume the future use of class 159 type rolling stock.

However, it is understood that SWT may not have any spare units available for operating a new service so this needs to be taken into consideration at the detailed analysis stage.

4.3.1 Operating Speeds – 30mph or 45mph

Feasibility has been investigated for both 30mph and 45mph operating speeds on the Fawley Branch line.

For an increased operating speed of 45mph, current track infrastructure and signalling is not suitable and requires upgrading. However for the hourly service, one unit would be able to operate the 60-minute frequency in its entirety, with a second unit providing the half-hourly frequency.

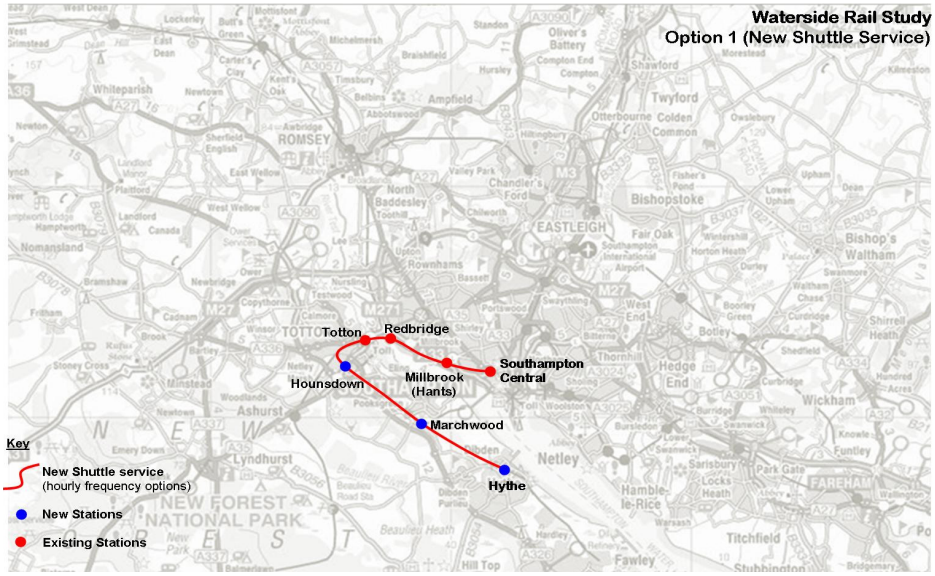
For current 30mph operating speeds delivering an hourly shuttle service would require additional units to those outlined for the 45mph requirements, which would increase the annual operating costs of the service and reduce the attractiveness of the service as a competitor to highway based modes and effectively decrease demand for the service.

4.4 Option 1: Hourly Shuttle Service

4.4.1 Proposed service

The introduction of an hourly service between Southampton and Hythe is relatively straightforward. As there is only one passenger train on the branch at any one time, there is no requirement for passing loop provision at Hounsdown and a single platform face is sufficient.

Figure 1: Option 1 – New hourly shuttle service



4.4.2 Features of the service

Aspects of the hourly passenger train service are as follows:

- Typical journey time is 22 minutes for Down trains (towards Hythe) and 23 minutes for Up trains (towards Southampton).
- Dwell time at the intermediate stations is typically 30 seconds.
- At Southampton, trains use platform 2B and 3B for reversal. Platforms 2 and 3 are permissive and can be shared by passenger trains (from Network Rail 2012 Timetable Planning Rules). Therefore, there is no requirement for a new platform (5) in the Down Bay for this option.
- Reversal times in Southampton are typically 4-5 minutes. (TPR minimum is 4 minutes). This is a potential performance risk but means that only one unit is required to operate the service.
- Turn round times at Hythe are typically 6 to 10 minutes with one turn round of 5 minutes.

- Services operate from first departure from Southampton at 06.15 to last arrival at Southampton at 23.13.
- Total trip numbers in each direction is 17.

Departures and arrivals are as follows:

Depart Southampton	Arrive Hythe	Depart Hythe	Arrive Southampton
06.16	06.38	06.47	07.10
07.16	07.38	07.47	08.10
08.16	08.38	08.47	09.10
09.14	09.36	09.41	10.04
10.16	10.38	10.47	11.10
11.16	11.38	11.47	12.10
12.16	12.38	12.47	13.10
13.16	13.38	13.47	14.10
14.16	14.38	14.47	15.10
15.16	15.38	15.47	16.10
16.16	16.38	16.48	17.10
17.16	17.38	17.47	18.10
18.14	18.36	18.45	19.11
19.22	19.44	19.50	20.13
20.17	20.39	20.50	21.13
21.17	21.39	21.50	22.13
22.17	22.39	22.50	23.13

4.4.1 Required infrastructure changes

Although identified in the operating assumptions, the station infrastructure required for delivering this option includes new stations at Hythe (with bay platform) and Hounsdown (single platform, no passing loop), along with the reinstatement and platform extension at Marchwood.

The bay platform at Hythe is required to minimise any timetabling issues with freight trains to and from Fawley.

4.4.2 Impacts on passenger services

Passenger train alterations include:

- Retime 2M20 (Gloucester – Southampton) so that it does not conflict with 07.47 Hythe between Redbridge and Southampton. Pathing after Romsey to give later arrival in Southampton and reduce scheduled turn round of 15 minutes to 12 minutes in Southampton – minimal risk to performance.
- Other minor pathing addition is required on the approach to Totton for faster trains following the new Waterside trains but these are only in a few instances and at least one of these relates to an empty coaching stock (ECS) train running to Bournemouth Traction and Rolling Stock Depot after 23.00 so the retiming is not regarded as problematical.

4.4.3 Impacts on current LTP freight services

Freights which would require retiming would be:

- 7V52 (SX) – conflict in Southampton with departing 14.47 for Hythe – this will require some retiming, as conflict occurs around the Redbridge/Millbrook area. This could potentially be addressed by not stopping at Millbrook for this one service and running to Southampton directly from Redbridge.
- There are a number of other relatively minor alterations required to the freights on the branch or the associated light engine movements but these should be accommodated by retiming so that they cross the new passenger services at either Marchwood or Totton Yard.

The level of freight service on the Fawley branch means that a separate platform track at Hythe is potentially not required. However, this will result in some more substantial retiming of some freights so that the single track is efficiently used. There are no freights currently scheduled after 11.40 at Totton Yard heading for Fawley. Opening the line for longer provides further freight path opportunities and thus more scope for retiming freights to avoid any of the conflicts outlined above.

4.4.4 Feasibility Conclusion

The hourly shuttle service appears to be achievable using one diagrammed unit of rolling stock but with near minimum turn rounds in Southampton station on most occasions (five minutes is common with a few instances of four minutes). This fact does present an operational robustness issue but the longer turn round time at Hythe could go some way to providing recoverability. Hythe-bound (Down) trains do not conflict with opposing movements at either Redbridge or Totton Junctions and therefore, even if running late, these should be able to reach Hythe without too much impact on other services.

However, late running Southampton-bound (Up) trains could present more problems as they need to cross services at Totton then further services at Redbridge. Adverse interactions at these two locations could result in a late arrival in Southampton resulting in a late departure due to the five minutes turn round scheduled at this location. However, the existence of one minute of recoverability is likely to help improve this to some extent.

The potential for recoverability is also assisted by the fact that the sectional running times between Redbridge and Southampton in total are more than one minute longer than the calculated performance of the class 159 trains. Therefore in the event of late

running there is nearly one and a half minutes recovery available in the timetable to improve the chance of a right time arrival and consequently, a right time departure.

The Waterside line is currently scheduled to be used by approximately one freight train per day plus associated light engine movements back to Eastleigh depot. Even with the freight trains continuing to run at 30mph (present line speed and thus requiring differential speed limits), the use of the line by passenger trains does not impede this requirement.

There will need to be some retiming to avoid conflicts but there are two passing locations available for crossing trains at Totton Yard and at Marchwood. The introduction of a regular passenger service would require the freight schedules to be reorganised but would also offer the opportunity for more freight paths as the line would be open longer than its current seven to eight hours on weekdays. This provides greater flexibility to the freight operating companies running trains to both Fawley oil refinery and Marchwood military port.

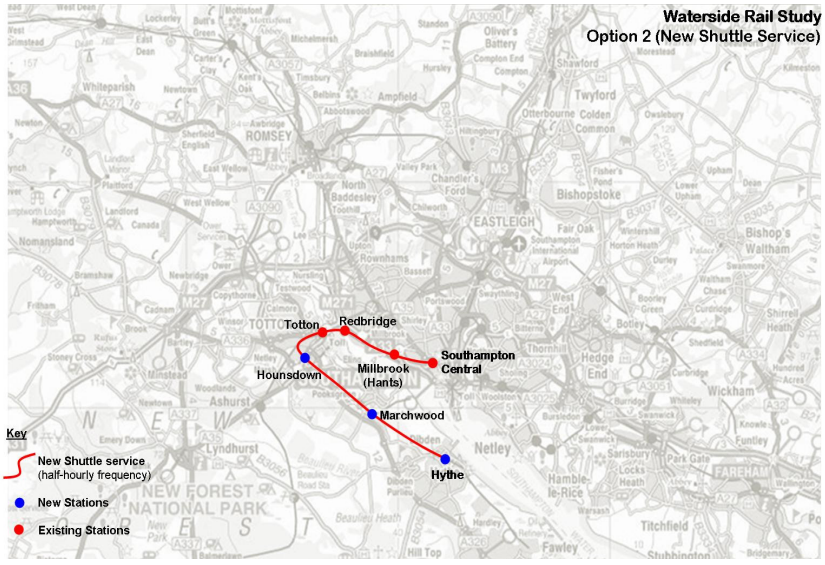
On the basis of this investigation, the operation of an hourly service between Southampton and Hythe using a refurbished and upgraded Waterside line is achievable, from a timetabling perspective.

4.5 Option 2: Half Hourly Shuttle Service

4.5.1 Proposed service

This option develops the hourly service discussed above into a half-hourly service between Southampton and Hythe. It is a standalone service with the same stopping pattern; however due to the need to cross trains in opposite directions on the Fawley branch there is a requirement to provide a passing loop at Hounsdown. This would result in a station with two platform faces and the ability to cross passenger trains to provide the half-hourly service.

Figure 2: Option 2 – New half-hourly shuttle service



4.5.2 Required infrastructure changes

The increase in passenger train frequency requires two significant infrastructure changes along the Fawley branch. As outlined above, for the two trains per hour to cross in opposite directions on the single track line, a new passing loop is required. This conveniently falls in the vicinity of Hounsdown station. The proposal is that a new passing loop would be built, with a platform face on each track and it would be signalled for one way operation in each track, not bi-directionally, to reduce the costs.

As mentioned above, the bay platform at Hythe, is required as the line will be used by two trains per hour; therefore potentially occupying the single line for a period of 32 minutes every 60 minutes (this being the time taken to travel from Marchwood, dwell in Hythe then return to Marchwood). This could create significant timetabling issues with freight trains to and from Fawley.

4.5.3 Features of the service

The doubling of the service frequency means that to maintain a reasonable interval service, the timings are largely defined on the basis of the service proposed for Option 1.

The trains in Option 1 were timed in appropriate gaps in the current timetable between Southampton and Totton so the additional half-hourly service was timed so that it could fit between existing trains and cross other Waterside trains at Hounsdown. The need to cross trains in each direction at Hounsdown has resulted in slightly longer journey times because the half minute dwell time is no longer feasible. A train has to be stationary in the platform before a crossing train can depart so there is an overlap in the station creating longer scheduled dwell times.

The junction margin at Totton of two minutes has resulted in the use of an operational stop in the yard by some Southampton-bound Waterside passenger services. This has been used where the new passenger train would otherwise be timed at Totton very close to the time of a Hythe-bound passenger train.

The introduction of the half-hourly service creates a greater requirement for timetable alteration of other existing services between Totton and Southampton. To remove the prospect of timetable conflicts, the regular half-hourly Waterside pattern also requires adjusting so that it can fit between and around other trains on the network. This is particularly prevalent during the two passenger peak periods, when additional Poole to Southampton trains are run to meet peak time demand and these coincide with the timings of new Waterside trains.

The half-hourly service envisaged operates between the start of service at 06.15 (first departure from Southampton to form the 06.47 from Hythe) through the morning peak, the inter-peak period and the evening peak, and then reverting to hourly after the 19.21 departure from Southampton. If there is a requirement for continued half-hourly operation this is likely to introduce some potential conflicts with current services between Southampton and Totton.

The proposed start and end times for the half-hourly service would be as shown in the following timetable.

Depart Southampton	Arrive Hythe	Depart Hythe	Arrive Southampton

06.15	06.39	06.47	07.11
06.44	07.08	07.16	07.41
07.16	07.40	07.46	08.10
07.45	08.09	08.17	08.41
08.16	08.40	08.47	09.10
08.45	09.10	09.17	09.41
09.15	09.38	09.46	10.08
09.45	10.09	10.17	10.41
10.16	10.40	10.47	11.09
10.45	11.09	11.17	11.41
11.16	11.40	11.47	12.09
Same hours until:			
18.46	19.09	19.22	19.45
19.21	19.44	19.50	20.12
20.17	20.41	20.48	21.12
Hourly from Southampton 19.21 departure			
21.17	21.41	21.48	22.12
22.17	22.41	22.48	23.12

4.5.4 Impacts on other passenger services

These are more significant with the half-hourly operation. The changes in line headway along the path of the new trains mean that in some instances, the trains can easily fit between existing services.

The issue of Totton not being a mandatory timing point also presents some difficulties as the trains might be the specified three and a half minutes apart at Redbridge but according to the RailSys calculations, only two minutes apart at Totton where a fast train follows a new Waterside train for example. However, with some alterations to timings, generally involving some reallocation of pathing time or some minor amendments to dwell times (but not infringing Timetable Planning Rules margins) the half-hourly service can be made to fit.

Some of the more significant alterations are shown in Appendix A.

4.5.5 Impacts on current LTP freight services

The increase in passenger traffic along the Fawley branch as far as the new station at Hythe will have a more significant effect on the scheduled freight paths than the hourly service. It is not proposed to cross freight trains either with other freight trains

or passenger trains at Hounsdown because the half-hourly schedule sees the loop in use twice per hour. Trains would need to cross at either Marchwood or in Totton Yard.

Freight traffic is still timed at 30mph along the branch but the sectional running times will still permit them to fit between the passenger trains as long as they are retimed from their current paths. This will need to be agreed by the freight operating companies but they will also have the benefit of a railway being open for traffic for up to 18 hours compared with the current eight, thus providing more opportunities to run trains at times more convenient to the operators and the oil refinery.

All of the freight services on the branch need retiming in a similar manner so that they run to avoid conflicts with the new passenger trains. Essentially they need to run in Totton Yard to Marchwood and Marchwood to Fawley legs with a dwell at each passing location to fit them around the new passenger trains. Further details on alterations are shown in Appendix A.

4.5.6 Feasibility Conclusion

The half-hourly service can be fitted into the current timetable with some relatively minor alterations to existing services. Some of these changes, which principally involve altering dwell times when passenger count activities are scheduled, would need to be discussed and agreed with the train operator.

A half-hourly service on a single track line with passing places and irregular freight movements is potentially more prone to service disruption and perturbation than a double track railway. For this reason, and the use of minimum turn round times, particularly in Southampton during the morning peak, the service could be liable to suffer from lack of robustness. However, as discussed for the one train per hour service in Option 1, there is scope for Waterside trains arriving in Southampton to make up some lost time due to the difference between scheduled and actual running times.

The turn-round times in Southampton, typically range from four minutes (TPR minimum) to eight minutes , and the minimum times do present an operational risk. As outlined in the analysis, this can reduce the robustness and the ability to recover from perturbations. However, many of the turn rounds exceed the minimum at both terminals of the operation and consequently, this is not regarded as too significant a risk overall.

Some passengers on a few existing services would experience slightly longer journey times due to the need to assign pathing time in places to make the trains run at appropriate headways and with appropriate junction margins. These changes would mainly occur to a few class 2 “ordinary” passenger trains and would not significantly affect turn rounds to the detriment of service reliability.

Within the current timetable, freight traffic is the only user of the branch being loaded and empty tank wagons, light locomotives and train to and from the military port complex. Consequently, timing these services once off the main line at Totton Yard is a straightforward process. Once a passenger service is reinstated, the flexibility of freight timing becomes more constrained and it is likely that more regularly defined standard paths will be required so that they fit within the gaps in the passenger timetable.

The likely mode of operation will be for freight trains to pass passenger trains either in Totton Yard sidings or at Marchwood. A freight train will be able to run between each successive pair of passenger trains (in one direction) so this provides a relatively high number of paths available to the freight operators but will require some retiming of the current operations to make use of the resultant paths.

The line will be open for much longer than is currently the case so the line will also be available all day for operation. If the passenger demand suggests that an hourly service is adequate for evening services, there will be at least two paths per hour available between 20.00 and the end of the operational day. This should benefit the operators of freight trains by providing more opportunities for running trains to and from Fawley or Marchwood.

In conclusion, the timetable developed for this assessment shows that with some minor amendments to the current plan, a half-hourly service can be run on the Waterside line, either all day (with greater variation being needed to some existing trains in the evening) or reducing to hourly after the evening peak.

4.6 Option 3: Extended Salisbury Services

4.6.1 Proposed service

This option involves the alteration of the current service which operates between Salisbury, Redbridge, Southampton, Eastleigh and Romsey and return. This service currently runs hourly and takes approximately 68 minutes for a one way trip. The current service makes the following calls:

- Dean
- Mottisfont & Dunbridge
- Romsey
- Redbridge
- Millbrook
- Southampton
- St Denys
- Swaythling
- Southampton Airport Parkway
- Eastleigh
- Chandlers Ford
- Romsey

As can be seen, this train passes Romsey before ultimately arriving at Romsey. The return journey makes the same calls on the way back. To incorporate the Hythe branch on a half-hourly service would require splitting the existing service into two so that the new services would be:

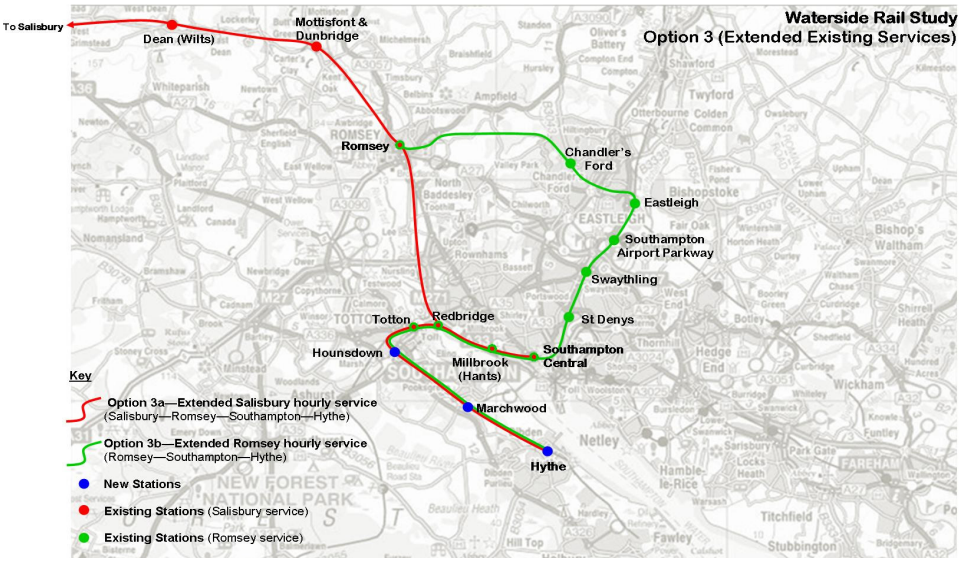
Option 3A (hourly)

- Salisbury
- Dean
- Mottisfont & Dunbridge
- Romsey
- Redbridge
- Millbrook
- Southampton (Reversal)
- Millbrook
- Redbridge
- Totton
- Hounsdown
- Hythe

Option 3B (hourly)

- Romsey
- Chandlers Ford
- Eastleigh
- Southampton Airport Parkway
- Swaythling
- St Denys
- Southampton
- Millbrook
- Redbridge
- Totton
- Hounsdown
- Hythe

Figure 3: Option 3 – Extension of existing Salisbury service to Hythe



The trains would be required to cross at Hounsdown and the intention would be to maintain as closely as possible the present paths between Salisbury and Southampton and Romsey and Southampton with the new legs to Hythe extending to and from Southampton. As with any single track operation where trains need to cross each other in opposite directions, the timing of the crossing is critical and can dictate the timings on the rest of the schedules.

With the timings assumed in the Atkins report, the trains do pass successfully at Hounsdown; however this results in an uneven distribution of trains between Redbridge and Southampton. If a train from Hythe to Salisbury is scheduled to cross a train to Hythe at Hounsdown (based on the largely fixed timings at Southampton), it makes a call at Redbridge at XX.24 whilst the train from Salisbury, approaching Southampton via Redbridge calls at this station at XX.19 resulting in two stopping passenger trains approaching Southampton, five minutes apart.

The Hythe to Romsey service calls at Redbridge at XX.54 so proving a half hourly service with respect to the Hythe to Salisbury service.

This situation is repeated at Millbrook and also for the trains in the opposite direction where each station is served by three trains per hour at intervals of 5-25-30 minutes.

4.6.2 Impacts on other passenger services

A further significant problem is that the schedule as proposed is in direct conflict with a number of other services between Southampton and Totton. For example, a train departing Hythe at XX.02 would be in Redbridge at XX.24. The hourly Weymouth to Waterloo services departing Weymouth at XX.03 pass Redbridge an

hour and 22 minutes later at XX.25. This occurs every hour and therefore cannot work with the new Waterside train.

The timing of the Waterside train is largely dictated by the timing of the train from Southampton to Salisbury (fitting in with the original path) and the crossing of another Waterside train at Hounsdown. It is not feasible to run this train earlier to avoid the conflict with the Waterloo train as to provide a conflict free path into Southampton puts the train in direct conflict with the hourly Salisbury to Waterloo service between Salisbury and Salisbury Tunnel Junction.

This option results in a significant level of network perturbation and direct conflicts with longer distance existing services, to the degree that without substantial network retiming and alterations, this option is not viable operationally. Therefore no further development of this option has been undertaken.

4.7 Option 4: Fareham to Hythe Service

4.7.1 Proposed service

This scheme could potentially utilise (and extend) the existing hourly Portsmouth to Southampton service plus an additional Southampton to Hythe shuttle. However there is an issue with this proposal due to the type of train currently used on the service, which according to the current timetable shows it to be an electric-powered unit (class 450 Desiro EMU). Therefore, for continuation of the service to Hythe, the route as far as the new Hythe station would need to be electrified or the present Portsmouth service would need to be changed to diesel operation. This would mean a DMU would travel for over 29 miles of a 35 mile journey over an electrified network per one-way trip.

The proposed option is prohibitive in terms of cost, due to the incompatibility between potential operating units (diesel/electric) for the wider Fareham to Southampton leg of the journey and the shuttle service extension to Hythe. Electrifying the Fawley Branch line would have a high capital cost element; and replacing the electric units on the Portsmouth to Southampton route with diesel units would have operational implications as over 80% of each journey would be undertaken on an electrified network. Therefore this option has not been developed further.

4.8 Operating Costs

Initial annual operating costs have been calculated for each of the options identified above. Table 1 outlines the summary of these costs, which include for rolling-stock lease, track access, fuel costs, and staff costs. Two prices have been identified, with and without signaller costs.

Table 1: Potential annual operating costs of service options

Option	Excluding Signaller Costs	Including Signaller Costs****
1 – Southampton to Hythe (1tph)	£1,181,892	£1,250,615
2 – Southampton to Hythe (2tph)	£1,916,258	£1,984,981

Option		Excluding Signaller Costs	Including Signaller Costs****
3 – Salisbury – Romsey – Hythe (2tph)*		£1,916,258	£1,984,981
4 – Fareham - Hythe	Electric unit**	£4,098,537	£4,167,259
	Diesel unit***	£4,314,058	£4,382,780

**the costs are for the extension of the service from Southampton to Hythe, they do not include the existing operating costs of the Salisbury-Romsey-Southampton service.*
***Assumed that both the shuttle and Fareham service are operated by 4-car EMUs.*
****Assumed 2-car diesel unit for shuttle, but 4-car unit for Fareham service.*
*****Assumed signaller costs calculated for additional 9 hours per day, for 304 working days and 12 hours per day Sundays and Bank Holidays.*

4.9 Conclusions

From the operational analysis of the various timetable options outlined, the two proposed options which appear to be operationally viable are the standalone shuttle services of either one or two trains per hour. The latter requires more infrastructure works due to the need to cross trains at Hounsdown but also offers the most commercially attractive schedule.

Neither scheme requires the use of a refurbished platform five in Southampton as both can use the existing permissive working facilities in platform two or three to facilitate the turn round operation. There are potential impacts on operational robustness but this would always be the case where a path which presently has no train scheduled to use it, becomes used on a regular basis. Although the turn-rounds in Southampton are not long, the fact that there is scope to run faster between Redbridge and Southampton than the sectional running times suggest means that there is some inherent recoverability in the schedules. This coupled with the fact that many of the turn-rounds are in excess of the four minutes minimum means that there is some resilience built into the timetable.

Freight operating hours have been extended, which could provide additional flexibility to freight movements, allowing for some rescheduling to facilitate reinstating passenger services on the Fawley Branch line to Hythe.

The selection of which service pattern to adopt is therefore dependent upon demand and cost as either option (assuming acceptance by the train operators affected) should be operationally viable.

5 Infrastructure Requirements and Costs

5.1 Introduction

Investigations have been carried out as part of this study to understand the infrastructure requirements and potential costs involved in reinstating a passenger service to the Waterside line. It builds on the initial GRIP 2 study work, schemes and costs for been developed to GRIP3 level for the following :

- A platform refurbishment at Southampton station;
- A new station at Hounsdown (two platforms and a new loop were required);
- A platform extension at Marchwood station; and
- A new station at Hythe (the existing station cannot be re-instated as it is in private ownership and the new station needed a head shunt for operational purposes).

Although the use of Platform 5 at Southampton is not required to deliver the new shuttle service options (operationally), as outlined in the above chapter, it has been included within infrastructure investigation and costings – for information.

Infrastructure investigations include:

- Permanent Way;
- Civil Engineering and Earthworks;
- Signalling; and
- Telecommunications

As outlined in Chapter 4, there are two operationally viable options for running services on the Waterside rail line; a new shuttle service between Southampton and Hythe, at hourly or half-hourly frequencies. Where these options have different infrastructure requirements, different assumptions and costings have been provided. The differences mainly involve the requirement of a passing loop for the half-hourly service at Hounsdown Station, resulting in the need for a second platform.

5.2 Permanent Way

5.2.1 General Assumptions

- Currently this line is used for freight trains only;
- It is proposed to raise the line speed from 30mph to 45mph for passenger trains;
- Freight trains will still run at 30mph;
- It is assumed that operating hours are from 6:00am to 11:00pm; and
- The proposed passenger trains will be of a 158 unit type with 3 cars (as per Grip 2 report).

5.2.2 Line Speed

It is proposed to raise the line speed from the current 30mph speed (freight trains) to 45mph for passenger trains, in order to cut journey times and make the service more attractive to potential passengers, and to improve the operational efficiency of the service.

To achieve the propose line speed, the following measures have to be taken:

- Increase existing cant (see Table 2, below);
- It is assumed that the re-canting of the track is to coincide with the relaying works and is achieved by applying extra top ballast to the outside of curves where required. No extra cost has been allocated for this activity – it is covered in the relaying activity;
- Place track in new position where new or longer transition curves for higher cants are required; and
- No major changes to the position of the existing alignment are anticipated. Again, no extra cost has been allocated for this activity as it is covered by the relaying works.

Table 2: Existing and proposed speed and cants

Curve No.	Mileage approx.	R/L Hand Curve	Radii	Existing Speed	Required cant for existing speed	Proposed speed	Proposed cant for proposed speed	Comment
S&C				15		15		Totton turnout from main line
1	83.5	L	345	30	55	45	70*	Hounsdown
2	87.0	L	1520	30	0	45	20	
3	88.25	R	1800	30	0	45	20	
4	88.5	L	650	30/X10	0	45	20	

**Cant determined by using max. cant deficiency (110mm) to avoid over-canting for 30Mph freight trains*

5.2.3 Track Components and Ballast

This report takes a critical look at the GRIP 2 cost estimate, as well as taking the existing track conditions into consideration. A site walk was conducted by a Halcrow PWay and Signalling team on 12th and 13th December 2012, where the existing track condition was assessed and associated works were proposed.

Due to the additional passenger trains proposed, the potential EMGTPA (Equivalent Million Gross Tons Per Annum) of the route has been re-assessed for both options (see above) and thus the track categories have been determined to be as follows:

- Option 1: Proposed Track Category: 4

- Option 2: Proposed Track Category: 4

Network Rail standard NR\L2\TRK\2102, Issue 6, (Design and construction of track) determines which type of components are required for a particular track category.

Table 3 below shows components required for track categories 3 to 5 (which includes track category 4):

Table 3: Extract from NR standard Nr/L2/TRK/2102 Issue 6 (Table 4 – Selection of rail, sleepers and ballast)

Track Category	Rails	Sleepers	Ballast Depth
3-5	Serviceable or cascaded CEN60, CEN56, BS113A, BS110A, CWR or new CEN56 CWR if serviceable not available. Serviceable 60ft rails to be cropped	Steel or serviceable concrete 650 spacing	200 (concrete) 150 (steel)
	Or serviceable or cascaded jointed if track curvature precludes CWR	Serviceable concrete, 700 spacing	200

By comparing these components with the ones on the ground it could be determined which works will have to take place to achieve the required track category and thus a price for these works could be estimated.

The following assumptions have been made leading to the required works below:

- All sleepers to be removed as inappropriate for new track category 4;
- All rail to be removed as inappropriate for new track category 4 or heavily worn;
- Ballast to be scarified, new top ballast required;
- S&C alongside Wessex Route Southampton to beyond Fawley Branch Jct. to be retained (to 83M);
- Track to be plain lined before Marchwood station, i.e plain-lining of 5 No. S&C units (including turnout to Military Branch);
- Marchwood loop to be retained with new track components;
- No formation treatment required at proposed Hounsdown loop and Hythe turnback siding. Site investigation (e.g. bore holes) excluded;
- Concrete sleepers used, steel sleepers optional at about same rate; and
- Existing drainage is working. No allowance for additional drainage works has been made.

The required works to be undertaken are as follows:

- Removal of existing plain line rails and sleepers to 88M 60ch;
- The existing sleepers are either wooden or an old concrete-type made for bullhead rail;
- From chainage 88M 60ch there is newly laid track on steel sleepers which can remain;
- Remove S&C units at Marchwood (5No.): 4 No. S&C around Marchwood loop and 1 No. S&C to Military Siding;
- Scarify ballast;
- Relay track including concrete or steel sleepers;
- Relay S&C units at Marchwood (5 No., see above);
- Provide new top ballast; and
- Track works related to the new stations at Hounsdown and Hythe are listed in the appropriate sections below.

5.2.4 Southampton Station

- The platform (5) is a bay platform located opposite platform 4b and overall seems to be in a good condition.
- The length of the platform is 145m from the top of the ramp to the face of the buffer stop. This is sufficient for a 3 car train (platform length required = 77m).
- The track mainly consists of BS113A rail on wooden sleepers which appears to be in a sound condition.
- An electrified third rail exists at the platform.
- From the buffer stop there is a stretch of about 30ft of bullhead rail on timber sleepers which looks life expired however, this track does not necessarily have to be used.
- The existing buffer stop (fixed type) can be moved further to the west thus minimising the risk of hitting the concrete wall behind the track.
- A buffer stop risk assessment will need to be done at a later stage to confirm whether a new or different type buffer stop will be required. It is currently assumed that the existing buffer can be re-used.
- Currently the buffer stop is located 3m in front of a wall as shown in Figure 5.
- The costs for the platform works are captured in the civil engineering and earthworks section of this report.

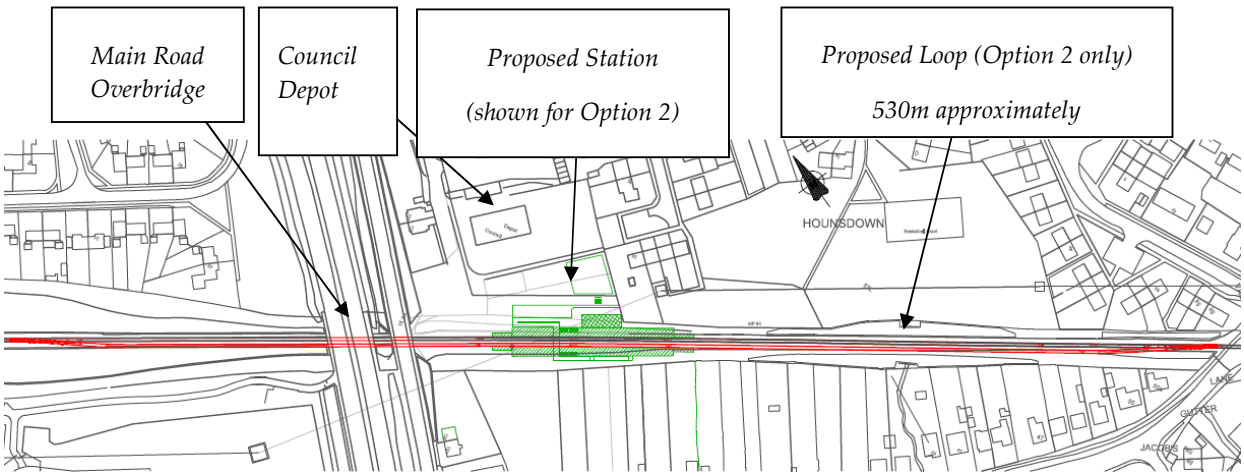
Figure 4 – Southampton Station opposite platform 4b (to right)

Figure 5 - Southampton Station existing buffer stop – to be shifted and re-used

5.2.5 Hounsdown Proposed Station

The proposed location for the new station at Hounsdown is to the south-east of over bridge TTF-E18 2B (Main Road, 83m72Ch) in the centre of Hounsdown town.

Figure 6 – Location of proposed Hounsdown station showing the additional loop and platform to the south (Option2).



It follows the logic of the GRIP 2 report taking into consideration the necessity of an additional loop for Option 2 (half-hourly service) and basic considerations such as distance to the town centre. Additionally, the proposed station is situated on council land.

The following works are required from a Permanent Way point of view:

- Site clearance for new loop (Option 2 only) including removal of top soil;
- Laying of ballast;
- Installation of loop (Option 2 only) including 2 No. S&C units (CV9.25); and
- Earthworks -
    - The site between the new turnout for the proposed loop (Option 2 only) and MP84 is in cutting, from there onwards until the level crossing (Jacob's Gutter Lane) it is on an embankment;
    - The soil gained by widening the existing cutting (new turnout to MP 84) will be used to widen the top of the embankment for the additional loop (from MP 84 to level crossing). These works will only be necessary on the southern cutting/ embankment for Option 2;
    - In the top left corner of Figure 9 the transition from cut to fill can be seen where the shade on the tracks stops; and
    - The costs for the earthworks are captured within civil engineering section (see 5.3).

Further works have been outlined in the civil engineering/earthworks and signalling works described in sections 5.3 and 5.4.

Figure 7 - Overbridge TTF-E18 2B (Main Road, 83m72Ch) with approx. clearances looking south-east towards Jacob's Gutter Lane. Station location behind both bridges (to left only for Option 1).

Figure 7 shows that the clearances for an additional loop under the overbridge are tight and need to be confirmed at the next design stage.

Figure 8 – Hounsdown proposed Station location looking south-east towards Jacob's Gutter Lane (northern side, required for both Option 1 and 2)

Figure 9 – Embankment to southern side of proposed Hounsdown station (looking south-east).

5.2.6 Marchwood station

Marchwood station is located in south Marchwood, just north-west of Main Road (see below). The existing platform at Marchwood is to be extended to be of a minimum length of 77m. The costs for these works are summarised in section 5.2.8 of this report.

From a track and operational point of view the existing loop is retained. However, all track components are to be replaced, including rails, sleepers and top ballast. Also, all existing bullhead S&C units including the turnout to the military branch are to be replaced. It is assumed that the existing Strail level crossing (Main Road) can be re-used after the rail components have been replaced.

Figure 10 – Marchwood station location

5.2.7 Hythe Station

The previous Hythe station which is located to the north of the town centre is in private ownership and therefore cannot be re-instated. The proposed new station location is in north Hythe to the west of School Road (see below).

Proposals include the installation of an additional head shunt and an additional platform. The trains will stop within the head shunt to allow freight trains to pass. Passive provision has been made to allow a widening of the platform by 1m (to 4m) to allow for a future use as a two-faced island platform. The track works required for Hythe are as follows:

- Site clearance and removal of top soil
- Scarify ballast
- Install new track on new or serviceable sleepers
- Install turnout (CV 9.25)
- Install buffer stop

The costs for these works are shown in section 5.2.8 of this report. Costs and considerations associated with earthworks are included in section 5.3.

Figure 11 – Hythe Station location

5.2.8 Permanent Way Costs

Tables 4 and 5 below show the costs associated with the Permanent Way aspect of the Waterside Rail Study project. Unit prices were determined using Spon's Railway Construction Price Book (2003). An inflation factor of 1.3 has been used to allow for inflation since 2003. Option 1 is the hourly service from Southampton to Hythe, Option 2 is the half-hourly service.

Table 4 – Permanent Way costs

Site and Item	Price (£)	Comment
Southampton Platform		
Re-surface platform	-	Included in Civils Costs
Option 1		
Remove Sleepers and rails:	140,353	
Rails (seviceable)	334,167	
Sleepers (concrete, seviceable)	719,560	average unit price
Clips	143,089	average unit price
Ballast	297,631	
Remove S&C (5 No)	3,296	Marchwood
Lay track (CWR plain line)	610,991	
Turnout (CV 9.25)	310,092	4 for Marchwood loop, 1 to military siding behind Marchwood
New head shunt Hythe		assumed length (m): 300
Site clearance	2,847	
Remove top soil	1,443	
Ballast	32,964	average ballast area approx. 1.1 m2
Rails (seviceable)	10,409	
Sleepers (concrete, seviceable)	14,636	
Turnout (CV 9.25)	62,018	
Catch Points (BV on timber)	13,235	
Buffer stop	4,001	material and fix
Total Option 1 :	**£2,700,731**	
Additions Option 2:		
Loop at Houndsdown		assumed length (m): 500
Site clearance	4,745	
Remove top soil	2,405	
Ballast	54,941	average ballast area approx. 1.1 m2
Rails (seviceable)	17,349	
Sleepers (concrete, seviceable)	24,394	
Turnout (2 x CV 9.25)	124,037	
Addition Option 2:	**£231,871**	
Total Option 2:	**£2,928,600**	

Table 5: Summary of Permanent Way Costs

	Option 1	Option 2
Material and Installation	£2,700,731	£2,928,600
Design	£80,000	£100,000
Total (excluding VAT and Profit)	**£2,780,731**	**£3,028,600**

5.3 Civil Engineering and Earthworks Investigations

Therefore two infrastructure options for the Waterside Line have been investigated with both options considering the following assumptions:

- Station platforms to accommodate a 3-car 158 unit;
- Car parking facilities;
- Shelter to be provided;
- Disability Discrimination Act (DDA)-compliant access;
- Provision of Long-Line Public Address (LLPA) system, Charging Information System (CIS), Closed-Circuit Television (CCTV) and Help Points; and
- Fencing

The factors considered for both options considering new stations (in Hounsdown and Hythe) are as follows:

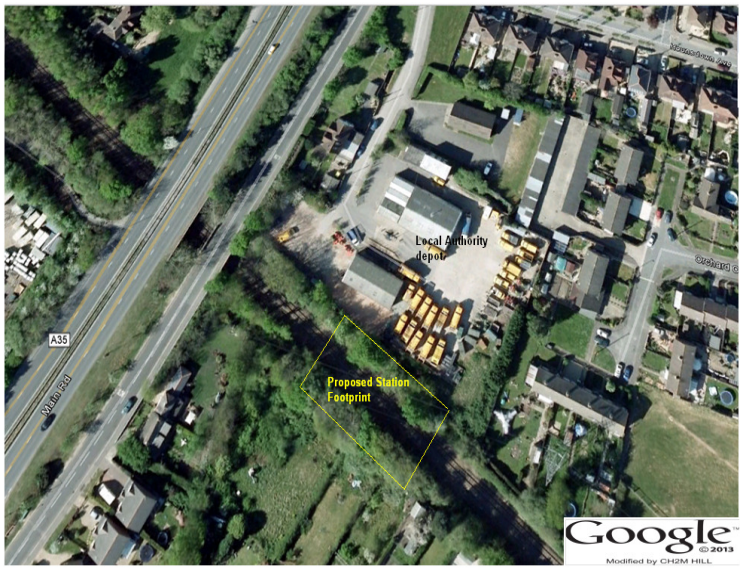
- Availability of land for station and further development (mainly council owned land, negotiation can be made with councils)
- Proximity to town
- Location not directly adjacent to residential properties
- Good access to roads network

5.3.1 Hounsdown Proposed New Station

Station Location

The proposal for new station is on a Greenfield site located south-east of an over-bridge to the west fringe of Hounsdown town. The general arrangements of the proposals are provided in Figures 12-14 below.

Figure 12 – Hounsdown proposed station location



Station Specification

The station design specifications are as follows:

Table 6 – Station design specification

Option 1 (Hourly Services)	Option 2 (Half Hourly Services)
• 1 platform for 3 car 158 unit; • Waiting shelters; • Customer information displays and public address; • Driver only operation viewing facilities; • CCTV and passenger help points; • Disabled access from car park to both platforms; • Ticket vending machines; • Access to the highway	• 2 platforms for 3 car 158 unit; • Waiting shelters; • Customer information displays and public address; • Driver only operation viewing facilities; • CCTV and passenger help points; • Disabled access from car park to both platforms; • Ticket vending machines; • Footbridge and ramps; • Access to the highway

It is anticipated that the station will initially be unstaffed, passive provision is made however, to accommodate staff in the proposed station building in future. Given the forecast footfall and anticipated staffing level, a 20 x 6m standard modular building is felt to be the most suitable. This provides a covered waiting area, booking office, staff accommodation and a public lavatory.

In addition to the station buildings and platforms, the requirements for a station at Hounsdown are:

- Long stay parking for cars, motorcycles and cycles;
- Set-down and pickup areas for buses, taxis and kiss & ride; and
- Dedicated parking for station and maintenance staff.

Design considerations for hourly service (Option 1)

Figure 13 – Hounsdown proposed new station (Option 1 – hourly service)

a) The platform is 3m wide to ensure a minimum clearance of 2.5m between the platform edge and any potential obstacle (e.g. signs, posts etc.). It is 77m long with 5m ramps to either side to accommodate standard prefabricated modules.

b) Customer information display screens to serve the station and car park areas and one help point are anticipated on each platform including lighting columns hosting CCTV cameras and LLPA speakers.

c) The platforms will be accessible through the access road. *This solution would avoid the need for lifts or DDA ramps required to bring passengers to platform level.*

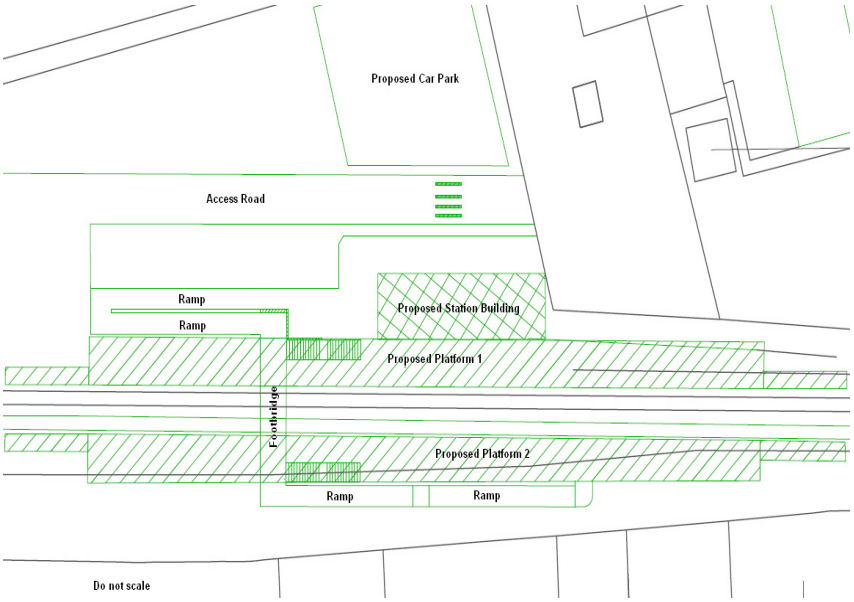
d) Lighting columns will host CCTV cameras and LLPA speakers and be located at the back of the platform. Two customer information displays and one help point assumed on each platform.

e) A waiting shelter on the platform will be provided; and

f) A shelter in the station forecourt will be provided to protect the ticket vending machines. It can also serve passengers waiting for bus, taxi or cars.

Design considerations for half-hourly service (Option 2)

Figure 14 – Hounsdown proposed new station (Option 2 – half-hourly service)



a) Each platform is 3m wide to ensure a minimum clearance of 2.5m between the platform edge and any potential obstacle (e.g. signs, posts etc.). It is 77m long with 5m ramps to either side to accommodate standard prefabricated modules.

b) Customers information displays screen to serve the station and car park areas and one help point are anticipated on each platform including lighting columns hosting CCTV cameras and LLPA speakers.

c) The platforms will accessible by installing a new footbridge. This solution avoids the need for lifts however, sizable DDA ramps would still be required to take passengers to across the tracks.

d) The installation of lifts compared with the ramps would be more expensive by a factor of approx. 1.7 (£380k > £225k). Additionally, maintenance costs for the lifts are higher than for the ramps. Furthermore it is pointed out that ramps are more reliable as lifts can break down.

e) Lighting columns will host CCTV cameras and LLPA speakers and be located at the back of the platform. Two customer information displays and one help point assumed on each platform.

f) Weather protection for passengers are provided by means of a waiting shelter on each platform.
A single shelter will be provided on the station forecourt to protect the ticket vending machines. It can also serve passengers waiting for bus, taxi or cars.

g) Earthworks are to be considered for the constructing of platform 2 (Option 2 only) and for the provision of the new loop parallel to the existing track.
The existing track is in a cutting of about 2-3m below the adjacent ground level for about 165m to mile post 84M. From there track runs towards the level crossing on an embankment for about 135m which is up to 5m high.

The proposal to construct a new loop at Hounsdown will cause significant earthworks movements to bring the tracks and the platforms station to standards levels. The height of embankments and the depth of cuttings have been roughly estimated during the track inspection and are to be seen as indicative. It is recommended to undertake a topographical survey before the next design stage.

The volume of the material expected to be removed from the cutting section (start of north-western turnout to around MP 84) is around 660m^3 (165m x 3m x 2m) from the southern side only. The volume of infill material expected to be used to level the embankment on the southern side from MP84 is about 1215m^3 (135m x 3m x 3m) in fill.

The associated earthworks cost is reduced significantly by reusing excavated material from the cutting area to enlarge the existing embankment and accommodate the new loop and siding. The cost for this is provided in Table 6.

Station access and car park design considerations

In order to provide some contingency in the design over and above the forecast demand requirements, the number of long stay car spaces is 50. The short stay parking area for kiss & ride pick up is located in the space adjacent to the car park, it does not need to be quite so close to the station entrance and there is space is available.

Cost Estimate

Table 7 summarises the capital cost estimate for Hounsdown station. A cost estimate breakdown of is presented in Appendix B.

Table 7– Hounsdown Station – Cost Estimate

				Option 1 (Hourly)	Option 2 (Half-Hourly)
Total Base Construction Cost				£496,520	£2,011,610
Non Construction Costs	% of Base	Unit	Rate		
Contractor preliminaries	20%			£99,304	£402,322
GRIP stages 4 development	1%			£4,965	£20,116
GRIP stage 5 detailed design	6%			£29,791	£120,696
Project Management & Sponsorship	10%			£49,652	£201,161
Testing and commissioning	2.50%			£12,413	£50,290
Possession management	2.50%			£12,413	£50,290
TOC Compensation	0.00%			0	0
Land	100x180x1	Hectare	13,580	£13,580	£13,580
Total Non Construction Cost				*£222,118*	*£858,456*

Sub Total				£718,638	£2,870,066
Contingency	20%			£143,727	£574,013
TOTAL				**£862,366**	**£3,444,079**

Notes:

- Prices exclude VAT
- No provision for contaminated waste disposal
- No provision for TOC compensation
- Overrun possessions not included
- NR Asset protection costs excluded from this GRIP 3 report. To be added from GRIP 4 design onwards

5.3.2 Hythe Proposed New Station

Station Location

The new station is proposed to be built on a Greenfield site ('Allotment gardens') located northwest of School Road. The general arrangement of the station is illustrated in Figures 15 and 16 below.

Figure 15 – Hythe proposed new station footprint

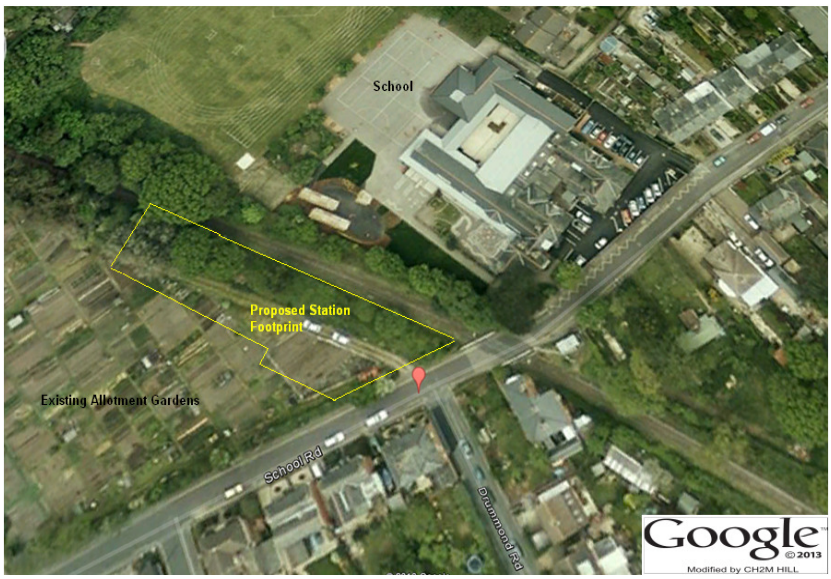
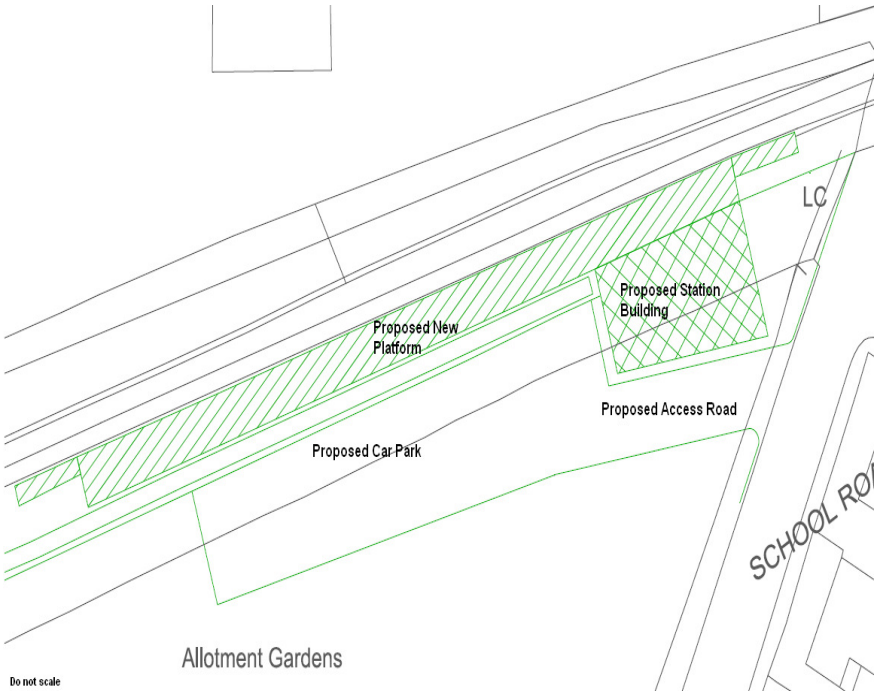


Figure 16 – Hythe proposed new station option (both Option 1 & 2 – hourly/half-hourly service)



Station Specification

The station design specifications are;

- Bay platforms for 3 car 158 unit (177m long plus 2 no. 5m long ramps)
- Waiting shelters
- Customer information displays and public address
- Driver only operation viewing facilities
- CCTV and passenger help points
- Disabled access from car park to platform
- Ticket vending machines
- Access to Pedestrian / cycle access to School Road

It is anticipated that the station will initially be unstaffed, passive provision is made however, to accommodate staff in the proposed station building in future. Given the forecast footfall and anticipated staffing level, a 16 x 10m standard modular building is felt to be most suitable. This provides a covered waiting area, booking office, staff accommodation and a public lavatory.

In addition to the station buildings and platform, the requirements for a station at Hythe are:

- Long stay parking for cars, motorcycles and cycles;
- Setdown and pickup areas for buses, taxis and kiss & ride; and
- Dedicated parking for station and maintenance staff.

Station design considerations

The single-face platform is 3m wide to ensure a minimum clearance of 2.5m between the platform edge and any potential obstacle (e.g. signs, posts etc.). It is 77m long with 5m ramps to either side to accommodate standard prefabricated modules.
The outer (northern) edge of the platform is to be built at a minimum offset of 1.730m to the running edge of the main line. This way a widening of the platform by 1m to then 4m is feasible to allow passive provision for a future island platform (2-faced).

Customers information displays screen to serve the station and car park areas and one help point is anticipated on each platform including lighting columns hosting CCTV cameras and LLPA speakers.

The proposal to construct a new loop at Hythe will cause significant earthworks movements to bring the tracks and the station platform to standards levels.

The height of embankments and the depth of cuttings have been roughly estimated during the track inspection and are to be seen as indicative.

It is recommended to undertake a topographical survey before the next design stage.

The volume of the material expected to be removed from the cutting section (start of turnout to end of head shunt, north of existing track) is around 660m^3 including stabilisation and re-profiling (165m x 3m x 2m).

The associated cost is provided in Table 7.

Station access and car park design considerations

The short stay parking area for kiss & ride pick up is located within the access road, it does not need to be quite so close to the station entrance and there is space available.

A single shelter will be provided on the station forecourt to protect the ticket vending machines and also to serve passengers waiting to be collected by bus, taxi or cars.

Pedestrian access routes from the station to the car park are to be provided on Network Rail land.

Cost Estimate

Table 8 summarises the capital cost estimate for Hythe station. A full breakdown of the estimate is presented in Appendix B.

Table 8 – Cost Estimate – Hythe Station

				Cost
Total Base Construction Cost				£645,520
Non Construction Costs	% of Base	Unit	Rate	
Contractor preliminaries	20%			£129,104
GRIP stages 4 development	1%			£6,455
GRIP stage 5 detailed design	6%			£38,731
Project Management & Sponsorship	10%			£64,552
Testing and commissioning	2.50%			£16,138
Possession management	2.50%			£16,138
TOC Compensation	0.00%			0
Land	100x180x2	Hectare	13,580	£13,580
Total Non Construction Cost				*£284,698*
Sub Total				£930,218
Contingency	20%			£186,044
TOTAL				**£1,116,262**

Notes:

- Prices exclude VAT
- No provision for contaminated waste disposal
- No provision for TOC compensation
- Overrun possessions not included
- NR Asset protection costs excluded from this GRIP 3 report. To be added from GRIP 4 design onwards

5.3.3 Marchwood Station Proposed Platform Extension

Station Location

The Proposal for the platform extension at Marchwood Station will be build south of the platform site. The general arrangement is shown in Figure 17 and 18 below.

Figure 17 – Existing station footprint - Marchwood

Figure 18 – Marchwood proposed stage upgrade and platform extension

Station Specification

The station will be upgraded to the following specifications:

- Upgrade of the existing platform to accommodate with 3 car 158 unit, there will be a need to extend the existing platform length by 21m. The platform will then have a minimum length of 77m plus 2 No. 5m ramps (one to each side)

- New ramped walkway off the north-western edge of the platform onto the Oakland Drive with platform area and access routes to be lit at night
- Customer information displays and public address
- Driver only operation viewing facilities;
- CCTV and passenger help points;
- Disabled access from car park to platform;
- Ticket vending machines;
- Access to Pedestrian / cycle access to School Road

Whilst it is anticipated that the station will initially be unstaffed, passive provision has been made in the design to use the existing station building in future. Given the forecast footfall and anticipated staffing level the existing building seems sufficient. It provides a covered waiting area, booking office, staff accommodation and a public lavatory.

In addition to the station building and platform, the requirements for Marchwood station are;

- Provision for limited car parking using existing area (approximately 10 cars) and an area to be provided for motorcycles and cycles;
- Setdown and pickup areas for buses, taxis and kiss & ride; and
- Dedicated parking for station and maintenance staff
- Resurfacing of the access road within the railway boundary

Station design considerations

The minimum clearance of 2.5m between the platform edge and any obstruction need to be satisfied furthermore the station platform upgrade location should demonstrate that the gradient does not present a safety risk to train operations.

Customers information displays screen to serve the station and car park areas and one help point are anticipated on each platform including lighting columns hosting CCTV cameras and LLPA speakers.

Cost Estimate

Table 9 summarises the capital cost estimate for Marchwood station upgrade. A full breakdown of the estimate is presented in Appendix B.

Table 9 – Cost Estimate – Marchwood Station

				Cost
Total Base Construction Cost				£161,400
Non Construction Costs	% of Base	Unit	Rate	
Contractor preliminaries	2%			£3,228
GRIP stages 4 development	1%			£1,614
GRIP stage 5 detailed design	6%			£9,684
Project Management & Sponsorship	10%			£16,140
Testing and commissioning	2.50%			£4,035
Possession management	2.50%			£4,035
Total Non Construction Cost				*£38,736*
Sub Total				£200,136
Contingency	20%			£40,027
TOTAL				**£240,163**

Notes:

- Prices exclude VAT
- No provision for contaminated waste disposal
- No provision for TOC compensation
- Overrun possessions not included
- NR Asset protection costs excluded from this GRIP 3 report. To be added from GRIP 4 design onwards

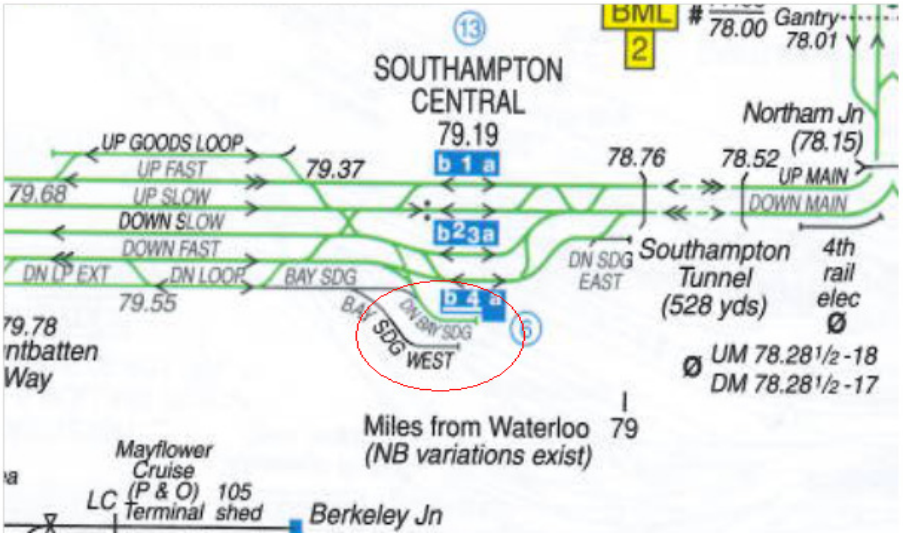
5.3.4 West Facing Bay Platform at Southampton Central Station

Station Location

The proposal for resurfacing and paving works for the west facing bay platform at Southampton central station (opposite platform 4b) will be required due to the fact of the quality of the surfacing and the impact on the H&S of the passengers and subsequent Standards requirements. Existing and general arrangement are provided in Figures 19 and 20 below.

Figure 19 – Southampton Central Station – west facing bay platform

Figure 20 – Southampton Central Station – proposed west facing platform opposite platform 4b



Platform Specification works

The platform works include the following:

- Resetting of the paving on the platform edge
- Make the platform conform to DDA requirements
- Re-surfacing full length of platform including installation of new copers, tactile paving and bituminous surfacing set to correct gauging and with appropriate falls

Cost Estimate

Table 10 summarises the capital cost estimate west facing for the bay platform at Southampton Central. A full breakdown of the estimate is presented in Appendix B.

Table 10 – Southampton Central Station – Cost Estimate

				Cost
Total Base Construction Cost				£173,400
Non Construction Costs	% of Base	Unit	Rate	
Contractor preliminaries	2%			£3,468
GRIP stages 4 development	1%			£1,734
GRIP stage 5 detailed design	6%			£10,404
Project Management & Sponsorship	10%			£17,340
Testing and commissioning	2.50%			£4,335
Possession management	2.50%			£4,335
Total Non Construction Cost				*£41,616*
Sub Total				£215,016
Contingency	20%			£43,003
TOTAL				**£258,019**

Notes:

- Prices exclude VAT
- No provision for contaminated waste disposal
- No provision for TOC compensation
- Overrun possessions not included
- NR Asset protection costs excluded from this GRIP 3 report. To be added from GRIP 4 design onwards

5.3.5 Summary of Civils and Earthwork Costs

Table 11: Summary Table – Civil Engineering and Earthwork Costs

	Option 1	Option 2
Hounsdown Station	£718,638	£2,870,066
Hythe Station	£930,218	£930,218
Marchwood Station	£200,136	£200,136
Sub-Total	**£1,848,992**	**£4,000,420**
Contingency (20%)	*£369,798*	*£800,084*
Total	**£2,218,790**	**£4,800,504**

The upgrade of Platform 5 at Southampton Central Station (£258,019- including contingency) has not been included in the overall capital cost assumptions and economic appraisal.

5.4 Signals

5.4.1 Fawley Branch – Option 1

The majority of the infrastructure alterations on the Fawley Branch are a result of the speed increase from 30mph to 45mph for passenger traffic.

It should be noted that freight traffic will continue to run at a maximum of 30mph. This is in order to avoid the repositioning of existing Distant Signals (e.g. 827R), which would be made necessary by the substantial increase in braking distances required for freight at 45mph.

Repositioning of Distant Signals would also result in excessive braking distances ("over braking") for the Passenger services, which is equally undesirable. "Differential" running speeds for the passenger and freight services are therefore the best and cheapest solution to this issue and do not have any negative impact on the provision of a half hourly passenger service (Option 2).

As a result of the increase in line speed, all the strike-in treadles and track circuits which are used to activate the automatic half barrier level crossings when a train is approaching need to be repositioned.

In the case of the treadles, this is simply a task of fixing new treadles onto the rails at the appropriate distance and running cables to the new sites. Additional treadles are required at the two new station sites to maintain correct function of the level crossings following a train having stopped at the platform or starting from the bay platform at Hythe.

Alterations and additions to the track circuits are partly to coincide with the repositioning of treadles and partly to provide full track circuit block operation along the whole line up to the new station at Hythe. This replaces the previous "One Train Working With Staff" method of operation which currently exists between Marchwood Station and Fawley and which would be impractical to operate with the substantial increase in traffic on the line.

Following the extension of Track Circuit Block to Hythe, One Train Working With Staff will continue to be used for the freight only section between Hythe and Fawley.

Installation of new track circuits or movement of existing ones is likely to require the installation of new Insulated Block Joints (IBJs) into the rails. The extent of this work may be possible to minimise depending on the type of track circuits adopted for the final scheme. Additional work associated with the installation of new track circuits will include running of new cables and possible provision of new lineside location equipment cases to house the power supplies, transmitters and receivers.

The provision of a new station at Hounsdown necessitates the provision of a new protecting signal (FFF signal) in the Down Direction, (i.e. towards Fawley), together with an associated distant signal (FFF R signal). Train Protection and Warning System TSS and OSS loops and Advanced Warning System magnets will be provided with the signals as is appropriate.

Alterations to the Automatic Half Barrier level crossings interlocking and barrier equipment should not be necessary and are not shown as being part of this scheme. However, it should be noted that these installations are coming towards the end of their intended lifespan and the significant increase in their use may accelerate their existing replacement date.

Network Rail will require all crossings affected by the speed increase to be risk assessed. Aside from the Automatic half Barrier Crossings, Network Rail may require the upgrade of Marchwood Crossing from Manual Gates to Manned Crossing Barrier (MCB) or with CCTV or Obstacle Detector provided as well. (MCB-CCTV or MCB-OD). This would be due to the significant increase in rail traffic and the extra time this would keep the crossing gates shut to road traffic. Barriers would be obviously quicker to operate.

The cost for an MCB crossing is shown as a possible extra to the main body of works, as this decision is entirely dependent on Network Rail. It should be noted that the cost to convert the crossing to MCB-CCTV or MCB-OD would be significantly more than the cost shown for conversion to MCB.

Marchwood Signal Box will require a new control panel providing to control the new signals at Hythe and the optional passing loop at Hounsdown (for Option 2), as well as any crossing controls required by the possible conversion of Marchwood Crossing to barriers. The cost of this conversion would amount to approximately £1.54million.

Due to the positioning of Marchwood Signal Box within the former station building, rather than immediately at the crossing itself, the signaller has no view of approaching road traffic from within the building. This is not an issue with the existing manually worked gates, but should the crossing be converted to barriers, there would need to be a means of detecting or viewing road traffic whilst operating the crossing. Hence the possibility that a conversion to an MCB-CCTV or MCB-OD type of crossing may be stipulated by Network Rail. Further issues regarding the operation of Marchwood Crossing can be found in the following section on Signalling operations.

An additional main signal (MW10) and associated distant signal (MW10R) are required to exit from the siding running from Marchwood Military Port onto the main line, due to the introduction of passenger traffic on the main line. These have been shown as a new semaphore to be operated by the existing lever and cable for MW10 mechanical shunt signal and a fixed reflective distant board.

A new main signal (AAA signal) and associated distant (AAA R signal) are required in the Down direction on the approach to the new platform at Hythe to define whether trains are to turn into the bay or continue to Fawley. This, together with CCC and CCC R signals in the Up direction also provides an emergency protection facility for School Road Crossing. AAA and CCC signals will therefore require to be capable of being replaced to a red aspect by the crossing keeper at Station Road. Consequently the Crossing Keepers Cabin at Station Road will require a small control panel for these 2 signals and slotting controls provided from here to Marchwood Signal Box to interlock the controls of the signals. CCC signal also provides protection from freight trains travelling in the Up direction colliding with passenger services exiting Hythe platform.

A trap point ("XXX") has been provided at Hythe to provide further protection to the passenger line from freight traffic.

Speed signs in the Hythe Station area have been moved slightly to further restrict the speed of freight trains approaching in the Up Direction, in order to minimise the effects of any run off at XXX points.

The costs for delivering these alterations and upgrades amount to approximately £2,100,000 for Option 1.

5.4.2 Fawley Branch – Option 2

All the signalling requirements outlined above are necessary for this option, as well as for the arrangement of a passing loop at Hounsdown (half-hourly service), a further protecting signal (EEE signal) and associated distant signal (EEE R signal) would be required for the protection of the single line in the Up direction (i.e. towards Totton Junction).

TPWS loops and AWS magnets would again be provided as needed. Two new point machines (VVV & WWW) would be required to power the points into the loop. The replacement of cabling, cable troughing and lineside equipment cases would be required around the station site to allow space for the station development.

The costs for delivering these alterations and upgrades amount to approximately £3,050,000 for Option 2. A breakdown of full signalling costs can be found in Appendix C.

Appendix D provides a diagram which illustrates the changes to the signalling network required for the delivery of the new shuttle service between Southampton and Hythe.

5.4.3 Southampton Station area

The operational feasibility assessment identifies that Platform 5 at Southampton Central Station is not required to deliver the new shuttle service to Hythe. Therefore no alterations to signalling infrastructure would be required at Southampton station.

However if the Platform were to be operational, alterations would be required to the signalling infrastructure as there is currently no main aspect signalling provided for routes in or out of the bay siding (platform 5) and passenger traffic would necessitate this. Similarly the newly created potential for collision between passenger and goods traffic at 525 points means there needs to be a new trap point (525A) provided to divert any run away from the route of the passenger service.

The costs for delivering these potential alterations and upgrades amount to approximately £391,000. Full signalling costs can be found in Appendix C.

5.4.4 Signalling Operations

As mentioned above, the principal change in the method of Signalling Operation is the change from "One Train Working With Token" to "Track Circuit Block" between Marchwood and Hythe stations.

This is necessitated by the introduction of the passenger service at a significantly increased frequency. This will also reduce the workload on the Signaller at

Marchwood Signal Box by not requiring them to physically hand out and collect tokens to each passing train, other than any freights travelling beyond Hythe which will still use this method.

The extension of the train operating period on the branch means that Marchwood Signal Box will have to move to a two-shift pattern, as opposed to the existing single morning shift. This will obviously have an impact on staffing costs for Network Rail.

The signallers will also have a significant increase in their workload. With a half hourly service in each direction (Option 2) equating to one train passing Marchwood every fifteen minutes, plus any freight traffic, the operation of the manned gates at Marchwood may become impractical. The signaller is likely to have a full workload without having to leave the signal box to operate the crossing gates in-between their other tasks.

The increase in rail traffic is also likely to result in a significant increase in the total time which all the crossings between Totton and Hythe are blocked to road traffic. This will particularly affect Marchwood due to its current use of manual gates rather than barriers.

Full assessment of this issue will be required by Network Rail to progress the scheme further. A risk assessment of all crossings between Totton and Hythe for the increase to 45mph running, including footpath and User Worked Crossings, will also be required by Network Rail, should the development of the scheme be progressed further. This may result in additional changes being required to level crossings, which cannot be foreseen at this time.

5.4.5 Summary of Signalling Costs

Table 12: Summary of Signal Costs – Waterside Rail Line

	Option 1	Option 2
Fawley Branch Line	**£2,099,610**	**£3,046,182**
Optional Southampton upgrade	£391,178	£391,178
Optional Marchwood Level Crossing upgrade	£1,540,000	£1,540,000

The upgrading of Platform 5 upgrade at Southampton Central Station and the Marchwood Level Crossing have not been included in the overall capital cost assumptions and economic appraisal.

5.5 Telecommunications

This section identifies the assessment of telecommunications infrastructure to enable the Waterside rail line to be upgraded to facilitate passenger service.

5.5.1 Eastleigh Area Signalling Centre (ASC)

New operational circuits in the Eastleigh ASC control area are to be added to the signaller's concentrator.

5.5.2 Marchwood Signal Box (SB)

The signaller communications would need to be assessed to determine the adequacy for the addition of new operational circuits in the control area. If there is not sufficient capacity then the concentrator would require expansion or, in the worst case, a new concentrator would be required.

If there is sufficient capacity then the concentrator shall be modified to add new circuits.

5.5.3 School Road Crossing Keeper's Hut

If the Crossing Keeper's Hut is provided with interlocking to the signals protecting School Road crossing, then a direct line will be required between the hut and Marchwood Signal Box.

The signal proposed to protect the crossing will be provided with a signal post telephone on the approach to the signal. This telephone will be connected as a direct line to the Marchwood SB. The telephone will require a tail cable to be run to the nearest telecoms location case. This then requires to then be jumpered on to the bearer cable.

5.5.4 Marchwood Station

Depending on the classification of the station, new electronic visual displays, Public Address CCTV and Passenger Help Points may be required. In order to provide these services, the TOC's information systems at the relevant control centre would have to be modified to add the station to their wider passenger information systems.

5.5.5 Hythe Station

Where the installation of new infrastructure such as station platforms would intrude on the current position of lineside cable routes, the existing cables and cable routes will require relocation to a new position.

Depending on the classification of the station, new electronic visual displays, Public Address, CCTV and Passenger Help Points may be required. In order to provide these services, the TOC's information systems at the relevant control centre would have to be modified to add the station to their wider passenger information systems.

5.5.6 Hounsdown Station

The two proposed starter signals will be provided with a signal post telephone on the approach to the signal. This telephone will be connected as a direct line to the

Marchwood SB. The telephone will require a tail cable to be run to the nearest telecoms location case. This requires to then be jumpered on to the bearer cable.

It is assumed that no telecoms equipment is required for train dispatch at the station.

Depending on the classification of the station, new electronic visual displays, Public Address, CCTV and Passenger Help Points may be required. In order to provide these services, the TOC's information systems at the relevant control centre would have to be modified to add the station to their wider passenger information systems.

Where the installation of new infrastructure such as station platforms would intrude on the current position of lineside cable routes then the existing cables and cable routes will require to be relocated to a new position.

5.5.7 Southampton Central Station

If the Down Bay Siding platform is brought into use then this would have to be reflected in the station information and surveillance systems operated at the station.

5.5.8 Line of Route

All new signals which are capable of displaying a red aspect will be provided with a signal post telephone on the approach to that signal. This telephone will be connected as a direct line to the controlling signal box. The telephone will require a tail cable to be run to the nearest telecoms location case. This requires to then be jumpered on to the bearer cable and transmission system if necessary. If there are no telecoms location cases within a reasonable distance of the new phones, new copper distribution cabinets would be required to limit the length of the new tail cables.

GSM-R radio coverage is provided along the route. The coverage and channel capacity would need to be cross-checked with the proposed operations to confirm they are sufficient.

If any level crossing requires conversion following a risk assessment of the impact from the change of line speed, then depending of the proposed crossing type, communications or indications may need to be provided to the controlling signal box.

Where the installation of proposed new infrastructure along the line (such as new S&C) would intrude on the current position of lineside cable routes, the existing cables and routes will require relocation to a new position.

The capacity of the relevant telecoms bearer cables will need to be checked to confirm that spare pairs exist to carry the new SPT circuits. Testing may be required to validate that they are viable.

5.5.9 West Street Automatic Half Barrier Crossing (AHBC)

The signal proposed to protect the crossing will be provided with a signal post telephone on the approach to the signal. This telephone will be connected as a direct line to the Marchwood SB. The telephone will require a tail cable to be run to the nearest telecoms location case. This requires to then be jumpered on to the bearer cable.

5.5.10 Telecommunication Costs

GRIP 3-5	Design Costs	£ 30,000.00
GRIP 6	Material Costs	£ 30,000.00
GRIP 6	Installation & Testing	£ 20,000.00
TOTAL		**£ 80,000.00**

- Does not include any costs associated with Southampton Central Station
- Assumes FTN is in the area and has sufficient spare capacity for the works.
- Does not include any Network Rail, Local Authority or other 3rd party costs.

5.6 Summary of Infrastructure Costs

Table 13: Summary of all capital infrastructure costs for reinstatement of Waterside Rail Line

Infrastructure Costs	Option 1	Option 2
Permanent Way (inc design costs)	£2,780,732	£3,028,603
Stations*	£1,848,992	£4,000,420
Signals	£2,099,610	£3,046,182
Telecommunications	£80,000	£80,000
Contingency (Stations)	*£369,798*	*£800,084*
TOTAL (excluding Southampton or Marchwood L/C)	**£7,179,133**	**£10,995,289**

Additional costs:		
Marchwood Level Crossing upgrade	£1,540,000	£1,540,000
Southampton Station - signals costs	£391,178	£391,178
Southampton Station - station costs	£258,019	£258,019
TOTAL (including Southampton, excluding Marchwood L/C)	£7,828,329	£11,862,505
TOTAL (including Southampton and Marchwood L/C)	£9,368,329	£13,402,505

*Stations include: Marchwood, Hounsdown and Hythe

6 Environmental Issues

6.1 Introduction

A full environmental appraisal has not been carried out at this stage. However a review has been carried out of the proposals for construction and operation, in the light of known sensitive locations along the route, to identify environmental issues which will need to be factored into further design work on any option which is taken forward.

No surveys have been carried out for this review.

6.2 Environmental issues during construction

There are three key aspects of construction which can be seen even at this early stage in design to be potentially significant:

- Construction and demolition work at the three station sites. All three are in built-up areas and two involve work on land which is currently outside the railway boundary fence.
- Re-laying of the track and track-bed along the whole length from the junction with the main line to the proposed Hythe station.
- New signalling works. These will be relatively minor in terms of noise and disruption. The works are mainly around the three stations and the existing level crossings.

Noise and disruption to traffic would be expected from any such project, the extent depending on the scale of the works proposed. It is generally possible to arrange works so that disruption to local residents is kept to a minimum, if constraints on working hours, transport routes and parking are imposed.

If option 2 were taken forward, the extensive earthworks needed for the additional track at Hounsdown station would significantly increase the scale of construction works and could lead to large numbers of HGV movements through the residential area if the volume of material excavated did not balance with the volume needed to build up the embankment.

It is not clear at this stage what the working arrangements for the track re-laying would be. If it could be arranged with Network Rail, closing the line during the re-laying and restricting works to daytime hours would minimise disturbance to local residents.

Both Hounsdown and Hythe stations require land which is not currently rail land. Some of this land, at Hythe, is currently allotments, although it represents only a small proportion of the total allotment area.

The platform extension at Marchwood is on rail land, but will require tree clearance.

There is one section of the line which is particularly sensitive. The line is within the New Forest National Park for 3km between near Marchwood Priory and Hythe, and for 780m the Dibden Bay SSSI is immediately adjacent to the railway boundary fence. The line also passes within 1km of the Hythe to Calshot Marshes SSSI, which is part of the Solent and Southampton Water Special Protection Area (SPA).

The main issue for the SPA would be potential for the works to disturb birds at this important site. Disturbance could come through construction noise and through increased human activity. Due to the distance from the SPA, it is likely that unacceptable disturbance could be avoided, but it is possible that Natural England might require works to be carried out at particular times of year in order to make disturbance even less likely.

Since there are no proposals to change the track drainage or to move the rail boundary, there is no reason to expect the Dibden Bay SSSI to be harmed. It would be necessary to reassure Natural England of this before work could proceed.

6.3 Visual appearance

Although the line passes near two listed buildings, it is far enough from them that effects on their surroundings appear unlikely. The one area where the visual appearance of the works may be more important than normal is the proposed Hythe station site, which is just outside the Hythe Conservation Area. Because it is outside the Conservation Area, there is no direct requirement for its design to be heavily constrained, however it may be appropriate to design the building's appearance to fit in with the character of its surroundings.

6.4 Increased use of the line

The number of trains on the line would increase significantly; in addition to the current low-frequency usage by freight trains there would be either two or four passenger trains per hour along the line during operating hours. The new trains, while much smaller than freight trains, would be travelling faster.

The main issues to consider in design will be noise affecting residents and potential minor disruption to local travel from the level crossings being closed more frequently. As the line crosses the New Forest National Park, the National Park Authorty will need to be consulted as to whether the increased frequency of trains would have any negative effect on the National Park.

There is no reason to believe that operation of the scheme would have an effect on the integrity of the SPA or cause any harm to either of the SSSIs, but Natural England must be consulted to ensure that no ecological harm is inadvertently caused. The scheme could not proceed if they were not content that adverse effects on the protected sites, particularly the SPA, had been avoided.

6.5 Next steps and consultation

If Hampshire County Council decides to pursue either of the options, the main statutory consultees should be consulted early in the design process, to ensure that any issues they identify can be taken into account.

The consultees whose views should be sought early in the development of the final proposals would be the same whether or not there are any aspects of the proposals needing planning consent. These would be New Forest District Council and New Forest National Park Authority, as the two local planning authorities, plus Natural England, the Environment Agency and English Heritage.

On the basis of what has been developed to date, English Heritage are unlikely to be affected by the proposals and the Environment Agency would only be likely to object

if any development were to be in a flood plain, which does not appear to be the case. The two planning authorities and Natural England all have statutory responsibilities which would be affected.

Ecological surveys would also be needed of all areas directly affected by the proposals other than the existing track-bed, to identify any areas where vegetation to be cleared may be of particular ecological value or may host protected species which would need specific management.

As the development of the preferred option proceeds, further consultation, including with the public and with relevant town/parish councils, would be needed.

Aside from normal land-use planning issues to be discussed with the two local planning authorities, special attention must be given to the adjacent SSSI and the nearby SPA. Natural England's agreement would be needed before construction could take place, so it would be important to establish any design constraints which might be needed in order to obtain that agreement. As noted in section 6.2 above, it is possible that the time of year at which construction could be undertaken near the SPA might be constrained, in order to minimise disturbance to birds.

7 Demand Forecasting

7.1 Introduction

This Chapter of the report describes the passenger demand and revenue forecasting processes for the proposed service options in the Waterside corridor. The Transport for South Hampshire (TfSH) Sub-regional Transport Model (SRTM) has been used to provide demand and revenue forecasts for the options and provide inputs to the economic social impacts appraisal reported in Chapter 8.

7.2 TfSH Sub-Regional Transport Model (SRTM)

The Transport for South Hampshire (TfSH) Sub-Regional Transport Model (SRTM) is an evidence based Land-Use and Transport Interaction model. It contains a suite of transport models and an associated Local Economic Impact Model (LEIM). The suite of transport models comprises the following models:

- Main Demand Model (MDM);
- Gateway Demand Model (GDM);
- Road Traffic Model (RTM); and
- Public Transport Model (PTM).

The main demand model represents travellers' behavioural response to policy and infrastructure interventions and includes:

- trip frequency;
- macro time of day choice;
- mode choice;
- destination choice; and
- park and ride.

The MDM has a base year of 2010, and forecast years of 2019, 2026 and 2036. Models for the AM, interpeak (IP) and PM weekday hours are available.

The following model outputs were provided to Halcrow by MVA Consultants, managers of the model for TfSH. All results are for four service options were provided for rail service between Hythe and Southampton Central, calling at all intermediate stations, and in the case of two options serving stations beyond the Southampton area. The service options were:

- Hourly shuttle service – Hythe to Southampton
- Half-Hourly shuttle service – Hythe to Southampton
- Extension of half hourly shuttle service – Hythe to Southampton – through to Fareham
- Extension of half hourly shuttle service – Hythe to Southampton – through to Ramsey and Salisbury

The results are from the GDM, RTM and PTM models, and the service has not been assessed in the MDM:

- demand matrices at 47 sector level for do-minimum and scheme test, and for 2019, 2026 and 2036, split by highway, public transport and active modes. Matrices are at all weekday level, and are split time period and trip purpose.

- select link matrices for Hythe Ferry demands, reported at 47 sectors and 64 sectors level. Forecasts for 2019, 2026 and 2036 provided.
- PTM analysis and service data for 2019, 2026 and 2036 for the do-minimum and scheme test. This data reported total PT network statistics, service data, mode data and boarding / alighting at each railway station.
- service data reporting loading change by service, split by inbound and outbound to Southampton City Centre. Results report the differences between the do-minimum and scheme test scenarios. Revenue changes are also reported at all PT level – there is no split within modes.
- rail service loading data for the services in the Hythe – Southampton Central corridor, including existing services between Southampton and Totton. Data provided for AM, IP and PM time periods and each of the three forecast years.
- population and employment data for the 47 sector. Data reported for 2010 to 2036.
- public transport and highway trip generalised cost data at 47 sectors level, split by elements of costs including fares, and weighted by demands. Data for 2019 provided for do-minimum and scheme test, so the time saving benefits of the scheme can be computed using a TUBA based approach, standard economic appraisal tool.

7.3 Demand Forecasts – Half-Hourly Service

The rail demands for the proposed half hourly Hythe to Southampton Central service are summarised in this section. Following examination of the model results, outputs from the SRTM models were adjusted for local corridor calibration and forecasting issues for the following factors:

- Higher travel demand growth in the Waterside corridor, based on Tempro changes for the corridor;
- Lower proportion of trips assumed to external areas, based on NRTS data;
- Higher proportion of demand abstraction from the Hythe ferry, based on comparison of relative travel times and costs with the bus and train.

The impact on the modelled demand and benefits forecasts of each of the above adjustments is summarised in Table 14.

Table 14: Impacts on Demand Adjustments

Adjustment	Demand	Benefits
High Demand Growth	+1.0%	+1.9%
External Trip Proportion	+0.0%	+9.3%
Higher Ferry Abstraction	+21.1%	+1.8%
Total	**22.1%**	**13.0%**

A further adjustment was applied to the half-hourly service options given the difference in the hourly and half hourly demand and revenue forecasts was

considered to exceed realistic limits, as define in PDFH, hence the half hourly forecasts were assumed as very optimistic. The incremental impacts of the schemes were reduced by 9% in each half hourly option.

Annual demands were computed are based on the factors provided by MVA and reported in the GRIP2 study, where:

- Weekday Daily Demand = 2.5* AM peak hour + 6 * Interpeak + 2.5 * PM peak hour
- Annual Demand = 300* Daily Demand

Demand on a Saturday is assumed to be 90% of a weekday, so the weekday to annual demand and revenue factor is 300.

Table 15: Rail Passenger Demands - Half Hourly Shuttle

Time Period	2019	2026	2036
AM hour	125	136	140
Inter peak hour	62	68	70
PM hour	146	159	164
Daily	1,052	1,142	1,180
Annual Passenger Trips	**315,500**	**342,500**	**354,000**
Annual Entry and Exits	**631,000**	**685,000**	**708,000**

Line loading diagrams for the 2026 forecasts are shown in Figures 22 to 24 for the AM, interpeak and PM hours, for the half hourly shuttle service.

Figure 22: Line Loading Diagrams for 2026 Forecasts – AM peak hour

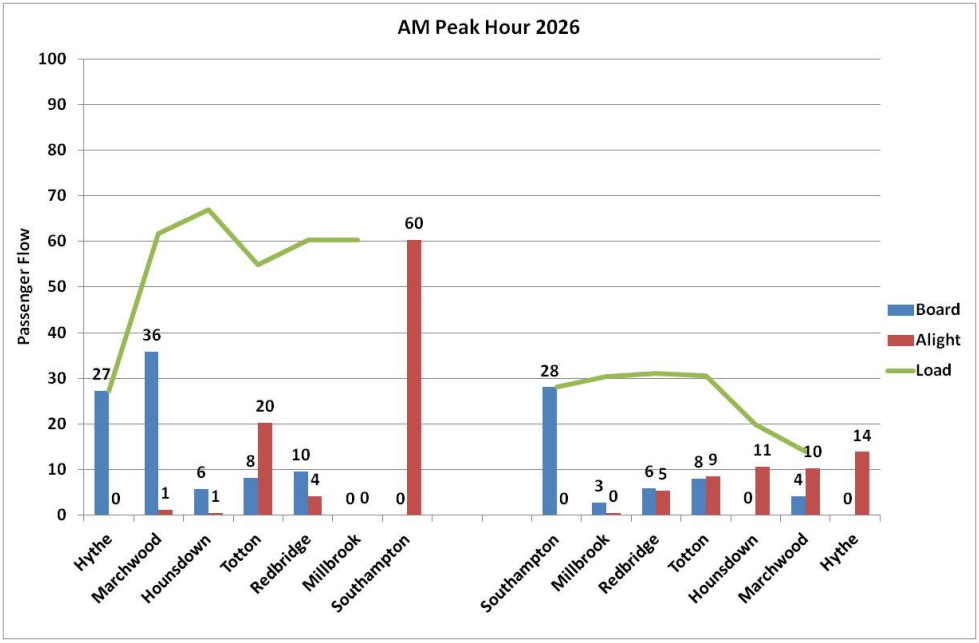


Figure 23: Line Loading Diagrams for 2026 Forecasts – Inter peak hour

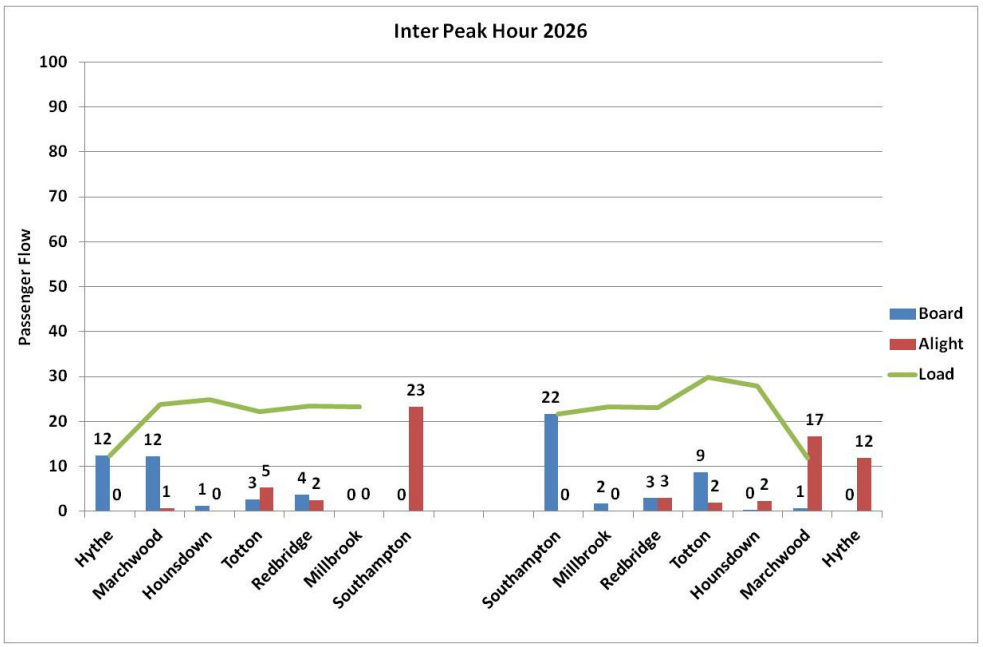
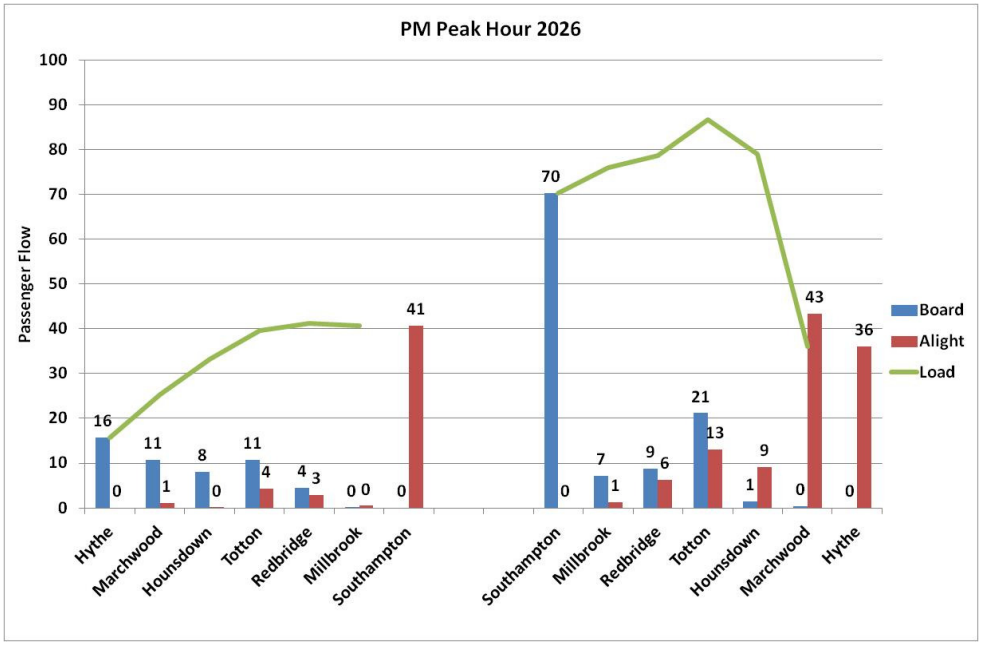


Figure 24: Line Loading Diagrams for 2026 Forecasts – PM peak hour



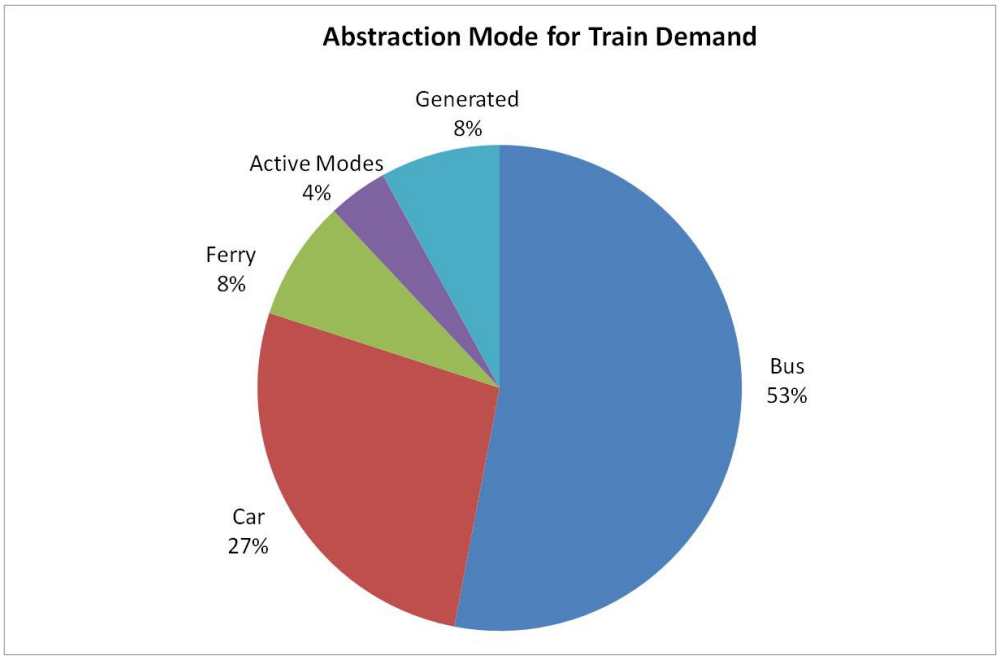
The forecasts show 26% of passengers are travelling between Totton and Southampton Central stations, including using Redbridge and Millbrook, so are attracted to rail from the improved service offered between these existing stations. Annual demand forecasts for each station are reported in Table 16, for 2026.

Table 16: Annual Station Demand Forecasts

Station	Annual Trips
Hythe	56,000
Marchwood	67,000
Hounsdown	16,000
Totton	52,000
Redbridge	28,000
Millbrook	6,000
Southampton	115,000
Total Corridor	**340,000**

The abstraction of demand, based on the trip matrix totals changes and the boarding and alighting data for public transport models. Overall, 50% of demand is assumed to come from bus, 30% from highway, 8% from ferry, 4% from active modes and 8% is generated.

Figure 25: Rail Passenger Abstraction Effects



7.4 Revenue Forecasts

The change in public transport revenue is shown in Table 17. The split of changes by mode is based on the changes in boardings for each mode and the average fare paid derived from model outputs and the fares tables input to the PTM reporting files. The net revenue increase is between 24% and 28% of the total rail revenue change, which shows a large transfer from bus and ferry modes.

Table 17: Estimates of Revenue Changes – Hourly Service

2019	Rail	405,000	£898,000	£2.22
	Bus	-199,000	-£559,000	£2.81
	Ferry	-35,000	-£101,000	£2.87
	Total	**171,000**	**£238,000**	**£1.39**
2026	Rail	439,000	£990,000	£2.25
	Bus	-236,000	-£661,000	£2.80
	Ferry	-39,000	-£111,000	£2.86
	Total	**164,000**	**£218,000**	**£1.33**
2036	Rail	454,000	£1,023,000	£2.25
	Bus	-246,000	-£689,000	£2.80
	Ferry	-44,000	-£125,000	£2.84
	Total	**164,000**	**£209,000**	**£1.27**

7.5 Demand and Revenue Forecasts – Other Options

Table 18 summarises the passenger demand and revenue forecasts for the following other options modelled in the SRTM, namely:

- Hourly shuttle service – Hythe to Southampton
- Extension of half hourly shuttle service – Hythe to Southampton – through to Fareham
- Extension of half hourly shuttle service – Hythe to Southampton – through to Ramsey and Salisbury

Table 18: Annual Rail Passenger Demand

Station	Hour Shuttle	Half-Hourly Shuttle	Fareham Extension	Salisbury / Ramsey Extension
Hythe	32,000	**56,000**	63,000	64,000
Marchwood	41,000	**67,000**	61,000	69,000
Hounsdown	5,000	**16,000**	14,000	19,000
Totton	33,000	**52,000**	48,000	58,000
Redbridge	17,000	**28,000**	25,000	27,000
Millbrook	4,000	**6,000**	6,000	6,000
Southampton	61,000	**115,000**	127,000	150,000
Total Corridor	193,000	**340,000**	344,000	393,000
Total Corridor Excl Southampton	132,000	**225,000**	217,000	243,000
Change from Half-Hourly Shuttle	***-41%***	***0%***	***-4%***	***8%***
Rail Outside of the Corridor	317,000	**538,000**	1,022,000	411,000
Total Rail	510,000	**878,000**	1,366,000	804,000

Station	Hour Shuttle	Half-Hourly Shuttle	Fareham Extension	Salisbury / Ramsey Extension
Change from Half-Hourly Shuttle	***-42%***	***0%***	***56%***	***-8%***
Bus	-308,000	**-472,000**	-734,000	-420,000
Ferry	-66,000	**-78,000**	-78,000	-82,000
Total Public Transport	136,000	**328,000**	554,000	302,000
Change from Half-Hourly Shuttle	***-59%***	***0%***	***69%***	***-8%***

The impacts on rail and net public transport revenue of each option are reported in Table 19. This highlights the likely impact on bus and ferry operations in the Waterside area. To add a bit of context, the Ferry operator, White Horse Ferries, currently receives a subsidy of around £55k per annum, plus there is a £2k per annum paid to ABP to sue Town Quay. The revenue impacts of the rail line would therefore increase the current £57k annual subsidy by £100k per annum, to around £158k annually.

Bus services are not currently subsidised for services that would directly compete with the ferry. There is some subsidy for extensions to commercial services to Fawley (Bluestar 8) and for local mini bus services around Hythe. Of wider concern is the potential response of the bus operators to a new rail service, and indeed how the forecast revenue implications would impact on the commerciality of the bus operations.

Table 19: Annual Rail Passenger Revenue

2019				
Rail Revenue	£551,000	£898,000	£1,579,000	£940,000
Net PT Revenue	£128,000	£238,000	£207,000	£270,000
Change from Half-Hourly Shuttle	***-46%***	***0%***	***64%***	***13%***
2026				
Rail Revenue	£613,000	£990,000	£1,794,000	£966,000
Net PT Revenue	£88,000	£217,000	£343,000	£261,000
Change from Half-Hourly Shuttle	***-59%***	***0%***	***129%***	***20%***
2036				
Rail Revenue	£617,000	£1,023,000	£1,846,000	£997,000
Net PT Revenue	£4,000	£209,000	£265,000	£218,000
Change from Half-Hourly Shuttle	***-98%***	***0%***	***103%***	***5%***

7.6 Ferry Demand Changes

The demand and patterns of demand forecast to use the Hythe ferry is summarised in Table 19. Values are for 2026 forecast year. The impact of the rail service on ferry demand is to reduce the latter by between 22% and 33%. Annual demand is estimated to be around 300,000 trips.

Table 20: Hythe Ferry Demand Forecasts

Ferry	Hour Shuttle	Half-Hourly Shuttle	Fareham Extension	Salisbury / Ramsey Extension
Loss in Ferry Demand in 2026	66,000	78,000	78,000	82,000
Percentage Loss	22%	26%	26%	27%

7.7 Benchmarking

The estimates of annual demand at new railway stations are shown in Table 20. These values are for 2019 forecasts. Existing stations are ORR observed value for 2010/11 values.

Table 21: Estimates of Station Annual Demand

Station	Annual Demand (Total Entry and Exits)	Daily Trips (2 –way)
New Stations		
Hythe	124,000	410
Marchwood	146,000	480
Hounsdown	38,000	120
Existing Local Stations		
Millbrook	34,000	120
Redbridge	26,000	90
Ashurst	101,000	340
Beaulieu Road	7,000	30

8 Socio-Economic Analysis

8.1 Introduction

This chapter of the report covers the economic appraisal of the scheme and the various service options considered. The output of the appraisal is the Benefits Costs Ratio (BCR) showing the value for money of the proposed scheme. The appraisal has been completed using WebTAG (DfT's Transport Analysis Guidance).

8.2 Scheme Costs

Table 22 shows the costs of each service option.

Table 22: Summary of Option Costs (2011 prices)

Service	Capital Costs	Annual Operating Costs
Hour Shuttle	£7.179	£1.251
Half-Hourly Shuttle	£10.955	£1.985
Fareham Extension	£10.955	£4.383
Salisbury / Ramsey Extension	£10.955	£1.985

8.3 Economic Appraisal Assumptions

The economic VfM of each option is a socio-economic appraisal reflecting the benefits to passengers, operators, other businesses and stakeholders against the costs of providing the strategy. The benefits include time savings, quality and comfort of journey and wider environmental benefits of reduced car travel as more trips are completed using rail. The costs of the scheme include capital, operating and management costs, plus revenues generated. The methods used for computing the economic appraisal use standard methods for major transport scheme appraisal and are based on the DfT's WebTAG. The appraisal is completed over the length of the contract and the VfM is expressed by the Benefit to Cost Ratio (BCR). A ratio value over 1.0 shows the benefits of the strategy exceed costs, with a value over 2.0 showing the strategy represents a strong VfM case.

The main outputs of the economic appraisal are standard economic tables required for a scheme submitted to the DfT, namely:

- **TEE – Transport Economic Efficiency**, showing benefits to commuting, other and business trips, plus the impact to the private sector and the PVB – Present Value of Benefits of the scheme.
- **PA – Public Accounts**, showing split of costs to central and local government, providing the PVC – Present Value of Costs of the scheme.
- **AMCB – Associated Monetised Costs and Benefits**, showing the results from the TEE and PA tables and adding in wider impacts to report the NPV – Net Present Value and BCR of the scheme.

All values in the economic appraisal are expressed in 2010 prices and values, as required by WebTAG.

The benefits of the scenarios include the following:

- **User benefits –** time savings (termed generalised journey time (GJT) as it includes walk, wait, in-vehicle, interchange and fare attributes of a journey) offered to passengers as a result of the proposed measures.
- **Non-user benefits –** decongestion on the highway network from car users switching to use rail, resulting is less traffic congestion in the future on route to the key centres in Hampshire. Non-user benefits also include savings in accidents, less noise and reduced vehicle emissions from less congestion and traffic. They also include less vehicle operating costs from not having to use a car.
- **User charges** – impact of more passengers paying to use buses, so incurring a cost of travel.
- **Revenue** – the net revenue gain to the operator from the farebox revenue is reported. Fares are assumed to grow at RPI+1%.
- **Indirect tax changes** – the impact to the Government of less fuel duty tax from less traffic on the roads and less fuel purchased as car users switch to using the bus, is reflected as a negative benefit of the scheme.
- The benefits of the scheme are summed to form the **Present Value of Benefits (PVB)**. All values are reported in 2010 prices and values.

The costs of the scheme are expressed as below:

- **Government costs** – implementation, network and other on-going costs. The costs assuming scheme length of 60 years.
- The costs of the scheme are summed to form the **Present Value of Costs (PVC)**. All values are reported in 2010 prices and values.

The two main values reported for each scheme are as below:

- Net Present Value, NPV = PVB – PVC
- Benefit to Cost Ratio, BCR = PVB / PVC

The assumptions adopted in the economic appraisal are listed below:

- Appraisal based on model results for years 2016 and 2031, and three modelled hours – AM, IP and PM;
- Optimism Bias at 40% of capital costs;
- Market price adjustment at 1.209;
- Appraisal over 60 years, opening year of mid 2015;
- Discounting at 3.5% of first 30 years, then 3.0% after;
- The Value of Time (VOT) is weighted by trip purpose;

- VOT increases as defined in WebTAG 3.5.6;
- Assumed commuter, other and business trips split taken from the SRTM model;
- Decongestion benefits based on WebTAG rates, and validated to overall rail passenger mileage change and proportion of overall scheme benefits;
- Indirect tax changes based on fuel efficiency changes from WebTAG;
- Uplift for wider external benefits, applied to change in vehicle hours, for reliability of +10.0%;
- Vehicle Operating Costs (VOC) based on WebTAG 3.5.6 values.

8.4 Economic Appraisal Results

The economic results for each option are reported in Table 23. Sensitivity tests on the half-hourly shuttle service are reported in Table 24 and for the Fareham service option on Table 25.

The results show only the Fareham Extension service option to have a BCR greater than 1.0, where benefits exceed costs. The BCR value of 1.28 is below the limit of 1.5 acceptable to DfT for funding of a major transport scheme.

For the BCR value to exceed 1.5 for the Fareham service option, a number of optimistic assumptions would all be required, with a 25% reduction in scheme costs, 10% less operating costs, higher transfer from car and higher rail revenue per trip. Such assumptions are all at the extreme limits of a range and hence the value of 1.83 is considered as extremely unlikely.

For the half hour shuttle option, applying the same set of optimistic assumptions would generate a BCR value of 1.12, so well below the acceptable minimum limit of 1.5 for a major transport scheme.

The economic case for a Waterside rail service is weak given the current demand conditions in the area. As suggested above, the minimum acceptable level of BCR for a DfT Major Transport Scheme is 1.5, with 2.0 being the benchmark level for most projects. To achieve this demand for the Waterside line would need to increase by around 125% for a BCR of 1.5 and 200% for a BCR of 2.0. Such growth equates to a demand increase of 190k per annum (630 per day) to achieve 1.5, and 435k per annum (1450 per day) for a BCR of 2.0. Given the current policy context in the area in terms of housing and employment, such growth rates seem unlikely, but the absolute numbers are not huge per se.

Table 23: Summary of Economic Results for Each Option

Economic Indicator	Hour Shuttle	Half-Hourly Shuttle	Fareham Extension	Salisbury / Ramsey Extension
Public Transport Benefits	£19.4	£37.3	£120.6	£42.0
Highway Decongestion	£6.6	£12.5	£31.7	£13.1
Bus Revenue	-£12.7	-£17.9	-£37.6	-£16.9
Rail Revenue	£16.4	£27.0	£48.5	£26.6
Rail Operating Costs	-£34.1	-£54.0	-£119.3	-£54.0
Rail Subsidy	£17.7	£27.1	£70.8	£27.5
Other Externality Benefits	£2.7	£5.1	£16.5	£5.8
Indirect Tax	-£1.1	-£2.2	-£7.0	-£2.4
Total Benefits PVB	**£14.8**	**£34.9**	**£124.2**	**£41.5**
Ferry Subsidy	£2.5	£3.2	£3.5	£3.3
Investment Costs	£14.9	£22.7	£22.7	£22.7
Rail Subsidy	£17.7	£27.1	£70.8	£27.5
Total Costs PVC	**£35.1**	**£53.0**	**£97.0**	**£53.4**
Net present Value NPV	**-£20.3**	**-£18.1**	**£27.2**	**-£11.9**
Benefits to Cost Ratio BCR	**0.42**	**0.66**	**1.28**	**0.78**

Note: Values in 2010 prices and values £million's

Table 24: Sensitivity Tests on the Half-Hourly Shuttle Case

Economic Indicator	Half-Hourly Shuttle	25% less Capital Costs	10% less operating costs	25% higher Level decongestion	Higher Rail revenue per trip @ £3	Combined Test Effects
Public Transport Benefits	£37.3	£37.3	£37.3	£37.3	£37.3	£37.3
Highway Decongestion	£12.5	£12.5	£12.5	£14.6	£12.5	£14.6
Bus Revenue	-£17.9	-£17.9	-£17.9	-£17.9	-£17.9	-£17.9
Rail Revenue	£27.0	£27.0	£27.0	£27.0	£35.9	£35.9
Rail Operating Costs	-£54.0	-£54.0	-£48.6	-£54.0	-£54.0	-£48.6
Rail Subsidy	£27.1	£27.1	£21.7	£27.1	£18.1	£12.7
Other Externality Benefits	£5.1	£5.1	£5.1	£5.5	£5.1	£5.5
Indirect Tax	-£2.2	-£2.2	-£2.2	-£2.8	-£2.2	-£2.8
Total Benefits PVB	**£34.9**	**£34.9**	**£34.9**	**£36.8**	**£34.9**	**£36.8**
Ferry Subsidy	£3.2	£3.2	£3.2	£3.2	£3.2	£3.2
Investment Costs	£22.7	£17.0	£22.7	£22.7	£22.7	£17.0
Rail Subsidy	£27.1	£27.1	£21.7	£27.1	£18.1	£12.7
Total Costs PVC	**£53.0**	**£47.3**	**£47.6**	**£53.0**	**£44.0**	**£32.9**
Net present Value NPV	**-£18.1**	**-£12.4**	**-£12.7**	**-£16.2**	**-£9.1**	**£3.8**
Benefits to Cost Ratio BCR	**0.66**	**0.74**	**0.73**	**0.69**	**0.79**	**1.12**

Note: Values in 2010 prices and values £million's

Table 25: Sensitivity Tests on the Half-Hourly Fareham Extension

Economic Indicator	Half-Hourly Fareham Option	25% less Capital Costs	10% less operating costs	25% higher Level decongestion	Higher Rail revenue per trip @ £3	Combined Test Effects
Public Transport Benefits	£120.6	£120.6	£120.6	£120.6	£120.6	£120.6
Highway Decongestion	£31.7	£31.7	£31.7	£36.0	£31.7	£36.0
Bus Revenue	-£37.6	-£37.6	-£37.6	-£37.6	-£37.6	-£37.6
Rail Revenue	£48.5	£48.5	£48.5	£48.5	£58.2	£58.2
Rail Operating Costs	-£119.3	-£119.3	-£107.4	-£119.3	-£119.3	-£107.4
Rail Subsidy	£70.8	£70.8	£58.9	£70.8	£61.1	£49.2
Other Externality Benefits	£16.5	£16.5	£16.5	£17.9	£16.5	£17.9
Indirect Tax	-£7.0	-£7.0	-£7.0	-£9.1	-£7.0	-£9.1
Total Benefits PVB	**£124.2**	**£124.2**	**£124.2**	**£127.7**	**£124.2**	**£127.7**
Ferry Subsidy	£3.5	£3.5	£3.5	£3.5	£3.5	£3.5
Investment Costs	£22.7	£17.0	£22.7	£22.7	£22.7	£17.0
Rail Subsidy	£70.8	£70.8	£58.9	£70.8	£61.1	£49.2
Total Costs PVC	**£97.0**	**£91.3**	**£85.1**	**£97.0**	**£87.3**	**£69.7**
Net present Value NPV	**£27.2**	**£32.8**	**£39.1**	**£30.7**	**£36.9**	**£58.0**
Benefits to Cost Ratio BCR	**1.28**	**1.36**	**1.46**	**1.32**	**1.42**	**1.83**

Note: Values in 2010 prices and values £million's

8.5 Option Values

Option values have been assessed as a sensitivity to the central case scenario, as advised by DfT in WebTAG. Option value is amount a household places on having a travel mode available to use in the event of their preferred mode not being available (i.e. if their car breaks down then they have a local rail service to use for the journey to Southampton). This benefit is separate from time saving benefits offered by the new service.

WebTAG provides an estimate per household of providing a new public transport service. Given the corridor is already well served by bus, and in the case of Hythe by a ferry service, the incremental change between the WebTAG values is assumed in the appraisal. The option values per household (in 2010 prices and values) are as below:

- Bus and train - £247
- Bus only - £135
- Increment for Appraisal - £112

The forecast number of households in the corridor, from the SRTM model is provided below

- 2010 – 10,995 households
- 2019 – 11,373 households
- 2026 – 11,504 households
- 2036 – 11,657 households

Over a 60 year appraisal period, the total benefits from option values of providing a rail service in the Waterside corridor is £41.4m (2010 prices and values). Adding the option values benefits to the wider benefits for the half hourly shuttle and Fareham options, generates BCR values of 1.44 and 1.71 respectively, compared to 0.66 and 1.28 previously. Hence, even with adding option values the case for the Waterside rail service is poor, and below the recommended value for money for DfT approval.

Table 26: Option Values Sensitivity Tests

PVB excluding OV	£34.9	£124.2
Option Value Benefits	£41.4	£41.4
PVB including OV	£76.2	£165.5
PVC	**£53.0**	**£97.0**
NPV	**£23.2**	**£68.5**
BCR	**1.44**	**1.71**

Note: Values in 2010 prices and values £million's

9 GRIP 2 to GRIP 3 – What's changed

9.1 Introduction

This section draws a parallel with the Grip 2 work undertaken in 2011.12. The first point to note is that in moving from the GRIP 2 stage gate in rail assessment to GRIP 3 the level of detail and application of appropriate resources increases significantly. Therefore any changes should not in general be read as a criticism of the previous work, but a recognition of the value additional investigation of the scheme can bring.

9.2 Process

There are a number of areas where additional investigation has been undertaken that has lead to changes to the original assumptions:

- Operational assessments – formal Railsys modelling undertaken;
- Infrastructure assessments – 2 day site assessments – detailed examination of signalling plans;
- Demand and economics – access to the TfSH model now available.

The outcomes of such detailed work lead to a number of changes in the engineering design, and also in the demand forecasting. Specific changes include:

- Operational assessment showed that there is no need to reinstate platform 5 at Southampton. It also identified that through running to Fareham or Chandlers Ford was problematic for the railway. The work confirmed that 45mph was the only sensible operational speed for rolling stock efficiency , and that a half hourly service would require a passing loop at Hounsdown;
- Infrastructure assessments showed that the quality of the existing track was not sufficient to operate the new service given the changed derogation of the track to category 4 as a result of the increased train mileage. The signalling work also showed that moving to 45mph required relocation of a number of signal heads and triggers on the route, and this does not seem to have been assumed in the GRIP2 works. Station works are similar.
- Demand work showed that the expectation was for a lower level of demand than originally assumed (though not significantly so). Perhaps more significant is that the source of the demand was shown to be largely from extraction of existing PT modes (bus and ferry) with knock on effects on requirements for local authority subsidy. A key issue though was the DfT confirmation that Option Values are not acceptable as central case benefits for

DfT funding – moreover they are only acceptable as a sensitivity under exceptional circumstances.[1]

9.3 Results

The result of such changes combine to produce the following impact on the business case for the scheme.

- Costs up around 40% - signalling and pway increases;
- Demand higher for half hourly shuttle (+10%) lower for hourly shuttle (25%);
- Option Values previously around 40% of scheme benefits – no longer included in central case.
- Central case BCR (half hourly shuttle) between 0.7 and 1.1
- Sensitivity with Option Value included takes BCR to 1.45. Note GRIP half hourly shuttle excluding Option Value had a BCR of 1.4

[1] "….we wouldn't tend to accept options values in the central case. I suspect the methodology would have to be well set out and justified to even accept them as a sensitivity" David Miller – DfT, Head of Rail Value for Money Assessment

10 Summary and Recommendations

10.1 General Points

There are a lot of positive findings from the assessment of the Waterside project. At face value we're able to procure a half hourly rail service on a previously passenger service free line, with three new stations for around £11m. Operationally the service appears to fit with the existing services with some retiming of services. The scheme has the added bonus of increasing the flexibility of the line for freight traffic by adding an additional signaller shift, thus doubling the operating period of the existing line.

The basic issue is that there does not appear to be enough inherent demand in the corridor to justify the scheme. There is a strong base market with bus services and ferry. Mode shift from car is not strong with 61% coming from existing PT modes, and only 8% being generated demand. It would appear therefore that provision of the rail option would be an over-supply of public transport options for the size of market available. Estimates suggest demand would need to more than double to achieve a BCR of around 2.0 and thus begin to attract investment from DfT and the wider rail industry. To achieve this would require either more inherent demand in the area (housing - employment) or greater mode shift from existing PT modes.

The Waterside area does appear to suffer from bottlenecks of the A33 and A35 as travellers move towards Southampton. A rail service would certainly alleviate that issue. But this does not appear to be sufficient to accommodate the associated operating costs of the service.

10.2 Next Steps

If the problem we are trying to address in developing the Waterside Rail Line is to improve the accessibility of the Waterside areas to Southampton and the wider region, and given the issues raised in the section above, it would appear that a sensible next step would be to undertake a brief review of alternative options to address this problem. That could be a public transport offering in the area to include any of the following:

- Bus and rail only (no ferry)
- Rail and ferry only (no subsidised bus)
- Bus and ferry (as today) with improved priority for bus services.
- Others?

It is recognised however that most of the above options would present significant public acceptability issues and these factors would need to be understood in developing any assessment.

Appendix A

Operational Feasibility – Timetabling Alterations

Appendix A Operational Feasibility – Timetabling Alterations

A.1 Option 2 – Half-hourly Southampton to Hythe Service

Some of the more significant passenger service retiming alterations:

- The 07.45 departure from Hythe conflicts with 1M30 (Bournemouth-MCR PIC) at Totton. RailSys shows 1M30 passing Totton station at 07.57 so the Waterside train needs to arrive at 08.00 at the earliest. It is unable to fit between 1M30 and 2M20 (they are only five and a half minutes apart).
  2M20 arrives 08.08 in SOTON and forms 2M97 departing at 08.23 so there is sufficient time to reduce the turn round. The 07.45 is rescheduled to depart at 07.46 with an 08.10 arrival in Southampton.

  The solution is to run the Waterside train later by giving Hounsdown a 3-minute dwell. It then runs behind 1M30 to Southampton but this in turn causes a conflict with 2M20 so this runs later from Redbridge by adding 2 minutes pathing after Romsey. It arrives in Southampton at 08.14 instead of 08.08 but this still leaves adequate time for it to form the 08.23 Southampton to Salisbury service 2M97.

- The 07.45 departure from Southampton conflicts with 5M34 Eastleigh TMD-Bournemouth (Cross Country ECS). 5M34 runs on the on the Down Fast at Millbrook and overtakes the Waterside train but by insufficient margin. This train cannot run earlier because of minimum turn round in Southampton. However, as 5M34 forms 1M34 in Bournemouth following 17 minute dwell in Middle Sidings, it should be able to arrive two minutes later without affecting the operation.

- The 09.45 departure from Southampton conflicts with 1W17 from Waterloo to Weymouth which passes Redbridge three and a half minutes after the Waterside train (headway value) but according to RailSys, it passes Totton only two minutes behind the Waterside stopping service.

  A solution is to add one minute of pathing time at Redbridge and this could be compensated for by reducing five minutes dwell at Bournemouth to four minutes. However, this is used as a passenger count point in this particular train. So the train operator would need to agree to this change. This situation also occurs on the following hour.

- The 10.17 departure from Hythe forming the 10.45 departure from Southampton are affected by the operation of a non-standard timed Romsey to Salisbury train 2S23. This particular train which runs in the XX.07 Romsey to XX.15 Salisbury path arrives at Salisbury at 11.22 rather than 11.15 due to a passenger count occurring in platform 3 at Southampton, resulting in a dwell time of nine and a half minutes (10.35-10.44½). This happens to directly coincide with the planned turn round of the 10.17 from Hythe arriving in Southampton platform 3 at 10.41. This train turns round in the minimum time and departs at 10.45, which is almost in the identical path to the later running 2S23.

The proposed solution to this is to allow 2S23 to depart after the normal two minutes dwell time so there is no interaction between the trains and provide pathing between Redbridge and Romsey so that it regains its path at Romsey for the run to Salisbury. This would require that the train operator undertook the passenger count either on the move or excluded this train from the list. However, this is likely to be a commercial requirement and would need to be agreed with the operator.

- The 11.45 departure from Southampton conflicts with 1O08 (Cross Country Manchester-Bournemouth) between Millbrook and Redbridge. If Waterside train dwell is increased at Millbrook to one minute to allow 1O08 to clear the Down Fast (three minutes separation at Redbridge), this then creates conflict between the Waterside train and the following 1W21 Waterloo-Weymouth. This has a five minutes dwell in Bournemouth so reducing this to three minutes and adding two minutes pathing at Redbridge keeps 1W21 a headway distance behind the Waterside train at Totton. However, the later running 1W21 causes headway conflict with 5B39 (Wimbledon Park-Bournemouth CSD ECS) which will have to run two minutes later to Branksome. This list of impacts clearly shows how altering the path of one train can have multiple knock on effects on other services.
- The 17.17 departure from Hythe conflicts with 2B62 Brockenhurst-Southampton (Arriving 17.41) between Totton and Southampton. 2B62 forms 5B62 to Northam depot so 2B62 either departs later from Brockenhurst or has three and a half minutes pathing added to arrive at Totton at 17.44. It still has nine minutes before 5B62 departs for Northam Depot.

The following list highlights some of the freight movements which are most affected by the operation of the new passenger service which would require retiming.

- 06.47 Hythe to Southampton conflicts with 6B41 (Tuesdays and Fridays Only) between Hounsdown and Totton Yard. The proposed solution is to recess 6B41 in Totton yard for 13 minutes and then again in Marchwood to permit the 07.17 Hythe to Southampton to cross here.
- Retiming of a light engine movement 0Y32 (Wednesday Only) required to avoid a conflict at Totton Yard with 06.44 Southampton to Hythe. It arrives in Fawley 12 minutes earlier than the current WTT.
- 6B41 Monday Only as planned would conflict with the 07.15 Southampton to Hythe train after Totton Yard. A solution would be to run this train in the same timings as the retimed Tuesdays and Fridays train described above.

However, some of the new passenger trains also introduce conflicts with freight trains on the main lines and these are outlined below.

- The 11.17 departure from Hythe conflicts with 6O41 (weekdays) from Westbury to Eastleigh Yard between Redbridge and Millbrook. If 6O41 can run two and a half minutes earlier the conflict is resolved. However, it then conflicts with 2R38 Salisbury to Romsey. 6O41 can run later after Redbridge with a stop in Southampton Up Goods Loop (or be given a lot of pathing time) and run to Eastleigh after 1E44, a Cross Country train from Southampton.
- The 14.47 from Hythe to Southampton Conflicts with 7V52 (weekdays) Hamworthy-Whatley Quarry between Totton and Southampton. 7V52 is three

and a half minutes behind the Waterside train at Totton (according to RailSys timings as Totton is not a mandatory timing point between Brockenhurst and Redbridge so there is no timing in the schedule). At Redbridge, 7V52 takes the US and catches up with the new passenger train which stops at Millbrook. The solution is to adjust pathing to ensure that the passenger train arrives in Southampton platform 2B before 7V52 crosses to the Up Main via platform 1 from the Up Slow.

Appendix B

Civil Engineering and Earthwork Cost Estimates

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Appendix B Civil Engineering and Earthworks Cost Estimates

Appendix C

Signalling Cost Estimates

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Appendix C Signalling Cost Estimates

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