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Technical Note – APPENDIX A

Project	TfGM Leigh Area Rail Study	Date	7 November 2011
Note	Rail Operations and Infrastructure	Ref	GLARSY001

1 Reference Data

1.1 The timetable and capacity analysis is based upon the current draft 2018 Northern Hub timetable as encapsulated by:

- Diagram: Northern Hub Possible Pattern: Infrastructure capability test 4A 23/08/2011 (henceforth the 'draft service pattern'
- Timetable: Manchester Hub – Option 2, (henceforth the 'draft timetable')

The Northern Hub timetable is still under development by Network Rail in co-operation with the train operators and PTEs, and will be subject to change. However, the basic timetable requirements for the Chat Moss route is clear, and it is this route which is of primary concern when considering providing rail service for Leigh, and in particular if a station is to be sited in the Pennington area, as it is the nearest main line to which the town can be connected.

2 Summary of Capacity Constraints

2.1 After Northern Hub works are completed the planning headway on the Chat Moss route will be three minutes. This will give a nominal capacity of 20 tph (trains per hour) each way on each line. However the natural variation in day to day performance requires some contingency; this effectively limits the reliably usable capacity to 80% of the nominal figure, in this case giving 16 tph net.

2.2 The draft service pattern shows the following utilisation levels on key sections of the Chat Moss line and relevant other infrastructure as follows:

- 10 tph Liverpool Lime Street – Olive Mount
- 12 tph Olive Mount – Huyton
- 8 tph Huyton – Earlestown
- 10 tph Earlestown – Newton-le-Willows
- 11 tph Newton-le-Willows – Port Salford
- 11 tph Port Salford – Ordsall Lane
- 7 tph Ordsall Lane – Ordsall Chord (south)
- 11 tph Ordsall Chord (south) – Deansgate
- 16 tph Deansgate – Manchester Piccadilly
- 7 tph Ordsall Lane – Salford Central
- 12 tph Salford Central – Manchester Victoria(includes four tph Deansgate – Ordsall Chord – Salford Central)

2.3 From the above we can see that the Deansgate – Piccadilly section is already planned to use post-Northern Hub capacity to the full, so additional trains serving Oxford Road and Piccadilly stations in Manchester is not feasible.

2.4 A significant number of services will cross one another at Ordsall Lane Junction. Therefore, while the new Ordsall Lane chord will enable capacity to be created in the terminus platforms at Piccadilly by routeing trains that currently reverse there via Salford Central and Victoria, it will add trains to the existing Ordsall Lane – Salford Central – Victoria corridor.

2.5 Ordsall Lane Junction has several nodes where movements potentially conflict. The busiest of these appears to be the node where the westbound Chat Moss route crosses the eastbound Bolton line, where 14 movements are expected per hour in two directions. This effectively creates the limit for addition of further trains, and means that only two additional trains per hour are likely ever to be feasible.

2.6 There is also potential for conflicts between trains on the Victoria bound Ordsall chord and trains on the eastbound Bolton line or eastbound Chat Moss line approaching Deansgate and Salford Central respectively.

2.7 This analysis assumes that all junctions are on the flat. However it should be noted that a degree of grade separation at Ordsall Lane has not been ruled out. At this stage the nature, extent or likelihood of any grade separation is not known and therefore it has been assumed that any additional services over and above those provided for by Northern Hub will have to operate within the constraints of flat junctions in the Ordsall Lane area.

2.8 Most Chat Moss services to Victoria use platforms three and 4 at Victoria, however one or two services use the Bolton / Atherton side of the station, platforms 5 and 6. It is not known which platforms the Bolton and Atherton line services use however it is likely that they will predominantly use platforms 5 and six however there will still be some interaction between the two service groups at Deal Street Junction.

2.9 In the draft timetable, off peak services to and from Blackpool North are platformed in platform eight. This is the only service to use this and it implies that platform eight is a west facing bay. Its exact position in the station is unknown.

3 Timetable Data Issues

3.1 The Network Rail draft timetable is incomplete in that the draft service pattern shows three trains per hour per direction traversing Ordsall Lane Junction from Deansgate to Salford Crescent; these services are omitted from the draft timetable. As a result Ordsall Lane junction will be more restricted than indicated and could invalidate identified paths.

3.2 Also omitted from the timetable are Atherton / Bolton line services, whilst these services to not affect the Chat Moss line directly they will use platform capacity at Manchester Victoria and this must be borne in mind when adding extra services.

3.3 The draft service pattern indicates 1 freight path per hour per direction on the Chat Moss line through Victoria. The draft timetable contains two freight services per hour in the west bound direction and only one in the east bound direction. It has been assumed that there are in fact two west bound freight services per hour, the missing service using the appropriate gap in the timetable offset half an hour from the included service.

3.4 There are conflicts inherent in the timetable at Ordsall Lane Junction and Parkside Junction. In addition there are apparent conflicts between services from Victoria to the Chat Moss line, which are timed at Ordsall Lane Junction and Victoria bound services on the Ordsall Chord which are timed at Ordsall Lane East Junction. These conflicts imply that the timetable has not been verified.

4 Pennington – Manchester Victoria Service

4.1 A short branch approximately one and a half miles long would leave the Chat Moss line at an eastwards facing junction approximately seven and a quarter miles west of Patricroft station, known here as Kenyon East Junction. Note: this is approximately half a mile east of the site of former Kenyon Junction which was westward facing.

4.2 Two additional services to Victoria should be feasible over Ordsall Lane Junction. The level of utilisation on plain line sections of the Chat Moss line will be within the 80% value of the lines capacity at 13 tph. Putting an east facing connection with Pennington trains crossing the main line to access the branch, will effectively increase utilisation to 15-16 tph, the robust maximum.

4.3 In the draft timetable two paths per hour have been identified between Kenyon East Junction and Victoria allowing services from Pennington to Victoria, these are shown below in bold in an indicative schedule:

Eastbound	Class	185	**319**	185	350		185	**319**	185	350
	From	LIV	**PEN**	MIA	BPN		LIV	**PEN**	MIA	GLC
	To	SCA	**MCV**	NCL	MCV		SCA	**MCV**	NCL	MAN
	Notes				PEAK?					
Parkside Junction	pass	15			25 ½		45			55 ½
Pennington	dep		**17** ½					**47** ½		
Eccles	dep	23 ½	**27** ½		35 ½		53 ½	**57**		05 ½
Ordsall Lane Junction	pass	28	**32**		40 ½		58	**02**		10 ½
Ordsall Lane East Junction	pass			40 ½					10 ½	
Salford Central	dep	30 ½	**34** ½	41 ½	45 ½		00 ½	**04** ½	11 ½	
Victoria	arr	33 ½	**37** ½	45	48		03 ½	**07** ½	15	

4.4 Between Victoria and Kenyon East Junction there is no space for valid paths in the draft timetable. The following indicative schedule shows how the best candidate paths can be validated by re-timing surrounding services. See the explanatory notes below as to the required re-timings.

Westbound	Class	175	**319**	185	185		175	**319**	185	185
	From	LDS	**MCV**	LDS	HUL		LDS	**MCV**	LDS	SCA
	To	CTR	**PEN**	MIA	LIV		LLD	**PEN**	MIA	LIV
	Notes	*		+			*		+	
Victoria	dep	21	**24**	26	30		51	**54**	56	00
Salford Central	dep	24	**27**	29	33		54	**57**	59	03
Ordsall Lane East Junction	pass			29 ½	34 ½				59 ½	04 ½
Ordsall Lane Junction	pass	25 ½	**28 ½**				55 ½	**58 ½**		
Eccles	dep	31	**34**		37 ½		01	**04**		07 ½
Pennington	Arr		**45 ½**					**15 ½**		
Parkside Junction	pass	40 ½			46		10 ½			16

*** Departs Victoria 1 minute earlier than in the draft timetable, back on Schedule by Parkside junction**

+ Departs Victoria 1 minute later than in the draft timetable

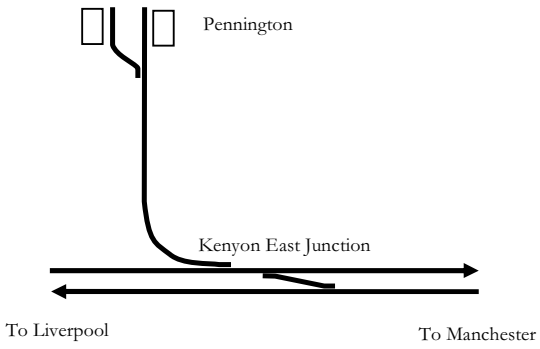
4.5 Timings on the main line section are derived from timings in the draft timetable such that the new services can keep pace with the preceding service. On the branch two and one half minutes have been allowed to travel from Pennington to the junction in either direction. This equates to an average speed of 36 mph.

4.6 The round trip time in the above schedules from Victoria to Pennington, including the likely trip needed to turn back at Victoria via Newton Heath TMD is one hour and 32 minutes and 30 seconds; therefore a single unit can only depart from Victoria every two hours thus requiring four units to cover a two tph service.

4.7 There is no platform capacity on platforms three -six of Victoria station. Only if the putative westward facing bay, platform eight as used by Preston services in the draft timetable, is provided can this service operate and then only once an hour in the off peak.

4.8 There is already a greater number of services proposed to the west of Victoria than to the east therefore the service would likely be a self contained shuttle. It is unlikely there will be other electric services terminating at Victoria this service could interwork with so as to achieve operating economies.

4.9 The following diagram illustrates the minimum infrastructure requirements for this option. It shows a single track branch and a single lead junction



4.10 The indicative schedule above features a 32 minute layover At Pennington, this is enforced by the availability of paths on the Chat Moss line leaving two and a half minutes margin between an arrival and the next departure which is below the four minutes minimum required in 2012 North Western Rules of the Plan (RotP). The consequence is the requirement for two platform faces at Pennington; in the diagram this is shown as two physical platforms but could instead be a single island platform.

4.11 The long layover could be used as a performance buffer, however with the single track arrangement a delayed arrival at Pennington could delay the next outbound service, to take full advantage of the layover in this fashion would require the branch to be double tracked and possibly require a double junction arrangement at Kenyon East.

4.12 It is feasible in the draft timetable to allow the Leeds to Chester services to depart one minute earlier from Victoria, this may not be acceptable as the resultant dwell would breach the minimum dwell value for Victoria which is two minutes in the 2012 RotP.

4.13 Also in the draft timetable it is feasible to allow the Leeds to Manchester Airport trains to depart one minute later from Victoria than in the draft timetable, however this may cause conflicts with services on the Deansgate to Piccadilly corridor. It is unknown at this time whether there would be a conflict and whether it would be resolvable.

4.14 Junction clearances at Kenyon East Junction and Ordsall Lane junction have been checked. All newly introduced junction clearances are three minutes.

4.15 Option Summary:

- Paths have been identified for a two tph service between Victoria and Pennington.
- Some minor re-timing of other services is required in the west bound direction which may result in timetable planning rule violations and conflicts on the Deansgate – Piccadilly corridor.
- Two tph requires three units and crews for a stand alone operation.
- There is no platform capacity on platforms three to six at Victoria even when the trains turn back via Newton Heath TMD. If a west facing bay is provided the service could run once per hour in the off peak.

5 Warrington Bank Quay – Pennington – Victoria Services

5.1 This scenario envisages two additional trains per hour per direction between Warrington Bank Quay and Victoria running via Earlestown and a reversal at Pennington.

5.2 This scenario requires two junctions on the Chat Moss line: Kenyon East Junction facing east, as identified for the Pennington – Victoria option, and a west facing junction at the original site of Kenyon Junction, henceforth known as Kenyon West Junction.

5.3 This option has the advantage of connecting Leigh to the West Coast Main Line at Warrington, as well as to Manchester. It could also relieve capacity on the Chester and North Wales services.

5.4 On the West Coast Main Line, four minute headways, a four track main line and only two tph running between Bank Quay and Earlestown with two tph express passenger and some freight trains on the West Coast Main Line means that additional trains here would not be a major issue.

5.5 However eastbound trains would have to cross the westbound Chat Moss line at Earlestown and westbound trains would have to cross the eastbound Chat Moss line twice at the Kenyon junctions. However, this still brings capacity utilisation up towards the limits at an equivalent of 15-16 tph rather than beyond it.

5.6 Two paths per hour per direction have been identified between Pennington and Warrington Bank Quay; the previously identified paths between Pennington and Victoria are re-used. The following table shows an indicative eastbound schedule. Note that arrivals are three minutes after departures necessitating a 27 minute layover in the station.

Eastbound	Class	185	**319**	185	185	**319**	FRT	185		185	**319**	185	185	**319**	FRT	185
	From	LIV	**WBQ**	MIA	LIV	**WBQ**	ARP	MIA		LIV	**WBQ**	MIA	LIV	**WBQ**	ARP	MIA
	To	LDS	**MCV**	LDS	SCA	**MCV**	IMM	NCL		LDS	**MCV**	LDS	HUL	**MCV**	IMM	MBR
	notes															
Warrington Bank Quay	dep		**59**								**29**					
Earlestown	dep	02	**07**		14		17			32	**37**		44		47	
Newton-le-Willows	dep	04	**09½**		14½		19½			34	**39 ½**		44½		49½	
Parkside Junction	pass	05½	**11**		15		22			35½	**41**		45		52	
Pennington	arr		**15**			**<B**					**45**			**<A**		
Pennington	dep		**A>**			**12**					**B>**			**42**		
Eccles	dep	15½			23½	**27½**	32			45½			53½	**57½**	02	
Ordsall Lane Junction	pass	20½			28	**32**	37½			50½			58	**02**	07½	
Ordsall Lane East Junction	pass			25½				40½				55½				10½
Salford Central	dep	23		27½	30½	**34½**	39½	41½		53		57½	00½	**04½**	09½	11½
Victoria	arr	25		29½	33½	**36½**	42½	45		55		59½	03½	**06½**	12½	14½

5.7 The following table shows an indicative westbound schedule. As for the Pennington only option the new paths require re-timing of some services, see the notes following the table.

Westbound	Class	175	**319**	185	185	319	FRT	**319**	185		175	**319**	185	185	319	FRT	**319**	185
	From	LDS	**MCV**	LDS	HUL	MIA	IMM	**MCV**	LDS		LDS	**MCV**	LDS	SCA	MIA	IMM	**MCV**	LDS
	To	CTR	**WBQ**	MIA	LIV	LIV	ARP	**WBQ**	LIV		LLD	**PEN**	MIA	LIV	LIV	ARP	**WBQ**	LIV
	notes	-1		+1							-1		+1					
Victoria	dep	21	**24**	26	30		33		45		51	**54**	56	00		03		15
Salford Central	dep	24	**27**	29	33		36		48		54	**57**	59	03		06		18
Ordsall Lane East Junction	pass			29½	34½								59½	04½				
Ordsall Lane Junction	pass	25½	**28½**			37½	40½		49½		55½	**58½**			07½	10½		19½
Eccles	dep	31	**34**		37½	41½	44		52½		01	**04**		07½	11½	14		22½
Pennington	arr		**48**					**<<<**				**18**					**<<<**	
Pennington	dep		**>>>**					**52**				**>>>**					**22**	
Parkside Junction	pass	39½			46	50		**56**	01		09½			16	20		**26**	31
Newton-le-Willows	dep	42½			47	51½	55	**58½**	03						21½	25	**28½**	33
Earlestown	dep	46			48	54½	00	**03**	04						24½	29	**33**	34
Warrington Bank Quay	arr	?						**10**									**40**	

*** Departs Victoria 1 minute earlier than in the draft timetable, back on Schedule by Parkside junction**

+ Departs Victoria 1 minute later than in the draft timetable

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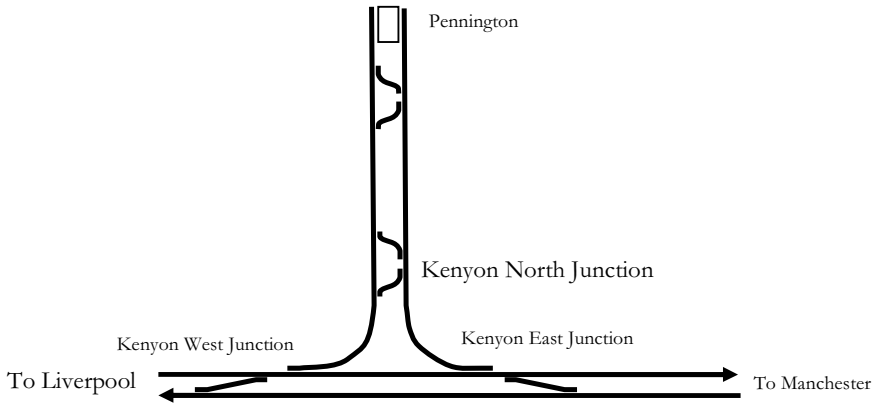
5.8 The following diagram illustrates the minimum infrastructure requirements for this option. It shows a double track branch between Pennington and Kenyon North Junction where single track chords diverged to single lead junctions at Kenyon East and Kenyon West. The double track arrangement is imposed by the paths available on the main line; with favourable paths the branch could be singled, saving five turnouts.



5.9 The reversal times for eastbound services of 27 minutes is imposed by the availability of paths on the main line and the need for a significant amount of pathing on the branch to avoid platform end conflicts.

5.10 Again running times on the main line between Victoria and Earlestown are such that the new service can keep pace with the preceding service. Between Earlestown and Warrington Bank Quay timings taken from the current working timetable (December 2011) have been used, these are for class 175 DMUs and it is assumed that the class 319 can match these. On the branch two and a half minutes are allowed for the run between the Chat Moss line and Pennington. Half a minute is provided between each Kenyon Junction.

5.11 The round trip time from Victoria to Warrington and back, including the likely necessity to shunt between platforms via Newton Heath TMD is two hours 32 minutes and 30 seconds. A single unit can make a departure from Victoria every three hours thus requiring a total of six units to cover a two tph service.

5.12 Junction clearances have been checked at Earlestown, Parkside Junction, Kenyon Junctions and Ordsall Lane Junction.

5.13 Victoria to Warrington Bank Quay services cross the east bound Chat Moss two and a half minutes in front of a Glasgow Central to Victoria and Blackpool North to Victoria service in each hour. All other newly introduced junction clearances are at least three minutes for Kenyon junctions and at least the current junction margins for other locations.

5.14 There is no platform capacity on platforms three -six of Victoria station. Only if the putative westward facing bay is provided can this service operate and then only at two tph off peak.

5.15 Option Summary:

- Paths have been identified for a service that runs between Victoria and Warrington Bank Quay via a reversal at Pennington.
- Some minor re-timing of other services is required in the west bound direction which may result in timetable planning rule violations and conflicts on the Deansgate – Piccadilly corridor.
- Journey time in the west bound direction is 46 minutes
- Journey time in the east bound direction is one hour and seven minutes and 30 seconds.
- The turn around time at Pennington in the west bound direction is four minutes
- The turn around time in the eastbound direction is excessive at 32½ minutes.
- Some minor re-timing is required of other services.
- Six units and crews would be required for a stand alone operation.
- Not an attractive through service in the eastbound direction.

6 Additional Through Liverpool – Victoria Services

6.1 This scenario envisages two additional trains per hour calling at a station located on the Chat Moss Line between the site of former Kenyon Junction and the former site of Glazebury station.

6.2 This option was ruled out at an early stage for the same reasons as the additional Liverpool – Pennington – Victoria services see section **Error! Reference source not found.**.

7 Additional through Warrington Bank Quay to Victoria service

7.1 This scenario envisages two additional trains per hour calling at a station located on the Chat Moss Line between the site of former Kenyon Junction and the former site of Glazebury station.

7.2 In the draft timetable there is no space for these paths through the Chat Moss corridor there are gaps at either end but not so that they form a continuous space thus this option was ruled out at an early stage

8 Additional Calls in Existing Chat Moss services

8.1 This would provide a two tph service per direction between a new station on the Chat Moss line and Manchester Victoria or Piccadilly.

8.2 The new station would be positioned between the former site of Kenyon Junction and the former site of Glazebury station (inclusive).

8.3 The fast Manchester – Liverpool and Manchester – Scotland services cannot be stopped as they are specified with constrained journey times.

8.4 Services that can potentially serve a new Chat Moss station are:

- Leeds – Victoria – Chester and beyond.
- Slow Manchester Airport – Liverpool
- Peak only, hourly, Preston and beyond to Victoria
- Semi-fast Leeds – Victoria – Liverpool

8.5 To stop a train at a station, dwell and then re-start incurs a penalty of between two and three minutes over the time taken to simply pass through the station at speed. Thus an additional stop in a service will extend the journey time by the same amount and require it to either run early before the stop or run later after the stop or some of both.

8.6 A surplus in headway around the candidate service of two and a half to three minutes is required i.e. the candidate service must run in excess of the minimum headway behind the train in front and the following service must run in excess of the minimum headway behind the candidate train such that the sum of the excesses can accommodate the time penalty incurred by stopping the candidate service.

8.7 If sufficient time around the train is not available then surrounding services may be re-timed to create that time if they in turn have excess time to move into.

8.8 Re-timing a train over a junction may result in a junction conflict with other services running in the opposite direction.

8.9 Westbound services to Chester and beyond can accommodate an extra stop at a Chat Moss station twice every hour; they can pass Parkside Junction tow and a half minutes later than scheduled and maintain the minimum headway in front of the following fast service to Liverpool, to maintain this headway the stop at Newton-le-Willows must be removed so that the arrival times at Earlestown of the Chester bound services is maintained.

8.10 Eastbound services from Chester and beyond can accommodate an extra stop at a Chat Moss station once an hour in the off peak: Alternate services cannot pass Parkside junction any earlier as they follow a constraining Scotland service, in the other half an hour the same path is occupied by a peak only Preston and beyond service which could be timed to pass Parkside junction earlier than proposed and thus make space for an extra stop in the Chester service. Note: Re-timing the Preston service would be subject to the constraints on the remainder of its route, principally the West Coast Main Line.

8.11 Westbound slow services to Liverpool can accommodate an extra stop at a Chat Moss station twice per hour; this requires the re-timing of the following Immingham – Arpley freight and Liverpool semi-fast service.

8.12 Eastbound slow services from Liverpool can accommodate an extra stop at a Chat Moss station twice per hour; this requires the re-timing of a Chester service earlier by half a minute at Earlestown and a two minute later arrival into Piccadilly.

8.13 Westbound semi-fast services to Liverpool can only accommodate an extra stop at a Chat Moss station once an hour; alternate services are constrained by a following Scotland service, in the other half of the hour the path is occupied by a Preston service which along with the following Immingham to Arpley freight and slow Liverpool service must be retimed.

8.14 Eastbound semi-fast services from Liverpool can accommodate an extra stop at a Chat Moss station twice an hour by removing two minutes of pathing allowance from the schedule and arriving one minute later into Victoria.

8.15 Westbound, hourly, peak hour only, Preston services can accommodate a stop at a Chat Moss station subject to the constraints of the rest of their route beyond Parkside Junction, principally the West Coast Main Line where to the north of Preston the mix of express and heavy freight trains means there is little timetable flexibility.

8.16 Eastbound, hourly, peak hour only, services from Preston can accommodate a stop at a Chat Moss station by joining the Chat Moss line at Parkside junction three minutes earlier; this is again subject to constraints on the West Coast Main Line.

8.17 Without access to any provisional rolling stock diagrams (and we understand none have been drawn up) it is not possible to assess the impact on vehicle requirements.

9 Impact of new and altered services on access to the Port Salford development

9.1 It has been assumed that the line to the Port Salford development makes a flat triangular junction with the Chat Moss line between the over bridges carrying the M62 and M60 motorways. This places the junction approximately half way between Eccles station and Astley Signal box.

9.2 There is potential for conflicts at this junction between freights on the half hourly, eastbound Arpley to Immingham paths leaving or joining the Chat Moss and westbound services on the Chat Moss line.

9.3 In the draft timetable as it stands it is estimated that an eastbound freight would cross the west bound Chat Moss line four minutes in front of Chester services and two minutes after the Scotland or Preston service, depending on the half hour.

9.4 In the Victoria – Pennington and Victoria – Pennington – Warrington option it was assumed that the Chester service would run one minute earlier reducing the margin with eastbound freights at the Port Salford junction to three minutes which is still acceptable.

In these options the Victoria to Pennington path follows the Chester service and will not conflict with the eastbound freight.

9.5 When inserting an extra stop into westbound Chester services, these will pass the junction site no more than one minute earlier than currently scheduled, maintaining a three minute junction margin.

9.6 Inserting an extra stop into the westbound slow Liverpool services does not affect the junction clearance of eastbound freight services.

9.7 Although inserting an extra stop into the westbound semi-fast Liverpool services requires re-timing of the Victoria – Blackpool North, peak, service it would not affect the junction margins at the freight junction.

9.8 If the Victoria to Blackpool North peak service were re-timed to accommodate an extra stop it would not affect the junction clearance at the freight junction.

9.9 The eastbound freight path follows the fast Liverpool – Victoria service on the Chat Moss and is constrained by it so that it cannot run earlier, none of the options considered alter its schedule.

10 Potential Benefits of loops at a Chat Moss line station

10.1 The provision of loops at a Chat Moss line station with the platforms situated on them would mitigate the lack of contiguous paths through the corridor by providing an opportunity for non stopping services to overtake.

10.2 The main line paths identified for the Victoria – Pennington – Warrington option could instead of reversing at Pennington could be linked at the Chat Moss station. The services that previously prevented a new through service would overtake whilst the new services waited in the loops. The new service could then continue on its journey.

10.3 The journey time from Victoria to Warrington would be reduced by half an hour in the above scenario as an arrival at the Chat Moss station would connect to the next path rather than the next but one path.

10.4 The dwells would be approximately 10 minutes in the westbound direction and 5 in the eastbound direction.

10.5 If such a station were included in the planning process for the next iteration of the draft timetable it may be that the added flexibility it would provide could result in quicker end to end journey times with a consequent fall in operating costs.

11 Conclusions

11.1 Analysis of various options against the draft timetable shows that the addition of a new service or additional stops in existing services is constrained by:

- the mix of fast and stopping passenger services and freight services on the Chat Moss Line
- the immovable express services on the Chat Moss Line
- the inflexibility of some WCML timings of services that use the Chat Moss Line-

11.2 The draft service pattern shows that the Deansgate – Piccadilly corridor is already at capacity ruling out services to and from Piccadilly or Oxford Road.

11.3 The draft timetable reveals that much of the increase in capacity provided by four-tracking between Huyton Junction and Roby is utilised by fast and semi-fast Manchester – Liverpool services overtaking slow Wigan – Liverpool and slow Manchester Liverpool services, this in conjunction with the provision of freight paths in each direction between Manchester Victoria and Earlestown and Earlestown and Olive Mount Junction effectively rules out additional direct services between Manchester and Liverpool or Manchester and Warrington Bank Quay.

11.4 Potential Paths have been identified for the inclusion in the draft timetable of two trains per hour per direction between Manchester Victoria and a new Pennington station situated on a branch. These paths are subject to the acceptance of minor re-timings to two services per westbound path which may not be possible.

11.5 Crucially there is no capacity at Victoria on platforms three - six for these paths. If a single west facing bay is provided, as implied by the draft timetable then this service can operate as two tph in the off peak and 1 tph in the peak. two tph in the peak would require another west facing bay at Victoria which may or may not be possible.

11.6 The Victoria – Pennington paths do not provide for optimal use of stock or crews due to the long layover at Pennington they enforce. Another consequence of the long layover is the need for two platform faces at Pennington, although the branch and junction on the Chat Moss line needs only to be single track.

11.7 Additional paths from Warrington Bank Quay to Pennington have been identified enabling a Warrington Bank Quay – Victoria service via a reversal at Pennington. Unfortunately the paths are not favourably distributed and result in an extended dwell time at Pennington in the westbound direction of approximately ~30 minutes. This results in extended journey times of over an hour and does not provide attractive through journeys. The constrained nature of the paths requires two platform faces and a double track branch, although both junctions on the Chat Moss line are single lead.

11.8 Again platform capacity at Victoria is an issue see section 11.5 above.

11.9 Of the services that it is permissible to re-time it is possible to insert additional stops at a Chat Moss station twice an hour into in to:

- Westbound Chester services
- East and Westbound slow Liverpool services
- Eastbound semi fast Liverpool services

Of the services that it is permissible to re-time it is possible to insert an additional stop at a Chat Moss station once per hour in the off peak in to:

- Eastbound Chester services
- Westbound semi-fast services

11.10 Additionally the hourly peak only Preston services can accommodate an additional stop at a Chat Moss station in both directions.

11.11 To attempt to improve the viability of each of the three options considered in detail here it would be necessary to include them as a requirement in future iterations of the Northern Hub timetable, a better distribution of paths for the additional service options would improve the utilisation of stock and crews and in the case of the Warrington Bank Quay service would improve the attractiveness of through journeys.

11.12 None of the developed options prejudice access to the proposed Port Salford development from the Chat Moss line.

11.13 'Off line' loop platforms would allow the partial paths found at each end of the Victoria – Parkside corridor to be joined up with better eastbound journey times and stock utilisation than for the Victoria – Pennington – Warrington option.

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Technical note – APPENDIX B

Project	Leigh Area Rail Study	**Date**	7th October 2011
Note	Census 2001 Data Analysis	**Ref**	GLARSY

1 Introduction

1.1 The purpose of this technical note is to present the analysis of the population of the Leigh study area undertaken for the Leigh Area Rail Study and outline any assumptions made in producing it. Station usage and mode share data is also included within the analysis.

1.2 There are eight tables and two figures of interest in this technical note which were first presented at the progress meeting for the study on the 30th September 2011. The meeting was held at the Life Centre in Wigan and was attended by representatives of TfGM, Wigan Council, Warrington Council and Halcrow.

1.3 Responding to the request from TfGM and Wigan Council at the meeting, Halcrow has provided some additional analysis in the tables and figures to extend the coverage of the area of analysis to Runcorn, Salford Quays/Trafford and Warrington.

1.4 The technical note is divided into four sections, which are as follows:

- Introduction
- Catchment Area
- Mode Share
- Station Usage

2 Catchment Area

2.1 The number of people living within a likely catchment of each of the new station options has been established, alongside how many of these people work within the likely catchment of a station that could be served by a new Leigh station. The figures have been taken from Census 2001 journey to work data and assumes the following:

- Population lives within a likely catchment area of a proposed Leigh station (e.g. Glazebury)

- Population must also travel to work at a destination which is within a 1km radius of possible end stations (e.g. Newton-le-Willows), with the exception of Liverpool and Manchester City Centres which have been expanded to take into account better modes of interchange e.g. Metrolink.
- The population is split into four distance bands from each option.
- Regardless of mode of transport used at present, the population is all thought to be a potential train user.
- The figures represent historic journeys to work and should not be mistaken as a demand forecast. However, it may be useful in understanding future demand and benefits derived for the study.
- The total population is the same for each option as the population is assumed to live within the same overall study area boundary. Only the figures within each distance band will change.

2.2 Tables 2.1 – 2.4 demonstrate the population by distance of living from each proposed station option and who work within the catchment of a possible station served by a new station at Leigh. This is assumed to form a potential market for rail if the station was to be constructed.

Table 2.1 - Population Catchment Working Outside of Leigh Area: Pennington Station (Journeys to Work per Day)

Distance From Station	All	Home	Underground	Train	Bus	Taxi	Car Driver	Car Passenger	Motorcycle	Bicycle	Walk	Other
Less than 1km	167	0	0	15	15	0	134	3	0	0	0	0
Between 1km and 2km	436	0	0	24	75	0	280	45	6	6	0	0
Between 2km and 5km	2,077	0	3	153	189	0	1,561	123	30	6	12	0
Greater than 5km	115	0	0	6	12	0	88	3	6	0	0	0
Total	**2,795**	**0**	**3**	**198**	**291**	**0**	**2,063**	**174**	**42**	**12**	**12**	**0**

Table 2.2 - Population Catchment Working Outside of Leigh Area: East of Kenyon Station (Journeys to Work per Day)

Distance From Station	All	Home	Underground	Train	Bus	Taxi	Car Driver	Car Passenger	Motorcycle	Bicycle	Walk	Other
Less than 1km	46	0	0	0	0	0	43	3	0	0	0	0
Between 1km and 2km	563	0	3	63	51	0	416	12	12	3	3	0
Between 2km and 5km	1,638	0	0	99	159	0	1,224	120	18	9	9	0
Greater than 5km	548	0	0	36	81	0	380	39	12	0	0	0
Total	**2,795**	**0**	**3**	**198**	**291**	**0**	**2,063**	**174**	**42**	**12**	**12**	**0**

Table 2.3 - Population Catchment Working Outside of Leigh Area: North of Culcheth Station (Journeys to Work per Day)

Distance From Station	All	Home	Underground	Train	Bus	Taxi	Car Driver	Car Passenger	Motorcycle	Bicycle	Walk	Other
Less than 1km	100	0	3	6	9	0	76	3	3	0	0	0
Between 1km and 2km	435	0	0	45	30	0	327	24	0	3	6	0
Between 2km and 5km	1,975	0	0	123	225	0	1,459	120	33	9	6	0

Greater than 5km	285	0	0	24	27	0	201	27	6	0	0	0
Total	**2,795**	**0**	**3**	**198**	**291**	**0**	**2,063**	**174**	**42**	**12**	**12**	**0**

Table 2.4 - Population Catchment Working Outside of Leigh Area: Glazebury Station (Journeys to Work per Day)

Distance From Station	All	Home	Underground	Train	Bus	Taxi	Car Driver	Car Passenger	Motorcycle	Bicycle	Walk	Other
Less than 1km	51	0	0	6	3	0	39	0	3	0	0	0
Between 1km and 2km	49	0	0	0	3	0	43	3	0	0	0	0
Between 2km and 5km	1,742	0	3	114	228	0	1,229	126	21	12	9	0
Greater than 5km	953	0	0	78	57	0	752	45	18	0	3	0
Total	**2,795**	**0**	**3**	**198**	**291**	**0**	**2,063**	**174**	**42**	**12**	**12**	**0**

2.3 It is clear that there are a low number of trips in the journey to work data from the Leigh study area to a destination which may be served by a future rail service. Particularly, there are very few rail trips, which is perhaps understandable given that Leigh does not currently have a rail station and therefore using rail would require an interchange journey to another station outside of the town.

2.4 Additionally, the levels of people living within a typical walking catchment (assumed to be 1km in this analysis) of the proposed options are very low and emphasise the need for provision of either park & ride or public transport interchange.

2.5 Table 2.5 demonstrates the population within the Leigh study area in terms of

- Working within the potential catchment of a served rail station outside of the Leigh study area (Destination: Catchment)
- Working within the Leigh study area (Destination: Leigh)
- All work trips (Destination: All).

Table 2.5: Comparison of Leigh Journey to Work Trip Destinations (Journeys to Work per Day)

Origin	Destination	Total	Home	Underground	Train	Bus	Taxi	Car Driver	Car Passenger	Motorcycle	Bicycle	Walk	Other
Leigh	Catchment	**2,795**	0	3	198	291	0	2,063	174	42	12	12	0
Leigh	Leigh	**16,506**	2,840	3	24	1,098	90	7,037	1,393	87	509	3,398	27
Leigh	All	**36,629**	2,840	9	354	2,466	135	23,113	2,773	312	746	3,797	84

2.6 The total number of journey to work trips from the Leigh study area to possible stations served is fairly low in comparison to the overall numbers of journey to work trips. The proportion is 7.6% (2,795 people). A total of 45.1% (16,506 people) of journey to work trips are internal to the Leigh study area and are unlikely to use a new station at Leigh in anything more than small numbers. The remaining 17,328 work in areas that are unlikely to be served by a new rail station at Leigh.

3 Mode Share

3.1 The destination of the journey to work trips from the Leigh study area has been analysed. The mode share for these trips has also been summarised. The assumptions used are the same as referenced in Section 2: Catchment Area.

3.2 In order to provide a comparison against regional trends, the mode shares for Wigan and Greater Manchester overall have also been analysed again using Census 2001 data.

3.3 Mode share is presented in table 2.6, underneath the Census 2001 journey to work trips by destinations that are likely to be served by a Leigh station. The destinations are presented in nine groupings e.g. Central Manchester.

Table 3.1: Destination of Leigh Study Area Trips

To	All	Home	Underground	Train	Bus	Taxi	Car Driver	Car Passenger	Motorcycle	Bicycle	Walk	Other
Central Liverpool	174	0	0	15	3	0	147	6	3	0	0	0
Central Manchester	1,253	0	0	180	210	0	749	87	18	3	6	0
Eccles	196	0	0	0	0	0	181	15	0	0	0	0
East Liverpool	30	0	0	0	0	0	30	0	0	0	0	0
Newton-le-Willows	228	0	0	0	9	0	192	18	0	6	3	0
Runcorn	21	0	0	0	0	0	21	0	0	0	0	0
v	195	0	0	0	6	0	174	12	3	0	0	0
St. Helens	75	0	0	0	0	0	69	6	0	0	0	0
Warrington	623	0	3	3	63	0	500	30	18	3	3	0
Total	**2,795**	**0**	**3**	**198**	**291**	**0**	**2,063**	**174**	**42**	**12**	**12**	**0**
Mode Share	**100.0%**	**0.0%**	**0.1%**	**7.1%**	**10.4%**	**0.0%**	**73.8%**	**6.2%**	**1.5%**	**0.4%**	**0.4%**	**0.0%**

3.4 The majority of trips from the Leigh study area are travelling to Central Manchester and Warrington with a total of 1,876, which is 67.1% of the total demand travelling from the catchment and to the potential destinations served by rail. Overall mode share is heavily skewed towards car, with 80% relying on car to travel to work – 73.8% car driver plus 6.2% car passenger.

3.5 The mode share of car relative to public transport to various wards served by a potential station in Leigh is summarised in figures 3.1 – 3.2. Figure 3.1 demonstrates the absolute values of car and public transport numbers of journeys to work, whereas figure 3.2 provides the percentage splits of car and public transport journeys to work. Each of the two figures provides the information at ward level to improve presentation.

Figure 3.1: Absolute Trips from Leigh Study Area to Destinations Potentially Served by Rail (Journeys to Work by Ward)

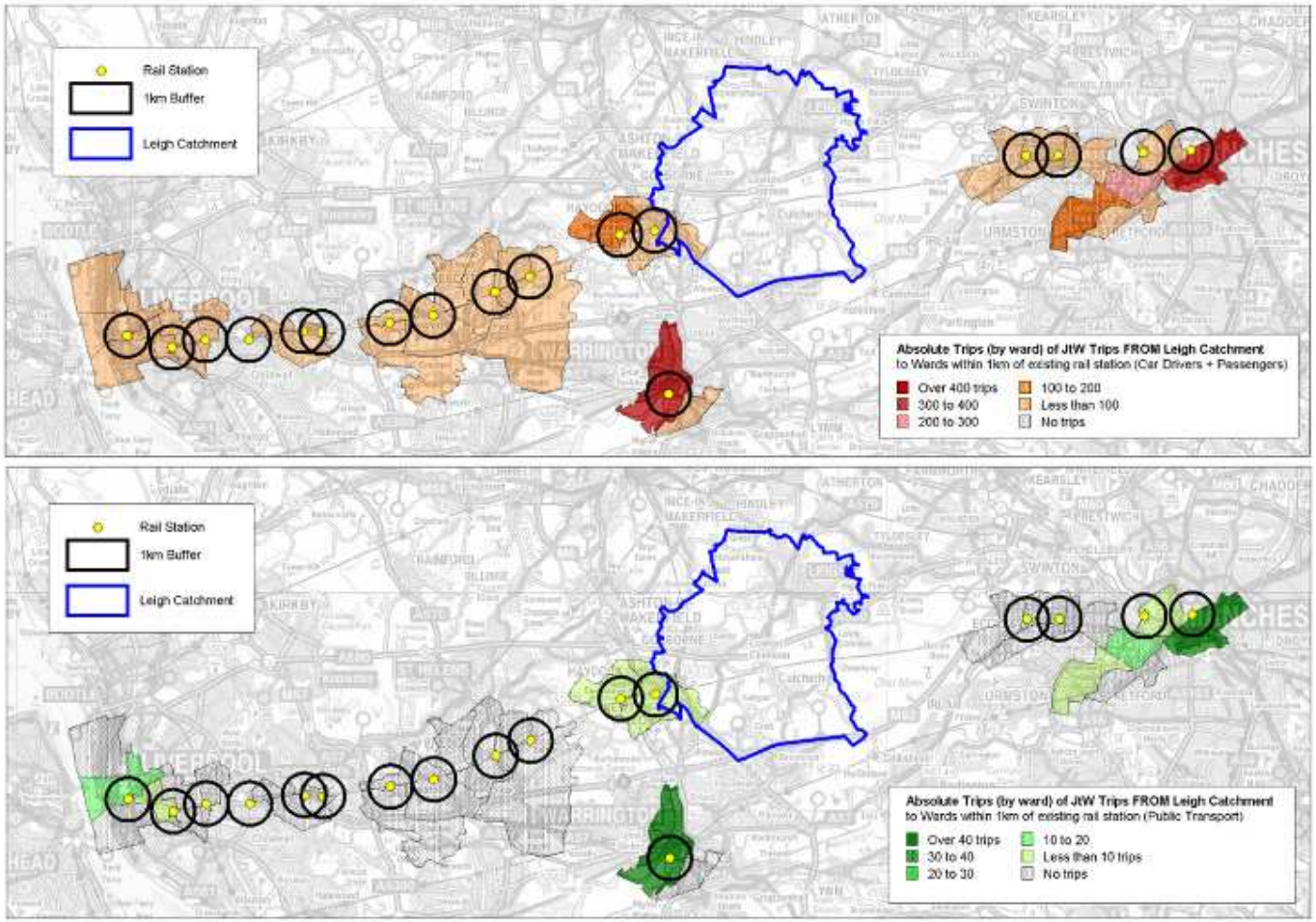
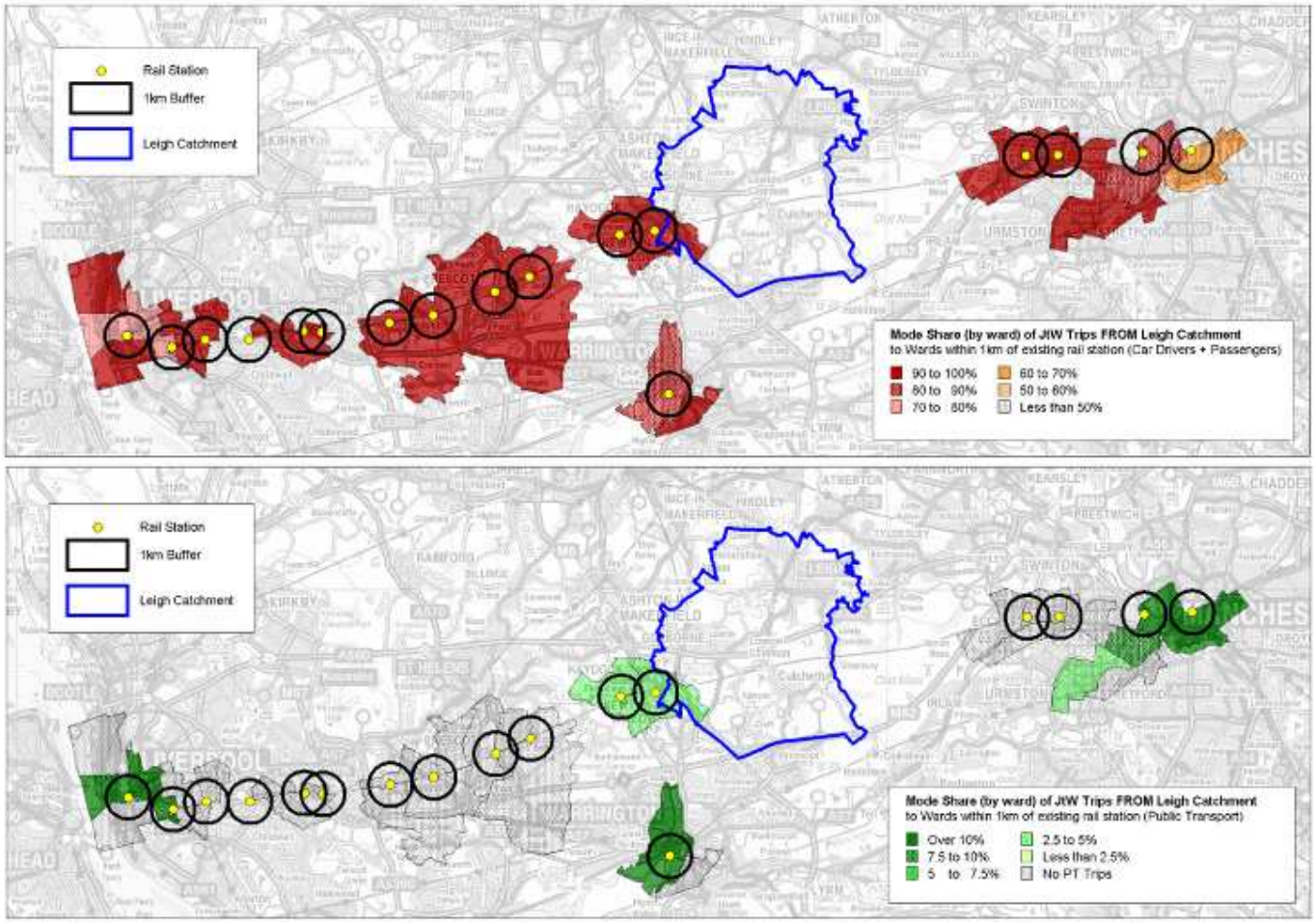


Figure 3.2: Mode Share from Leigh Study Area to Destinations Potentially Served by Rail (Journeys to Work by Ward)



3.6 Figures 3.1 and 3.2 further demonstrate the dependency on car for journeys to work from the Leigh study are and to areas potentially served by a future rail service from Leigh, although it should be noted that the share of public transport is higher to the larger cities and towns of Liverpool, Manchester and Warrington, which is understandable given trends in urban congestion and parking provision.

3.7 Runcorn has not been presented in figures 3.1 and 3.2 in order to improve the presentation. However, there are very few trips from the study area and to Runcorn to support the inclusion.

3.8 The mode shares for Wigan and Greater Manchester are presented in table 3.2 for the resident population of the region.

Table 3.2: Mode Share: Wigan and Greater Manchester (Resident Population)

To	Wigan	Greater Manchester
Car Driver	67.3%	62.4%
Car Passenger	9.6%	8.0%
Public Transport	8.8%	14.7%
Active Modes	12.3%	12.7%
Other	2.1%	2.2%
Total	**100.0%**	**100.0%**

3.9 Consistent with the findings of the Leigh study area, car is the most significantly used mode, with 76.9% of the population in Wigan and 70.4% of the population in Greater Manchester using the car. These figures are lower than for the Leigh study area at 80.0% but serve to demonstrate that even with rail provision, the mode share for car is still high relative to other modes.

4 Station Usage

4.1 Station usage data taken from the Office of Rail Regulation (ORR) datasets has been analysed to observe the numbers of passengers using local stations and the trends in usage between 2002/03 (first year of data availability) and 2009/10 (final year of data availability).

4.2 The stations selected on an individual basis are consistent with those for which Halcrow has requested NRTS data from the DfT. The NRTS data will serve as a basis for determining the potential rail market for the demand forecasts and also provide a basis for benchmarking. There are two exceptions, which are Eccles and

Patricroft, for which NRTS data has not been requested. However, the usage figures at these stations have been included in the table as these stations may possibly incur a reduced frequency of service due to the proposals at Leigh.

4.3 Table 4.1 presents the station usage figures (total entries and exits) and the change between 2002/03 and 2009/10.

Table 4.1: Station Usage Statistics (Passenger Numbers)

Station	2002/03	2009/10	Change	% Change
Atherton	179,915	367,554	187,639	104.3%
Birchwood	307,124	489,242	182,118	59.3%
Daisy Hill	96,385	216,216	119,831	124.3%
Earlestown	183,804	394,374	210,570	114.6%
Eccles	106,462	224,576	118,114	110.9%
Glazebrook	24,902	41,226	16,324	65.6%
Hag Fold	29,457	59,308	29,851	101.3%
Horwich Parkway	165,050	462,000	296,950	179.9%
Irlam	90,587	177,304	86,717	95.7%
Lea Green	110,212	442,548	332,336	301.5%
Newton-le-Willows	217,441	549,908	332,467	152.9%
Patricroft	42,030	101,298	59,268	141.0%
Warrington Bank Quay	949,031	1,073,842	124,811	13.2%
Warrington Central	411,073	1,007,372	596,299	145.1%
Leigh Study Stations	**2,913,473**	**5,606,768**	**2,693,295**	**92.4%**
Wigan Borough	**1,961,270**	**3,431,984**	**1,470,714**	**75.0%**
Greater Manchester	**31,869,824**	**59,435,048**	**27,565,224**	**86.5%**

4.4 There has been a significant increase between 2002/03 and 2009/10 in the numbers of people using each of the stations listed above. Overall the total increase is over 2.6 million passengers for Leigh Area Study Stations, which reflects a 92.4% change in demand. This compares to 75.0% for the Wigan Borough and 86.5% for Greater Manchester as a whole.

4.5 These figures demonstrate the strength of the growth in demand for rail since the 2001 Census and may indicate that demand for a station in Leigh could potentially be higher than tables 2.1 – 3.1 would initially indicate.

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Technical Note – APPENDIX C

Project	Leigh Rail Study	**Date**	26 October 2011
Note	National Rail Travel Survey (NRTS) Analysis	**Ref**	GLARSY / TN3

1 Introduction

1.1 This note summarises the findings of analysis conducted using the National Rail Travel Survey (NRTS) dataset. The analysis conducted covers two spatial levels, these being the entire Greater Manchester area and the localised Leigh catchment.

1.2 The data has been supplied by the Department for Transport (DfT), as a result of Wigan Metropolitan Borough Council's involvement in the study.

1.3 Data for the following stations was provided by DfT:

- Atherton;
- Hag Fold;
- Daisy Hill;
- Irlam;
- Glazebrook;
- Newton-le-Willows;
- Earlestown;
- Birchwood;
- Warrington Central; and
- Warrington Bank Quay.

1.4 The NRTS dataset includes, but is not limited to the following information:

- Origin station;
- Mode of access to origin station;
- Destination station;
- Mode of egress from destination station;
- Trip purpose; and
- Time of travel

1.5 It is possible to estimate the total number of rail trips for any given movement, as expansion factors are included in the dataset. The data set reports the rail demand on an average weekday.

2 Leigh Catchment

2.1 The NRTS rail user origin and destination points are supplied at postcode sector level, accordingly the Leigh catchment has been defined based on this information also. Professional judgement has ensured that the scale of the catchment is realistic.

2.2 Figure 1 and 2 show the area within the Leigh catchment where rail trips originate, and AM peak hours and all day. The matrices are area and station used are reported in Tables 1 and 2.

2.3 Tables 1 and 2 show rail users in the north of the catchment from West and North Leigh use Atherton station, trips from Croft and North Birchwood use Birchwood station, and Golborne use Newton-le-Willows station. Trips from Pennington are split between using Atherton and Newton stations. Trips to Warrington Bank Quay come from the south of the catchment.

Figure 1: AM Peak – Rail Trip Origins in Leigh Catchment, Average Weekday

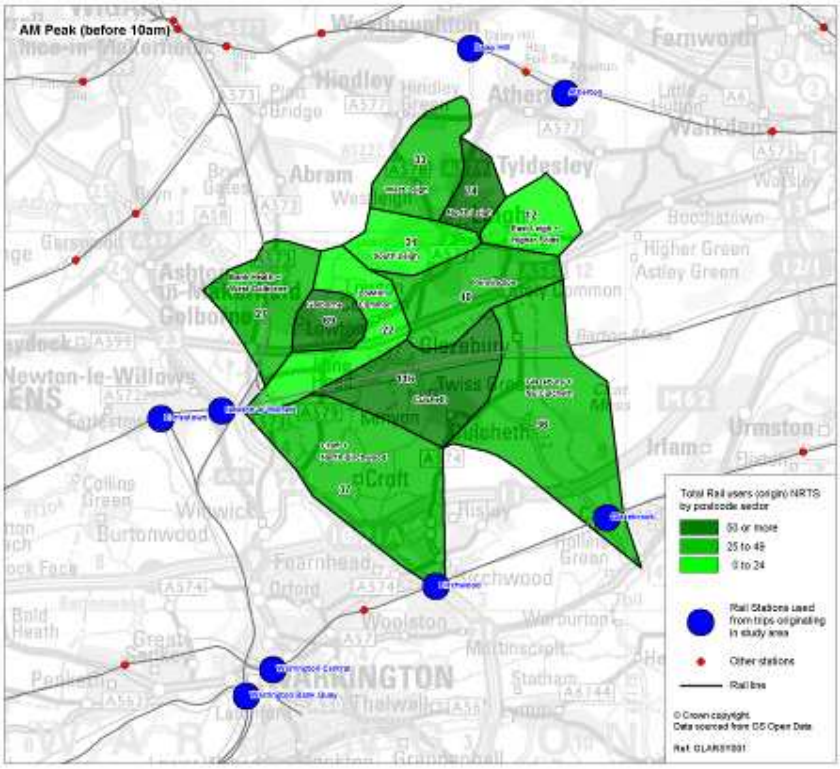


Figure 2: All Day – Rail Trip Origins in Leigh Catchment, Average Weekday

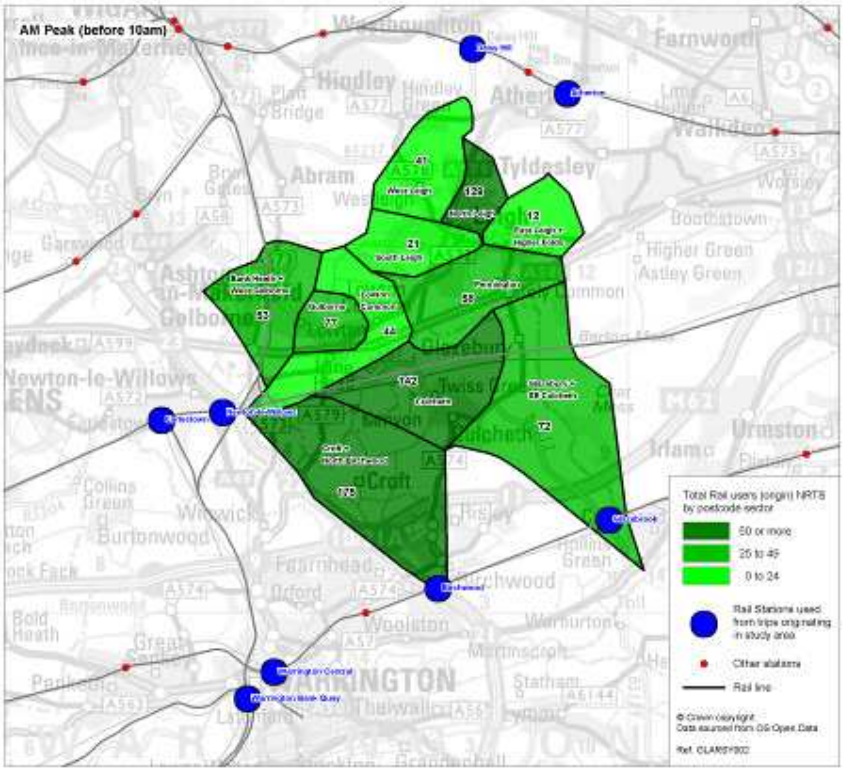


Table 1: Leigh Catchment Area by Station Used – AM Peak Weekday

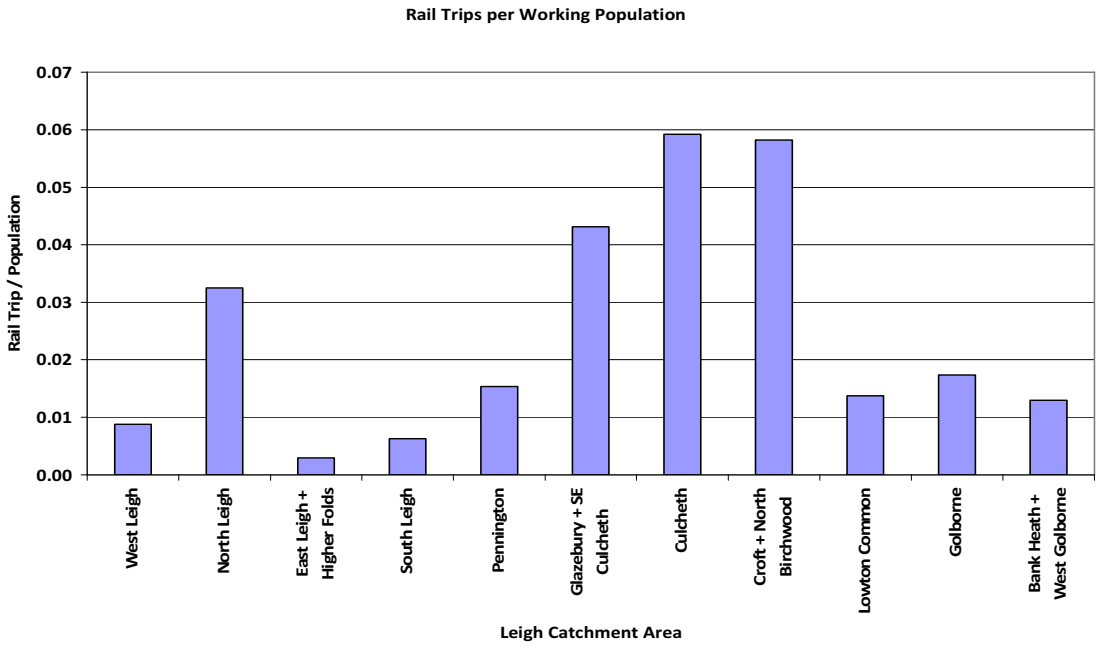
Postcode Sector Name by Station Used	Atherton	Birchwood	Daisy Hill	Earlestown	Glazebrook	Newton-le-Willows	Warrington BQ	Warrington Central	Total
West Leigh	27	0	7	0	0	0	0	0	**33**
North Leigh	74	0	0	0	0	0	0	0	**74**
East Leigh + Higher Folds	0	0	0	0	0	12	0	0	**12**
South Leigh	12	0	0	0	0	9	0	0	**21**
Pennington	25	3	0	0	0	13	0	0	**41**
Glazebury + SE Culcheth	0	7	0	0	15	2	12	2	**37**
Culcheth	0	85	0	0	0	4	14	14	**117**
Croft + North Birchwood	0	30	0	0	0	0	7	1	**38**
Lowton Common	0	0	0	15	0	7	0	0	**23**
Golborne	0	0	0	0	0	62	8	0	**70**
Bank Heath + West Golborne	6	0	0	0	0	18	4	0	**28**
Total	**143**	**125**	**7**	**15**	**15**	**127**	**44**	**17**	**493**

Table 2: Leigh Catchment Area by Station Used – All Day Weekday

Postcode Sector Name by Station Used	Atherton	Birchwood	Daisy Hill	Earlestown	Glazebrook	Newton-Le-Willows	Warrington BQ	Warrington Central	Total
West Leigh	35	0	7	0	0	0	0	0	**41**
North Leigh	130	0	0	0	0	0	0	0	**130**
East Leigh + Higher Folds	0	0	0	0	0	12	0	0	**12**
South Leigh	12	0	0	0	0	9	0	0	**21**
Pennington	29	3	0	0	0	25	2	0	**59**
Glazebury + SE Culcheth	0	16	0	0	25	4	26	2	**72**
Culcheth	0	92	0	0	0	4	32	14	**143**
Croft + North Birchwood	0	157	0	0	0	0	13	5	**175**
Lowton Common	0	0	0	15	0	7	0	5	**28**
Golborne	0	0	0	0	0	67	10	0	**78**
Bank Heath + West Golborne	12	0	0	0	0	31	11	0	**54**
Total	**218**	**268**	**7**	**15**	**25**	**160**	**95**	**26**	**813**

2.4 Figure 3 shows the rail trip rate per working person in each catchment area. The rate for areas to the south of the catchment is highest, at up to 0.06 trips per person per day, with Newton, Birchwood and Glazebrook stations in these areas. Rates in south Leigh and Pennington have the lower rates and no station within or close the areas.

Figure 3: Rail Trip Area for Leigh Catchment



2.5 Figure 4 indicates the rail stations first used as part of a trip that has originated from within the Leigh catchment, showing passenger demand in the AM Peak, Interpeak, PM Peak and Evening time periods. Figure 5 shows the mode of travel used to access the origin station.

2.6 Figure 6 indicates the rail stations last used as part of a trip that has an ultimate destination within the Leigh catchment, showing passenger demand in the AM Peak, Interpeak, PM Peak and Evening time periods. Figure 7 shows the mode of travel used to egress the destination station.

Figure 4: Origin Rail Station Demand (from trips utilising rail with an ultimate origin within the Leigh Catchment)

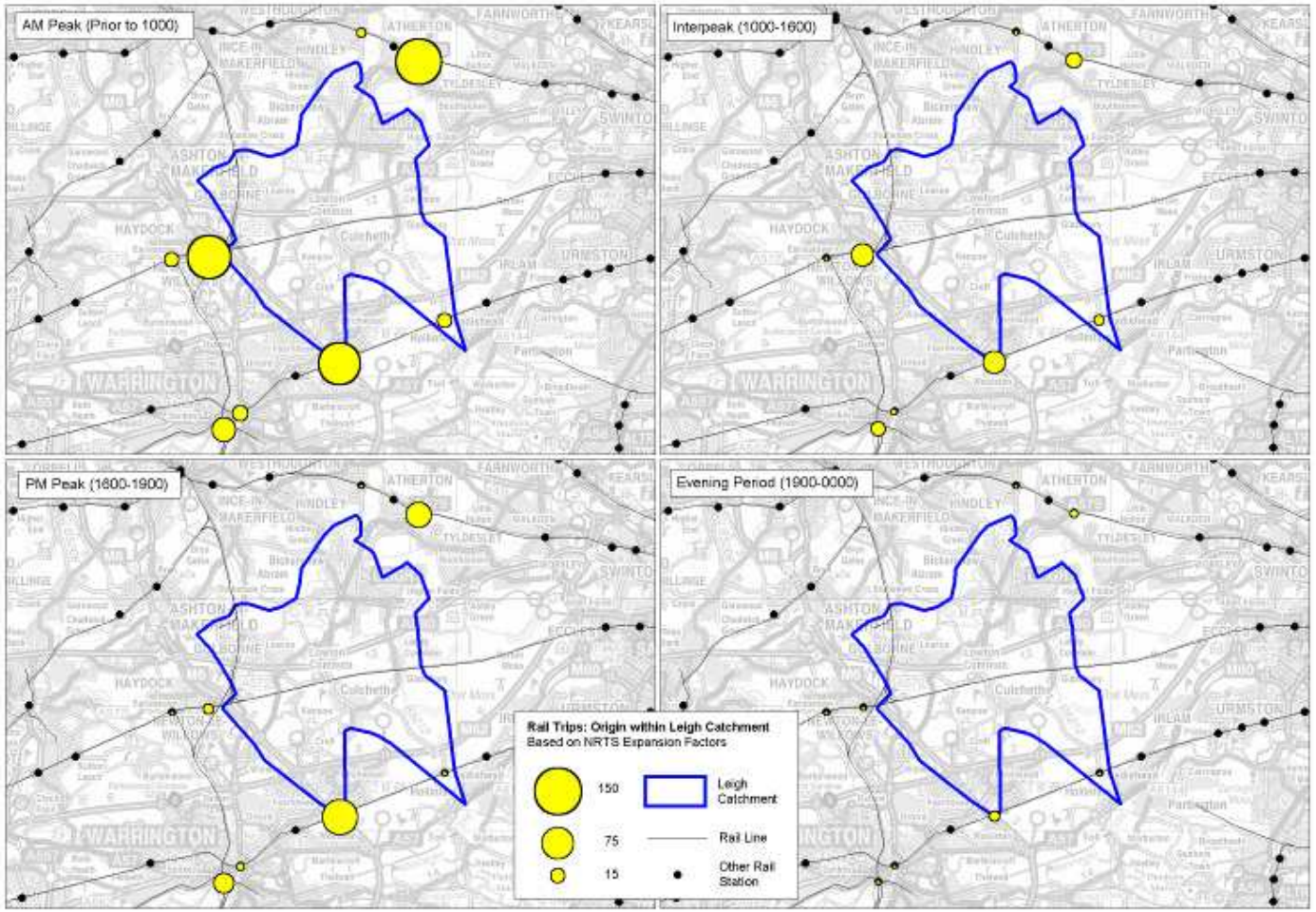


Figure 5: Mode of Travel used to Access Origin Rail Station

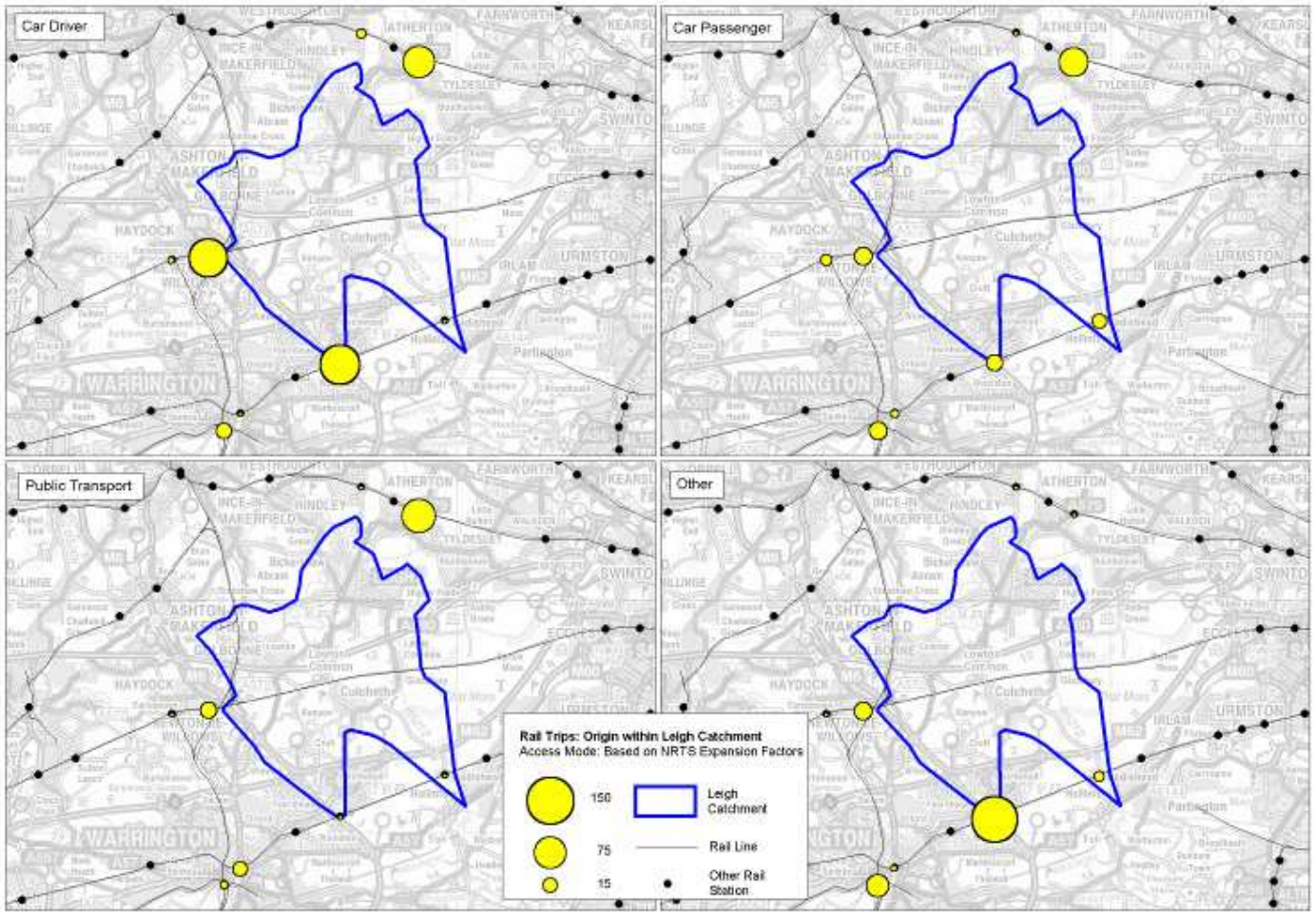


Figure 6: Destination Rail Station Demand (from trips utilising rail with an ultimate destination within the Leigh Catchment)

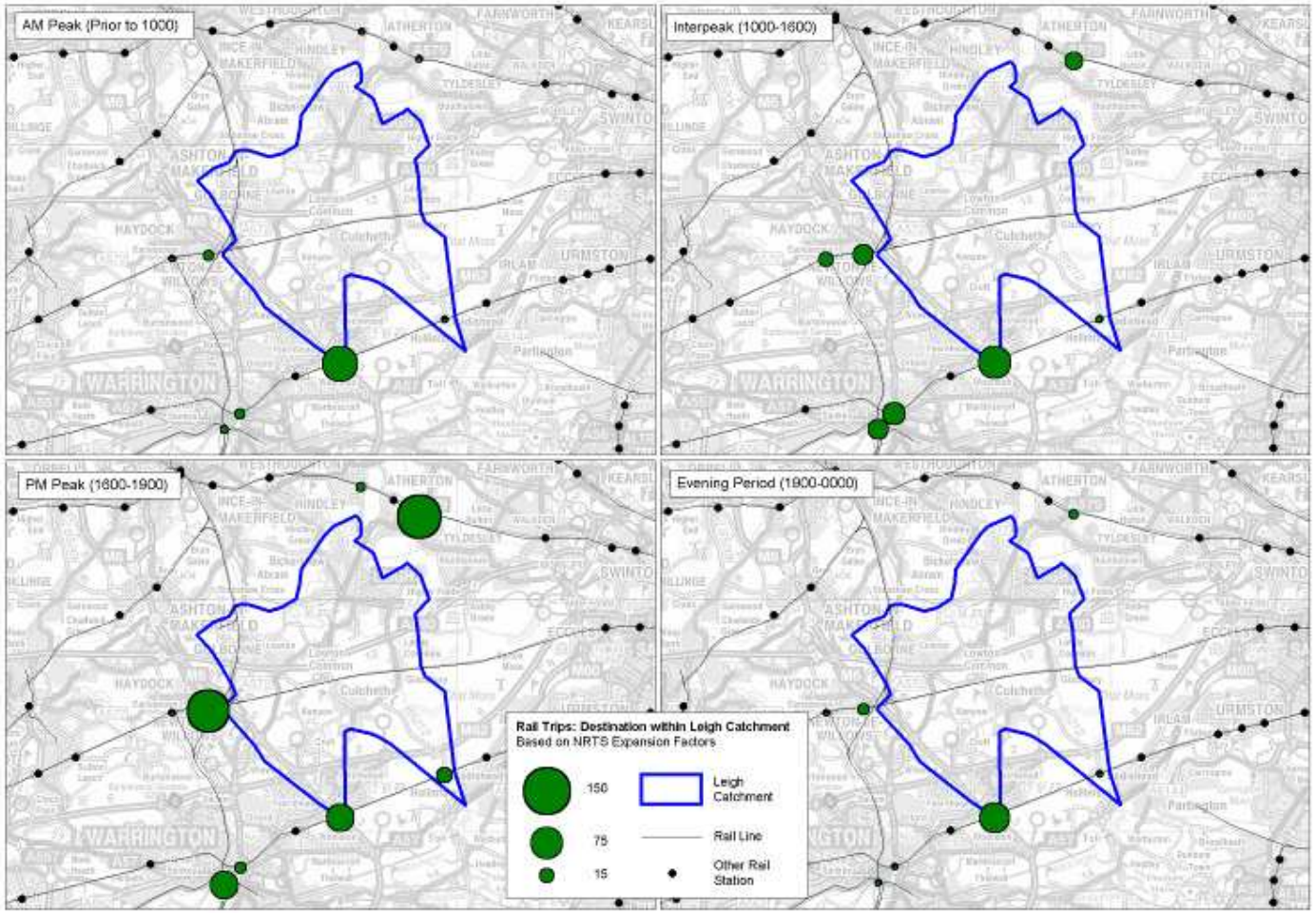
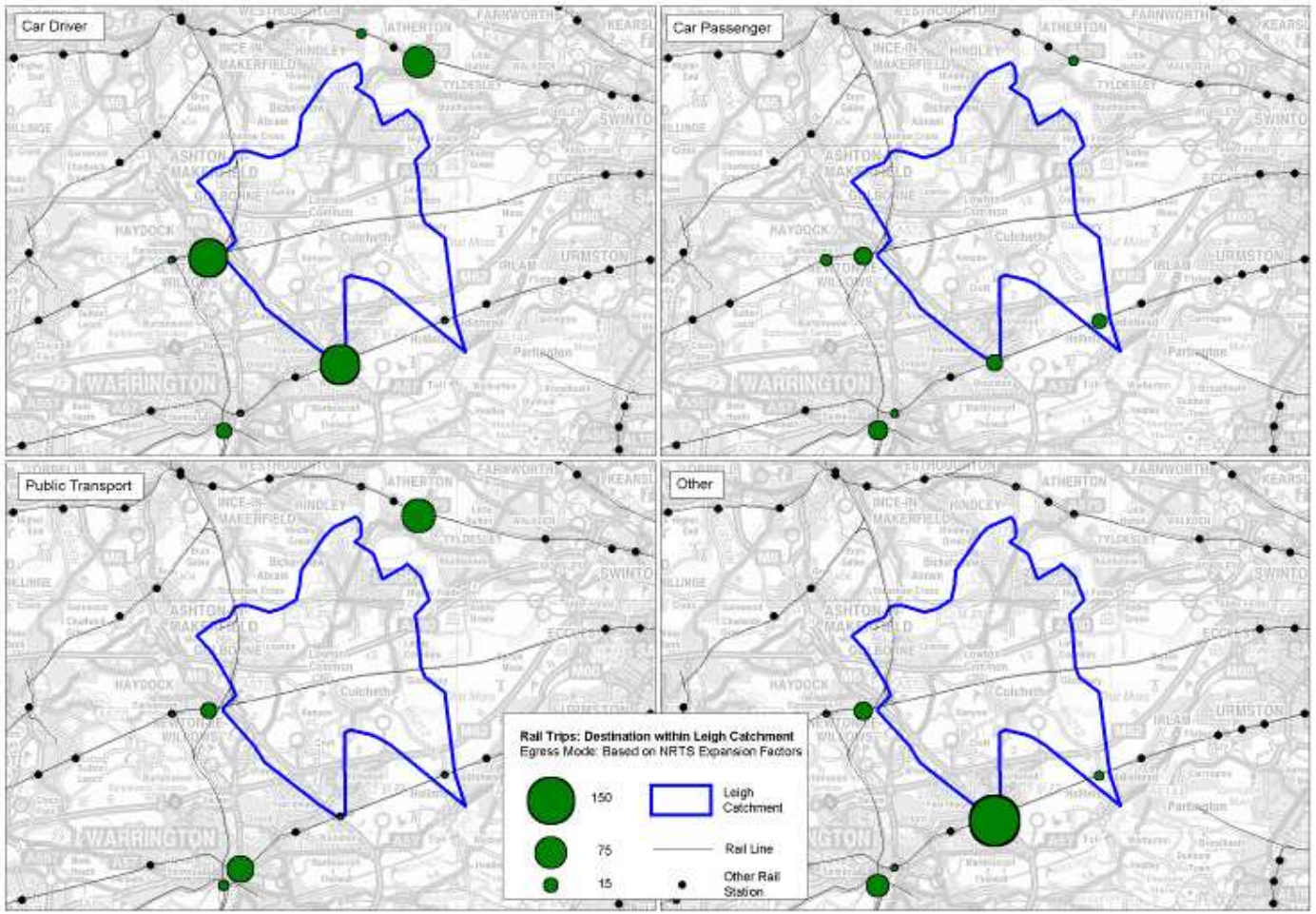


Figure 7: Mode of Travel used to Egress Destination Rail Station



2.7 Table 3 shows the external stations (final rail station destination) for trips utilising rail that have originated from the Leigh catchment.

Table 3: External Stations used for trips with an Origin in the Leigh Catchment

EXTERNAL STATION (Destination)	Expanded Trips	%
MANCHESTER OXFORD ROAD RAIL	152.7	18.4%
MANCHESTER VICTORIA RAIL	116.9	14.1%
LIVERPOOL LIME STREET RAIL	83.5	10.1%
TODMORDEN RAIL	55.6	6.7%
SALFORD RAIL	51.4	6.2%
EUSTON LONDON RAIL	35.1	4.2%
WARRINGTON CENTRAL RAIL	32.1	3.9%
BROAD GREEN RAIL	17.7	2.1%
WIDNES RAIL	17.0	2.0%
SALFORD CRESCENT RAIL	16.5	2.0%
MANCHESTER PICCADILLY RAIL	15.7	1.9%
GLOSSOP RAIL	14.7	1.8%
OXFORD RAIL	13.6	1.6%
WATERLOO (MERSEYSIDE) RAIL	12.0	1.4%
PADGATE RAIL	11.0	1.3%
LEEDS RAIL	10.8	1.3%
COLCHESTER RAIL	10.4	1.3%
HAMPTON COURT RAIL	10.0	1.2%
URMSTON RAIL	8.5	1.0%
STOCKPORT RAIL	8.1	1.0%
LIVERPOOL JAMES STREET RAIL	7.9	1.0%
SOUTHPORT RAIL	7.9	0.9%
HEBDEN BRIDGE RAIL	7.7	0.9%
LANCASTER RAIL	7.6	0.9%
NEWCASTLE RAIL	7.3	0.9%
SHEFFIELD RAIL	6.6	0.8%
UNIVERSITY (BIRMINGHAM) RAIL	5.6	0.7%
BOOTLE ORIEL ROAD RAIL	5.6	0.7%
CREWE RAIL	5.5	0.7%
DURHAM RAIL	5.3	0.6%
DEANSGATE RAIL	5.3	0.6%
RHYL RAIL	5.1	0.6%
GLASGOW CENTRAL RAIL	4.8	0.6%
IRLAM RAIL	4.3	0.5%
READING RAIL	4.1	0.5%
ELLESMERE PORT RAIL	4.0	0.5%
BLACKPOOL NORTH RAIL	3.9	0.5%
BRIGHTON RAIL	3.5	0.4%
WALTON-ON-THAMES RAIL	3.4	0.4%
WATFORD JUNCTION PAR RAIL	3.3	0.4%
MEOLS RAIL	3.1	0.4%
HAZEL GROVE RAIL	3.0	0.4%
SANKEY FOR PENKETH RAIL	2.7	0.3%
HUYTON RAIL	2.7	0.3%
MANCHESTER AIRPORT RAIL	2.6	0.3%
SWINTON (GREATER MAN) RAIL	2.5	0.3%
BROADBOTTOM RAIL	2.3	0.3%
ST ANNES-ON-THE-SEA RAIL	2.2	0.3%
KNUTSFORD RAIL	1.8	0.2%
CHESTER RAIL	1.6	0.2%
HOLMES CHAPEL RAIL	1.3	0.2%
GATLEY RAIL	1.0	0.1%
RUGBY RAIL	0.8	0.1%
MOORFIELDS (LIVERPOOL) RAIL	0.4	0.1%

2.8 Table 4 shows the external stations (first rail station origin) for trips utilising rail that have a destination within the Leigh catchment.

Table 4: External Stations used for trips with a Destination in the Leigh Catchment

EXTERNAL STATION (Origin)	Expanded Trips	%
MANCHESTER OXFORD ROAD RAIL	152.7	18.3%
MANCHESTER VICTORIA RAIL	115.4	13.8%
LIVERPOOL LIME STREET RAIL	73.3	8.8%
SALFORD RAIL	51.4	6.2%
WARRINGTON CENTRAL RAIL	42.9	5.1%
STOKE-ON-TRENT RAIL	35.4	4.2%
EUSTON LONDON RAIL	35.1	4.2%
BIRKENHEAD HAMILTON SQUARE RAIL	23.2	2.8%
BROAD GREEN RAIL	17.7	2.1%
WIDNES RAIL	17.0	2.0%
SALFORD CRESCENT RAIL	16.5	2.0%
MANCHESTER PICCADILLY RAIL	15.7	1.9%
GLOSSOP RAIL	14.7	1.8%
OXFORD RAIL	13.6	1.6%
WATERLOO (MERSEYSIDE) RAIL	12.0	1.4%
PADGATE RAIL	11.0	1.3%
LEEDS RAIL	10.8	1.3%
COLCHESTER RAIL	10.4	1.2%
HAMPTON COURT RAIL	10.0	1.2%
URMSTON RAIL	8.5	1.0%
STOCKPORT RAIL	8.1	1.0%
LIVERPOOL JAMES STREET RAIL	7.9	0.9%
SOUTHPORT RAIL	7.9	0.9%
HEBDEN BRIDGE RAIL	7.7	0.9%
LANCASTER RAIL	7.6	0.9%
NEWCASTLE RAIL	7.3	0.9%
SHEFFIELD RAIL	6.6	0.8%
UNIVERSITY (BIRMINGHAM) RAIL	5.6	0.7%
BOOTLE ORIEL ROAD RAIL	5.6	0.7%
CREWE RAIL	5.5	0.7%
DURHAM RAIL	5.3	0.6%
DEANSGATE RAIL	5.3	0.6%
GLAZEBROOK RAIL	5.2	0.6%
RHYL RAIL	5.1	0.6%
GLASGOW CENTRAL RAIL	4.8	0.6%
IRLAM RAIL	4.3	0.5%
READING RAIL	4.1	0.5%
ELLESMERE PORT RAIL	4.0	0.5%
BLACKPOOL NORTH RAIL	3.9	0.5%
BRIGHTON RAIL	3.5	0.4%
WALTON-ON-THAMES RAIL	3.4	0.4%
WATFORD JUNCTION PAR RAIL	3.3	0.4%
MEOLS RAIL	3.1	0.4%
SANKEY FOR PENKETH RAIL	2.7	0.3%
HUYTON RAIL	2.7	0.3%
CARLISLE RAIL	2.5	0.3%
SWINTON (GREATER MAN) RAIL	2.5	0.3%
BROADBOTTOM RAIL	2.3	0.3%
ST ANNES-ON-THE-SEA RAIL	2.2	0.3%
KNUTSFORD RAIL	1.8	0.2%
CHESTER RAIL	1.6	0.2%
HOLMES CHAPEL RAIL	1.3	0.2%
BIRCHWOOD RAIL	1.1	0.1%
INVERNESS RAIL	1.1	0.1%
GATLEY RAIL	1.0	0.1%
RUGBY RAIL	0.8	0.1%
MOORFIELDS (LIVERPOOL) RAIL	0.4	0.1%

2.9 Analysis of journey purposes has also been conducted with Tables 5 to 8 showing the number of rail trips made by journey purpose, during different time periods. This analysis has been completed for trips utilising rail with either an ultimate origin point or destination point within the Leigh catchment.

Table 5: Journey Purpose and Time of First Train (Origin within Leigh Catchment)

	AM Peak (pre 1000)	Inter Peak	PM Peak (1600-1900)	Evening	Total
Home	7	24	171	14	**216**
Leisure	45	63	15	0	**123**
Normal Workplace	278	10	0	0	**288**
Other Business	129	13	6	2	**149**
Education	34	16	0	0	**50**
Other	0	3	0	0	**3**
Total	**493**	**129**	**192**	**16**	**829**

Table 6: Journey Purpose and Time of First Train (Origin within Leigh Catchment) as Percentage

	AM Peak (pre 1000)	Inter Peak	PM Peak (1600-1900)	Evening	Total
Home	1%	3%	21%	2%	**26%**
Leisure	5%	8%	2%	0%	**15%**
Normal Workplace	33%	1%	0%	0%	**35%**
Other Business	16%	2%	1%	0%	**18%**
Education	4%	2%	0%	0%	**6%**
Other	0%	0%	0%	0%	**0%**
Total	**59%**	**16%**	**23%**	**2%**	**100%**

Table 7: Journey Purpose and Time of First Train (Destination within Leigh Catchment)

	AM Peak (pre 1000)	Inter Peak	PM Peak (1600-1900)	Evening	Total
Home	2	166	368	80	**616**
Leisure	13	41	25	0	**79**
Normal Workplace	80	3	10	5	**97**
Other Business	19	23	3	0	**45**
Education	0	0	0	0	**0**
Other	0	0	0	0	**0**
Total	**113**	**232**	**406**	**85**	**837**

Table 8: Journey Purpose and Time of First Train (Destination within Leigh Catchment) as Percentage

	AM Peak (pre 1000)	Inter Peak	PM Peak (1600-1900)	Evening	Total
Home	0%	20%	44%	10%	**74%**
Leisure	2%	5%	3%	0%	**9%**
Normal Workplace	10%	0%	1%	1%	**12%**
Other Business	2%	3%	0%	0%	**5%**
Education	0%	0%	0%	0%	**0%**
Other	0%	0%	0%	0%	**0%**

Total	**14%**	**28%**	**49%**	**10%**	**100%**

2.10 Tables 9 to 12 show the number of rail trips made by journey purpose and rail station. This analysis has been completed for trips utilising rail with either an ultimate origin point or destination point within the Leigh catchment.

Table 9: Journey Purpose and First Rail Station Used (Origin within Leigh Catchment)

	Home	Leisure	Normal Workplace	Other Business	Education	Other	Total
Atherton	56	21	128	14	0	0	**218**
Birchwood	117	24	28	82	17	0	**268**
Daisy Hill	0	0	7	0	0	0	**7**
Earlestown	0	3	0	0	12	0	**15**
Glazebrook	3	5	15	2	0	0	**25**
Newton-Le-Willows	8	37	92	19	19	3	**176**
Warrington Bank Quay	24	26	9	33	2	0	**95**
Warrington Central	9	8	10	0	0	0	**26**
	216	**123**	**288**	**149**	**50**	**3**	**830**

Table 10: Journey Purpose and First Rail Station Used (Origin within Leigh Catchment) as Percentage

	Home	Leisure	Normal Workplace	Other Business	Education	Other	Total
Atherton	7%	2%	15%	2%	0%	0%	**26%**
Birchwood	14%	3%	3%	10%	2%	0%	**32%**
Daisy Hill	0%	0%	1%	0%	0%	0%	**1%**
Earlestown	0%	0%	0%	0%	1%	0%	**2%**
Glazebrook	0%	1%	2%	0%	0%	0%	**3%**
Newton-Le-Willows	1%	4%	11%	2%	2%	0%	**21%**
Warrington Bank Quay	3%	3%	1%	4%	0%	0%	**11%**
Warrington Central	1%	1%	1%	0%	0%	0%	**3%**
Total	**26%**	**15%**	**35%**	**18%**	**6%**	**0%**	**100%**

Table 11: Journey Purpose and Last Rail Station Used (Destination within Leigh Catchment)

	Home	Leisure	Normal Workplace	Other Business	Education	Other	Total
Atherton	162	0	0	0	0	0	**162**
Birchwood	137	33	97	30	0	0	**297**
Daisy Hill	7	0	0	0	0	0	**7**
Earlestown	15	0	0	0	0	0	**15**
Glazebrook	17	6	0	0	0	0	**23**
Newton-Le-Willows	161	9	0	2	0	0	**172**
Warrington Bank Quay	63	31	0	4	0	0	**98**
Warrington Central	53	0	0	9	0	0	**62**
Total	**616**	**79**	**97**	**45**	**0**	**0**	**836**

Table 12: Journey Purpose and Last Rail Station Used (Destination within Leigh Catchment) as Percentage

	Home	Leisure	Normal Workplace	Other Business	Education	Other	Total
Atherton	19%	0%	0%	0%	0%	0%	**19%**
Birchwood	16%	4%	12%	4%	0%	0%	**35%**
Daisy Hill	1%	0%	0%	0%	0%	0%	**1%**
Earlestown	2%	0%	0%	0%	0%	0%	**2%**
Glazebrook	2%	1%	0%	0%	0%	0%	**3%**
Newton-Le-Willows	19%	1%	0%	0%	0%	0%	**21%**
Warrington Bank Quay	8%	4%	0%	0%	0%	0%	**12%**
Warrington Central	6%	0%	0%	1%	0%	0%	**7%**
Total	**74%**	**9%**	**12%**	**5%**	**0%**	**0%**	**100%**

3 Greater Manchester Analysis

3.1 The NRTS dataset has been reviewed at a higher level in order to ascertain the patterns of travel to and from rail stations. The analysis has focussed upon ascertaining how the journey purpose impacts upon the mode of travel used to access / egress end rail stations. Tables 13 to 16 demonstrate the variance in modal choice across a range of journey purposes.

3.2 Table 17 shows a summary of results by trip purpose. Rail direct trips are those with only one train journey and rail interchange trips include more than one rail service. Over 86% of trips involve only one rail service, with of 89% of commuting trips in the category. Walk access / egress at either or both ends of the trip occurs for 78% of trips, and 88% of commuting trips.

Table 17: Rail Trip Access / Egress Modes and Interchange

Trip Purpose	Trips with Rail Interchange	Percentage of Rail Interchange Trips with Walk at one or both ends of Trip	Trips with Direct Rail	Percentage of Rail Direct Trips with Walk at one or both ends of Trip	Total Rail Trips	Percentage of All Rail Trips with Walk at one or both ends of Trip	%Direct Rail Trips
Commuting	2,174	90.2%	18,288	88.4%	20,462	88.6%	89.4%
Travel for Work	3,000	72.0%	13,486	63.3%	16,486	64.9%	81.8%
Social	3,731	61.5%	13,053	65.4%	16,784	64.5%	77.8%
Shopping	481	89.1%	6,303	85.5%	6,784	85.8%	92.9%
Education	1,082	78.5%	8,913	82.5%	9,995	82.1%	89.2%
Personal Business	500	54.1%	2,528	73.8%	3,028	70.5%	83.5%

Other	1,256	86.2%	18,775	87.4%	20,031	87.4%	93.7%
Total	**12,223**	**74.0%**	**81,347**	**79.0%**	**93,570**	**78.3%**	**86.9%**

Table 13: Access and Egress Modes for Normal Workplace Journeys

	Home to Normal workplace	1	2	3	4	5	6	7	8	9	**Total**	**%**
1	Walked	8,159	769	27	171	0	7	57	670	3	**9,861**	**48%**
2	Bus/Coach	1,434	350	13	57	0	0	22	97	0	**1,974**	**10%**
3	Car (Parked at or near the station)	4,413	362	26	11	0	11	26	273	0	**5,122**	**25%**
4	Car (Dropped off by someone)	1,888	261	3	91	0	2	41	168	0	**2,453**	**12%**
5	Motorcycle	23	2	0	0	0	0	0	0	0	**25**	**0%**
6	Bicycle	151	6	0	6	0	315	0	6	0	**484**	**2%**
7	Air/Sea	131	23	0	8	0	0	47	58	0	**266**	**1%**
8	Taxi/Minicab	231	15	2	0	0	0	16	15	0	**278**	**1%**
9	Other	0	0	0	0	0	0	0	0	0	**0**	**0%**
	Total	**16,428**	**1,787**	**71**	**344**	**0**	**334**	**209**	**1,287**	**3**	**20,462**	**100%**
	Percentage	**80%**	**9%**	**0%**	**2%**	**0%**	**2%**	**1%**	**6%**	**0%**	**100%**	
	Walk at one or both ends of trip	**18130**	**89%**									
	OD other Modes	**2332**	**11%**									

Table 14: Access and Egress Modes for Shopping Journeys

	Shopping	1	2	3	4	5	6	7	8	9	**Total**	**%**
1	Walked	945	202	148	122	0	0	63	87	0	**1,567**	**52%**
2	Bus/Coach	183	106	47	37	0	0	56	11	0	**440**	**15%**
3	Car (Parked at or near the station)	146	48	65	30	0	0	25	18	0	**332**	**11%**
4	Car (Dropped off by someone)	131	47	24	46	0	0	42	33	0	**322**	**11%**
5	Motorcycle	0	0	0	0	0	0	0	0	0	**0**	**0%**
6	Bicycle	3	0	0	0	0	0	0	0	0	**3**	**0%**
7	Air/Sea	52	37	28	28	0	0	41	21	0	**207**	**7%**
8	Taxi/Minicab	54	8	38	37	0	0	19	0	0	**157**	**5%**
9	Other	0	0	0	0	0	0	0	0	0	**0**	**0%**

	Total	**1,514**	**448**	**351**	**300**	**0**	**0**	**247**	**170**	**0**	**3,028**	**100%**
	Percentage	**50%**	**15%**	**12%**	**10%**	**0%**	**0%**	**8%**	**6%**	**0%**	**100%**	
	Walk at one or both ends of trip	**2136**	**71%**									
	OD other Modes	**892**	**29%**									

Table 15: Access and Egress Modes for Educational Journeys

	School/college/university	1	2	3	4	5	6	7	8	9	**Total**	**%**
1	Walked	7,961	1,419	3,939	1,758	9	146	194	268	0	**15,694**	**78%**
2	Bus/Coach	733	365	337	231	2	8	40	21	0	**1,737**	**9%**
3	Car (Parked at or near the station)	54	11	36	11	0	0	7	9	0	**128**	**1%**
4	Car (Dropped off by someone)	225	73	12	98	0	7	33	19	0	**466**	**2%**
5	Motorcycle	0	0	0	0	0	0	0	0	0	**0**	**0%**
6	Bicycle	8	0	18	2	0	274	0	0	0	**302**	**2%**
7	Air/Sea	86	29	21	38	0	0	82	24	9	**289**	**1%**
8	Taxi/Minicab	700	113	258	162	0	11	67	97	0	**1,408**	**7%**
9	Other	0	0	0	0	0	0	8	0	0	**8**	**0%**
	Total	**9,766**	**2,010**	**4,621**	**2,299**	**10**	**446**	**431**	**439**	**9**	**20,031**	**100%**
	Percentage	**49%**	**10%**	**23%**	**11%**	**0%**	**2%**	**2%**	**2%**	**0%**	**100%**	
	Walk at one or both ends of trip	**17499**	**87%**									
	OD other Modes	**2532**	**13%**									

Table 16: Access and Egress Modes for Personal Business Journeys

	Home	1	2	3	4	5	6	7	8	9	**Total**	**%**
1	Walked	3,594	553	1,126	645	5	21	591	460	8	**7,003**	**42%**
2	Bus/Coach	569	230	83	122	0	7	110	102	3	**1,226**	**7%**
3	Car (Parked at or near the station)	1,245	80	164	70	0	4	467	455	0	**2,485**	**15%**
4	Car (Dropped off by someone)	908	174	87	152	0	5	370	284	0	**1,978**	**12%**
5	Motorcycle	3	0	8	0	0	0	1	0	0	**11**	**0%**
6	Bicycle	27	10	7	8	0	130	5	12	0	**199**	**1%**
7	Air/Sea	506	108	341	291	2	5	529	255	0	**2,037**	**12%**
8	Taxi/Minicab	412	80	381	235	0	13	253	143	0	**1,517**	**9%**
9	Other	20	2	0	6	0	0	2	0	0	**30**	**0%**

	Total	**7,284**	**1,238**	**2,197**	**1,528**	**7**	**183**	**2,327**	**1,711**	**10**	**16,486**	**100%**
	Percentage	**44%**	**8%**	**13%**	**9%**	**0%**	**1%**	**14%**	**10%**	**0%**	**100%**	
	Walk at one or both ends of trip	**10693**	**65%**									
	OD other Modes	**5793**	**35%**									

4 Summary

4.1 The analysis of the NRTS data in the context of the wider Leigh Rail Study has led to the following conclusions:

- Atherton, Newton-le-Willows and Birchwood are the main stations used by rail passengers in the Leigh catchment area. Atherton is favoured by those in the north of the catchment, and Newton and Birchwood by those in the south of the catchment.
- Manchester is the destination that attracts the largest amount of rail trips from the Leigh catchment;
- 59% of trips that originate within the Leigh catchment and utilise rail travel on their first train prior to 1000 hrs. The corresponding figures are 16% during the Interpeak, 23% during the PM Peak and just 2% during the Evening Peak.
- 48% of trips that terminate within the Leigh catchment and utilise rail travel on their first train between 1600 and 1900 hrs. The corresponding figures are 14% during the AM Peak, 28% during the Interpeak and just 10% during the Evening Peak.
- Birchwood, Atherton and Newton-le-Willows see the most demand of the rail stations that currently serve the Leigh catchment.
- There are only fairly limited records of rail users using public transport to access / egress the stations that currently serve the Leigh catchment. Travel by car and other modes (which include walking and cycling) dominate the access / egress from these rail stations. Atherton sees the largest amount of public transport travel of all the stations.
- Journey purpose data shows that 74% of journeys terminating within the Leigh catchment do so in order to reach home and 12% to reach their normal workplace. In the opposite direction (trips that originate within the Leigh catchment) 26% are seeking to reach home and 35% to reach their normal workplace.
- Across Greater Manchester 89% of rail journeys to a normal workplace walk to both the origin rail station and from the destination rail station. This demonstrates the importance of locating any new rail station facilities within walking distance of employment opportunities.

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Technical note – APPENDIX D

Project	Leigh Area Rail Study	**Date**	1 December 2011
Note	Cost Comparisons Halcrow & Stobart	**Ref**	GLARSY

1. Introduction

1.1 The cost comparison was carried out between Halcrow and Stobart Rail estimates for a rail link to Pennington in Leigh.

1.2 The method of cost compilation and the categorisation of elements differ between the Halcrow and Stobart methods. In order to allow the Stobart costs to be compared on a like for like basis in the format already used in the evaluation for TfGM, a categorisation was created, with each Stobart cost element allocated to a cost category that has been already in use in the Halcrow analysis.

1.3 In order to further ensure like for like comparability the TfL Pennington line proposal was compared with Halcrow Option 1 Pennington – Victoria service and Option 2 Warrington – Pennington - Victoria.

1.4 Costs have all been converted to 2016 outturn costs, so are presented on a common price base.

2. General Findings

2.1 Itemised costs are not necessarily dissimilar when aggregated, although in three areas they do differ significantly.

2.2 The aggregated total including project costs and contingency of the Stobart scheme is within the range of Halcrow options 1 and 2. Overall though each achieves a line to a station at Pennington, albeit using different routes and project structures.

2.3 Stobart's assumptions on project costs are lower than Halcrow's in terms of overall percentages; this excludes Stobart's allowances for design which they present after the itemised list next to the project costs. For this comparison design costs have been treated as works costs, as per the Halcrow assumption.

2.4 Some differences exist in the final project costs methodology depending on which cost the percentage allowances are applied. We have reworked Stobart's percentages, applying them to the specific items; Stobart gave separate consideration only to certain S&T costs. The difference still puts total project costs and contingency between GBP 30m and GBP 45m.

3. Station Costs

3.1 Stations costs in the Stobart estimates are about 25% higher at GBP 4.1m compared to Halcrow's GBP 3.3m. This can be largely explained by the higher specification assumptions made in the Stobart estimates.

3.2 This should make the difference greater that it is, but Halcrow's estimates include an item for land purchase for the station which the Stobart figures do not. Adding land costs to the Stobart estimates would significantly increase the station costs, but there does not appear to be an allowance for this that can be separated out. (See also the section below on land cost assumptions.)

4. Track Costs

4.1 Stobart's overall track cost estimates are substantially higher at GBP 5.6m compared to GBP 3.6m from Halcrow Option 1 and GDP 8.9 for Option 2. This is accounted for by the longer route taken between Leigh and the Chat Moss line. On to its overall figure Halcrow also adds a road overbridge at the East Lancs Road. Without this cost the Stobart unit cost is 7% lower for track at GBP 1.11m/km compared to GBP 1.19m/km. This can be viewed as being within the bounds of reasonable variation at this stage.

4.2 Stobart's estimates for turnouts may be low as we believe 6 or 7 turnouts will be needed rather than the 5 or 8 cited, which will bring pro rata costs closer to Halcrow's

4.3 We understand that the Stobart estimates assumed that a single line would suffice; the Halcrow operational analysis suggests that this is impossible in Option 2 and only possible in Option 1. Nevertheless the amount of layover time found to be necessary in Halcrow's operational analysis should be capable of absorbing the additional travel time on Stobart's longer alignment. We note that detailed work would need to be done to confirm the ability of the alignment to allow reasonable line speeds on curves and at junctions in this respect, but that this lies beyond the scope of the current brief.

5. Infrastructure and Earthworks

5.1 Stobart are cheaper at GBP 7.3m and Halcrow range from GBP 9.7m to 11.2m. The difference is starker when viewed per km, at 65%, with Stobart at GBP 1.46m/km and Halcrow at GBP 3.22/km. Although the Halcrow route is shorter the difference can be accounted for by the inclusion of a new bridge to cross under the East Lancs Road at GDP 6m; Stobart's longer route exploits an existing bridge.

6. Signalling

6.1 Halcrow's costs per km of signalled railway are lower than those of Stobart even after taking account of route length. Having reviewed our project source costs it is likely that our own initial costs may be to be too low as they are based on the marginal costs at the time of the proposed Chat Moss upgrading required for electrification rather than a from scratch build.

6.2 It is noted also that Stobart have assumed axle counters rather than track circuits, axle counters being more expensive.

7. Electrification

7.1 Halcrow has used a cost per metre of GBP 360. Stobart's estimates give a cost of GBP 1,280/m. This difference appears somewhat difficult to fully explain, but our electrification engineer considers that the Stobart estimates may represent a more heavy duty installation than is likely to be needed in this case.

8. Land Acquisition Costs

8.1 This is an area of substantial difference. Halcrow has assumed land being purchased at market rates for all operational property including railway alignment. Much of the previous

alignment on the corridor has been converted into a road. It is understood that part of the land is already allocated for new housing, so will cost premium rates to purchase.

8.2 Stobart's estimates assume that a pre-existing alignment be used and land is purchase under Compulsory Purchase arrangements. This is residual BR land now under the ownership of the DfT. It is not clear at what price DfT would make this land available.

8.3 The current difference in land cost assumptions cannot be reconciled without detailed assessment of the actual costs likely to be involved. It is suggested that a sensitivity test be carried out regarding these two figures.

9. Project Cost Assumptions

9.1 These include fees, Network Rail Costs and contingency. The Stobart estimates include a civils and signalling design assumptions that have been moved in this analysis into the relevant cost categories. Stobart allow 46% for project costs and 35% for contingency (optimism bias), and Halcrow allow for 59% project costs and 66% contingency.

9.2 Of the remaining items two are lump sum costs and these have been split 50/50 between station and route capital costs for the purposes of this exercise.

10. Overall Comparison

10.1 A summary of the Stobart costs with the two Halcrow options is provided below.

Cost Item £m's	Stobart - 4km route	Halcrow - 2.4km route - Option 1	Halcrow - 2.4km route - Option 2	Main Reason for Difference
Station	4.1	3.3	3.3	Specification
Track	5.6	3.6	8.9	Length of route and amount of double track
Infrastructure / Earthworks	7.3	9.7	11.2	Bridge / Earthworks due to different route
Signalling	9.6	3.1	5.5	New / Marginal upgrade
Overhead electrification	6.4	1.1	2.1	Specification
Land Costs	2.4	6.7	13.0	Land Values
Project Costs	16.1	16.2	26.1	Rates Applied
Contingency / Optimism Bias	12.4	18.1	29.1	Rates Applied
Total	**64.0**	**61.8**	**99.3**	

Note: All costs are £m's in 2016 Outturn Costs

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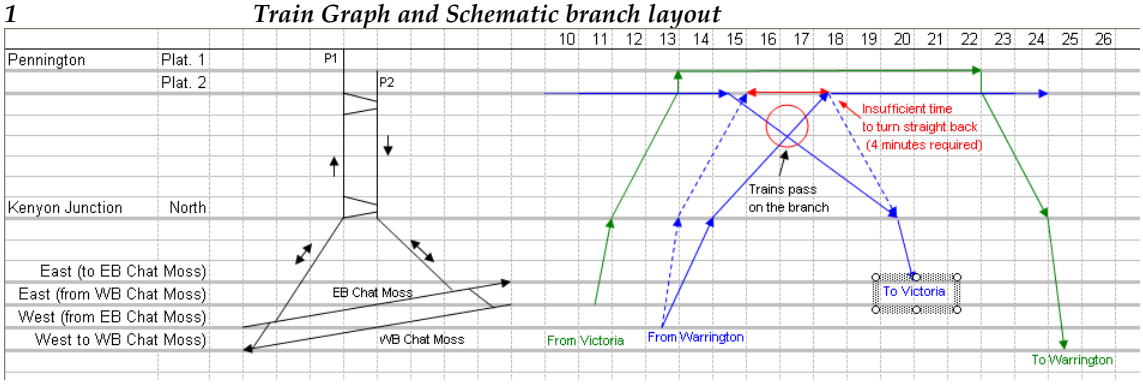
Technical note - APPENDIX E

Project	Leigh Area Rail Study	**Date**	2 December 2011
Note	Explanation of Double track requirement for option 2	**Ref**	GLARSY

1 *Train Graph and Schematic branch layout*



2 *Explanation of the diagram*

2.1 Leftmost is a list of locations which the schematic branch layout and the train graph use. Note this axis is not to scale.

2.2 Immediately to the right of the locations list is the schematic showing the double track branch connecting to the Chat Moss line via two single track sections and two junctions. The single track sections are by necessity bi-directional as indicated by the arrows. Note: The platform 1 track is shown longer only so it matches up with the location list, the same applies to the east by north east alignment of the Chat Moss line.

2.3 On the far right is the train graph. This has time on the x-axis and distance on the y-axis.

2.4 Note that the times that trains pass Kenyon East and West junctions are fixed and are dictated by the Northern Hub draft timetable.

2.5 Green lines represent the west bound service; from the graph it can be seen to run into Pennington from Kennington East Junction, dwell and run out again via Kennington West Junction; there is sufficient time between the arrival and the departure to satisfy the requirement for a minimum 4 minute turnaround (This allows time for the driver to shut down one cab, walk to the other end, set up the other cab and get ready for departure) and so these two services can be linked.

2.6 Blue lines represent eastbound services, the dashed blue lines show when the trains would pass Kenyon North junction and arrive and depart from Pennington if the normal running times on the branch were observed

2.7 However, as shown by the red line, there is insufficient time to turn straight back at Pennington and so to avoid the need for a third platform the eastbound services have been slowed to arrive later at Pennington and depart earlier from Pennington; typically three minutes are required between a train departing from a platform and another arriving at the same platform.

2.8 The unfortunate consequence of this is that trains now cross on the branch and double track is required.

3 ***A third platform***

3.1 There are two possible locations for a third platform at Pennington, it could either be connected to the arrival line and be positioned next to platform 1 or it could be connected to the departure line and be positioned next to platform 2.

3.2 In either location the problem is that there would be insufficient time between the arrival of an eastbound service and the departure of the next eastbound service.

3.3 The assumed headway on the branch is three minutes meaning that the arriving eastbound service must be slowed on approach to Kenyon North junction to follow three minutes behind the preceding westbound service.

3.4 From Kenyon North Junction it can run to its normal running time arriving at xx:16 in the diagram, this however only leaves 1½ minutes before the departure of the next eastbound service.

3.5 Eastbound services must alternate between platform 2 and the new platform 3. At best an arriving eastbound train would cross the route of the departing eastbound train once an hour and the margin of 1½ is not practical and therefore this option can be discounted.

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Technical note - APPENDIX F

Project	Leigh Area Rail Study	**Date**	2 December 2011
Note	Detailed Cost Tables	**Ref**	GLARSY

Cost tables for the following are provided in this note:

- **Heavy Rail Track and Infrastructure**
- **Heavy Rail Station and Other Costs**
- **Heavy Rail Operating Costs**
- **Bus Shuttle Services**
- **Park and Ride Costs**
- **PPM Costs**
- **Capital Cost Summary**
- **Operating Cost Summary**

All costs are reported in 2016 Outturn Costs

Heavy Rail Track and Infrastructure **2016 Outturn Costs**

Cost Item			Option 1 – Pennington to Victoria Service		Option 2 – Warrington to Victoria via Pennington Service		Options 3, 4 and 5 – New Station on Chat Moss Line	
Fixed Costs	**Unit**	**Unit Cost**	**Qty**	**Cost**	**Qty**	**Cost**	**Qty**	**Cost**
Plain line (single track)	m	£944	2,180	£2,057,080	1,550	£1,462,603	0	£0
Plain line (double track)	m	£1,887	150	£283,084	1,630	£3,076,184	0	£0
Switch	each	£314,538	4	£1,258,153	14	£4,403,535	0	£0
Flat crossing	each	£359,832	0	£0	0	£0	0	£0
Overhead electrification	m of single track	£440	2,480	£1,092,077	4,810	£2,118,100	0	£0
Signalling (general)	m of route	£453	2,330	£1,055,339	3,180	£1,440,333	0	£0
Signalling (junct mods)	each	£2,013,045	1	£2,013,045	2	£4,026,089	0	£0
Land purchase for track	sq.m	£434	15,500	£6,727,972	30,063	£13,049,011	0	£0
Level crossing on public road	each	£1,918,683	1	£1,918,683	1	£1,918,683	0	£0
Retaining walls	m	£1,258	200	£251,631	200	£251,631	0	£0
East Lancs Rd bridge/road diversions/rail c&c tu	each	£7,548,917	1	£7,548,917	1	£9,058,701	0	£0
Project management	%age	n/a	15%	£3,631,407	15%	£6,121,750	15%	£0
Project design and development	%age	n/a	15%	£3,631,407	15%	£6,121,750	15%	£0
Interfacing/commissioning	%age	n/a	15%	£3,631,407	15%	£6,121,750	15%	£0
NR costs	%age	n/a	15%	£3,631,407	15%	£6,121,750	15%	£0
Contingency allowance	%age	n/a	66%	£15,978,189	66%	£26,935,698	66%	£0
Total				**£54,713,193**		**£92,234,360**		**£0**

Heavy Rail Station and Other Costs **2016 Outturn Costs**

Cost Item			Option 1 – Pennington to Victoria Service		Option 2 – Warrington to Victoria via Pennington Service	
Fixed Costs	**Unit**	**Unit Cost**	**Qty**	**Cost**	**Qty**	**Cost**
Station platform	each	£2,142,383	1	£2,142,383	1	£2,142,383
Footbridge	each	£629,076	0	£0	0	£0
Booking Office	each	£113,234	1	£113,234	1	£113,234
Land purchase	sq.m	£434	1750	£759,610	1750	£759,610
Project management	%age	n/a	15%	£452,284	15%	£452,284
Project design and development	%age	n/a	10%	£301,523	10%	£301,523
Interfacing/commissioning	%age	n/a	10%	£301,523	10%	£301,523
NR costs	%age	n/a	15%	£452,284	15%	£452,284
Contingency allowance	%age	n/a	66%	£1,990,050	66%	£1,990,050
Total				**£6,512,890**		**£6,512,890**
TOTAL HEAVY RAIL				**£61,226,082**		**£98,747,249**

Heavy Rail Operating Costs **2016 Outturn Costs**

Cost Item			Option 1 – Pennington to Victoria Service		Option 2 – Warrington to Victoria via Pennington Service		Options 3, 4 and 5 – New Station on Chat Moss Line	
Variable Costs per day	**Unit**	**Unit Cost**	**Qty**	**Cost**	**Qty**	**Cost**	**Qty**	**Cost**
Rolling stock lease	4 car set	£2,102.67	4.00	£8,411	6.00	£12,616	0.00	£0
Traction power costs	mile	£1.21	1052.80	£1,272	1720.00	£2,077	0.00	£0
Driver	hour	£42.40	33.33	£1,413	81.33	£3,449	0.00	£0
Conductor	hour	£23.44	33.33	£781	81.33	£1,906	0.00	£0
Track access (fixed)	/track-km	£51.70	2.48	£128	4.81	£249	0.00	£0
Track access (variable)	mile	£0.25	1052.80	£261	1720.00	£427	0.00	£0
Electrification asset usage	daily	£0.06	1052.80	£61	1720.00	£100	0.00	£0
Asset maintenance	daily			£620		£620		£918
Total Daily				**£13,219**		**£21,715**		**£1,189**
Total Annual				**£4,443,652**		**£7,287,740**		**£425,827**

Park and Ride Costs **2016 Outturn Costs**

Option	Required Spaces	Capital Cost	Annual Operating Cost
Option 1- Pennington to Manchester Victoria Service	250	£1,827,467	£125,815
Option 2- Warrington to Manchester Victoria via Pennington	350	£2,558,454	£176,141
Option 3- Pennington Station with rail shuttle service	200	£1,461,974	£100,652
Option 4- New Station at Glazebury	150	£1,096,480	£75,489
Option 5- New Station at Kenyon	200	£1,461,974	£100,652

Bus Shuttle Services **2016 Outturn Costs**

Time Period	Vehicle Hours	Operating Costs
Shuttle Service Daily	50.8	£2,237
Annual	15240	£671,099

PPM Costs **2016 Outturn Costs**

Cost Element	Costs
Station Platform	£1,428,255
Line	£2,887,461
Signalling	£1,092,077
Land	£5,566,131
Project Management	£811,169
Project Development	£270,390
Interfacing/Commissing	£270,390
NR Costs	£811,169
Vehicle Purchase	£50,326
Operating Costs	£62,908
Staffing Costs	£377,446
Depot and Storage Costs	£125,815
Renewals	£5,583,934

Capital Cost Summary **2016 Outturn Costs**

Option	Heavy Rail	Park and Ride	Bus Shuttle	Highway Schemes	PPM	TOTAL
Option 1- Pennington to Manchester Victoria Service	£61,226,082	£1,827,467	£0	£0	£0	£63,053,549
Option 2- Warrington Bank Quay to Manchester Victoria via Pennington	£98,747,249	£2,558,454	£0	£0	£0	£101,305,703
Option 3- Kenyon Station with PPM shuttle service to Pennington and Town Centre	£9,645,164	£1,461,974	£0	£6,061,969	£30,370,477	£47,539,584
Option 4- New Station at Glazebury	£9,645,164	£1,096,480	£0	£323,723	£0	£11,065,367
Option 5- New Station at Kenyon with Highway Link and Shuttle Buses	£9,645,164	£1,461,974	£0	£6,061,969	£0	£17,169,107

Operating Cost Summary **2016 Outturn Costs**

Option	Heavy Rail	Park and Ride	Bus Shuttle	Highway Schemes	PPM	TOTAL
Option 1- Pennington to Manchester Victoria Service	£4,443,652	£125,815	£0	£0	£0	£4,569,467
Option 2- Warrington Bank Quay to Manchester Victoria via Pennington	£7,287,740	£176,141	£0	£0	£0	£7,463,882
Option 3- Kenyon Station with PPM shuttle service to Pennington and Town Centre	£425,827	£100,652	£0	£0	£1,527,230	£2,053,710
Option 4- New Station at Glazebury	£425,827	£75,489	£0	£0	£0	£501,317
Option 5- New Station at Kenyon with Highway Link and Shuttle Buses	£425,827	£100,652	£671,099	£0	£0	£1,197,578