MOTT MACDONALD

Wirral Local Plan

Baseline Modelling Report

August 2019

Wirral Council

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Wirral Council

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Issue and Revision Record

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A	July 2019	Natalie Osborne	Sarah Pierce	Tony Millward	Draft
B	August 2019	Natalie Osborne	Sarah Pierce	Tony Millward	Draft – updated input assumptions

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Contents

1 Introduction

Wirral Council has appointed Mott MacDonald to conduct baseline Wirral Local Plan modelling for a 2035 future year using the Wirral Traffic Model (WTM). This has consisted of including committed planning applications, Strategic Housing Land Availability (SHLAA), windfall housing sites, demolition sites and employment supply sites, and inclusion of the Wirral Waters development.

The purpose of this forecast is to act as a baseline scenario for assessment of the proposed sites included in Wirral's Local Plan.

1.1 Scope of Work

The scope of work comprises developing future year local highway forecasts that take into account traffic associated with proposed housing and employment development sites together with any committed network updates.

The forecasts have been developed based on the 2015 calibrated/validated base year WTM. The WTM has been developed using SATURN software, which allows the impact of changes to junction layout to be assessed.

The model forecast has been developed for the future year 2035.

The demand forecasting has been undertaken in the Liverpool City Region Transport Model (LCRTM) to make use of its detailed forecasting mechanisms[1], and the output matrices converted to WTM zones and assigned in WTM.

Model forecasts for the defined scenarios have been prepared for the following time periods:

- AM (08:00 – 09:00);
- IP (average hour 10:00 - 16:00); and
- PM (17:00 - 18:00).

1.2 Report Structure

The structure of this report is as follows:

- Section 2 – presents future year developments incorporated in the model;
- Section 3 – documents highway network assumptions;
- Section 4 – presents the future year demand forecasts;
- Section 5 – presents the results of the highway assessment; and
- Section 6 – presents a summary of the conclusions from the traffic modelling.

This report is supported by a set of Appendices:

- Appendix A – provides details of the development sites included;
- Appendix B – provides an overview of the trip generation process;
- Appendix C – describes the LCRTM demand model;
- Appendix D – presents model convergence statistics;

[1] LCRTM2012_v3b_TEMPRO7.2_ForecastingReport_RevA_v1

- Appendix E – presents model outputs; and
- Appendix F – provides a glossary of modelling terms.

2 Future Year Developments

This section of the report provides details of the developments included in the future year baseline model.

2.1 Data Sources

Future year housing has come from the following sources:

- Completions from the model base year of 2015 to 2017;
- Planning permissions from 2018-2033;
- Strategic Housing Land Availability Assessment (SHLAA) sites from 2018-2033;
- Windfall sites distributed over the district at a rate of 60 per year;
- Demolition sites distributed over the district at a rate of 50 per year; and
- Wirral Waters proposed development.

Housing growth from the end of the Local Plan (2033) to the model future year of 2035 has been calculated from the average houses per year for the period 2015 to 2033 and assuming the same growth for 2033 to 2035.

Future year employment has come from two sources:

- Baseline employment growth from the Strategic Housing & Employment Land Market Assessment (SHELMA), distributed using employment supply for Wirral;
- Development based employment growth for major employment sites from the SHELMA ('growth' scenario), updated with the latest proposals for Wirral Waters.

2.2 Method

The data has been processed in the following manner:

- Each development site has been allocated to the LCRTM zone in which the majority of the site is located;
- The total housing and employment numbers have been calculated by LCRTM zone; and
- The total baseline employment growth has been constrained to SHELMA baseline district growth and major development information added on top.

2.3 Results

Appendix A presents details of the housing and employment sites incorporated in the model and Figure 1 shows the location of the development sites to provide an indication of the geographical spread of the sites, differentiated by the source:

- Housing completions 2015-2017;
- Housing Planning Permissions Category 1: housing sites with planning permissions deliverable within 0 to 5 years;
- Housing Planning Permissions Category 2: housing sites with planning permissions deliverable within 6 to 10 years;
- Housing Planning Permissions Category 3: housing sites with planning permissions deliverable within 11 to 15 years;Housing Category 1 sites: SHLAA sites that could come forward by 2023;

- Housing Category 2 Sites: SHLAA sites that could come forward by 2028;
- Housing Category 3 Sites: SHLAA sites that could come forward by 2033;
- Employment Supply: employment land supply;
- SHELMA employment sites; and
- Wirral Waters housing and employment: units that could come forward by 2033.

Table 1 presents the number of proposed dwellings by LCRTM zone and Table 2 the proposed jobs by LCRTM zone. For comparison purposes Table 3 presents the SHELMA projections and total growth by modelled year. It can be seen that the SHELMA and WTM forecast similar numbers of additional housing and employment. Figure 2 presents the LCRTM zones, for cross-referencing with the tables.

Figure 1: Development Sites

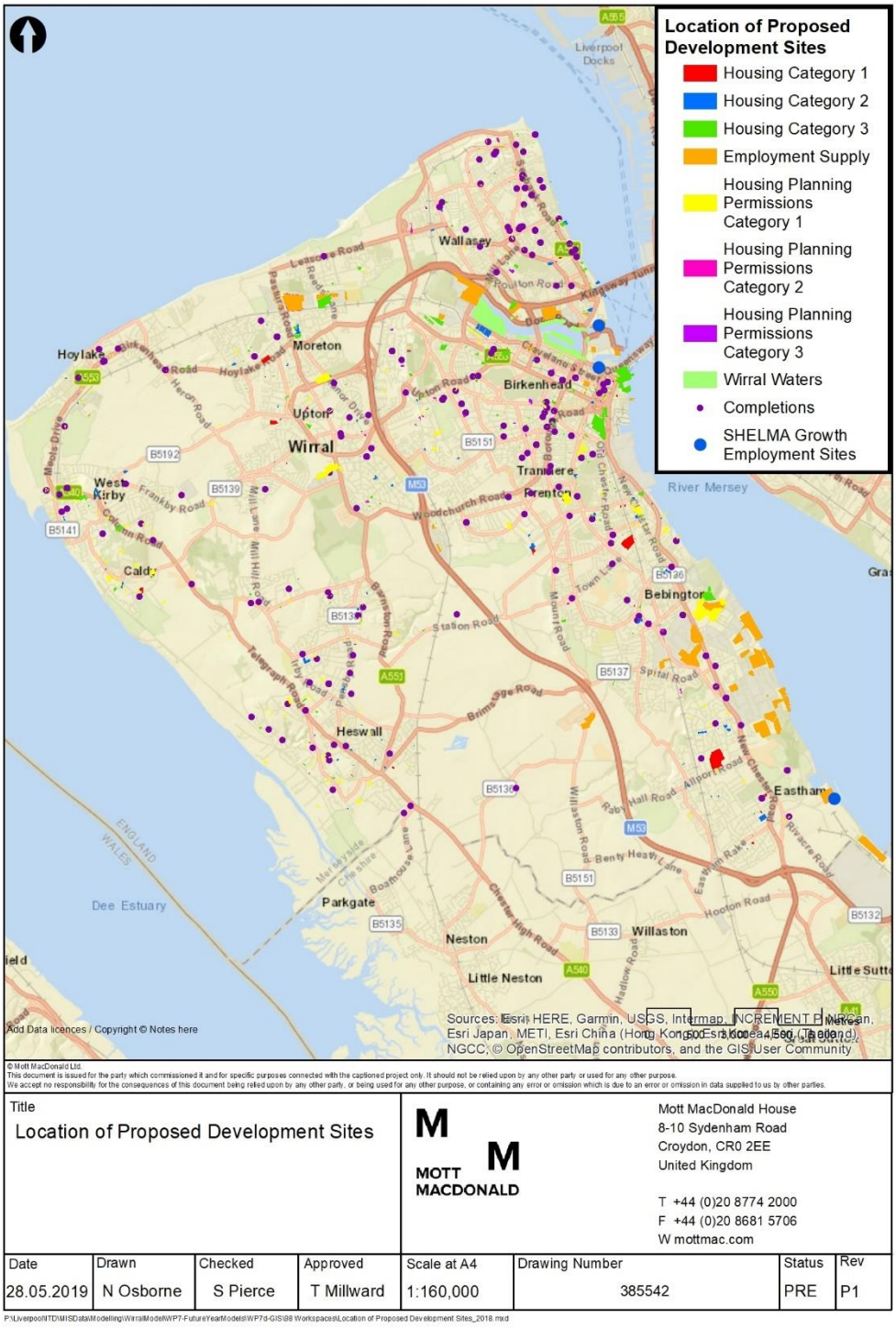


Table 1: Housing Forecasts by LCRTM Zone (Additional Dwellings)

LCRTM Zone	Completions 2015-2017	Planning Permissions + SHLAA 2018-2033	Windfall 2018-2033	Demolitions	Additional Housing 2015-2033	Housing 2033-2035	Additional Housing 2015-2035
105	40	241	22	-19	285	30	315
106	0	4,100	1	-1	4,100	35	4,135
107	0	358	4	-3	359	8	366
108	40	350	5	-4	391	9	400
109	28	315	31	-26	348	42	390
110	0	0	0	0	0	0	0
277	0	59	5	-4	60	7	67
278	3	54	25	-21	61	32	93
279	16	280	28	-23	301	38	338
280	45	143	27	-22	192	35	228
281	123	121	46	-38	252	60	311
282	1	2	18	-15	6	22	28
283	6	73	23	-19	83	30	113
284	0	0	0	0	0	0	0
285	0	0	0	0	0	0	0
286	0	128	5	-5	129	8	137
287	114	252	19	-16	369	27	396
288	11	70	15	-12	83	20	103
289	10	35	20	-17	48	26	74
290	19	91	22	-18	114	28	142
291	20	37	19	-16	60	25	85
292	0	5	15	-12	7	19	26
293	10	54	20	-16	67	25	93
294	43	37	16	-14	83	21	104
295	18	204	30	-25	227	40	268
296	61	304	24	-20	369	33	402
297	5	94	9	-7	100	12	113
298	19	353	4	-3	373	8	381
299	31	24	4	-4	56	6	62
300	4	24	36	-30	34	46	80
301	3	0	1	-1	3	1	4
302	34	80	30	-25	119	39	158
303	0	7	12	-10	9	15	24
304	2	77	12	-10	81	16	97
305	19	304	34	-29	329	46	375
306	0	0	1	-1	0	1	2
307	27	8	4	-3	36	5	41
308	1	1	3	-2	2	3	6
309	43	167	42	-35	217	55	272
310	14	155	54	-45	178	70	248
311	4	38	12	-10	44	15	59
312	1	9	26	-22	14	33	48
313	29	279	44	-36	315	58	373

LCRTM Zone	Completions 2015-2017	Planning Permissions + SHLAA 2018-2033	Windfall 2018-2033	Demolitions	Additional Housing 2015-2033	Housing 2033-2035	Additional Housing 2015-2035
314	25	345	52	-43	379	68	447
315	1	398	20	-17	402	29	432
316	76	281	60	-50	367	79	446
Total	946	9,957	900	-750	11,053	1,228	12,281

Table 2: Employment Forecasts by LCRTM Zone (Additional Jobs)

LCRTM Zone	Baseline Employment 2015-2035	Growth Forecast Employment 2015-2035	Growth Forecast Location	Additional Jobs 2015-2035
105	58	0		58
106	0	2,149	Wirral Waters East Float[2]	2,149
107	173	400	Kingsgate, Tower Wharf	573
108	166	0		166
109	294	0		294
110	23	0		23
277	83	2,500	Woodside	2,583
278	366	0		366
279	0	0		0
280	203	0		203
281	27	0		27
282	0	0		0
283	0	0		0
284	0	3,105	Wirral Waters West Float[3]	3,105
285	839	0		839
286	61	0		61
287	201	0		201
288	0	0		0
289	0	0		0
290	0	0		0
291	5	0		5
292	0	0		0
293	55	0		55
294	0	0		0
295	0	0		0
296	0	0		0
297	0	0		0
298	1,039	0		1,039
299	879	0		879
300	0	0		0
301	0	0		0
302	111	0		111
303	0	0		0

[2] VN81125 Wirral Waters Development Trajectory Information Medium Housing PT231018.pdf, Vectos

[3] VN81125 Wirral Waters Development Trajectory Information Medium Housing PT231018.pdf, Vectos

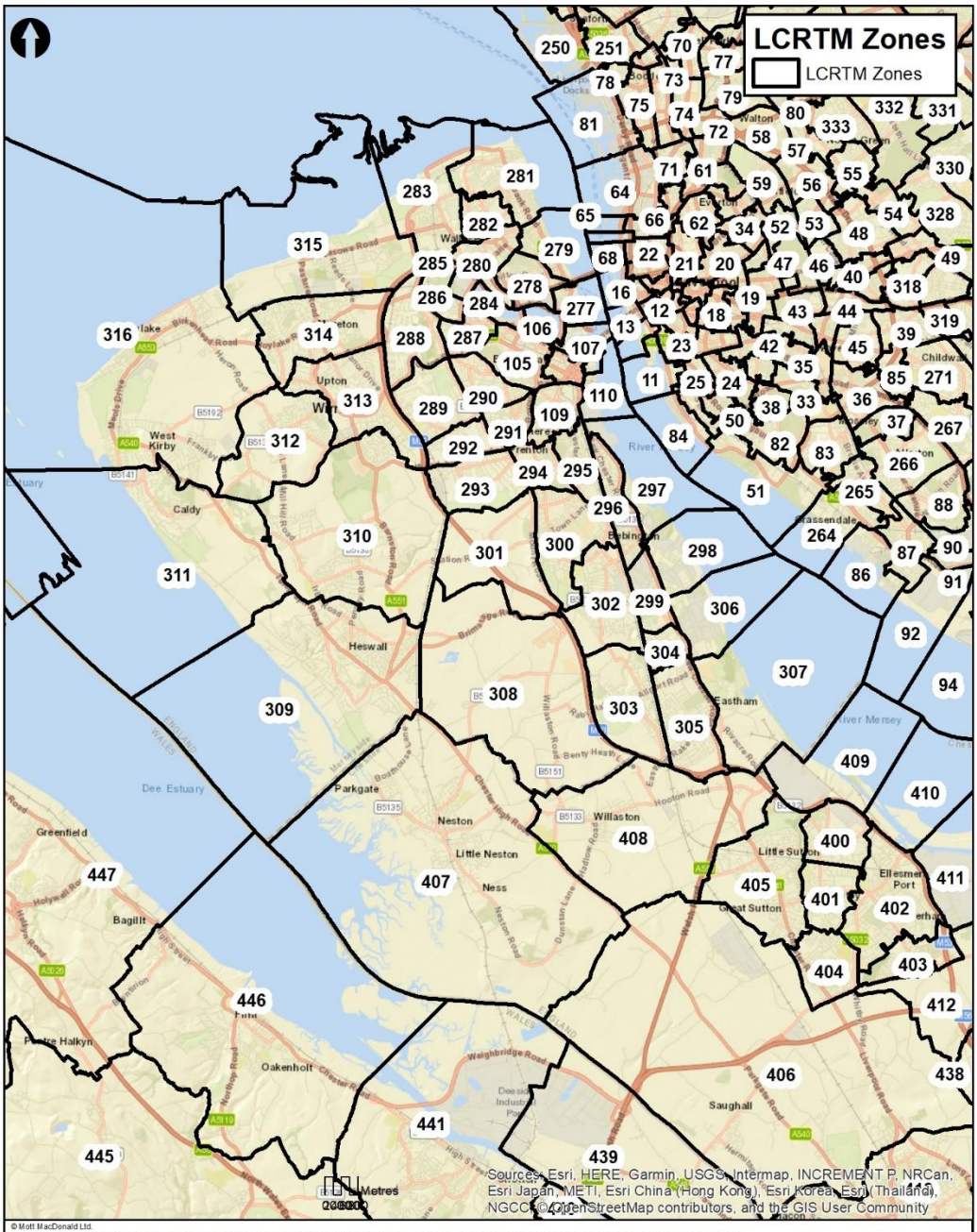
LCRTM Zone	Baseline Employment 2015-2035	Growth Forecast Employment 2015-2035	Growth Forecast Location	Additional Jobs 2015-2035
304	0	0		0
305	0	0		0
306	1,866	0		1,866
307	0	325	Port Wirral, Eastham	325
308	226	0		226
309	0	0		0
310	0	0		0
311	0	0		0
312	0	0		0
313	0	0		0
314	0	0		0
315	1,040	0		1,040
316	16	0		16
Total	7,733	8,479		16,212

Table 3: Summary of Proposed Growth

Type	SHELMA (Jobs/Year)	SHELMA** Jobs 2035	WTM Jobs 2035
Employment*	760	15,200	16,212
	SHELMA (Dwellings/Year) Baseline | Growth Scenario	SHELMA Dwellings 2035 Baseline | Growth Scenario	WTM Dwellings 2035
Housing*	536 | 737	10,720 | 14,740	12,281

** the figures in the table represent additional houses/jobs*
*** the SHELMA growth (policy on) scenario has been used for jobs. There is a difference between the SHELMA and WTM values due to a refinement to the development information for Wirral Waters.*

Figure 2: LCRTM Zones



3 Highway Network

This section of the report documents the highway network assumptions that have been applied in the WTM.

3.1 Future Year Highway Improvement Schemes

Consultation has been undertaken with Wirral Council to identify whether there are any committed or 'most likely' highway improvement schemes to be included in the model.

The following improvement schemes have been included in the model:

- Introduction of a separate right lane and phase at Old Hall Road, Bromborough;
- Lane reduction at Leasowe Road, Leasowe;
- Introduction of an additional right turn lane at Liscard Road;
- Wirral Water Access Improvements – lane reductions at Duke Street, Park Road North, Cleveland Street and Price Street;
- Introduction of traffic signal control at the A554/M53 Interchange (M53 Junction 1);
- Introduction of traffic signal control at Greasby Road/Arrowe Road, Greasby;
- Lane reduction at New Chester Road, Rock Lane Road West and Bedford Road;
- Introduction of traffic signal control at New Chester Road, New Ferry Road and Grove Road; and
- Change of signal phases at junctions: Balls Road East/Oxton Road, Borough Road/Prenton Road East, New Chester Road/Marine Drive, New Chester Road/Pool Lane, New Chester Road/Hesketh Way, New Chester Road/Old Hall Road Bromborough and Allport Road/Allport Lane.

3.2 Development Access

Each development site has been allocated to a model zone and the zone loading examined to determine whether the trips will enter the network in a suitable location. The zone loading was suitable for all developments, so no changes were made to the zone access.

3.3 Buses

Bus vehicle volumes have been taken from the LCRTM future year models and added to the WTM network as pre-loads.

3.4 Future Year Tolls

The forecast increases in toll charges have been derived in line with GDP growth predicted between the model base year (2015) and forecast year (2035) as contained in the TAG Databook – May 2019.

The toll charges have been applied to Mersey Tunnels and the Mersey Gateway as well as Silver Jubilee Bridge in the relevant assessment year. Table 4 shows the toll charges.

Table 4: Toll Charges (pence)

	2015 Toll	2035 Toll	2015 – 2035 Growth
Car	170	261	54%
Light Goods Vehicles (LGV)	340	523	54%
Heavy Goods Vehicles (HGV)	550	845	54%

3.5 Generalised Costs

Assignment of vehicles is based on the lowest cost route that combines journey times, vehicle operating costs and toll charges, by means of a generalised cost.

The generalised cost coefficient values: pence per minute (PPM); and pence per kilometre (PPK) for model assignment are shown in Table 5. These values are representative of 2015 prices and are obtained from TAG databook May 2019, used to be consistent with the base model. It must be noted that the value of time for OGVs has been factored by a value of 2.3 to take account of the influence of owners on the routing of vehicles in line with TAG guidance that 'it may be considered to be more appropriate to use a value of time around twice the TAG Unit A1.3 values'.[4]

Table 5: Future Year Generalised cost coefficients (pence)

Year	Type	Car Commute	Car Other	Car EB	LGV	OGV (VOT uplift)
2035	PPM	28.88	20.70	43.46	30.23	70.59
2035	PPK	5.86	5.86	12.96	15.75	41.07

Source: Highway Model Assignment cost coefficients, TAG Databook May 2019

[4] webtag-tag-unit-m3-1-highway-assignment-modelling.pdf, Section 2.8.8

4 Demand Matrices

This section of the report documents the development of the demand forecasts. LCRTM has been used to produce the matrices, and these have then been converted to WTM zones.

The forecasts have been created for all model user classes:

- Car – Commute;
- Car – Other;
- Car – Employers Business (EB);
- LGV; and
- OGV.

4.1 Method

The following process has been used to create the future year WTM matrices:

- WTM base year matrices converted to LCRTM zones (see section 4.1.1 below);
- LCRTM demographic and land-use projections have been updated for Wirral using the development information discussed in Section 2;
- The LCRTM trip generation process was run, pivoting off the WTM base year matrices at LCRTM zone level;
- The LCRTM variable demand model has been run with the future year demand to incorporate variable demand impacts; and
- The output matrices have been converted to WTM zone to form the WTM forecast matrices (see section 4.1.1).

4.1.1 Zone Conversions

A correspondence has been created between the LCRTM and WTM zone systems. LCRTM has 467 zones and WTM has 668 zones which are largely a disaggregation of the LCRTM zones.

To convert between WTM and LCRTM it is simply a case of aggregating the WTM matrices, but to convert between LCRTM and WTM a correspondence has been set up as described below.

Firstly, a list was created noting the corresponding WTM zone for every LCRTM zone. Where a WTM zone crossed LCRTM zone boundaries the WTM zone was included in both instances.

Trip end data from the WTM matrix was used to create a correspondence to convert between LCRTM and WTM zones by user class and time period where:

- the user classes are Commute, Other, EB, LGV and OGV; and
- the time periods are AM, IP and PM.

The correspondence was created by:

- aggregating the WTM base year matrix to trip ends at WTM zone level;
- aggregating WTM base year matrix to trip ends at LCRTM zone level (a simple addition as the WTM zones are within the LCRTM zones); and
- dividing the WTM trip ends by the LCRTM trip ends to calculate the proportion of each WTM trip end within the LCRTM zone, by origin and destination.

4.2 Forecasting Processes

The full LCRTM system includes components representing six travel responses comprising: trip generation, mode choice, time period choice, trip distribution, departure time choice and highways assignment and public transport assignment.

The trip generation process takes land-use and demographic forecasts to calculate trip growth. This growth is applied to the calibrated base year matrices, and the resultant matrix is constrained to TEMPRO trip end growth by district.

The demand model focuses on mode choice (how people travel), time period choice (when people travel), trip distribution (where people travel) and departure time choice (the hour of the morning peak period in which people travel).

The assignment models provide details of the routes taken and network performance.

Appendix B describes the LCRTM trip generation process and Appendix C provides details of the LCRTM demand model.

4.3 Reference Case Forecast Matrices

Reference case future year matrix totals for Wirral are shown in Table 6 to Table 8. The tables represent trip growth due to demographic and land-use changes. Commute, other and employer's business (EB) matrices are in person trips. Freight matrices are in vehicles. All numbers have been rounded to the nearest hundred.

Table 6: Matrix Totals, Wirral District – AM Peak Hour

User Class	Matrix Totals 2015	Matrix Totals 2035	Difference 2015 - 2035	Percentage Difference 2015 - 2035
Commute	21,800	24,100	2,300	11%
Other	41,100	45,200	4,100	10%
EB	2,900	3,100	200	7%
LGV	4,700	6,000	1,300	28%
OGV	2,300	2,300	0	0%

Table 7: Matrix Totals, Wirral District – Average Inter Peak Hour

User Class	Matrix Totals 2015	Matrix Totals 2035	Difference 2015 - 2035	Percentage Difference 2015 - 2035
Commute	5,000	5,500	500	10%
Other	44,300	50,300	6,000	14%
EB	2,500	2,800	300	12%
LGV	4,000	5,100	1,100	28%
OGV	2,500	2,500	0	0%

Table 8: Matrix Totals, Wirral District – PM Peak Hour

User Class	Matrix Totals 2015	Matrix Totals 2035	Difference 2015 - 2035	Percentage Difference 2015 - 2035
Commute	17,500	19,100	1,600	9%
Other	48,600	55,500	6,900	14%

User Class	Matrix Totals 2015	Matrix Totals 2035	Difference 2015 - 2035	Percentage Difference 2015 - 2035
EB	3,900	4,300	400	10%
LGV	3,700	4,800	1,100	30%
OGV*	1,100	1,200	100	9%

*Large percentage growth due to rounding

4.4 Variable Demand Matrices

Variable demand matrix future year totals for Wirral are shown in Table 9 to Table 11. These matrices are the output of the demand model. The demand model takes the reference case matrices and adjusts them to take into account generalised cost changes as a result of network changes. All matrices are in vehicle trips. All numbers have been rounded to the nearest hundred.

Table 9: Matrix Totals, Wirral District – AM Peak Hour

User Class	Matrix Totals 2015	Matrix Totals 2035	Difference 2015 - 2035	Percentage Difference 2015 - 2035
Commute	18,800	19,600	800	4%
Other	26,000	28,600	2,600	10%
EB	2,400	2,500	100	4%
LGV	4,700	6,000	1,300	28%
OGV	2,300	2,300	0	0%

Table 10: Matrix Totals, Wirral District – Average Inter Peak Hour

User Class	Matrix Totals 2015	Matrix Totals 2035	Difference 2015 - 2035	Percentage Difference 2015 - 2035
Commute	4,300	4,800	500	12%
Other	28,600	33,100	4,500	16%
EB	2,000	2,300	300	15%
LGV	4,000	5,100	1,100	28%
OGV	2,500	2,500	0	0%

Table 11: Matrix Totals, Wirral District – PM Peak Hour

User Class	Matrix Totals 2015	Matrix Totals 2035	Difference 2015 - 2035	Percentage Difference 2015 - 2035
Commute	15,400	16,400	1,000	6%
Other	30,300	34,400	4,100	14%
EB	3,100	3,300	200	6%
LGV	3,700	4,800	1,100	30%
OGV	1,100	1,200	100	9%

5 Highway Assessment

This section of the report presents analysis and discussion of the impact of the future year traffic projections on the highway network.

Model assignments have been undertaken for the AM, IP and PM in 2035.

5.1 Model Assignment Convergence

Model convergence checks have been carried out to ascertain the stability of the model assignment results. This has been done by observing the flow difference of subsequent iterations within the model assignment.

The stopping criteria for the assignment/simulation loops in SATURN, as specified in TAG Unit M3.1 is for the percentage of links where the flow changes by less than 1% (denoted as %FLOWS) is greater than 98% on four consecutive iterations. Even though this guideline is used to show that the model is stable, a truer measure is the duality gap (delta, d, %GAP) which represents the percentage difference between the minimum cost routes and the chosen routes summed across the network. TAG Unit M3.1 recommends that delta and %GAP should be less than 0.1%.

Table 12: Summary of Convergence Measures and Base Model Acceptable Values

Measure of Convergence	Base Model Acceptable Values
Delta and % Gap	Less than 0.1% or at least stable with convergence fully documented and all other criteria met
Percentage of links with flow change (P) <1%	Four consecutive iterations greater the 98%
Percentage of links with cost changed (P2) <1%	Four consecutive iterations greater than 98%

Source: Table 4, TAG UNIT M3.1 Highway Assignment Modelling, January 2014

Model convergence statistics are presented in Appendix D for the final iterations of the AM, IP and PM models where it is evident that the model convergence criteria have been achieved for all time periods. Key highlights from Appendix D show:

- The “%FLOWS” values are higher than 99% in the final four assignment loops for all models
- “%GAP” values for 2035 of 0.015, 0.010 and 0.015 have been achieved for the AM, IP and PM models respectively.

5.2 Model Results

This section presents analysis of the baseline 2035 assessment.

5.2.1 Network Statistics

Table 13 presents the overall network statistics. The modelling shows a 20-30% increase in traffic between 2015 and 2035 with corresponding increases in queues and travel time. The average speed across the network in the AM peak has decreased from 40 kph in 2015 to 38 kph in 2035, the equivalent figures for PM are 39 kph to 38 kph.

Table 13: Network Statistics

	Base Year			Future Year			Difference			Percentage Difference		
Statistics	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**
Transient Queues (PCU HRS/HR)	1,565	1,029	1,553	2,069	1,427	1,971	504	398	419	32%	39%	27%
Over-Capacity Queues (PCU HRS/HR)	221	70	577	1,282	225	1,184	1,061	155	607	480%	220%	105%
Link Cruise Time (PCU HRS/HR)	10,057	6,739	9,619	12,110	8,839	11,191	2,053	2,100	1,573	20%	31%	16%
Total Travel Time (PCU HRS/HR)	11,844	7,838	11,748	15,461	10,491	14,346	3,618	2,653	2,598	31%	34%	22%
Travel Distance (PCU KMS/HR)	477,314	328,612	459,822	585,451	447,954	546,946	108,138	119,343	87,124	23%	36%	19%
Average Speed (KPH)	40	42	39	38	43	38	-2	1	-1	-6%	2%	-3%
Total Trips Loaded (PCU)	481,832	364,497	487,182	596,446	478,639	596,279	114,613	114,142	109,097	24%	31%	22%

5.2.2 Comparison of Flow Volumes

The traffic flow volumes have been compared in the base and future years using bandwidth plots.

The bandwidth plots are based on actual flow volumes and represent the traffic flow that can load onto the highway network during the modelled time period.

Figure 3 to Figure 5 present flow difference plots between the 2035 baseline and the base year scenarios for AM, IP and PM respectively.

The primary increase in traffic flow volume is on the M53, which records increase in over 400 PCUs for the AM, IP and PM. The A540 north of Neston and the Kingsway Tunnel also record significant increases in PCUs for all periods. The B5151 through Willaston records increases over 300 PCUs for both the AM and IP. There is an increase in cross-boundary traffic to Cheshire West and Chester.

The A41 records a slight decrease in traffic flows in all time periods. The only marginal increases on the A41 are shown further south at the junction with the M53 in the PM.

There are also increases in traffic flow volume along the A550 for all periods which represents a wider increase in flows along routes from Cheshire West and Chester in the south. This is also evident for the M53 and A540 which record increases in traffic flow volume as outlined above.

Figure 6 to Figure 8 present the 2035 baseline traffic flows. The Wirral highway network is clearly depicted within the three figures in which the M53 forms the primary spine of the network, supporting traffic flow volumes over 2,000 PCU in all periods.

The A road network accommodates a large volume of flows and support access to various destinations in Wirral such as the A41 for key employment sites along the A41 Corridor, A553 for access to West Kirby and A552 for access to Birkenhead. All of which accommodate over 750 PCU in all periods. The A540 and A550 also accommodate large volumes of traffic flow exceeding 750 PCU in all periods, recognising the importance of these routes alongside the M53 as the key routes in the south for connectivity to Cheshire West and Chester.

Figure 3: Difference in Actual Flow (PCUs): 2035 Baseline Growth Scenario Compared to Base Year: AM

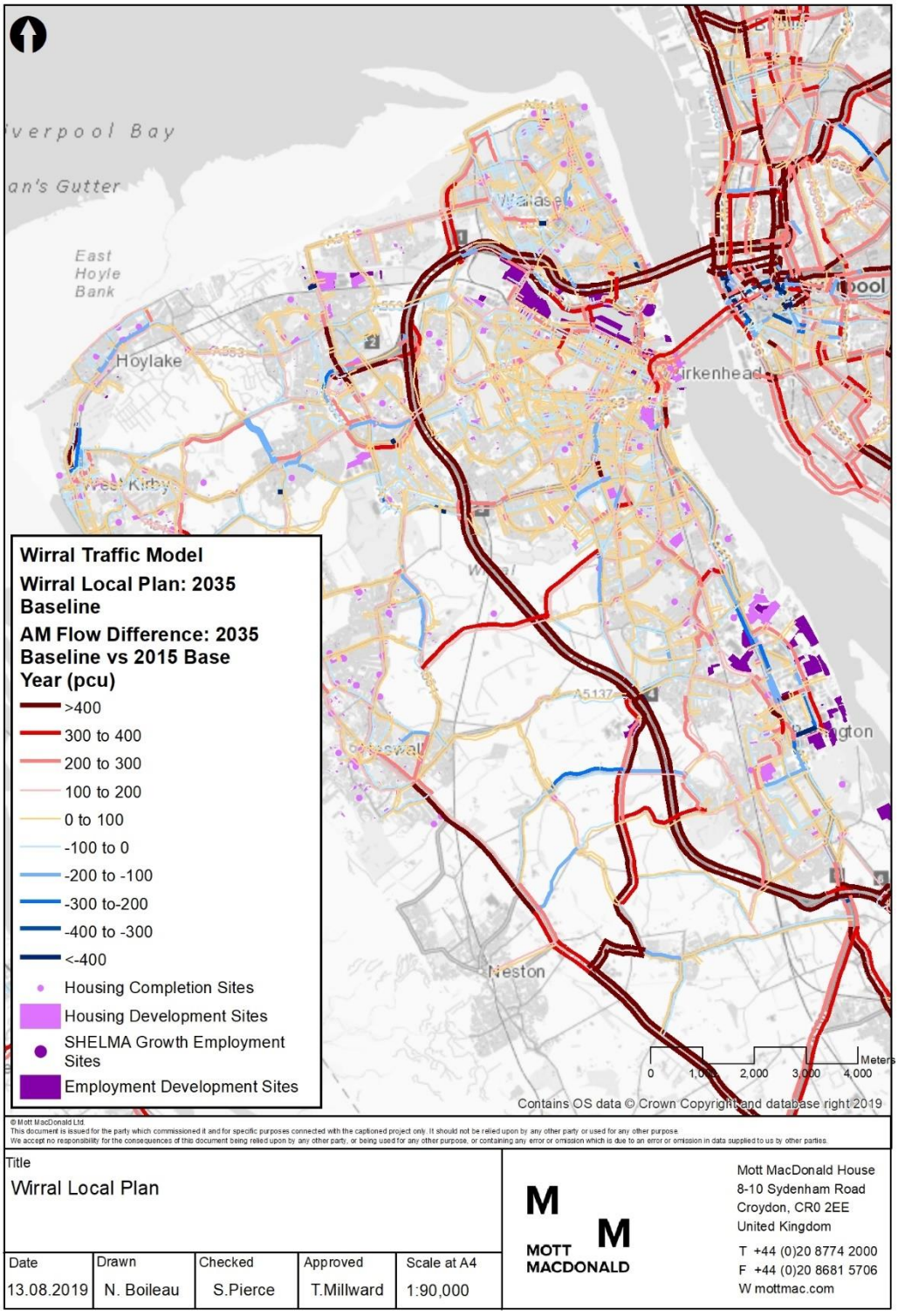


Figure 4: Difference in Actual Flow (PCUs): 2035 Baseline Growth Scenario compared to Base Year: IP

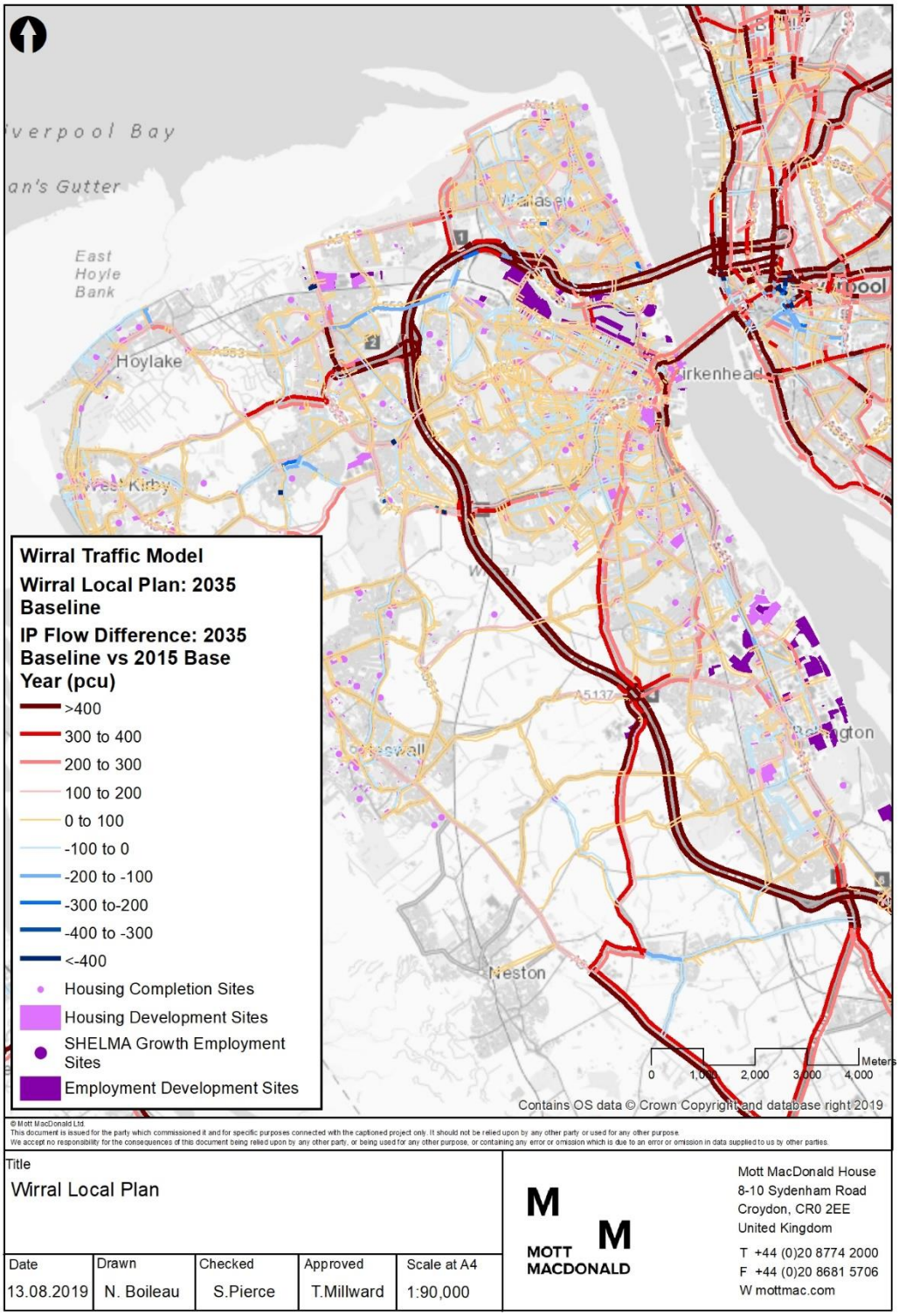


Figure 5: Difference in Actual Flow (PCUs): 2035 Baseline Growth Senariocompared to Base Year to PM

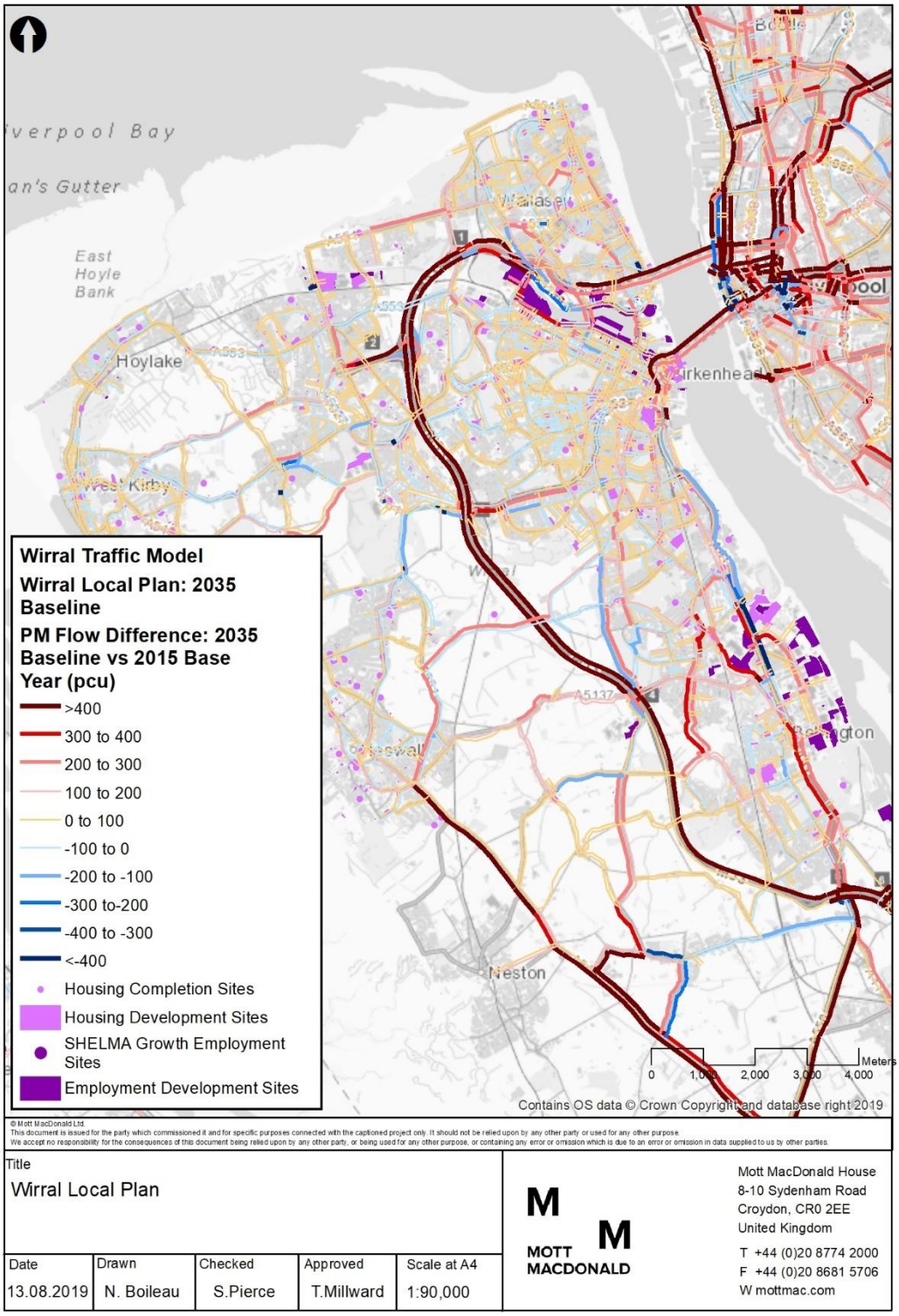


Figure 6: Actual Flow (PCUs): 2035 Baseline Growth Scenario: AM

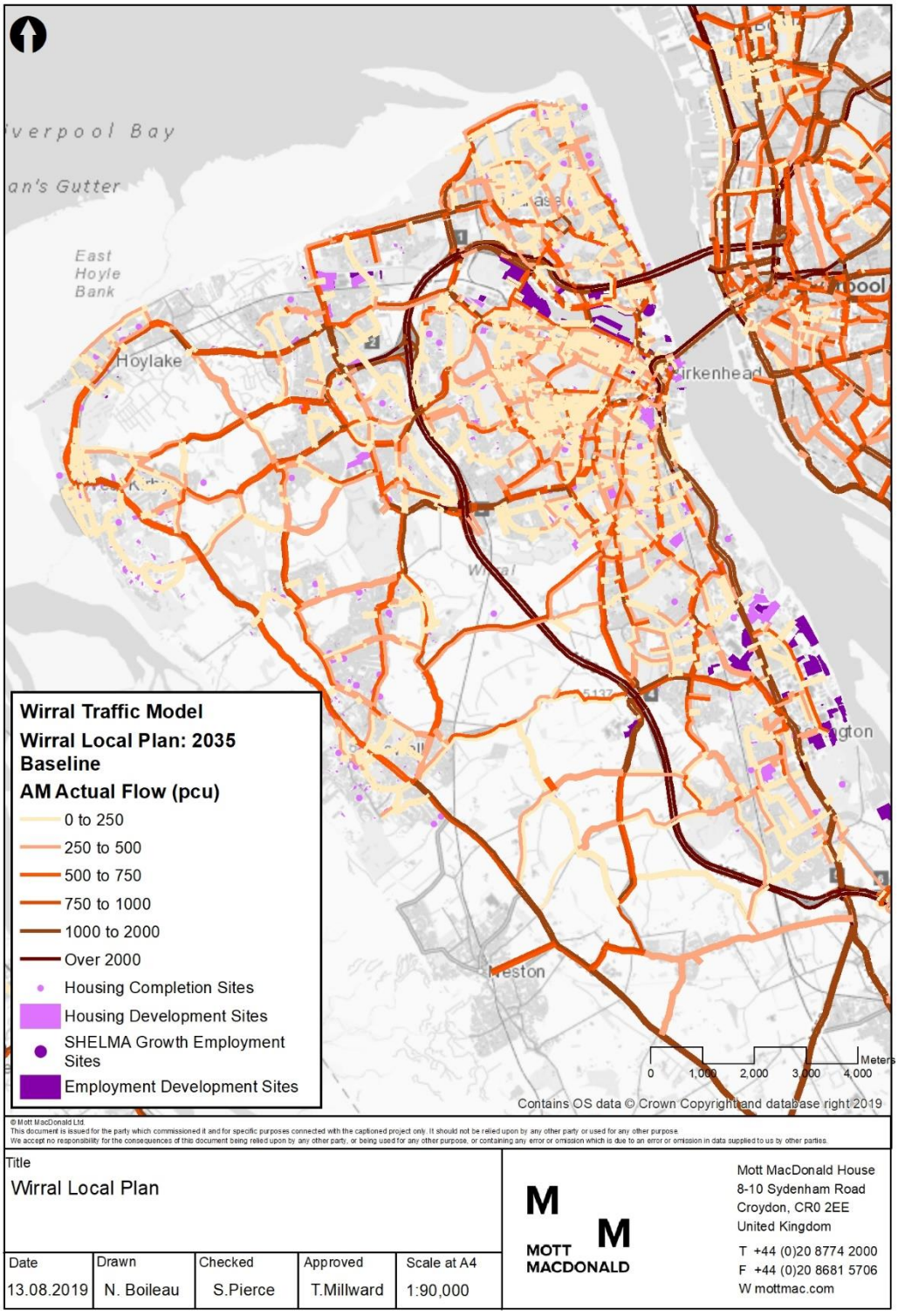


Figure 7: Actual Flow (PCUs): 2035 Baseline Growth Scenario: IP

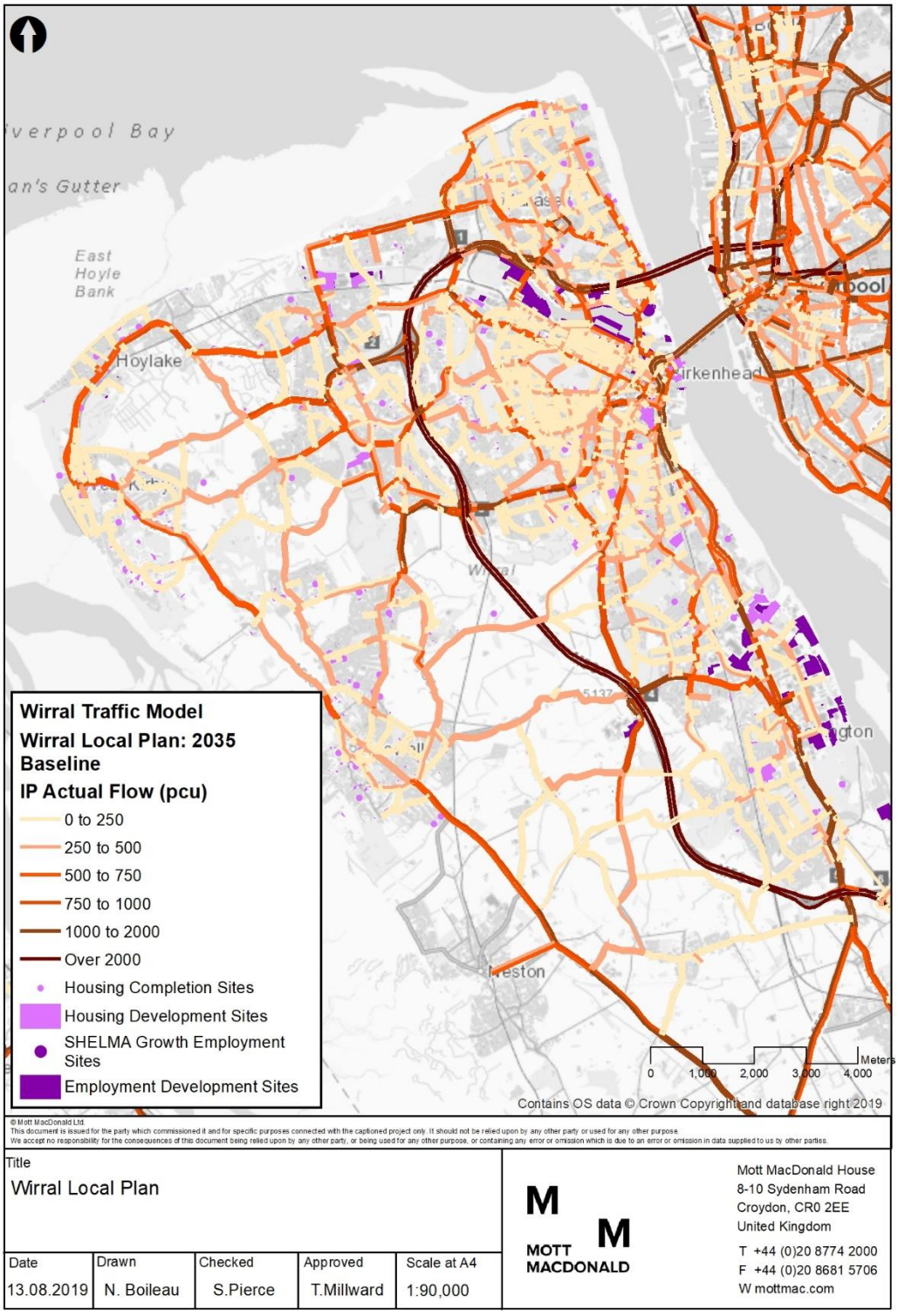
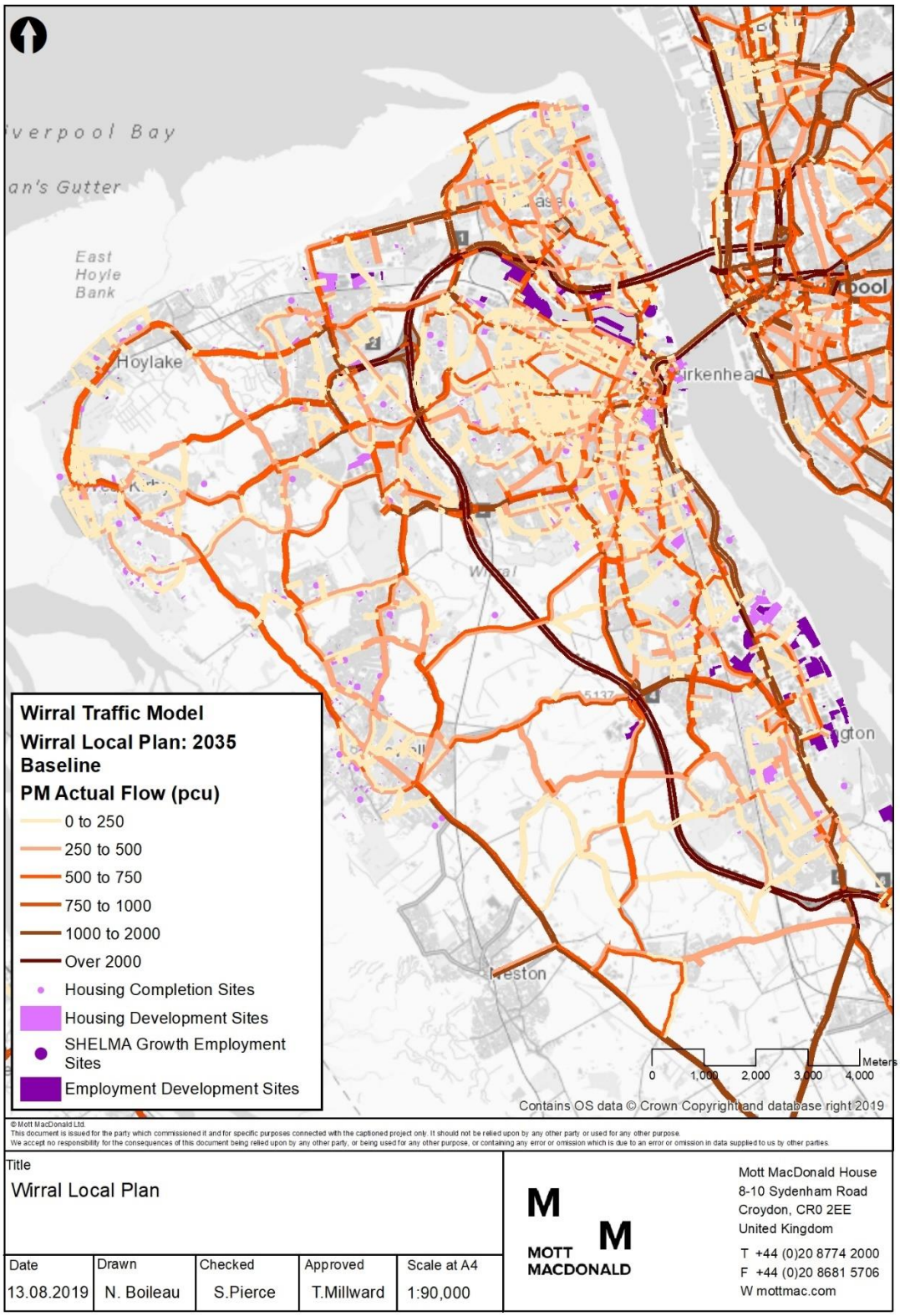


Figure 8: Actual Flow (PCUs): 2035 Baseline Growth Scenario: PM



5.2.3 Junctions over Capacity

The operational performance of the local highway network has been reviewed from reference to the volume over capacity (v/c) relationships for turning movements at junctions.

The junctions have been plotted on the network and colour classified according to the following capacity bands:

- **Yellow (85% v/c to 100% v/c):** This junction is operating with at least one turning movement that is approaching capacity and as a result there are increased queue lengths and delays.
- **Orange (100% to 115% v/c):** This junction is operating over capacity for at least one turning movement. Queues and delays at this location are likely to grow exponentially.
- **Red (> 115% v/c):** This junction is operating considerably over capacity for at least one turning movement and is likely to experience considerable congestion.

Figure 9 to Figure 11 present the junctions approaching or over capacity in the 2035 baseline scenario in the AM, IP and PM respectively.

There are 189 junctions that are over capacity in one or more time periods in 2035.

There are a number of junctions over capacity, in particular the Arrowe Park junction, junction 5 of the M53 and approaches to Queensway Tunnel, all of which are over 115% capacity in the 2035 AM (Figure 9). Several junctions along the A41 corridor operate at over 85% capacity, with several also over 100%, such as to the south at the junction with the M53, and to the north in Birkenhead town centre.

For the PM peak (Figure 11), two junctions record over 115% capacity, one located at Arrowe Park and the other at Birkenhead Town Centre. There are also several junctions along the M53 between Junction 1 and 5, that record a capacity over 85%, of which several record between 100% and 115%. Additionally, several junctions along the A553 towards West Kirby record a capacity over 85% in both the AM and PM. For all periods, there remain several junctions over capacity which are spread across the Wirral highway network, but the main clusters are shown along the A41, at junctions with the M53 and in Birkenhead town centre.

Table 14 summarises the number of junctions over capacity. There are nearly double the number of junctions over capacity in 2035 than there are in the 2015 base year.

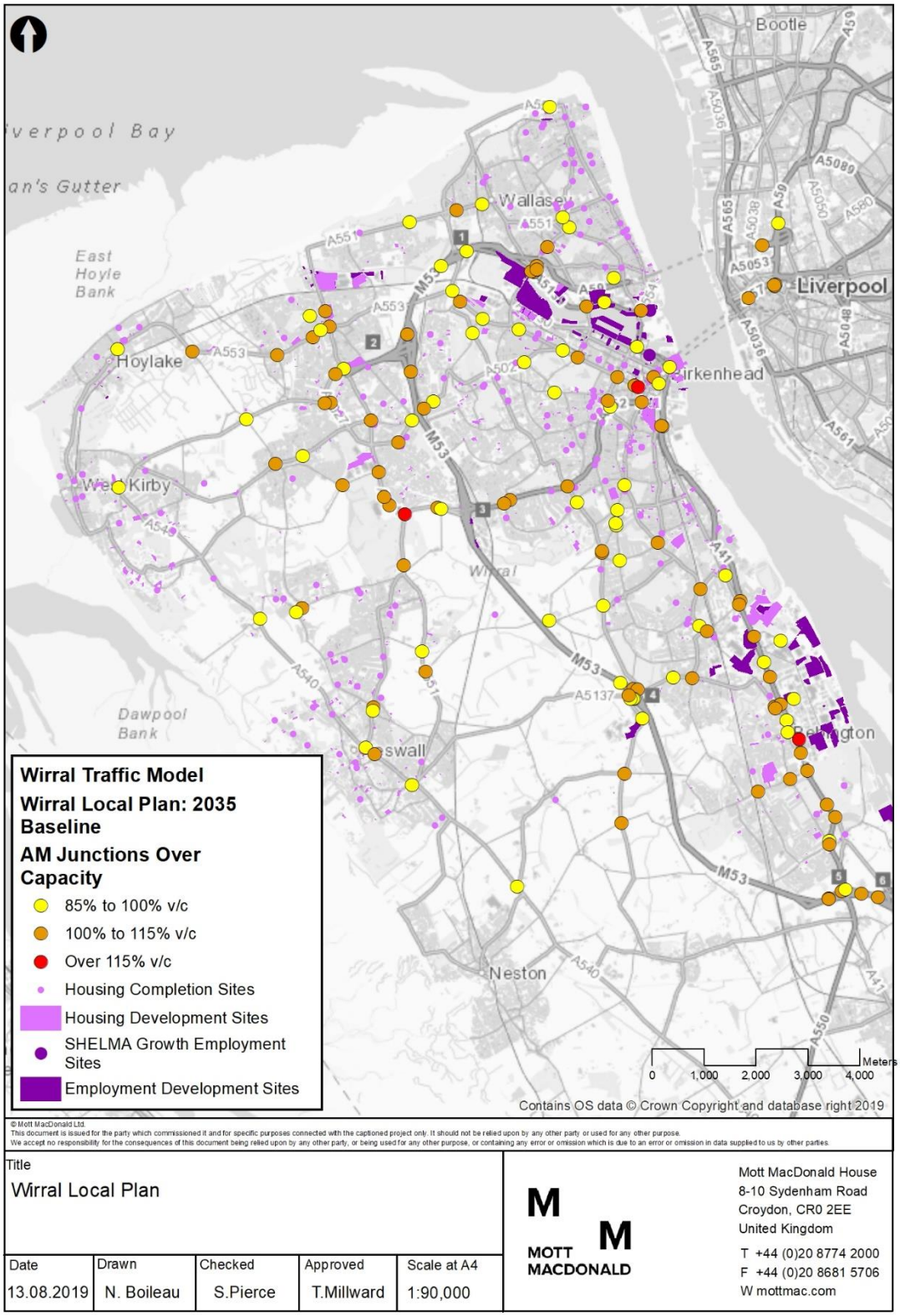
Table 14: Number of Junctions Over Capacity

Time Period	Base Year	Future Year
AM	71	143
IP	26	62
PM	78	124

Appendix E contains a list of all junctions over capacity and which time period this applies.

The accompanying spreadsheet (WTM_2035Baseline_TurnVolumes_RevA) provides details of the volume, delay and v/c for each junction that is over capacity.

Figure 9: Junctions Over Capacity: 2035 Baseline Growth Scenario: AM



Title				
Wirral Local Plan				
Date	Drawn	Checked	Approved	Scale at A4
13.08.2019	N. Boileau	S.Pierce	T.Millward	1:90,000

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Figure 10: Junctions Over Capacity: 2035 Baseline Growth Scenario: IP

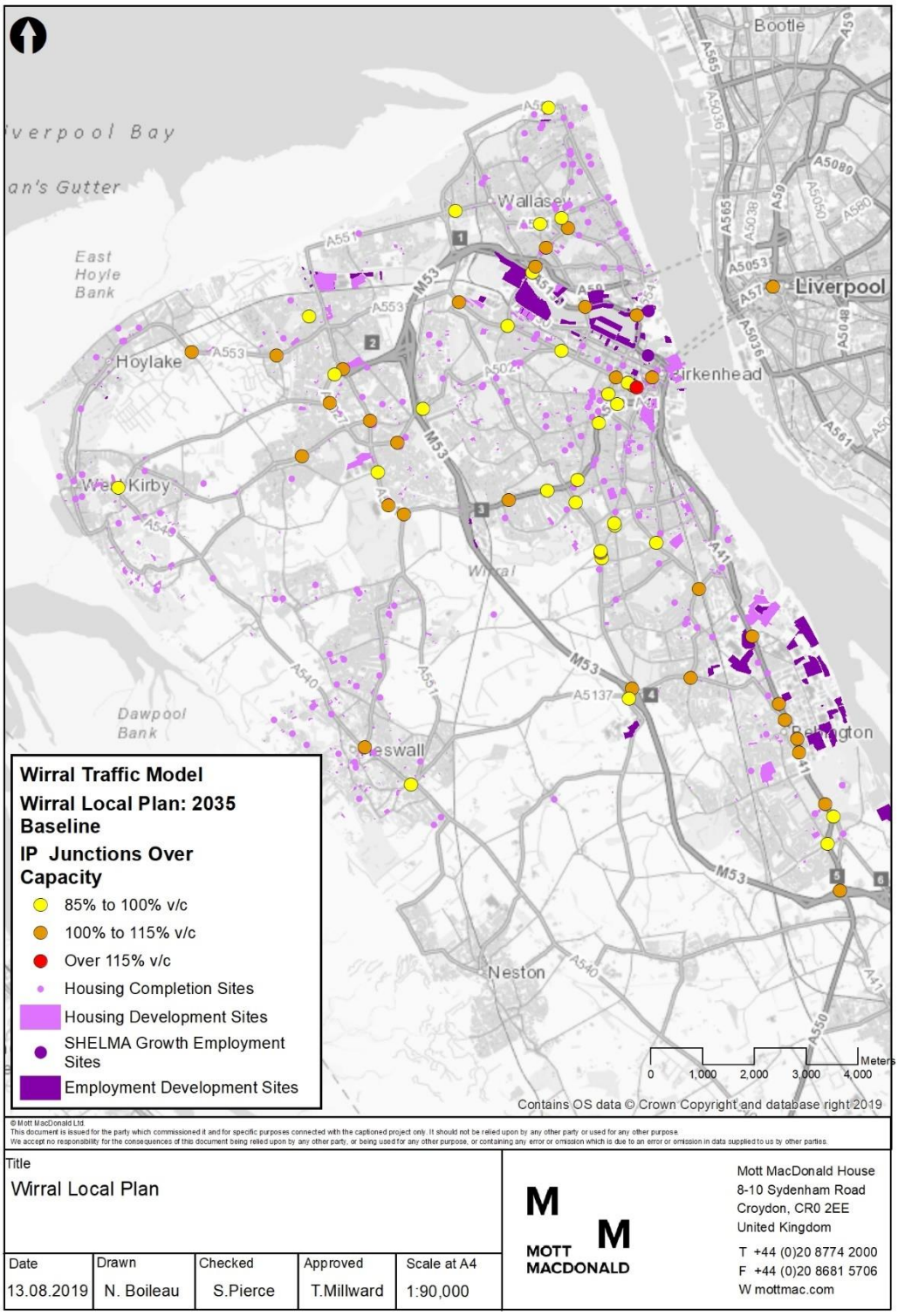


Figure 11: Junctions Over Capacity: 2035 Baseline Growth Scenario: PM

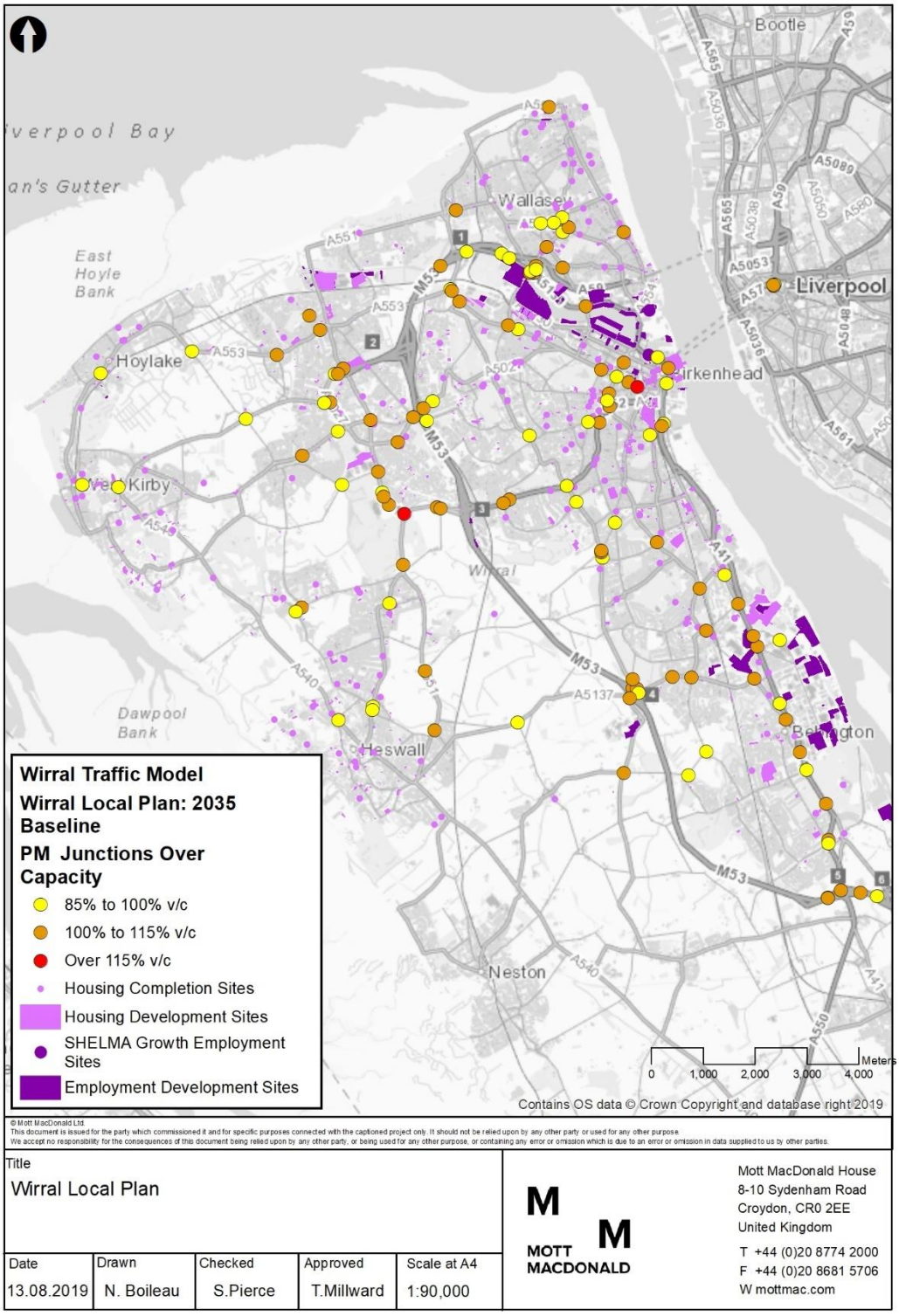


Figure 12 to Figure 14 presents junctions that are approaching or over capacity in the 2035 baseline scenario that were under 85% v/c in the 2015 base year.

This demonstrates that a number of the over capacity junctions have become over capacity due to future developments, especially around Wirral Waters, the A41 corridor, along the M53 and in the Heswall area.

Figure 12: Junctions That Become Over Capacity in 2035 Baseline Growth Scenario: AM

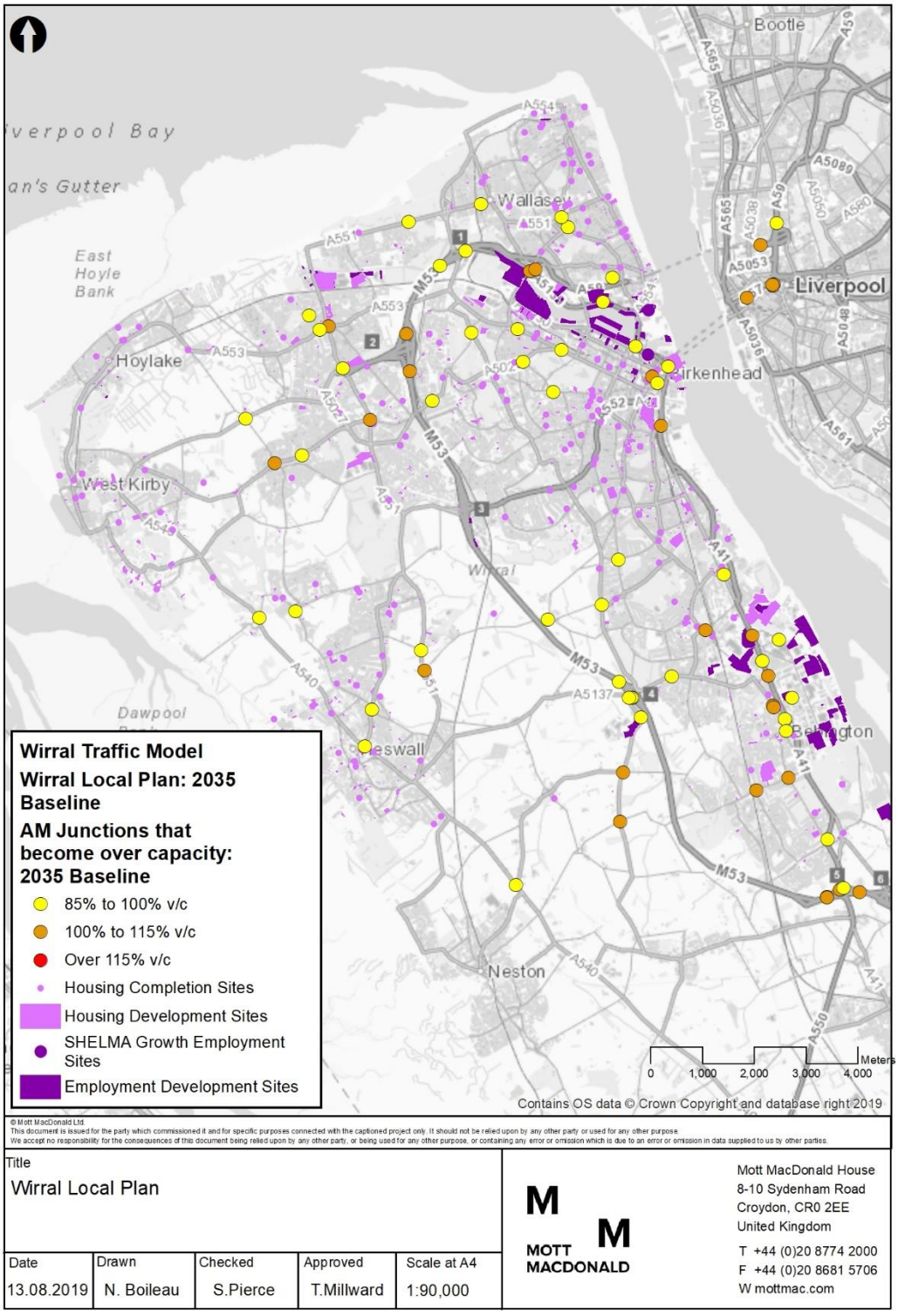


Figure 13: Junctions That Become Over Capacity in 2035 Baseline Growth Scenario: IP

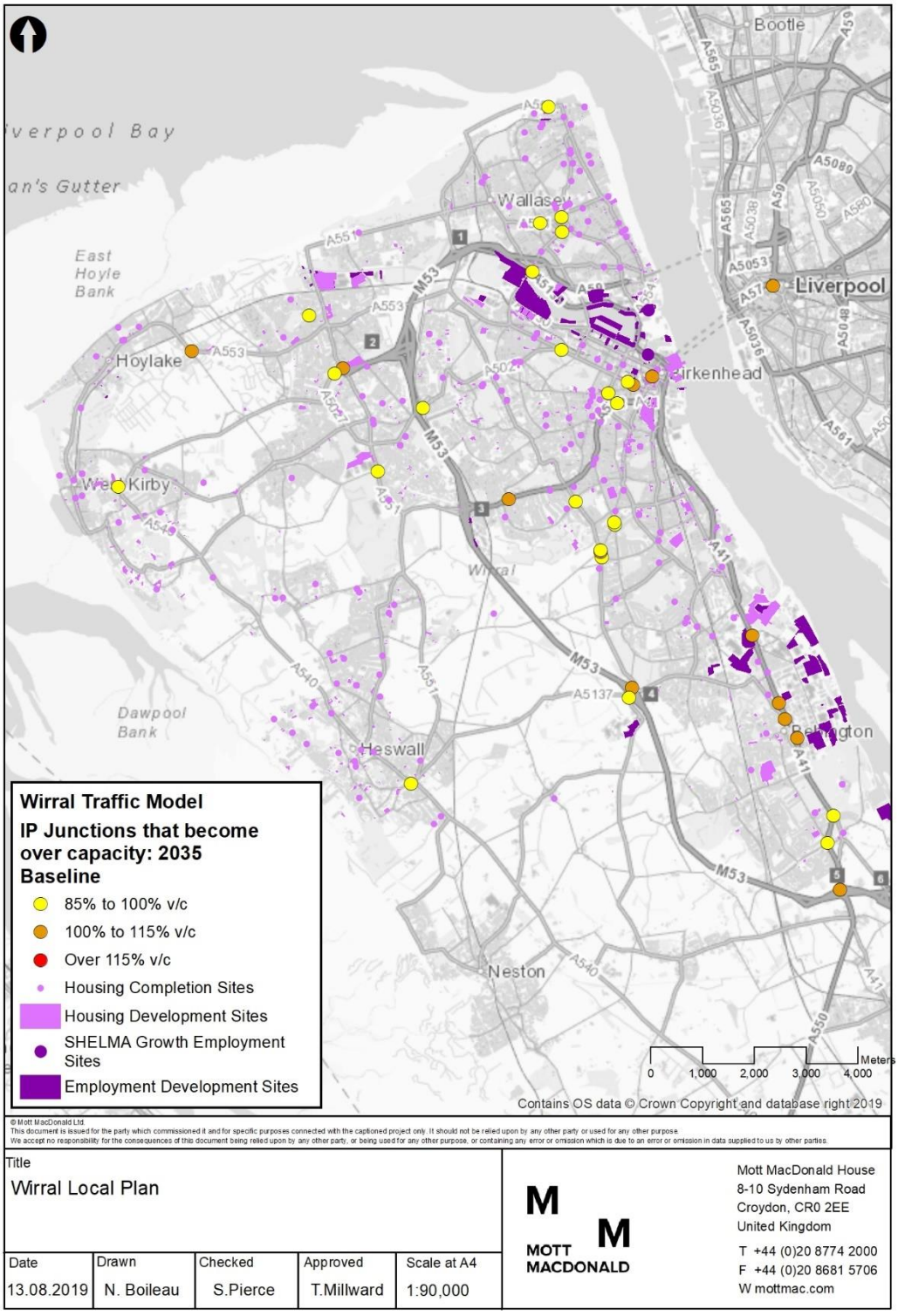
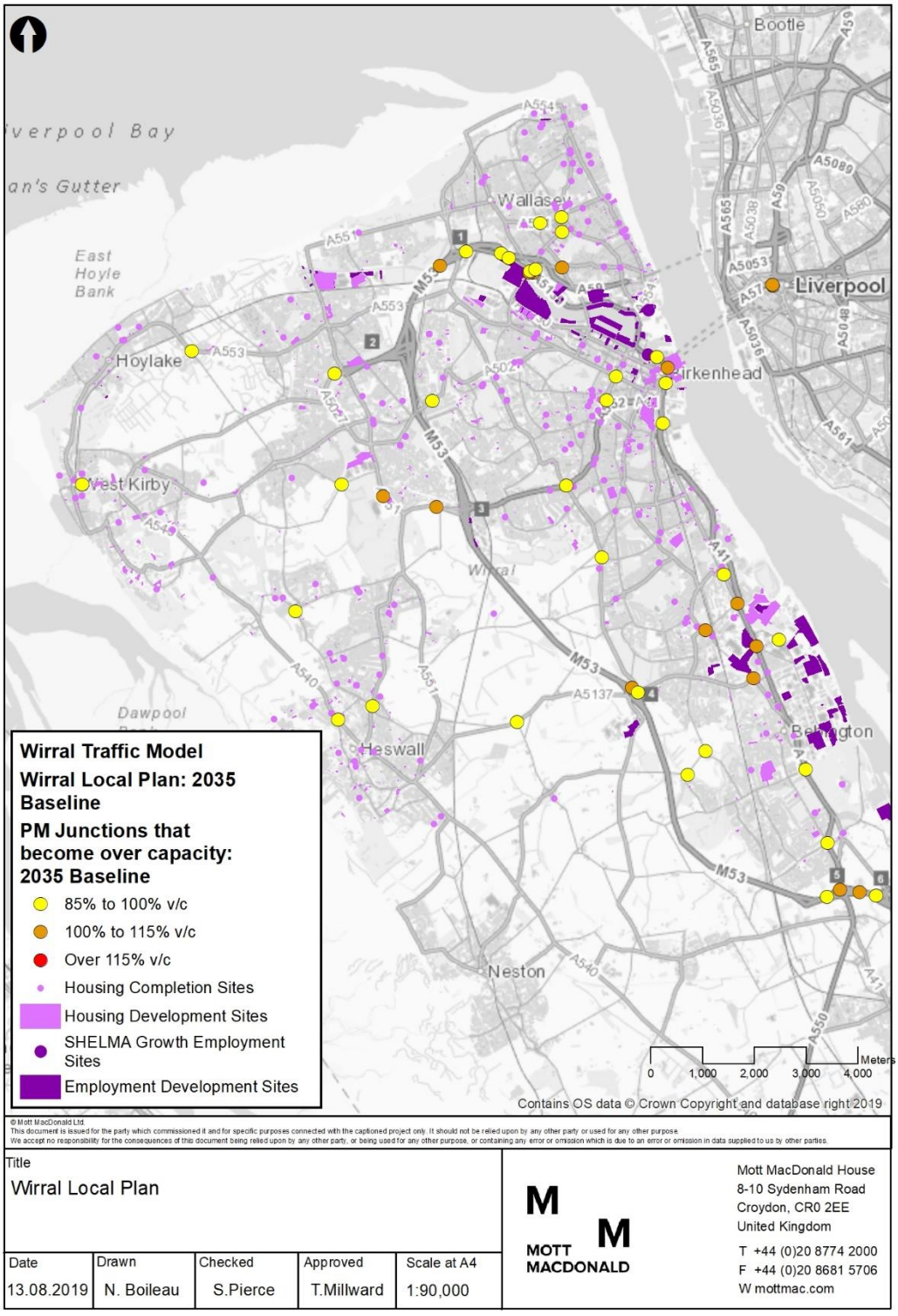


Figure 14: Junctions That Become Over Capacity in 2035 Baseline Growth Scenario: PM



5.2.4 Comparison of Link Volume over Capacity

The operational performance of the local highway network has also been reviewed from reference to the volume over capacity relationships for the flows at model links.

The volume over capacity value for each link has been plotted on the network and colour classified according to the following capacity bands:

- **Yellow (85% v/c to 100% v/c):** This link is approaching capacity.
- **Orange (100% v/c to 115% v/c):** This link is operating over capacity.
- **Red (> 115% v/c):** This link is operating considerably over capacity.

Figure 15 to Figure 17 show the volume over capacity relationship of links in the 2035 baseline scenario. There are no links operating at over 115% capacity across the three periods, and for the IP there are only a minor number of links operating at over 100% capacity. These links are spread across the network, including the A41, to the south of Wallasey around the Wirral Waters site, and west of the M53 around Arrowe Park. Several links also operate over 85% capacity in the IP and are distributed across the network e.g. in Wallasey and along the A553 to Hoylake.

Both the AM and PM peaks show a greater number of links over capacity with the primary cluster of links over 100% capacity in the AM located along the A41, at junctions 4 and 5 of the M53 and at the Kingsway Tunnel both within the tunnel and on the approach. There are also a number of links to the west of the M53 opearting at over 85% and 100% respectively. These links are located on key routes which provide accessibility to several destinations in West Wirral such as West Kirby, Heswall, Arrowe Park and Neston.

For the PM, several of the links recorded as over capacity in the AM located in West Wirral are no longer over capacity. The A41 and Kingsway Tunnel areas record links over capacity as per the AM, however the Kingsway Tunnel itself does not exceed 85% capacity in the PM. To the south, the A550 exceeds 85% capacity on part of the route with links around the junction with the A41 and M53 also recording over 85 % capacity in the PM peak.

Figure 15: Links Over Capacity - 2035 Baseline Growth Scenario: AM

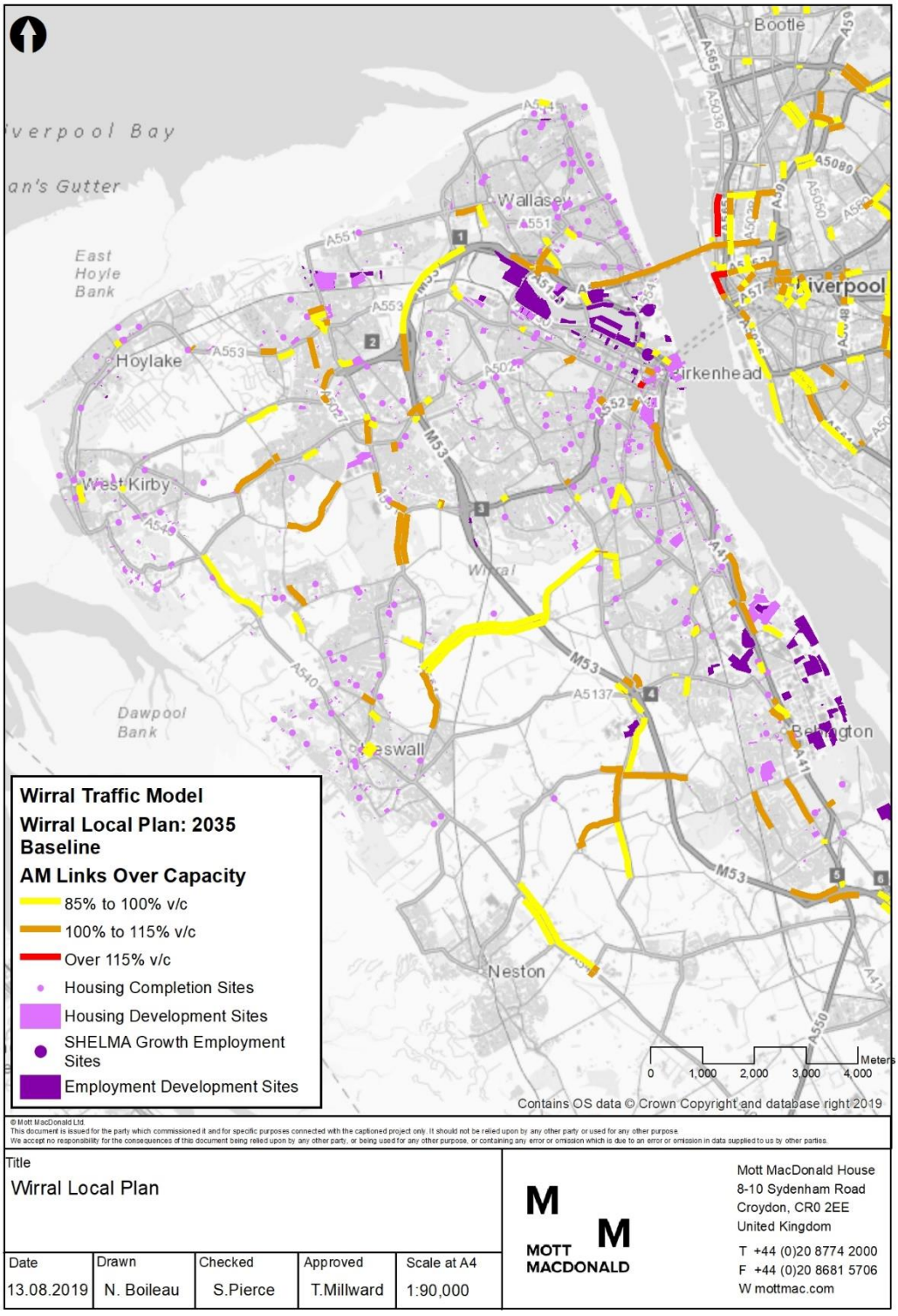


Figure 16: Links Over Capacity - 2035 Baseline Growth Scenario: IP

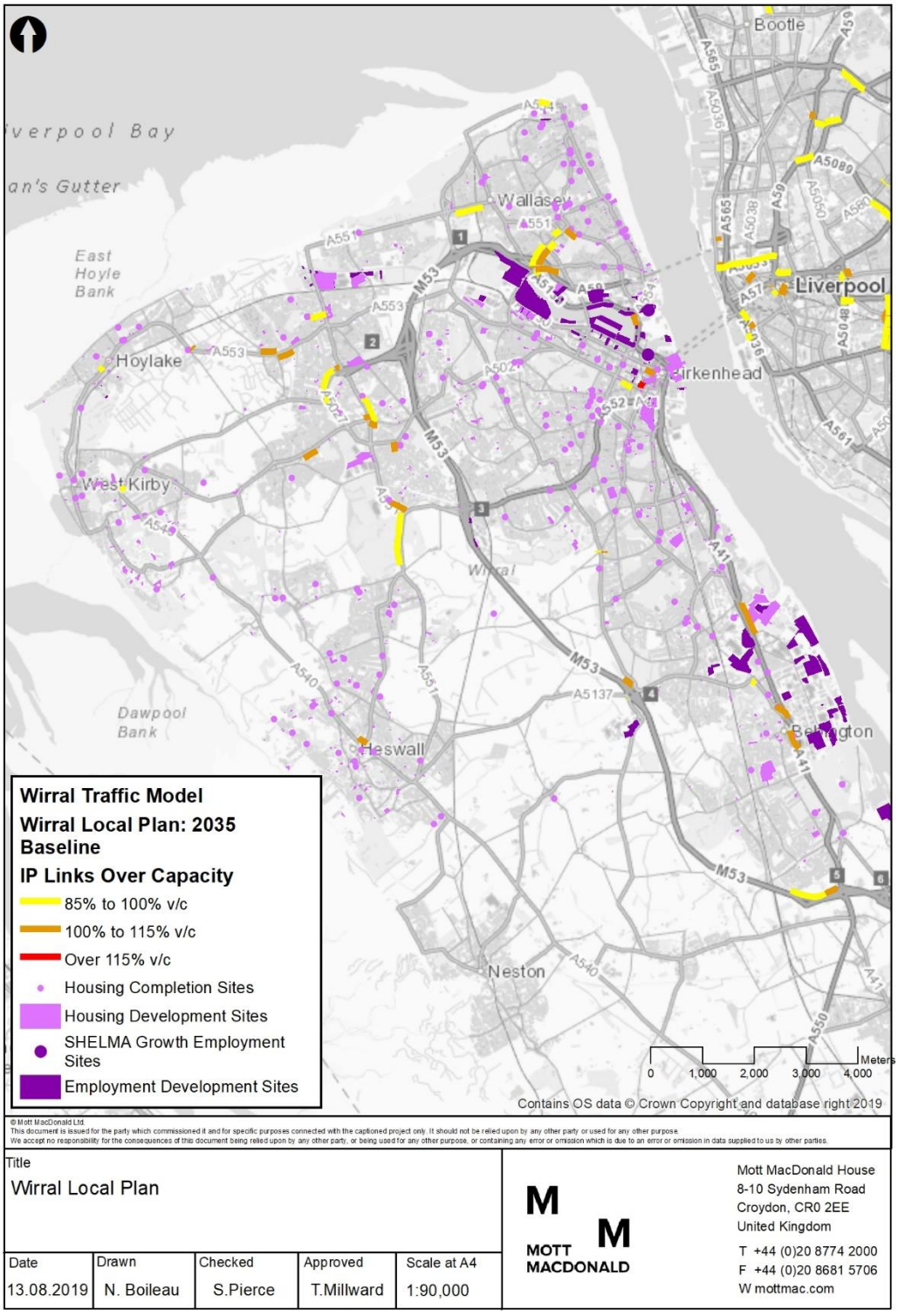
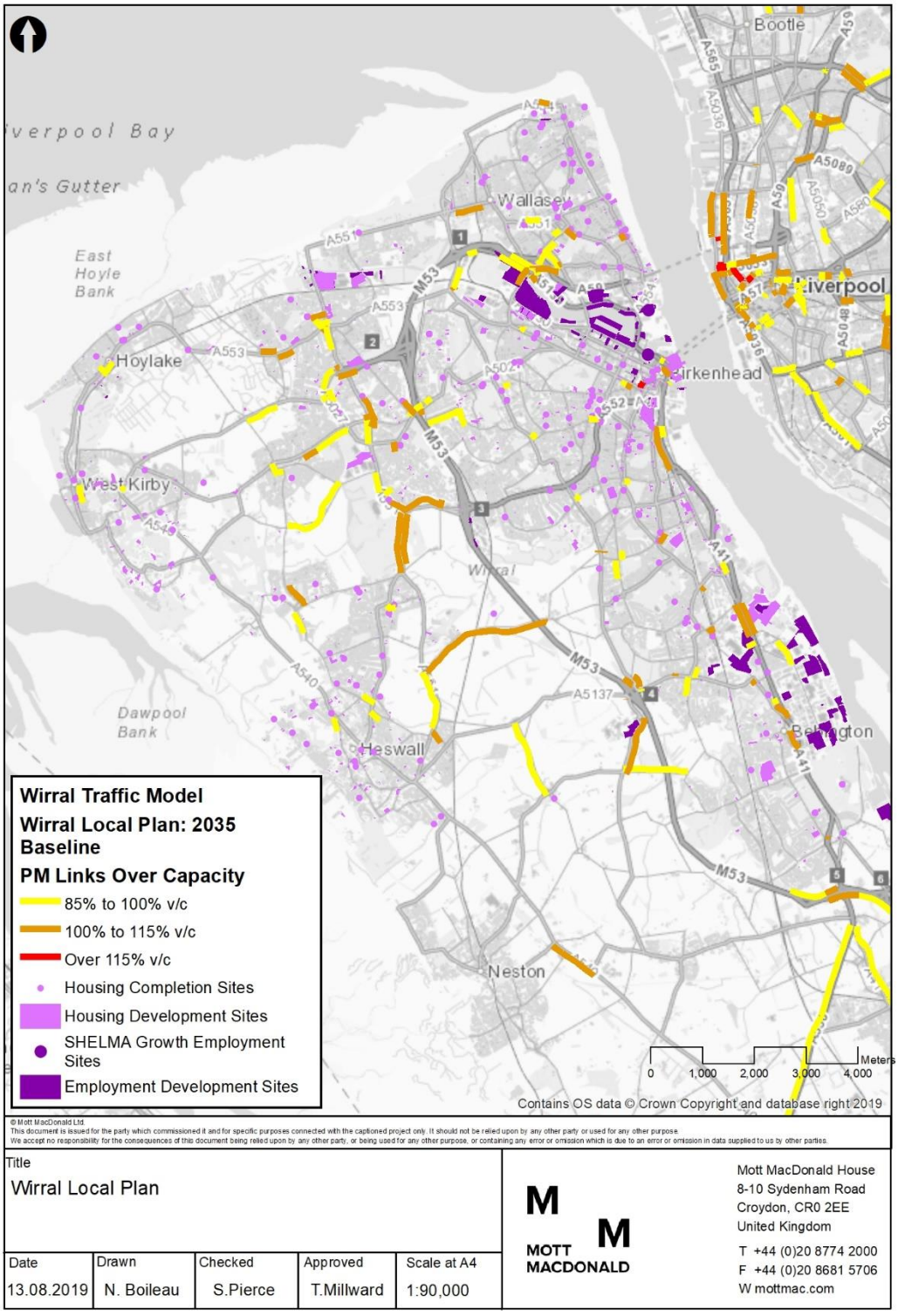


Figure 17: Links Over Capacity - 2035 Baseline Growth Scenario: PM



Title				
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5.2.5 Link Delay

The link delay plot shows average delay per vehicle. The plot highlights links which have a delay greater than 10 seconds. The links with the greatest delay is highlighted in red, over 60 seconds, and links with the lower delay, between 10 to 20 seconds, are highlighted in yellow.

Figure 18 to Figure 20 present the link delay for AM, IP and PM respectively. The primary link delay is forecast within the Kingsway and Queensway Tunnels for both the AM and PM, where delay is over 60 seconds. Delay is also recorded on the A41, notably in the AM and PM, reaching over 60 seconds along several parts of the route, such as on the approaches to the Queensway Tunnel and to the south at M53 J5.

The IP (shown in Figure 19) forecasts delays of over 60 seconds within the Kingsway Tunnel and along a cluster of links at Arrowe Park. Delay is much more prominent in both the AM and PM, and is forecast along several links west of the M53 in areas such as Arrowe Park, Willaston and Upton. These delays reach over 60 seconds at some points in the AM peak, with a much wider spread of delay on the network ranging from 10 to 30 seconds.

The wider East Wirral area, which includes residential areas around Birkenhead, namely Prenton, Oxton, Wallasey and Bidston, all experience delays on the local road network of up to 30 seconds. This is the case for both the AM and PM peaks, with a reduced spread of delay occurring in these areas during the IP.

In the west of Wirral, delay occurs along the A540 of up to 30 seconds across all periods, particularly to the south of Heswall. Within West Kirby and Hoylake, forecast delay is much less.

Figure 18: Link Delay (s) 2035 Baseline Growth Scenario: AM

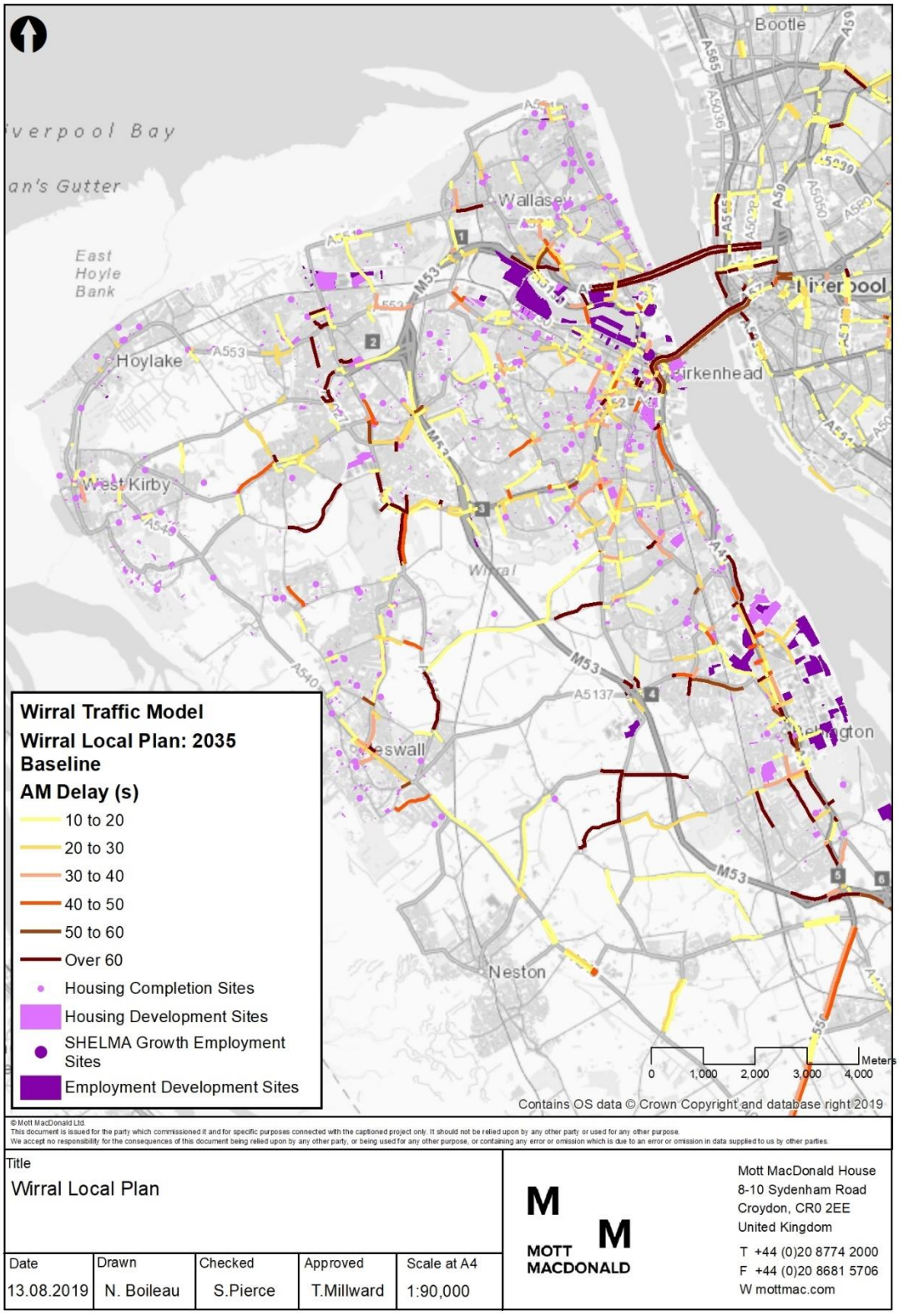


Figure 19: Link Delay (s) 2035 Baseline Growth Scenario: IP

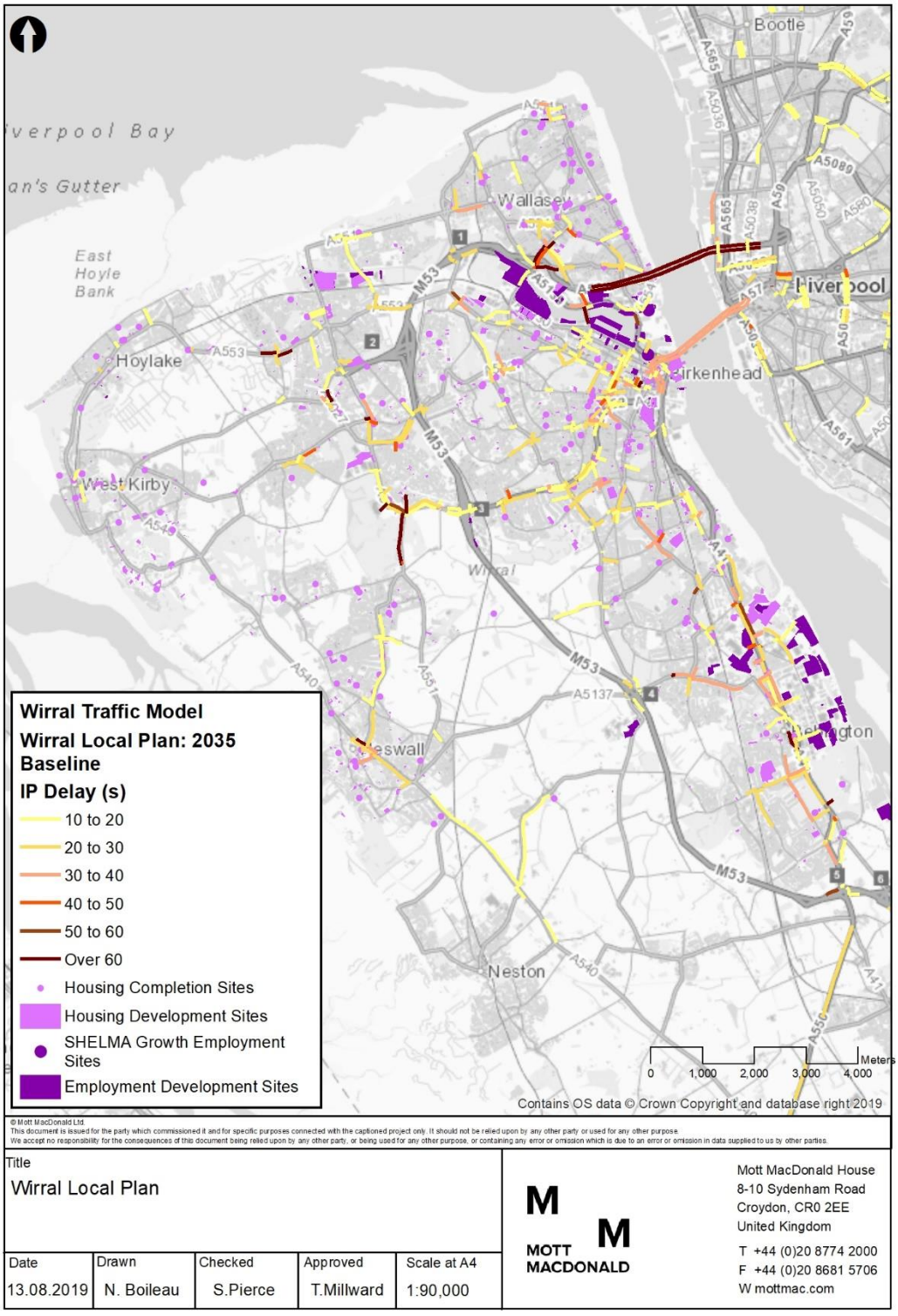
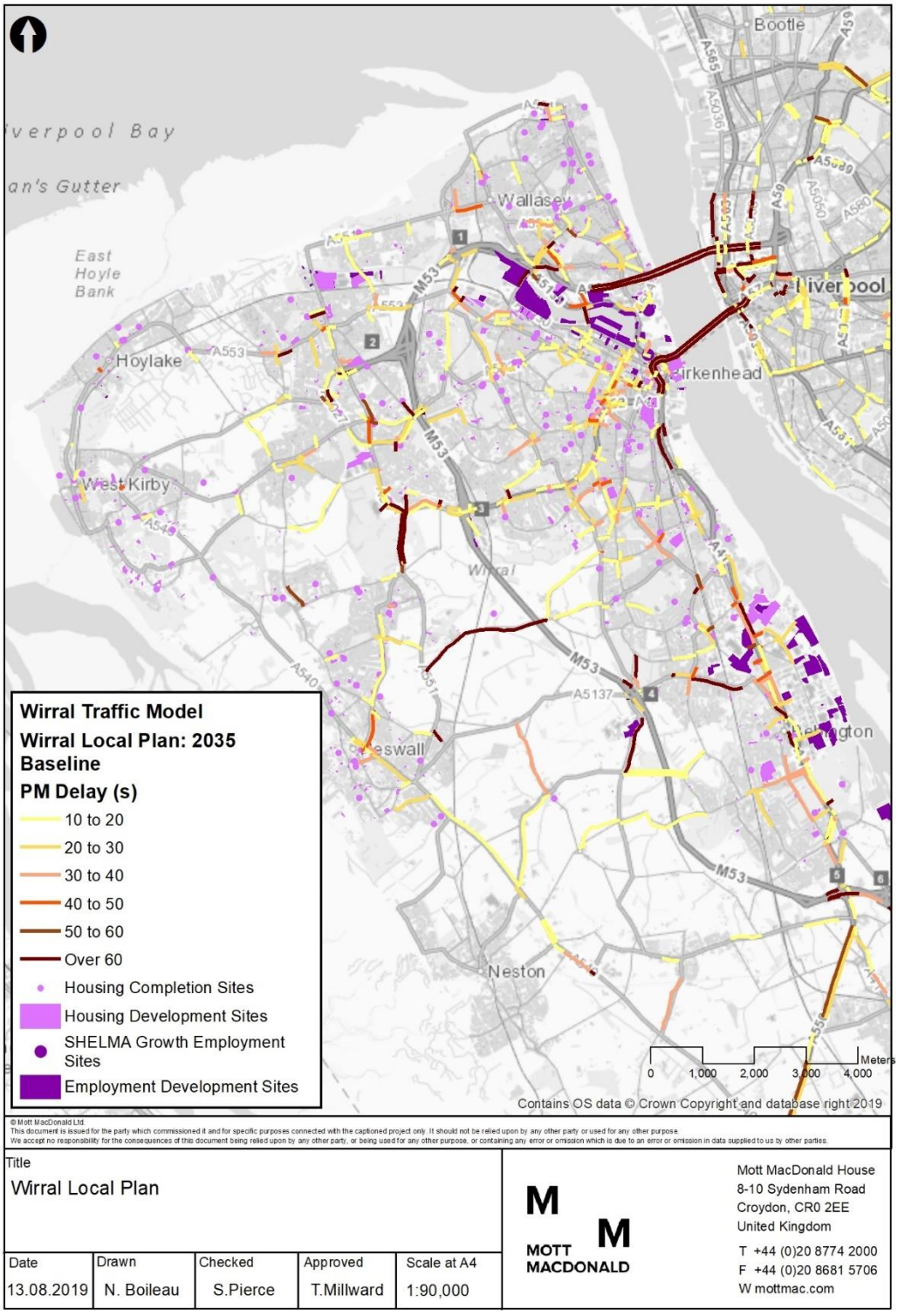


Figure 20: Link Delay (s) 2035 Baseline Growth Scenario: PM



6 Summary

Wirral Council has appointed Mott MacDonald to conduct baseline Wirral Local Plan modelling for a 2035 future year using the Wirral Traffic Model (WTM). This has consisted of including committed planning applications, Strategic Housing Land Availability (SHLAA), windfall housing sites, demolition sites and employment supply sites; inclusion of the Wirral Waters development; and development of a 2035 version of WTM.

The purpose of this forecast is to act as a baseline scenario for assessment of the proposed sites included in Wirral's Local Plan.

The forecasts have been developed based on the 2015 calibrated/validated base year WTM. The WTM has been developed using the SATURN software that allows the impact of changes to junction layout to be assessed.

The demand forecasting has been undertaken in the Liverpool City Region Transport Model (LCRTM) to make use of its detailed forecasting mechanisms, and the output matrices converted to WTM zone to make use of the detailed traffic assignment.

The baseline modelling has demonstrated that there are 189 junctions that are over capacity in 2035, of which in total 128 were not over capacity in one or more time periods in the base year. Accompanying this report is a detailed breakdown of the modelled flow, delay and v/c by turning movement to assist in the identification of mitigation measures.

Appendices

A. Development Sites

Table 15: Forecast Housing per Site (dwellings)

SHLAA/PP Ref	LCRTM Zone	2035	Address
1659	296	2	South of 109 Thorsway, Rock Ferry
1041	298	9	Adjacent 168 Dock Road North, Bromborough
2071	309	5	277 Telegraph Road, Heswall
2075	309	2	Land at 16 Barnston Road, Heswall
3022	309	1	West of 10 Anthony's Way, Gayton
3030	309	1	South of 19 Farr Hall Drive, Heswall
758	107	28	93 Chester Street, Birkenhead
3025	311	2	Rear of 46 Croft Drive East, Caldy
3042	316	3	Rear of Majestic Wine, Column Road, West Kirby
1868	310	1	Rear 376a to 378 Pensby Road, Heswall
1827	314	43	Former Foxfield School, Moreton
1594	313	10	Land at Royden Road, Overchurch
1292	313	78	Girtrell Court, Saughall Massie
937	305	8	Eastham Home Guard Club, Park Road
2034	305	10	Land at Delamere Avenue, Eastham
3033	305	7	Land at Mallowdale Close, Eastham
667	279	10	South of 6 Darlington Close, Egremont
2028	279	6	West of 84 Liscard Road, Seacombe
775	295	10	Former 165 to 169 Bedford Road, Rock Ferry
1665	295	66	Former Rock Ferry High School, Ravenswood Avenue
1832	295	8	9-11 Highfield Road, Rock Ferry
1685	293	3	Rear of 36 to 40 Stanley Avenue, Prenton
1691	108	12	Former Brooklands, Brook Street, Birkenhead
3040	305	217	Former Education Resource Centre, Bromborough
492	296	2	Land at Rock Lane East, Rock Ferry
763	296	9	Former Nelson House, Rock Ferry
1621	296	23	Land at Howson Street, Rock Ferry
1833	296	6	43 Bebington Road, New Ferry
2041	296	5	East of 34 to 36 St Peter's Mews, Rock Ferry
3032	296	6	Former 56 to 66 Bebington Road, New Ferry
3036	296	10	Woodhead Street Car Park, New Ferry
684	303	2	East of 216 Allport Road, Bromborough
1032	303	1	Rear of Lyndhurst, 54 Dibbinsdale Road, Bebington
306	309	1	North of 88C Downham Road South, Heswall
313	309	2	Adjacent 37 Rhodesway, Heswall
898	309	6	Builders Merchant, 8 Berwyn Drive, Pensby
982	309	1	North of 22 Heythrop Drive, Heswall
1072	309	3	Adjacent 21 Lightfoot Lane, Heswall
1083	309	1	Adjacent White House, Grange Road, Heswall
1101	309	1	Adjacent 9 Queens Drive, Heswall
1989	309	1	11 Barnston Road, Barnston

SHLAA/PP Ref	LCRTM Zone	2035	Address
1991	309	1	Adjacent 23 Buffs Lane, Barnston
1858	309	1	Former 11 Dawstone Road, Lower Heswall
2074	309	8	Heswalll Police Station
3013	309	1	West of 28 North Drive, Gayton
3014	309	1	Rear of 6 Cottage Lane, Gayton
3020	309	1	North of 42 Thurstaston Road
3026	309	1	East of 1 Quarry Road East, Heswall
3029	309	3	Silverdale Medical Centre, Heswall
1075	312	1	West of 4 Rylands Hey, Greasby
936	283	6	West Wallasey Van Hire, Leasowe
2047	283	4	215 to 223 Wallasey Village
689	109	12	Gladstone Liberals, Dial Road, Tranmere
617	108	132	Former Rank Bingo, Conway Street, Birkenhead
1127	278	28	Former St John's Church, Liscard Road
126	289	1	Rear of Phoenix House, Upton
694	289	5	South of Moira Sephton Court, Noctorum
1197	289	1	The Paddock, Noctorum Lane
475	277	21	South of 6 to 36 New Street, Seacombe
1518	277	20	Former Seacombe Ferry Hotel, Seacombe View
557	287	40	Land at Beaufort Road, Birkenhead
2029	105	13	Former Riverside Day Centre, Birkenhead
1672	293	1	South of Chelwood, Pine Walks, Prenton
1813	293	6	Rear of 24 Pine Walks, Prenton
1044	311	1	Adjacent 18 Croft Drive, Caldy
1047	311	1	Rear of 64 Caldy Road, Caldy
888	316	5	Cooleen, 1 Riversdale Road, West Kirby
916	316	10	Land at Grange Hill Farm, West Kirby
1094	316	1	Adjacent 2 Cable Road, Hoylake
1183	316	1	Adjacent 4 Hillside Road, Newton
1409	316	1	22A Shaw Street, Hoylake
1641	316	1	Land at Alderley Road, Hoylake
1931	316	40	Grosvenor House, Albert Road, Hoylake
2035	316	10	Rear of Paton Close, West Kirby
2042	316	7	1 to 11 Ashton Court, West Kirby
2043	316	7	12 to 22 Ashton Court, West Kirby
3009	316	2	Grange Hill Farm West, West Kirby
3021	316	1	North of 12 Hawthorne Drive, Newton
935	310	6	West Wallasey Van Hire, Thingwall
1110	310	1	Adjacent 20 Coombe Road, Irby
1742	310	30	Rear of Pensby Childrens Centre, Fishers Lane
1267	310	3	Rear of 1 to 3 Mill Road, Thingwall
1146	314	1	Adjacent 58 Bermuda Road, Moreton
1645	314	4	North of 67 Pasture Road, Moreton
1646	314	2	West of 61 Harvest Lane, Moreton
1992	314	4	White Gates, 12 Carr Lane, Moreton
2007	314	47	Land at Knutsford Road, Moreton

SHLAA/PP Ref	LCRTM Zone	2035	Address
3017	314	6	Land at 8 Rone Close, Moreton
1319	313	11	Adjacent 51 Grasswood Road, Woodchurch
1290	313	1	Rear of 38A Ford Road, Upton
1994	313	1	64 Big Meadow Road, Woodchurch
3016	313	1	Rear of 53 Birch Avenue, Upton
3018	313	2	Rear of 22 Mount Road, Upton
3019	313	1	Adjacent 65 Big Meadow Road, Woodchurch
1610	302	34	Land at Civic Way, Bebington
683	304	16	Land at The Rake/Park View, Bromborough
1628	304	2	East of 35 The Rake, Bromborough
2025	304	5	Allport Lane Car Park, Bromborough
2024	304	5	Bromborough Civic Centre, Bromborough
299	305	1	Rear of 49 Dearnford Avenue, Bromborough
510	305	5	Adjacent 24 Swaledale Close, Eastham
685	305	4	North of 1 Archers Green, Eastham
980	305	1	North of 11 Crosthwaite Avenue, Eastham
1033	305	1	Rear of 38 Plymyard Avenue, Bromborough
1974	305	11	Eastham Youth Centre, Lyndale Avenue
1850	305	24	Former Lyndale School, Eastham
3024	305	1	East of 32 Berwick Avenue, Eastham
32	281	1	Adjacent 60 Albion Street, New Brighton
663	281	2	South of 16 Magazine Brow, New Brighton
913	281	1	North of 8 Linksway, Wallasey
1172	281	1	Adjacent 51 Mount Road, New Brighton
1654	281	1	South of 1 Seymour Street, New Brighton
463	279	18	Former Seacombe House, Demesne Street, Seacombe
468	279	10	Former 22 to 40 Borough Way, Seacombe
1259	279	6	Seacombe Community Centre, Ferry View Road
2006	279	11	Rear of Gibson House, Maddock Road, Egremont
1988	294	1	11 Moss Grove, Prenton
1922	295	12	Former 42 to 44 Egerton Park, Rock Ferry
3011	300	1	Rear of 14 Village Road, Higher Bebington
517	310	16	Rear of 86 to 140 Ferny Brown Road, Woodchurch
1187	292	2	Adjacent 20 Aldford Close, Oxton
1225	292	1	Holmlands Drive Car Park, Prenton
255	296	10	South of 706 New Chester Road, Rock Ferry
500	296	3	North of 2-4 Thorburn Close, Rock Ferry
502	296	1	Adjacent 33-35 New Chester Road, New Ferry
785	296	8	101 to 103 New Chester Road, New Ferry
806	296	9	99c New Chester Road, New Ferry
965	296	2	7 New Chester Road, New Ferry
1249	296	8	North of 70 Mersey Road, Rock Ferry
1250	296	8	Rear of 72 to 88 Bedford Road, Rock Ferry
1362	296	10	103 Beaconsfield Road, New Ferry
1418	296	10	Former Bedford Gardens, Rock Ferry
1658	296	8	Olinda Street Car Park, New Ferry

SHLAA/PP Ref	LCRTM Zone	2035	Address
1671	296	9	156 to 162 Bedford Place, Rock Ferry
1998	296	2	South of 560 New Chester Road, Rock Ferry
2049	296	6	North of 91 Russell Road, Rock Ferry
2099	296	3	Former 550 to 558 New Chester Road, Tranmere
1558	296	7	576 to 578 New Chester Road, Rock Ferry
3038	296	2	South of 728 New Chester Road, New Ferry
3034	296	2	Rear of 91 to 99 Russell Road, Rock Ferry
3035	296	5	Former 25 to 107 Thorsway
1895	298	78	Land and Marine Depot, Dock Road North, Bromborough Pool
1896	298	16	Plant Hire Depot, Dock Road North, Bromborough
1555	291	2	Adjacent 28 Carlton Road, Tranmere
218	291	4	Former 65 to 67, Woodchurch Road, Prenton
2040	309	2	North of 34 Telegraph Road, Heswall
1088	309	1	Adjacent 35 Farr Hall Drive, Heswall
1408	309	2	69 Pipers Lane, Heswall
1440	309	2	Springfield, Wallrake, Heswall
1457	309	1	344 Telegraph Road, Heswall
1883	309	2	Land at 39 Quarry Road East, Heswall
131	315	9	123 Reeds Lane, Moreton
2068	315	56	East of Typhoo, Moreton
732	315	4	Rear of 1 Birket Square, Leasowe
1472	315	18	Former Fernleigh Care Home, Leasowe
1328	312	1	280 to 282 Greasby Road, Greasby
449	283	34	Rear of 88 Wallasey Village, Wallasey
651	283	8	Rear of Lighthouse Public House, Wallasey Village
1297	283	1	Rear of Granthorpe, St George's Road, Wallasey
483	109	26	13 Green Lane, Tranmere
485	109	3	Adjacent to 47 Agnes Road, Tranmere
608	109	1	East of 40 Beech Road, Tranmere
776	109	5	Former Crooked Billet Public House, Tranmere
1027	109	2	1 Jackson Street, Tranmere
1272	109	1	Adjacent 11 Marquis Street, Tranmere
1283	109	3	Adjacent 38 Church Road, Tranmere
1284	109	5	Rear of 1 to 5 Holt Hill, Tranmere
1285	109	4	Adjacent 135 Whetstone Lane, Tranmere
2094	109	2	South of 41 Thomas Street, Tranmere
1358	109	11	Rear of 127 to 165 Hinderton Road
1391	109	1	13 Hampden Road, Tranmere
1561	109	6	96 to 100 Rodney Street, Tranmere
1686	109	9	Former 62 to 66 and 68 Derby Road, Tranmere
1990	109	1	South of 1 Poplar Grove, Tranmere
1993	109	1	Former 90 Sidney Terrace, Tranmere
2084	109	60	Former Mollington Street Depot, Tranmere
2085	109	71	Former Hind Street Gas Depot, Tranmere
2098	109	5	77 Old Chester Road, Tranmere
3023	109	11	Church and Hall, 61 Wilmer Road, Tranmere

SHLAA/PP Ref	LCRTM Zone	2035	Address
958	108	3	Former 22-24A St Anne Street, Birkenhead
1023	108	1	Argyle Street Car Park, Birkenhead
1550	108	4	22 Lorn Street, Birkenhead
1576	108	1	11 to 17 Dacre Street, Birkenhead
1619	108	2	West of 43 Price Street, Birkenhead
1620	108	7	Car Park, west of 22 Lorn Street, Birkenhead
1663	108	2	East of Florence Street, Birkenhead
1664	108	9	East of 198 Conway Street, Birkenhead
1887	108	2	30 to 32 Conway Street, Birkenhead
2036	108	4	Elgin Way Car Park, Birkenhead
2069	108	9	Hinson Street Car Park
3041	108	2	West of Florence Street, Birkenhead
545	286	30	Former 1 to 53, Bluewood Drive, Bidston
546	286	26	Former 2 to 104, Bluewood Drive, Bidston
1660	286	72	Rear of Wildbrook Drive, Birkenhead
478	107	130	Former Rose Brae, Church Street, Birkenhead
752	107	104	Land at Woodside, Chester Street, Birkenhead
47	278	7	37A Hartismere Road, Seacombe
571	278	2	Former 6-8 The Grove, Liscard
1651	278	7	Rear of 3 to 43 Naples Road, Seacombe
1876	278	2	22 Drayton Road, Wallasey
1564	288	2	Adjacent 2 Worcester Road, Bidston
3005	288	1	25 Eleanor Road, Upton
127	289	2	North of Phoenix House, Upton
893	289	1	The Coppice, 65 Vyner Road South
111	290	8	East of 2 Devonshire Road, Oxton
604	290	1	North of 20 Balls Road, Birkenhead
889	290	1	2 Palm Grove, Oxton
1030	290	9	Grosvenor Buildings, 1 Grosvenor Road, Birkenhead
1049	290	4	Grosvenor Place Car Park, Claughton
1191	290	3	23 Beresford Road, Oxton
1738	290	1	25 Slatey Road, Oxton
1987	290	1	Rear of 3 Devonshire Road, Oxton
2077	290	10	Hamilton Memorial Church, Claughton
476	277	2	Former 1-17 Montrose Avenue, Seacombe
1261	277	1	Rear of Mona Castle, Wheatland Lane, Seacombe
1835	277	3	Former Great Float Hotel, Seacombe
572	287	19	Rear of 70 to 100 Brassey Street, Birkenhead
621	287	2	Former 31 to 35 Mona Street, Claughton
735	287	2	Rear of 24 to 38 Arkle Road, Bidston
736	287	10	Rear of 2 to 22 Deakin Street, Bidston
1003	287	1	Rear of 7-11 Beaufort Road, Birkenhead
1050	287	3	Scotts Place Garage, Claughton
1893	287	2	Former 327 Laird Street, Birkenhead
1831	287	11	Rear of 57 to 61 Norman Street, Birkenhead
3039	287	50	Crossways Demolition Area, Naylor Road, Bidston

SHLAA/PP Ref	LCRTM Zone	2035	Address
146	105	1	Adjacent 5 Claughton Place, Claughton
574	105	2	Land at Stoke Street, Birkenhead
600	105	2	Adjacent 95 Craven Street, Birkenhead
602	105	17	120-126 Bentnick Street, Birkenhead
761	105	4	Former Great Float Public House, Birkenhead
996	105	2	Former Christ Church, Park Road South, Birkenhead
1019	105	6	Quarrybank Car Park, Birkenhead
1402	105	4	Opposite 89 to 99 Park Road East, Birkenhead
152	105	1	Adjacent 575 Price Street, Birkenhead
1797	105	1	1 to 3 Westbourne Road, Birkenhead
1911	105	6	South of 81 Duke Street, Birkenhead
3008	105	1	North of 21 Patten Street
189	293	1	North of 155 Durley Drive, Prenton
933	311	0	Grange Water Treatment Works, West Kirby
1899	311	4	North of 1 and 2 Beatty Close, Caldy
369	316	1	Birchlea Cottage, Pinetree Drive, Caldy
716	316	30	North of 90 to 92 Grange Road, West Kirby
718	316	13	East of 92 Grange Road, West Kirby
743	316	10	East of 72 Barn Hey Crescent, Meols
1105	316	1	Plasterers Arms Car Park, Back Sea View, Hoylake
1106	316	1	Rear of 26 School Lane, Hoylake
1136	316	1	Adjacent 2 Bennetts Lane, Meols
1182	316	2	Rear of 94 Newton Cross Lane, West Kirby
1301	316	1	Adjacent 1 Cholmondeley Road, West Kirby
1302	316	1	Adjacent 11 Groveside, West Kirby
1315	316	1	Adjacent 3 Townfield Road, West Kirby
1417	316	2	2 Charles Road, Hoylake
136	310	4	North of 41 Eltham Green, Woodchurch
516	310	4	Adjacent 44, Schoolfield Road, Woodchurch
696	310	10	South of Meadowside School, Woodchurch
703	310	3	Rear of 1 Martin Close, Irby
705	310	5	East of 51 Thingwall Road, Irby
1109	310	1	274 Irby Road, Irby
1439	310	2	23 Oaklea Road, Irby
1489	310	2	Adjacent 14 Private Drive, Barnston
1595	310	4	Between 86 and 136 Ferny Brow Road, Woodchurch
2031	310	3	Fishers Lane Car Park, Pensby
2039	310	2	North of 67 Glenwood Drive, Irby
534	314	2	Rear of 83 to 91, Hoylake Road, Moreton
726	314	2	North of 14 Birchfield, Moreton
729	314	2	North of 39 Millhouse Lane, Moreton
1145	314	2	Adjacent 12 Hoylake Road, Moreton
1151	314	1	East of 58 Cobham Road, Moreton
1255	314	0	Between 31 and 37 Acton Lane, Saughall Massie
1513	314	6	91 Bermuda Road, Moreton
1794	314	1	South of 28 Litherland Avenue, Moreton

SHLAA/PP Ref	LCRTM Zone	2035	Address
2096	314	13	Former Moreton Centre and Car Park, Pasture Road
1997	314	2	South of 19 Barnston Lane, Moreton
2008	314	18	Moreton Family Centre, Pasture Road
2009	314	4	Moreton Youth Club, Pasture Road
2010	314	13	Moreton Municipal Building, Knutsford Road
2097	314	14	Moreton Library, Pasture Road
698	313	7	East of Fender Court, Woodchurch
1295	313	4	Former 20 Elm Avenue, Moreton
1454	313	1	Rear of 5 Larkhill Avenue, Upton
1996	313	3	West of 198 Saughall Massie Road, Saughall Massie
693	313	15	Paddock north of Upton Cricket Club, Upton By-Pass
1612	302	2	Between 4 and 6 Henley Close, Spital
1615	302	5	Land at Monks Way, Bebington
1616	302	5	Rear of 31 to 47 Dutton Drive, Poulton-Spital
5	281	1	West of 71 Warren Drive, New Brighton
20	281	16	Former Grand Hotel, Marine Promenade
454	281	3	26A Sandfield Road, New Brighton
1156	281	1	20A Sandfield Road, New Brighton
1171	281	6	Egerton Street Playground, New Brighton
1436	281	1	1A Clywyd Street, New Brighton
1599	281	3	Albert Street Car Park, New Brightion
1603	281	2	Egerton Street Car Park, New Brighton
1656	281	2	Mount Pleasant Road Car Park, New Brigton
1866	281	4	114 Rake Lane, Wallasey
2046	281	8	16 Magazine Lane, New Brighton
1170	281	2	Field Road Car Park, New Brighton
3031	281	1	Rear of 1 Sandfield Road, New Brighton
3010	281	13	15-25 Field Road, New Brighton
1134	282	1	Adjacent 15 Claremount Road, Wallasey
1129	280	8	Adjacent Wallasey Fire Station, Liscard
418	280	42	Former Waste Transfer Station, Limekiln Lane
560	280	1	Adjacent 1, Austin Street, Poulton
561	280	1	Adjacent 8, Sherlock Lane, Liscard
562	280	9	Former St Lukes Church Hall, Poulton
967	280	4	Former Pool Inn, Poulton Road, Wallasey
1131	280	2	Manor Road Car Park, Liscard
1846	280	1	81A Withens Lane, Liscard
2051	280	14	Sycamore Lodge, Greenheys Road, Liscard
457	279	2	Former 19-21 Trafalgar Road, Egremont
459	279	3	Former 40 to 44 Rice Lane, Liscard
460	279	1	Former 60 Union Street, Liscard
462	279	8	Rappart Road Car Park, Seacombe
464	279	1	West of 45 Brougham Road, Seacombe
465	279	2	Former 174 to 178 Borough Road, Seacombe
1070	279	3	22 to 28 Littledale Road, Seacombe
1257	279	1	East of 5 Brougham Road, Seacombe

SHLAA/PP Ref	LCRTM Zone	2035	Address
1503	279	6	Former 23 to 37 Trafalgar Road, Egremont
1562	279	1	142 Borough Road, Seacombe
1570	279	9	Former 85 to 89 King Street, Egremont
1605	279	2	Bell Road Car Park, Wallasey
1647	279	3	North of 117 Brighton Street, Seacombe
1744	279	5	Land at Kenilworth Road, Seacombe
1357	279	4	Former 108 to 108A King Street, Egremont
2005	279	45	Gibson House, Seabank Road, Egremont
2022	279	10	Wallasey Town Hall North Annexe, Egremont
2023	279	11	Wallasey Town Hall South Annexe, Egremont
2083	279	2	North of 8 Darlington Street, Seacombe
2076	279	0	Manor Road Church, Egremont
466	279	3	East of 1 Leopold Street, Seacombe
1280	294	6	Dial Road Warehouse, Tranmere
1282	294	2	Rear of 144 Church Road, Tranmere
1753	294	1	100 Church Road, Tranmere
3001	294	11	Birch Tree Public House, Prenton
495	295	10	Former 1-17 Highfield Court, Rock Ferry
672	295	6	Rear of 19 to 37 Bedford Avenue, Rock Ferry
820	295	1	Rear 29 to 33 Ravenswood Avenue, Rock Ferry
1232	295	7	Former 46 to 48 Egerton Park, Rock Ferry
1269	295	2	Southwick Road Car Park, Old Chester Road
1507	295	4	77 Egerton Park, Rock Ferry
1622	295	5	St Pauls Road Car Park, Tranmere
1834	295	10	108 Egerton Park, Rock Ferry
2032	295	2	Gladstone Road Car Park, Tranmere
686	300	1	South of 52, Shallmarch Road, Bebington
1450	300	1	10 Acres Road, Bromborough
1613	300	12	North of Broomleigh Close, Bebington
1634	300	3	Kingsway Car Park, Higher Bebington
134	287	2	West of 100 Brassey Street, Birkenhead
441	108	22	West of Tunnel Road, Birkenhead
974	290	16	Land at Oxton Road, Birkenhead
1014	108	4	Adjacent 34 Wood Street, Birkenhead
1337	108	4	West of Town Station, Jackson Street
1571	107	9	Rear 3 to 17 Duncan Street, Birkenhead
1604	278	1	Borough Road Car Park, Wallasey
1618	287	9	North of 62 to 68 Brassey Street, Birkenhead
467	279	28	East of 74 Borough Road, Seacombe
2002	107	4	Duncan Street Car Park, Birkenhead
	106	4100	East Float, Wirral Waters
664800	292	2	LAND ADJACENT TO 5 MOUNT OLIVE, OXTON, WIRRAL CH43 5TT
666600	296	95	Cleared land to the east of New Chester Road, ROCK FERRY,WIRRAL, CH42 2AZ
541900	296	19	55 Rock Lane West, Rock Ferry

SHLAA/PP Ref	LCRTM Zone	2035	Address
675200	296	2	Residential Home, 4-6 KNOWSLEY ROAD, ROCK FERRY, CH42 1QG
682200	296	1	29 BEBINGTON ROAD, NEW FERRY, CH62 5BE
687800	296	5	14 ROCK LANE WEST, ROCK FERRY, CH42 1RF
662200	298	58	Land Off New Chester Road, Bromborough Wirral (Phase A)
617800	298	72	Unichema Chemicals, Pool Lane, Bromborough
676600	298	86	LAND OFF NEW CHESTER ROAD, NEW FERRY, CH62 4RE
657000	298	10	Car Park, South View, Bromborough
677800	298	1	30 SHORE DRIVE, NEW FERRY, CH62 4RW
672100	298	23	Pool Lane, Bromborough Pool, Wirral
662500	303	3	Dormy, 100 Brookhurst Road, Bromborough
649600	303	1	The Haven, Blakeley Road, Raby Mere
600600	291	1	Unused Land, Village Road, Oxton
641700	291	2	Car Park, Heathfield Road, Oxton
681500	291	1	The Old Bakery, 1 WOODCHURCH ROAD, OXTON, CH41 2UE
627400	291	4	27A WOODCHURCH ROAD, OXTON, CH42 9LG
676400	291	1	10 HEATHFIELD ROAD, OXTON, CH43 5RT
686600	291	14	107-111 (including basement of 103-105) OXTON ROAD, BIRKENHEAD, CH41 2TN
678200	291	1	1 CHRISTCHURCH ROAD, OXTON, CH43 5SE
652600	299	1	Land South Of , 6 Central Avenue, Bromborough
664000	299	1	Land Adjacent 6 Central Avenue, Bromborough
618600	299	1	Land Adjacent To Winkie Wood, 11 Mill Road, Bromborough
670900	299	1	5 UPLANDS ROAD, BROMBOROUGH, CH62 2BY
090200	299	3	Land at the corner of MILL ROAD & SPITAL ROAD, BROMBOROUGH, CH62 2BH
675800	299	5	217 SPITAL ROAD, BROMBOROUGH, WIRRAL, CH62 2AF
658200	309	2	Gayton House, 46 Well Lane, Gayton
657900	309	21	Barncroft, Larchwood Close, Pensby
633400	309	2	Willow Cottage, Banks Road
654600	309	1	Land Adjacent to Barnston Primary School, Sandham Grove, BARNSTON, WIRRAL, CH60 1XW
645400	309	1	Land Adjacent To, St Peters Ce Primary School,Nursery Allotment Gardens, Thurstaston Road, Heswall
652900	309	6	Denecourt, 37 OLDFIELD DRIVE, HESWALL, CH60 6SS
076000	309	1	Whitefield, 55 Barnston Road, Barnston
657100	309	1	2 Oaklands Drive, Heswall
659000	309	3	Farm Cottage, 33 Downham Road North, Heswall
658100	309	2	The Lydiate, Heswall, Wirral, Merseyside
640900	309	19	104 Pensby Road, Heswall
647300	309	1	St Minver, Greenfield Lane, Heswall
604900	309	1	Wade Cottage, 10 Farr Hall Drive
604100	309	1	44 Well Lane, Gayton
666500	309	1	Newton House, 18 WELL LANE, GAYTON, CH60 8NF
676500	309	6	Axholme, 76 THURSTASTON ROAD, HESWALL, CH60 4SA
674600	309	1	77 PIPERS LANE, HESWALL, CH60 9HR
664300	309	1	Ashbourne House, MOUNT AVENUE, HESWALL, CH60 4RH
658000	309	1	Land North West To 1 The Knap, Gayton

SHLAA/PP Ref	LCRTM Zone	2035	Address
656700	309	1	Little Orchard, Hill Top Lane, Gayton
631800	309	1	Denecourt, 37 OLDFIELD DRIVE, HESWALL, CH60 6SS
647600	309	1	Green Gables, 7 Riverbank Road, Heswall
660200	309	2	78 Dawstone Road, Gayton
653000	309	2	Sonning, 75 Oldfield Drive, Heswall
636100	309	7	LAND AT STRATHEARN ROAD, LOWER HESWALL, WIRRAL, CH60 8PT
666300	309	1	Heath Top, 29 TOWER ROAD NORTH, HESWALL, CH60 6RS
667900	309	1	Moonshine, 2 THE AKBAR, HESWALL, CH60 9HQ
671500	309	1	5 BIRCHMERE, HESWALL, CH60 6TN
673700	309	1	346 TELEGRAPH ROAD, HESWALL, CH60 6RW
678400	309	1	62 WHITFIELD LANE, HESWALL, CH60 7SB
678900	309	1	Courtyard House, 9 DEE VIEW ROAD, HESWALL, CH60 0DJ
679400	309	1	LAND ADJACENT TO 3 DALE GARDENS, HESWALL, CH60 6TQ
681300	309	2	Rosemary Cottage, 131A MILNER ROAD, BARNSTON, CH60 5RX
682100	309	1	LAND AT BEECHFIELD CLOSE, GAYTON, CH60 8PD
123200	309	1	The Old Forge, 2 ACRE LANE, BARNSTON, CH60 1UW
687700	309	1	Angarra, 9 THE RIDGEWAY, GAYTON, CH60 8NB
632800	309	5	Grange Villa, 1 Rocky Lane, Heswall
678100	309	2	The Co Operative Pharmacy, 20 VILLAGE ROAD, HESWALL, CH60 0DZ
602300	309	1	2 TARGET ROAD, HESWALL, CH60 9LD
685000	309	6	Highfield, THE MOUNT, HESWALL, CH60 4RD
687600	309	2	Holly Bank, 53 FARR HALL DRIVE, HESWALL, CH60 4SE
688100	309	1	Whistling Sands, 15 DALESWAY, HESWALL, CH60 4RU
648900	315	6	Cleared Site, Cameron Road, Leasowe
686000	315	6	Oyster Catcher, TWICKENHAM DRIVE, LEASOWE, CH46 2QE
669400	312	1	230 GREASBY ROAD, GREASBY, CH49 2PW
678300	312	1	Land north-west of Netherset Hey, ARROWE BROOK LANE, IRBY, CH49 3NY
652500	312	1	Bay Tree Farm, Frankby Road, Frankby,Wirral
619500	283	1	Land Adjacent To 2 Mockbeggar Wharf, Wallasey Village
666400	283	2	2 WALLACRE ROAD, WALLASEY VILLAGE, CH44 2DY
587100	297	67	Former Site Of The Dell Primary School, The Dell
667800	297	21	LAND ADJACENT TO 16 THE ESPLANADE, NEW FERRY, CH62 1EH
606700	297	6	18 Rock Park, Rock Ferry
654000	109	11	LAND AT CHURCH ROAD, SEYMOUR STREET & THOMPSON STREET, TRANMERE,CH42 0LG
683300	109	34	Land at CHURCH ROAD, WARRINGTON STREET, THOMPSON STREET & LIVERSIDGE ROAD, TRANMERE, CH42 5LD
584000	109	1	LAND ADJACENT TO 33A CHESNUT GROVE, TRANMERE, CH42 0LB
683500	109	1	Garage to the rear of 107 CHURCH ROAD, TRANMERE, CH42 5LF
631200	109	7	Rainbow House Day Nursery, 21-23 Rockybank Road, Tranmere
653400	108	2	Unused Land, Park Street, Birkenhead
666200	108	72	76 HAMILTON STREET, BIRKENHEAD,WIRRAL

SHLAA/PP Ref	LCRTM Zone	2035	Address
565400	108	2	Barclays Bank, 50 Hamilton Square, Birkenhead
659400	108	5	59 Hamilton Square, Birkenhead
672600	108	2	34 HAMILTON STREET, BIRKENHEAD, CH41 5AD
673900	108	5	40 HAMILTON SQUARE, BIRKENHEAD
684100	108	4	Ballam Delaney Hunt Solicitors, 58 HAMILTON SQUARE, BIRKENHEAD
646300	107	2	5-9 Park Street, Birkenhead
646600	107	62	Birchen House, 1 Canning Street, Birkenhead
685700	107	1	Unit 1, Hamilton Plaza, DUNCAN STREET, BIRKENHEAD, CH41 5EY
656600	288	11	Land On Corner Of Beechwood Drive And Fender Way, Beechwood
677700	288	2	LAND AT CORNER OF DOULTON CLOSE & FOURTH AVENUE, BEECHWOOD, WIRRAL CH43 9XT
677600	288	3	LAND AT CORNER OF DENSTON CLOSE & FOURTH AVENUE, BEECHWOOD, WIRRAL CH43 9XU
673200	288	10	The Windmill, FOURTH AVENUE, BEECHWOOD, CH43 9QU
670200	288	1	West Brow Mews, 107 ELEANOR ROAD, BIDSTON, CH43 7QP
632300	289	2	The Chase, Noctorum Road, Noctorum
683400	289	3	PIPISTRELLE RISE, NOCTORUM DELL, NOCTORUM, CH43 9UL
684300	289	4	2 BERYL ROAD, NOCTORUM, CH43 9RT
637900	289	3	Morgen, Noctorum Road, Noctorum
555700	289	1	Stokesay House, 12 Stokesay, Bidston
644200	289	1	Beech House, Noctorum Road, Noctorum
618900	289	1	1 Mere Cottages, Mere Farm Road, Oxton
665200	289	1	Land adj to Priory Cottage, 175 UPTON ROAD, BIDSTON, CH43 7QF
656300	290	6	Flaybrick Hill Reservoir, Boundary Road, Bidston
566000	290	2	Unused Land, Beresford Road, Oxton
680800	290	9	Land on corner of WESTBOURNE ROAD & RIDLEY STREET, BIRKENHEAD, CH43 4TQ
665800	290	1	9 ST AIDANS TERRACE, CLAUGHTON, WIRRAL
661400	290	1	50 Egerton Road, Claughton
655100	290	1	20 Devonshire Road, Oxton, Wirral
648500	277	2	16 Peter Street, Seacombe
668200	287	20	LAND NORTH OF TYRER STREET AND RIBBLE STREET, BIRKENHEAD, CH41 8HY
634700	287	33	837-839 Corporation Road, Birkenhead
670400	287	1	LAND NORTH, TYRER STREET, BIRKENHEAD, WIRRAL
652700	287	3	169-171 Laird Street, Birkenhead
671300	287	42	The Open Arms, BIDSTON AVENUE, CLAUGHTON, CH41 0BR
675900	287	1	Laird Street Police Station, LAIRD STREET, BIRKENHEAD, CH41 7AJ
561300	105	47	Royal Extrusions Aluminium, 99A Duke Street, Birkenhead
452700	105	3	Cleared Site Grassed Adjacent 54, Old Bidston Road, Birkenhead
677200	105	1	LAND ADJACENT TO 123 LIVINGSTONE STREET, BIRKENHEAD, CH41 4HQ
660900	105	47	Fomer Cole Street Primary School, Cole Street, Birkenhead

SHLAA/PP Ref	LCRTM Zone	2035	Address
628100	105	4	239-241 GRANGE ROAD, BIRKENHEAD, CH41 2PH
666000	105	1	11 GRANGE MOUNT, BIRKENHEAD, CH43 4XN
661300	105	1	88 Grange Road West, Birkenhead
684600	105	2	Dickie Lewiss Sports Bar, 1 OXTON ROAD, BIRKENHEAD, CH41 2QQ
678500	105	2	68 PARK ROAD SOUTH, BIRKENHEAD, CH43 4UY
677000	105	5	Red Cross Shop Charity Shop, 27-29 GRANGE ROAD WEST, BIRKENHEAD, CH41 4BY
681600	105	5	70-74 GRANGE ROAD WEST, BIRKENHEAD
668400	293	32	Land rear of 81 Glenavon Road, Prenton CH43 0RD
669000	293	1	2 BRYANSTON ROAD, PRENTON, CH42 8PU
679000	293	6	Former Dave Pluck Licenced Bookmaker, 343 WOODCHURCH ROAD, PRENTON
673300	293	2	144 WATERPARK ROAD, PRENTON, CH43 0SP
670600	293	1	Ombersley, 8 PINE WALKS, PRENTON, CH42 8LQ
630900	311	1	Cedar Cottage, 10 CROFT DRIVE WEST, CALDY, CH48 2JG
659600	311	1	Rock Bottom, Kings Drive, Caldy
672000	311	2	Orovales, 135 CALDY ROAD, CALDY, CH48 1LP
656100	311	1	Brackenwood, Column Road, Newton
653300	311	1	Beacon Tor, Village Road, West Kirby
612500	311	1	East Farm Bungalow, 171 Caldy Road, Caldy
639900	311	1	Corbiere, Thorsway, Caldy
636900	311	1	Greenboughs, 17 Links Hey Road, Caldy
668600	311	6	The Sundial, 61 CALDY ROAD, CALDY, CH48 2HN
634000	311	1	40 Caldy Road, West Kirby
124200	311	1	Sawrey Knotts, 18 CROFT DRIVE, CALDY, CH48 2JW
682400	311	1	Former Muldron, 52 CROFT DRIVE EAST, CALDY
683900	311	1	Crafnant, 10 CROFT DRIVE, CALDY, CH48 2JN
676700	311	1	Long Hay, 20 CROFT DRIVE WEST, CALDY, CH48 2JG
686200	311	1	Land adjacent to Wyle Cop, 126 CALDY ROAD, CALDY, CH48 1LW
672200	311	6	Newhall BMW, CALDY ROAD, WEST KIRBY, CH48 2HE
679200	311	1	WHYTETHORNE, 74 CALDY ROAD, CALDY, CH48 2HW
669100	311	1	COACH COTTAGE, Church Lane, THURSTASTON, CH61 0HL
662600	311	1	Sandstone Medical Centre, 161 Banks Road, West Kirby
652300	316	2	3 Grammar School Lane, Newton, Ch48 8Ay
668700	316	2	Land to the rear of Veterinary Surgery, Geneva, 43 BIRKENHEAD ROAD, MEOLS, CH47 5AF
672500	316	1	Land adjacent to 15 HERON ROAD, MEOLS, CH47 9RU
676800	316	1	Seafield, 49 BIRKENHEAD ROAD, MEOLS, CH47 5AF
491100	316	1	11 SANDLEA PARK, WEST KIRBY, CH48 0QE
670700	316	1	Stone Hive, DARMONDS GREEN, WEST KIRBY, CH48 5DU
684500	316	1	36 JUBILEE DRIVE, WEST KIRBY, CH48 5EF
682600	316	1	18 GRANGE CROSS LANE, NEWTON, CH48 8BG
673600	316	1	17 GRANGE CROSS LANE, NEWTON, CH48 8BJ
667100	316	3	22 GRAMMAR SCHOOL LANE, NEWTON, CH48 8AY
681000	316	2	18 BROOKFIELD GARDENS, WEST KIRBY, CH48 4EL
677100	316	4	25 CHURCH ROAD, WEST KIRBY, CH48 0RL

SHLAA/PP Ref	LCRTM Zone	2035	Address
672700	316	8	51 SOUTH PARADE, WEST KIRBY, CH48 0QQ
664400	316	1	Land adjacent to 1 HERON ROAD, MEOLS, CH47 9RU
658300	316	1	Land Adjacent To 3 Morpeth Road, Hoylake
654100	316	1	Springfield, 34 Gorse Lane, Newton
647800	316	2	The Mushroom Farm Grange Old Road, West Kirby
659500	316	10	St Lukes Tennis Club, Charles Road, Hoylake
672400	316	1	WHITE GABLES, 4 ST MARGARETS ROAD, HOYLAKE, WIRRAL, CH47 1HX
660800	316	1	Abbeystead, 23 Abbey Road, West Kirby
675300	316	1	16 GORSE LANE, NEWTON, CH48 8BH
680400	316	2	The Forge, LANG LANE SOUTH, WEST KIRBY, CH48 7EQ
680600	316	8	The Blue Anchor, MARKET STREET, HOYLAKE, CH47 3BE
681900	316	1	BRIGHT SMILES DAY NURSERY, 2 MORPETH ROAD, HOYLAKE, CH47 4AT
682900	316	1	43 WALKER STREET, HOYLAKE, CH47 2DY
683200	316	2	Braeside, 2 LANG LANE, WEST KIRBY, CH48 5HF
684200	316	18	Hoylake Presbyterian Church, ALDERLEY ROAD, HOYLAKE CH47 2AX
684800	316	5	Grosvenor Court, GROSVENOR ROAD, HOYLAKE
606600	316	1	West Kirby Unitarian Church And Sunday School, Brookfield Gardens, West Kirby
637700	316	4	Punch Bowl Inn, 77 Market Street, Hoylake
684700	316	1	17 BLACK HORSE HILL, WEST KIRBY, CH48 7EE
600000	316	1	Four Foxes, Park Road Meols
649200	316	1	Four Acres Frankby Road Frankby
679900	316	1	Six Acres, 75 COLUMN ROAD, NEWTON, CH48 1PX
678000	316	1	Lifeboat House, NORTH PARADE, HOYLAKE, CH47 2AL
681800	316	8	38 GRANGE ROAD, WEST KIRBY, WIRRAL,CH48 4EA
687000	316	1	298 MEOLS PARADE, MEOLS, CH47 7AU
687300	316	3	Pellminhey, Heron Road, West Kirby, CH48 1PU
662000	316	1	The Dunes, 18 Lingdale Road, West Kirby
680200	316	2	Lebistes, CLEVELEY ROAD, MEOLS, CH47 8XN
680300	316	2	119 FRANKBY ROAD, NEWTON, CH48 9UT
654900	316	3	34 Queens Road, Hoylake
668000	316	1	Flat 3, 108 MEOLS DRIVE, WEST KIRBY, CH48 5DA
672900	316	5	Westways, 16 LINGDALE ROAD, WEST KIRBY, CH48 5DQ
682700	316	2	63 GRANGE ROAD, WEST KIRBY, CH48 4EE
686300	316	7	Hilstone Grange, 17 STANLEY ROAD, HOYLAKE, CH47 1HN
688200	308	1	Groveside Barn, WILLASTON ROAD, THORNTON HOUGH, CH63 4JG
663200	310	2	Dale End, 178 Barnston Road, Barnston
411200	310	1	77-79 Thingwall Road, Irby
550310	310	6	Unused Land, Seven Acres Lane, Thingwall
624800	310	1	Highbury, 12 Woodlands Drive, Barnston
638700	310	1	6 Oaklea Road, Irby
669900	310	1	2 WHALEY LANE, IRBY, CH61 3UN
663700	310	1	Land To The Rear (East Of) 'Garwick' Quarry Lane, Thingwall
659300	310	1	Hillside, Sandy Lane North, Irby

SHLAA/PP Ref	LCRTM Zone	2035	Address
662100	310	2	Land to the rear, 4 MARLFIELD LANE, PENSBY, CH61 1AJ
668300	310	3	3 BARKER ROAD, IRBY, CH61 3XH
675100	310	1	Land adjacent to Hillcroft, 106 BARNSTON ROAD, THINGWALL, CH61 1AT
679300	310	1	55A SOMERSET ROAD, PENSBY, CH61 8SN
662900	310	1	Land To The Rear Of 33 Thurstaston Road, Irby
637100	310	2	Coppins Hey, 8 Woodlands Drive, Barnston
661900	310	1	42 Bridgenorth Road, Pensby
610200	310	14	Barleyfield House, BARLEYFIELD, PENSBY, WIRRAL
663400	310	1	440 Pensby Road, Thingwall
652000	310	1	133 Kings Drive, Irby
635700	310	1	42 Sparks Lane, Thingwall
635500	310	1	Greenheys Nursery, 41 Thurstaston Road, Irby
403000	310	4	Woodland, SEVEN ACRES LANE, THINGWALL
684900	310	1	LAND ADJACENT TO 15 GILLS LANE, BARNSTON, CH61 1AF
688300	310	1	Conifers, 24 KYLEMORE DRIVE, PENSBY, CH61 6YF
685800	310	1	1 DEVON DRIVE, PENSBY, CH61 8SZ
657200	310	1	Redstones Farm, Arrowe Brook Lane, Irby,Wirral
669300	310	1	124A BARNSTON ROAD, BARNSTON, CH61 1BT
674500	314	123	Land off Manor Drive, UPTON, WIRRAL, CH49 4NU
656800	314	28	Millhouse, 79 Millhouse Lane, Moreton
682300	314	5	Moreton Police Station, CHADWICK STREET, MORETON, CH46 7TE
659100	313	110	Land Off Arrowe Park Road, Upton
650800	313	13	Unused Land, Kenilworth Gardens, Upton
648400	313	1	Westward, 54 Moreton Road, Upton
592300	313	3	11 Birch Avenue Upton
623700	313	2	48 Moreton Road, Upton
674800	313	1	43 OVERCHURCH ROAD, UPTON, CH49 4NW
655300	313	1	83 Saughall Massie Lane, Upton
680500	313	2	Edel Quinn House, 2 THE LIMES, UPTON, CH49 6PN
556100	302	1	44 St Andrews Road, Bebington
674900	302	1	Rosebrae Nursing Home, 8 SPITAL ROAD, BEBINGTON, CH63 9JE
681100	302	2	Wardens Flat, 53 The Court, KIRKET LANE, BEBINGTON, CH63 3HX
671700	304	10	Land adjacent to The Rectory, MARK RAKE, BROMBOROUGH, CH62 2DH
678600	304	36	Formerly The Archers, MARK RAKE, BROMBOROUGH, CH62 2DL
663800	304	2	Land Off Belmont Avenue, Bromborough
656500	304	1	Ronald Dene, 16 Croft Lane, Bromborough
663000	305	3	Land To The Rear Of 106 Allport Road, Bromborough
671000	305	3	Abbey Grange, BRIDLE ROAD, EASTHAM, CH62 8BR
680700	305	4	106 ALLPORT ROAD, BROMBOROUGH, CH62 6AQ
680900	305	2	106 ALLPORT ROAD, BROMBOROUGH, CH62 6AQ
653500	305	2	73 Acre Lane & 1 Dawpool Drive, Bromborough,Wirral
655200	307	6	St Marys Ce Primary School, Stanley Lane, Eastham

SHLAA/PP Ref	LCRTM Zone	2035	Address
644500	307	2	91 Eastham Village Road, Eastham
535300	281	1	W Redcliffe, 34 Wellington Rd, New Brighton
644700	281	4	Little Brighton Inn, 2 Rowson Street, New Brighton
669800	281	4	Travellers Rest, ROWSON STREET, NEW BRIGHTON, CH45 2NB
670300	281	2	17-24 Marine Park Mansions, WELLINGTON ROAD, NEW BRIGHTON, CH45 2NP
648600	281	14	169-171 Victoria Road, New Brighton
681200	281	2	Wardens Flat, Gerard Corr House, 25 PENKETT ROAD, LISCARD
671200	281	2	111 ROWSON STREET, NEW BRIGHTON
671600	281	2	Flat 7, The Warren, 147 GROVE ROAD, WALLASEY VILLAGE, CH45 0JD
677500	281	4	78 VICTORIA ROAD, NEW BRIGHTON, CH45 2JF
547300	281	9	50 WELLINGTON ROAD, NEW BRIGHTON, CH45 2NF
659900	281	2	7 Marine Terrace, Magazines Promenade, Egremont
664500	282	1	Rockland House, MORTUARY ROAD, LISCARD, CH45 5LD
663300	280	1	5 Cliff Road, Liscard
055300	280	1	14 Palmerston Road, Wallasey, Wirral, CH44 3ED
686700	280	9	The Ship Inn, 208 BRECK ROAD, WALLASEY VILLAGE, CH44 2ED
654800	280	1	Capital Buildings, 10 Seaview Road, Liscard
685600	280	6	1-11 LISCARD VILLAGE, & 2 SEAVIEW ROAD, LISCARD, WIRRAL CH45 4JG
662300	280	13	Garage Rear Of, 18 Rullerton Road, Liscard
679800	280	1	The Ship Inn, 208 BRECK ROAD, WALLASEY VILLAGE, CH44 2ED
680000	280	3	224 LISCARD ROAD, LISCARD, CH44 5TN
659700	280	2	49 Limekiln Lane, Poulton
594900	279	2	Land To The Rear Of 56 King Street
673500	279	2	9A, 9B, 11A, & 11B WEBSTER AVENUE, EGREMONT, CH45 7AB
676200	279	12	ISMAY DRIVE, EGREMONT, CH44 0EU
681700	279	3	Amenity Open Space, BRIGHTON STREET, SEACOMBE, CH44 6QH
686900	279	2	Cleared Site (Grassed), WALMSLEY STREET, EGREMONT, CH44 1DY
647100	279	2	Acme Plumbers, 41 Wright Street, Egremont
664700	279	1	150 BOROUGH ROAD, SEACOMBE, WIRRAL, CH44 6NH
628900	279	3	42 Trafalgar Road, Egremont
671400	279	5	156 FALKLAND ROAD, EGREMONT, WIRRAL
663100	279	22	Norton Court, 154 Borough Road, Seacombe
667300	279	3	143 BRIGHTON STREET, EGREMONT, CH44 8DT
563500	279	8	45-49 KING STREET, EGREMONT, CH44 0BY
645800	294	7	Land At Ingleborough Road, Prenton
682800	294	1	191 STORETON ROAD, PRENTON, CH42 8LY
655400	294	5	1 Mellor Road, Prenton,Wirral
682000	294	3	1 WOODCHURCH LANE, PRENTON, CH42 9PJ

SHLAA/PP Ref	LCRTM Zone	2035	Address
683600	295	18	LAND TO THE REAR OF 27-31 WELL LANE, ROCK FERRY, CH42 4QQ
636500	295	1	71 Bebington Road, Rock Ferry
654300	295	17	143 Highfield Road, Rock Ferry
653100	295	1	194 Bedford Road, Rock Ferry
685900	295	4	10 WOODLAND ROAD, ROCK FERRY, CH42 4NT
658900	300	2	Electronic Surgery, 12A The Village, Bebington
658700	300	1	170 Bebington Road, Bebington
607700	299	12	Continental Landscapes, Wharf Street, Port Sunlight
668900	313	1	4 BEECH AVENUE, UPTON, CH49 4NJ
682500	295	20	Land at OLD CHESTER ROAD, TRANMERE, CH42 3TA
668800	310	4	Heatherland Court Restaurant, 100 THURSTASTON ROAD, THURSTASTON, CH61 0HS
645500	296	6	Cleared Site, 15 NEW CHESTER ROAD, NEW FERRY, CH62 1DG
664100	291	1	Land Adjacent To 23 Nursery Close, Oxton
685200	315	299	Burtons Foods, PASTURE ROAD, MORETON, CH46 8SE
686400	312	4	216 GREASBY ROAD, GREASBY, CH49 2PN
671800	283	10	Grazing Land, LEASOWE ROAD, WALLASEY VILLAGE
644300	278	2	1 HALSTEAD ROAD, POULTON, CH44 4BH
676300	278	1	Land adjacent to 19 Gorsedale Park, OAKDALE ROAD, SEACOMBE, CH44 9HB
545600	288	8	Copper Beech, 99 Eleanor Road, Bidston
686500	288	6	Land Adjacent to 73 & 108 Statham Road, Bidston, Wirral CH43 7XS
664900	289	1	1 THE RIDINGS, NOCTORUM, CH43 9XZ
660000	289	1	Foxearth, St Davids Lane, Noctorum
658800	289	2	Broomlands, 38 Vyner Road South, Bidston
241500	289	1	48 BERYL ROAD, NOCTORUM, CH43 9RT
679500	289	3	Rear of 7 & 9 WEST ROAD, NOCTORUM, CH43 9RP
646800	289	1	65 Bidston Road, Oxton
668400	293	1	The Coach House, 21 CLIFTON ROAD, TRANMERE, CH41 2SF
653600	310	1	Land Adjacent To 91 The Meadow, Woodchurch
688000	310	1	The Rectory, 1 CHURCH LANE, WOODCHURCH, CH49 7LS
656200	314	1	Land Adjacent To 9 Acton Lane, Saughall Massie
082000	314	1	Unused Land Adjacent To 70 Meadowbrook Road, Moreton
658400	313	2	Land At 46 Ford Road, Upton
673800	313	1	Meadowside, 30 MOUNT ROAD, UPTON, CH49 6JB
674400	313	1	2 GIRTRELL ROAD, UPTON, CH49 4LQ
683800	302	4	Land adjacent to Spital Railway Station car park, SPITAL ROAD, BEBINGTON, WIRRAL
557000	302	26	Trafalgar Garage Service Station, Gardens Road, Bebington
672800	281	2	Redcliffe, 34 WELLINGTON ROAD, NEW BRIGHTON
686100	281	1	50 WELLINGTON ROAD, NEW BRIGHTON, CH45 2NF
687400	280	1	66 SEAVIEW ROAD, LISCARD, CH45 4LB
667500	300	1	20 VILLAGE ROAD, HIGHER BEBINGTON, CH63 8PT
677900	300	1	THE GEORGE 57 VILLAGE ROAD, HIGHER BEBINGTON
679100	300	1	24 ACRES ROAD, BEBINGTON, CH63 7QQ

SHLAA/PP Ref	LCRTM Zone	2035	Address
673400	291	6	Cleared Site (Grassed), 2 SINGLETON AVENUE, PRENTON, CH42 9JH
651400	283	2	Cleared Site, Leasowe Road, Wallasey Village
654200	283	3	8 Green Lane, Wallasey Village
680100	283	2	7 LEASOWE ROAD, WALLASEY VILLAGE, CH44 2BY
687500	109	2	Land on Corner of HAMPDEN GROVE & CAERWYS GROVE, TRANMERE, CH42 5LL
667700	109	18	Land at the corner of Holt Road and Old Chester Road, Tranmere, Wirral
602700	109	1	Unused Land, 32 HARLAND ROAD, TRANMERE, CH42 0LU
549700	108	38	Rockys Gymnasium, Henry Street, Birkenhead
540500	107	18	Atlantic House, 18-22 HAMILTON SQUARE, BIRKENHEAD, CH41 1AL
677300	278	4	Land to the rear of 171A POULTON ROAD, POULTON, CH44 9DG
655500	288	26	Land At Bidston Village Road, Bidston
665400	290	10	31 - 33 PALM GROVE, OXTON, WIRRAL, CH43 1TG
647500	290	7	Enfield Terrace, Claughton
685100	277	10	LAND ADJACENT TO 70 ST PAULS ROAD, SEACOMBE, WIRRAL
661800	287	1	Land At Beaufort Road Adjoining To Corporation Road, Birkenhead
685500	105	39	Eswa Club, 54-56 Park Rd South, Wirral, CH43 4UY
586000	105	16	Vacant Land At Livingstone Street & St Anne Street, Birkenhead
633900	105	3	Land To The Rear Of New Birkenhead Community Fire Station, Exmouth Street, Birkenhead
678700	313	6	The Overchurch, 129 ROYDEN ROAD, UPTON, CH49 4LY
529900	281	3	LAND ADJACENT TO 38 MOUNT PLEASANT ROAD, NEW BRIGHTON
661200	280	23	Land Fronting Love Lane To The Rear Of Mill Lane, Liscard
638600	279	4	Car Park, Stringhey Road, Egremont
649500	105	5	Cleared Site (Grassed), Patten Street, Birkenhead

Table 16: Employment Site Locations (Baseline)

ID	Address	LCRTM Zone	Area (Hectare)
100	East of Lubrizol, Bromborough Coast	298	9.63
101	Quest International, Bromborough Coast	298	0.59
263	Riverbank Road, Magazine Lane	298	1.78
254	Rear of AP Refractory (Grammont Properties)	298	1.88
324	Former Croda/ Uniqema site	298	5.01
334	Former UML Power Station (balance of site 75)	298	2.77
255	Village Road (2-2A)	291	0.1
78	Lever Faberge - Former BOCM Silcock Animal Feeds	299	6.42
82	Levers - Bromborough Road	299	11.91
343	Chester Road Industrial Units	309	0.01
24	Premier Brands, Reeds Lane - North of Access Road	315	1.45
8	Premier Brands, Reeds Lane - South of Access Road	315	5

ID	Address	LCRTM Zone	Area (Hectare)
70	Peninsula Business Park, Moreton	315	1.26
65	Former Burtons Biscuits, Pasture Road	315	12.47
125	Tarran IE - Tarran Way North	315	0.24
248	Tarran IE - Tarran Way North (Rear 30a)	315	0.2
251	Rear Nextdom Complex, Harvey Road	315	0.64
300	Tarran IE - Selwyn Contruction	315	0.14
358	Forge Engineering Ltd	315	0.3
45	British Gas Depot, Hind Street	109	2.7
15	Former Railway Depot, Mollington Street	109	3.44
29	Conway Park - North of Station	108	1.24
148	Conway Park - Cinema Frontage	108	0.1
239	Conway Park - NE of Crown Hotel	108	0.16
247	Former Rank Bingo	108	0.24
355	5 Thomas Street	108	0.16
64	Former TRFC Training Ground, Valley Road	286	1.27
31	Twelve Quays - Morpeth Waterfront	107	1.5
259	Cleveland Street (adj 52)	107	0.11
108	Rose Brae Phase 2, Church Street	107	1.96
327	George Street / Lord Street	107	0.04
35	North of Oakdale Road - West of New Way	278	0.78
229	Former Stone Manganese Marine Dock Road	278	6.86
97	Former Royal Swan Hotel, Dock Road	277	0.23
123	Wheatland Lane, Seacombe	277	0.5
328	Former Pallet yard, Birkenhead Road	277	0.63
392	Land at Riverside House, East Street	277	0.38
66	Former River Streets, Beaufort Road	287	4.01
342	57A-59 Norman Street	287	0.18
400	Land at Corporation Road	287	0.01
309	Adj 45 Old Bidston Road	105	0.13
403	E of 54 Old Bidston Road	105	0.02
72	North Cheshire TE - North of PK Commercial	293	0.47
57	North Cheshire TE - S of Avalon Funeral Supplies	293	0.21
94	North Cheshire TE - Former Horiticultural Training Centre	293	0.47
252	Carr Lane IE - New Hall Lane (20)	316	0.2
356	Royston Dental Laboratory	316	0.07
359	Pemway Enterprise Centre	316	0.05
360	Punch Bowl Inn	316	0.01
54	Clatterbridge Hospital, Clatterbridge Road	308	4.72
329	URL south site	302	2.31
50	Former Tank Farm, Commercial Road	306	0.97
74	Former MOD Tank Farm, Old Hall Road	306	8.05
17	Riverview Road - East of Tulip	306	2.93
43	Centuria Business Park, Stadium Road	306	8.05
234	Former Spectrum Adhesives, Caldbeck Road	306	2.35
242	Slack Wood, Riverview Road	306	2.02
49	Riverside Park (Phases 2b - 4)	306	3.36
330	Tulip expansion	306	2.29

ID	Address	LCRTM Zone	Area (Hectare)
341	Arnwood Phase 2 (balance of 241)	306	0.16
364	Former Epichem, Power Road	306	3.85
415	Former Eastham Sand, Riverbank Road	306	3.88
365	Former Hurstwoods International	281	0.57
110	West Float Industrial Estate, Dock Road	280	0.34
133	Former Waste Transfer, Limekiln Lane	280	1.58
417	Former Gas Holders, Dock Road	280	2.32
60	Kern's Warehouse, Cleveland Street	105	0.98
79	Birkenhead Dock Estate - Bidston Dock	285	17.49
84	Former Town Station, Borough Road East	108	1.26
116	Former Builders Yard, Magazine Lane	306	1.01
308	E of 491 Cleveland Street	105	0.07
332	Jackson Street	108	0.31
391	Car Park, Alabama Way	110	0.49

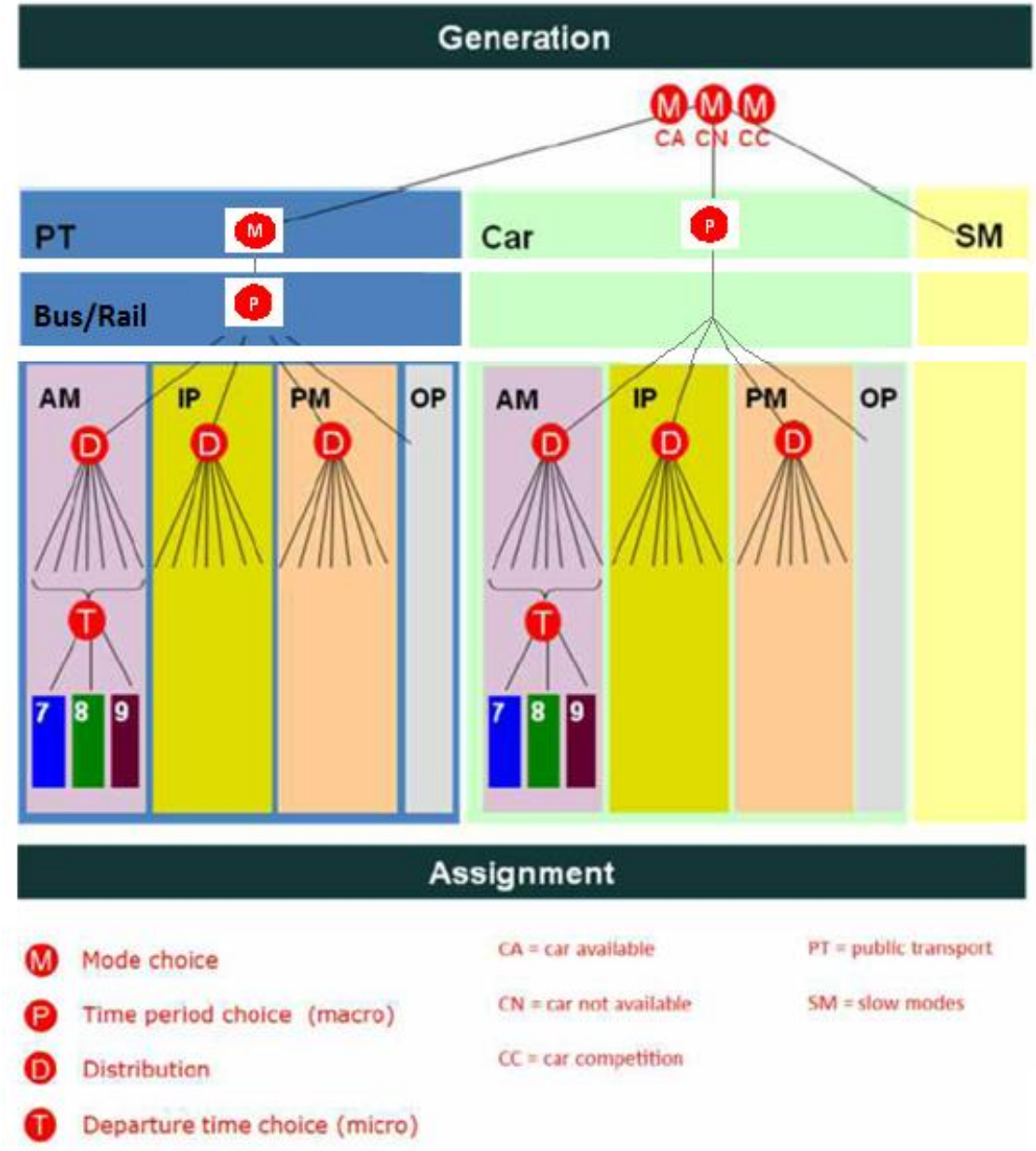
Table 17: Employment Site Locations (Growth Scenario)

LCRTM Zone	Growth Forecast Location	Additional Jobs 2015-2035
106	Wirral Waters East Float	2,149
107	Kingsgate, Tower Wharf	573
277	Woodside	2,583
284	Wirral Waters West Float	3,105
307	Port Wirral, Eastham	325

B. Trip Generation

This section of the report provides details of how forecast trip ends are produced for LCRTM. Trip generation is dealt with exogenously to the demand model, by means of the external forecasting module (EFM), which is a bespoke tool developed in MS Access. The position of the trip generation element in terms of the overall model structure is shown below in Figure 21.

Figure 21: Structure of LCRTM



Trip generation is primarily a household based forecast, which includes household category analysis to model household car availability and income changes, and allows the integration of central household forecasts with local land use forecasts.

The building of future year trip end growth has a segmented land use forecast using central TEMPRO car ownership and UK's Household Projections database (HOPS) central growth and local development information. The application of trip end growth converts land use forecasts to trip growth and caters for Non-Home Based (NHB) trips, such as a trip between the workplace and the shops.

The EFM has the functionality to control forecasts to national projections, or to use locally derived data to develop trip end forecasts that take into account local forecasts of growth in households and employment.

B.1 Overview

The EFM derives future year household changes using household category analysis to model changes in household composition and car ownership, which predicts future year car availability and income splits. Future year household developments are combined with the household structure changes and these are used to derive Home Based (HB) productions using the product of households and HB trip rates.

Trip attraction forecasts can be defined by central growth forecasts, commercial economic forecasts and development control information. A number of control mechanisms are applied to the future year production and attraction trip ends. Base year trip ends are used with the future year trip ends to derive a trip end growth. This is then applied to calibrated and fully segmented base year matrix trip ends to provide future year trip ends. These are used to growth the calibrated segmented base year matrices.

For this study the following base year matrices are used as the input:

- The highway matrix has been taken from the calibrated 2015 LCH model[5], converted to LCRTM model zones[6].
- The public transport matrix has been taken from the calibrated 2015 LCRTM PT model developed for this study[7].
- The walk cycle matrix has been growthed from the 2012 LCRTM matrix using land use data.

The resulting HB matrices are used to derive future year growth in NHB trips, which are assumed solely dependent on HB trips.

B.2 Method

B.2.1 Home Based Production Growth

LCRTM productions are determined by households. Households are input for each zone, and split into car ownership and household composition categories.

Production growth is calculated in two steps:

1. Base Year households are re-distributed within each zone in line with future year Household Composition (from HOPS) and Car Ownership changes (from TEMPRO)

[5] LCH LMVR

[6] LCCC_ModelIntegrationReport_RevA_v1

[7] LCCC_2015LCRTMPTModelUpdate_RevA_v3.docx (2107244862)

2. Additional future year households are added

The default EFM option is to run step 1, although this can be switched off using the EFM form.

The total future year households are multiplied by trip rates to calculate future year productions. This is divided by the base year productions to calculate production growth.

B.2.2 Home Based Attraction Growth

Attraction growth is calculated by LCRTM zone, directly from the input forecasting data. Four measures are used:

- Total Employment – Commute and EB
- Retail Employment – Shopping
- Other Employment – Other
- Pupils – Education

B.2.3 Application of Home Based Growth

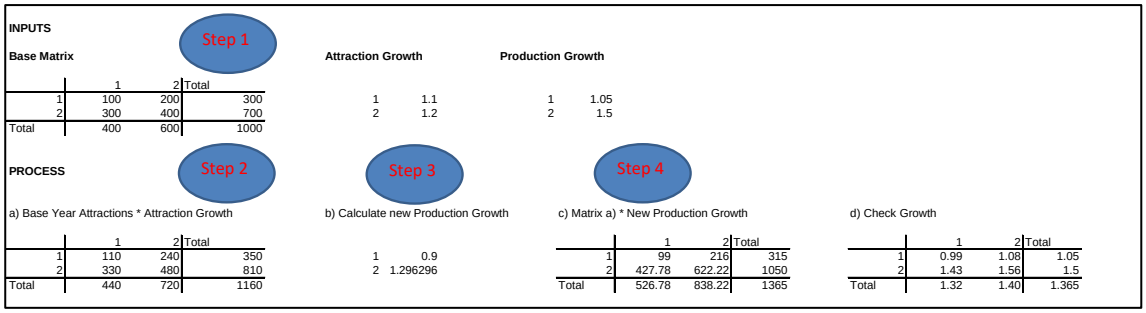
Home based production and attraction growth is applied to the segmented calibrated base year matrices, and is constrained to production growth. – i.e. when the growth is applied it gives different total trip ends for productions and attractions, so we constrain to productions.

The base year matrices are in Origin-Destination format, therefore the attraction growth is applied to the From Home Destinations and the To Home Origins, the production growth is applied to the From Home Origins and the To Home Destinations.

To ensure growth is constrained to productions the growth is applied using the following method:

1. Future year production trip-end values are calculated
2. Attraction growth applied to base year matrix
3. Revised production growth factors are calculated based on the future year production trip-end values (1) and the attraction balanced matrix (2)
4. Production growth is applied to the attraction balanced matrix (3)

The below example illustrates this process:



	1	2	Total
1	100	200	300
2	300	400	700
Total	400	600	1000

1	1.1
2	1.2

1	1.05
2	1.5

	1	2	Total
1	110	240	350
2	330	480	810
Total	440	720	1160

1	0.9
2	1.296296

	1	2	Total
1	99	216	315
2	427.78	622.22	1050
Total	526.78	838.22	1365

	1	2	Total
1	0.99	1.08	1.05
2	1.43	1.56	1.5
Total	1.32	1.40	1.365

B.2.4 Non-Home Based Trips

Future year non-home based trips (NHB) are calculated through the application of production growth to the NHB segmented calibrated base year matrix. The NHB future year productions are calculated by the sum of the future year home based attractions multiplied by the propensity to make a NHB trip (calculated from Household Interview data). These are divided by the base year productions to calculate NHB production growth.

B.2.5 Freight

Freight matrices are growthed using DfT National Road Traffic Forecasts 2015 (NRTF).

NRTF growth factors are applied to all trips. For trips with a start or end point in the LCRTM study area the North West forecast is applied. For all other trips i.e. within the buffer/external areas, the forecasts for England are applied.

Note, LCRTM is not a freight forecasting tool, and this process simply provides a background level of freight growth.

B.3 Major Developments

It is accepted that where a major development is proposed, the default LCRTM forecasting mechanism may not produce realistic results due to the scale of the change in land-use from the base year. This could take two forms; inaccurate representation of trips, or inaccurate distribution of trips (i.e. where trips to or from the development start or finish).

To account for this there is an option to replace the base distribution of trips with a new distribution based on a gravity model, utilising future year trip ends and costs for specific zones. There is also the option to superimpose a trip generation for specific zones.

B.4 TEMPRO Constraint

There are three constraints of the forecast matrices available within EFM. These are applied on an Origin-Destination basis to the EFM outputs.

i) None – this is the default option. This applies a constraint to the buffer area only (to ensure car ownership changes are taken into account for each mode)
ii) LCRTM Study Area – this applies a constraint across the entire study area and buffer area (as in i)
iii) District – this applies a constraint to each study area district and buffer area (as in i)

For this study the district level constraint has been applied. Overall TEMPRO study area growth is input by mode and purpose, this is compared to the study area growth in EFM and the EFM matrices adjusted accordingly.

C. Demand Model

The full LCRTM system includes components representing six travel responses comprising: trip generation, mode choice, time period choice, trip distribution, departure time choice and highways assignment and public transport assignment. The demand model estimation focuses on four of these responses, which are: mode choice, time period choice, trip distribution and departure time choice.

The main features of the demand model include the assumed hierarchy of travel responses; the different dimensions of demand segmentation; the input data; geographical coverage; matrix format; the generalised cost functions used in the model; the use of the logit formulation and adjustment process post model estimation.

C.1 The Hierarchy of Responses

The different components of a demand model form a hierarchy, so that each level of the hierarchy represents a specific type of choice individuals make. The hierarchy of responses represent the level of flexibility travellers demonstrate when making travel choices. At the bottom of the hierarchy is the choice that travellers are most sensitive to. In this case this is route choice (assignment).

The hierarchy of the LCRTM model, which accords with the DfT TAG[8] recommended structure, is shown below:

- Trip Generation
- Mode Choice
- Time Period Choice
- Trip Distribution
- Departure Time Choice
- Assignment

C.2 Demand Segmentation

Several dimensions are used in the model for segmenting demand, but some of them are only used for specific parts of the model. These different dimensions are described in the following paragraphs.

- **Journey Purpose:** The demand model uses three purposes, complying with the requirement defined in TAG.
- **Car Availability:** This dimension of segmentation appreciates that although travel behaviour is modelled by individual traveller, the availability of a car is often a key feature of the household that the person belongs to.
- **Period of Travel:** The different categories are the morning peak, inter-peak, afternoon peak or off-peak.
- **Hour of Travel:** This allows the impacts of morning peak spreading to be examined.
- **Mode:** The trip rates used at the generation stage do not distinguish between trips made by different modes. From the mode choice stage the split by mode is retained throughout the model.

[8] Transport Analysis Guidance: https://www.gov.uk/guidance/transport-analysis-guidance-webtag

C.3 Geographical Coverage

Due to level of validity and detail of the network and the base year data, it was not feasible to estimate the demand model parameters for the whole of the area that is covered by the model. Rather model estimation is done only within a defined area, consistent with the Liverpool City Region.

C.4 Matrix Formats

Information in travel demand models can be stored either in a Production/Attraction (PA) format or in an origin-destination (OD) format. PA formats are more consistent with methodologies for trip generation, as they store any home-based trip at the home end (i.e. the production end), whatever the direction of the trip. OD formats are more straightforwardly associated with the assignment model and with the format of traffic count data, as they store trips based on their direction.

For this study, the amount of inputs at a PA format was not sufficient for the estimation of credible mode choice and time choice models; it has been critical to also exhaust the traffic count data during the estimation of these models. Since this can only be done at an OD format, the process is based on conversion from PA to OD format after the trip generation stage, and work with an OD format from that point.

C.5 The Input Data

The inputs for the estimation of the demand included detailed information about all components of the generalised costs for travel. These all came in the form of origin-destination matrices. For car trips, typical components of the generalised cost are the travel time and the distance travelled.

For public transport trips, typical components of the generalised cost are the fare, travel time, access time to the boarding stop, egress time from the alighting stop, waiting time and the time associated with transfer.

C.6 Generalised Cost Functions

The mode choice, time period choice, distribution and departure time choice models are all logit models. The use of logit models, in general, is the standard practice in travel demand modelling. In each one of these models there are a given number of alternatives, and a generalised cost is associated with each one of them. When the model is applied, the logit model converts the set of generalised costs into an estimate of the proportion of travellers choosing each alternative.

C.7 Compliance with WebTAG

All major features of the demand model are designed to comply with the Department for Transport guidance for travel demand modelling, as specified in WebTAG.

C.8 The Model Estimation Approach

The demand model parameters have been estimated using household interviews from the Merseyside Countywide Household Travel Survey (CWS) data collected in 2008, 2010 and 2013 and level of service (travel cost) information from LCRTM.

Comparisons of the CWS data to independent data-sets produce close comparisons for mode, purpose and car availability proportions, demonstrating that this data-set provides a strong basis for the estimation.

The estimation has been undertaken using the Biogeme 2.4[9] software, and has concentrated on estimation of demand model parameters. A set of sequential nested logit models have been developed for each stage of the choice hierarchy; and socio-economic constants and attraction variables have been included to improve fit. Access weights have been fixed to those estimated in earlier versions of the model. Values of time and vehicle operating costs have been taken from TAG[10].

The parameters have been estimated for all modes, for commute and other trips. There has been no estimation of business parameters as home-based business is not an allowed response in CWS. The business segment equates to less than 5% of the total matrix, therefore the current LCRTM parameters have been retained.

The estimation has been undertaken at origin-destination (OD) level, to be consistent with the current LCRTM demand model.

A limited calibration estimation exercise has been undertaken on the parameters to improve the response in the TAG realism tests.

The results have been checked against:

- Illustrative TAG parameters;
- Relative strength of the parameters at each level of the hierarchy (ie decreasing through the hierarchy);
- TAG fuel and fare realism testing;
- Run of an absolute demand model to check outputs match observed data;
- Elasticities from sensitivity tests; and
- Implied values of time.

These checks have all produced sensible results, and where applicable the model meets TAG criteria.

C.9 Demand Model Summary

The demand model developed for LCRTM has in summary the following characteristics:

- A hierarchy in line with WebTAG expectations;
- Makes best use of existing data sources in model development and estimation;
- Has elasticities to fuel price and public transport fares that are in line with WebTAG expectations;
- Generalised cost coefficients are in line with expectations; and
- Average modelled trip lengths match observed values sufficiently well.

[9] Bierlaire, M. (2003). BIOGEME: A free package for the estimation of discrete choice models , Proceedings of the 3rd Swiss Transportation Research Conference, Ascona, Switzerland.

[10] Department for Transport Transport Analysis Guidance (TAG). December 2015.

D. Model Convergence

Table 18: 2035 AM Peak Hour – Model Convergence Statistics (Table 1)

Loop	Ass.	Sim.	A/S Step	%Flows	%Delays	%V.I.	%Gap
45	0.0185/20	0.008/7	1.000/ 1	99.6	99	0.00026	0.019
46	0.0259/20	0.008/7	1.000/ 1	99.6	99	0.00028	0.014
47	0.0135/20	0.008/7	1.000/ 1	99.7	99.1	0.00022	0.017
48	0.0161/20	0.007/7	1.000/ 1	99.6	99.1	0.00021	0.015

Table 19: 2035 AM Peak Hour – Model Convergence Statistics (Table 2)

Loop	ASS-HRS	Change	SIM_Hrs	SIM_KMs	GEHBAR	AAD	RAAD	XMSD	SAD	RSAD
45	843292	0.001	15459.9	585446.1	0.006	0.14	0.02	0.05	0.36	4.45
46	843303.1	0.001	15461.7	585458.8	0.006	0.14	0.02	0.06	0.34	4.23
47	843272.9	-0.004	15460	585454.3	0.006	0.14	0.02	0.07	0.33	4.13
48	843298.2	0.003	15461.4	585451.4	0.005	0.13	0.02	0.07	0.32	3.95

Table 20: 2035 IP Peak Hour – Model Convergence Statistics (Table 1)

Loop	Ass.	Sim.	A/S Step	%Flows	%Delays	%V.I.	%Gap
28	0.0136/20	0.006/7	1.000/ 1	99.6	99.7	0.00038	0.011
29	0.0120/20	0.006/7	1.000/ 1	99.6	99.7	0.00036	0.018
30	0.0140/20	0.006/7	1.000/ 1	99.7	99.6	0.00031	0.012
31	0.0163/20	0.005/7	1.000/ 1	99.7	99.7	0.00031	0.01

Table 21: 2035 IP Peak Hour – Model Convergence Statistics (Table 2)

Loop	ASS-HRS	Change	SIM_Hrs	SIM_KMs	GEHBAR	AAD	RAAD	XMSD	SAD	RSAD
28	493432.7	0	10491	447965.7	0.006	0.13	0.02	0.12	0.08	1.38
29	493462.2	0.006	10491.6	447955.3	0.006	0.15	0.02	0.1	0.08	1.43
30	493422.1	-0.008	10490.8	447959.2	0.005	0.13	0.02	0.09	0.08	1.42
31	493439.6	0.004	10491.2	447954.3	0.005	0.11	0.02	0.09	0.08	1.39

Table 22: 2035 PM Peak Hour – Model Convergence Statistics (Table 1)

Loop	Ass.	Sim.	A/S Step	%Flows	%Delays	%V.I.	%Gap
58	0.0153/20	0.023/7	1.000/ 1	99.5	99.2	0.00018	0.015
59	0.0117/20	0.023/7	1.000/ 1	99.5	99.2	0.00014	0.015
60	0.0135/20	0.022/7	1.000/ 1	99.5	99.2	0.00015	0.014
61	0.0109/20	0.023/7	1.000/ 1	99.6	99.1	0.00015	0.015

Table 23: 2035 PM Peak Hour – Model Convergence Statistics (Table 2)

Loop	ASS-HRS	Change	SIM_Hrs	SIM_KMs	GEHBAR	AAD	RAAD	XMSD	SAD	RSAD
58	802776.9	-0.002	14344.3	546952.3	0.005	0.12	0.02	0.11	0.18	2.41
59	802764.9	-0.001	14345.2	546943.6	0.005	0.12	0.02	0.07	0.18	2.32
60	802792.7	0.003	14345.7	546944.7	0.005	0.11	0.01	0.08	0.17	2.28

Loop	ASS-HRS	Change	SIM_Hrs	SIM_KMs	GEHBAR	AAD	RAAD	XMSD	SAD	RSAD
61	802799.1	0.001	14346.1	546946.1	0.005	0.12	0.01	0.1	0.18	2.39

E. Model Outputs

Table 24: Junctions over Capacity by Time Period: 2035

Node	Location	AM	IP	PM
4991	Mersey Tunnels Roundabout	Y	N	Y
4999	Mersey Tunnels Roundabout	Y	Y	Y
5003	Mersey Tunnels Roundabout	Y	N	Y
5034	Queensway Tunnel (Towards Liverpool)	Y	N	N
5341	Noctorum Avenue/ Beryl Road	N	N	Y
5436	Ashville Road/ Oakdale Road	Y	N	N
5608	A553 Laird Street/ Miriam Place	Y	N	Y
5630	A553 Laird Street/ Cavendish Street	Y	Y	N
5674	Conway Street/Park Rd East	N	N	Y
5686	Price Street/Watson Street	N	N	Y
5688	Conway Street/Europa Boulevard	Y	Y	N
5691	Kingsway Tunnel (Towards Liverpool)	Y	N	N
5696	Price Street/Argyle Street	Y	Y	N
5702	Market Street/Hamilton Street	Y	N	N
5705	Mersey Tunnel/ Scotland Road	Y	N	N
5736	King Street/ Church Street/ Brighton Street	N	N	Y
5753	A554 Birkenhead Road/ Kelvin Road	Y	N	N
5757	A5139 Dock Road/ Oakdale Road	Y	N	N
5759	Gorsey Lane/ A5139 Dock Road/ Duke Street	Y	Y	Y
5766	Slip Road off A59/ A5139	N	N	Y
5772	A5139	N	N	Y
5773	A554 Tower Road/ A5029 Rendal Street Roundabout	Y	N	N
5777	A554 Canning Street/ Hamilton Street Roundabout	Y	N	N
5781	A552 Woodchurch Road/ Homl Lane	Y	Y	Y
5783	A41 Chester Street / Duncan Street	N	N	Y
5788	A553 Conway Street/ Herringford Street	N	Y	Y
5795	A553 Hoylake Road/ St James Road/ Tollemache Road	N	Y	Y
5798	A552 Borough Road/ Salisbury Street	N	Y	N
5799	A553 Park Road North/ Duke Street/ Ashville Road	Y	N	N
5801	A553 Conway Street/ A5029 Watson Street/ A5029 Exmouth Street	Y	Y	Y
5804	A41 New Chester Road/ Campbeltown Road	N	N	Y
5809	A5029 Exmouth Street/ Claughton Road	N	Y	Y
5811	A552 Borough Road / A5029 & B5148 Whetstone Lane	Y	N	Y
5816	A5029 Exmouth Street / A5029 Whetstone Lane / Oxton Road / Grange Road West	Y	N	Y
5817	A552 Borough Road / B5147 Argyle Street South	Y	N	N
5824	A41 New Chester Road Roundabout	Y	N	Y
5825	A41 New Chester Road Roundabout / B5149 Green Lane	Y	N	N
5830	A5139 / Poulton Bridge Road Roundabout	Y	Y	Y
5832	A5139 Dock Road / Wallasey Bridge Road Roundabout	N	N	Y
5834	A5088 Wallasey Bridge Road / A5139 Roundabout	N	N	Y
5836	A5139 Roundabout	Y	N	Y

Node	Location	AM	IP	PM
5842	A554 Tower Road / A5139 Dock Road Roundabout	N	Y	N
5857	B5148 Church Road / B5148 Bebington Road / Mount Road / Greenway Road	Y	N	N
5858	Borough Road / Thornton Road	Y	Y	N
5860	Borough Road / The Wiend	Y	Y	Y
5862	A552 Woodchurch Road / Prenton Hall Road	Y	N	Y
5863	A552 Woodchurch Road / B5151 Storeton Road	Y	N	Y
5865	B5151 Storeton Road / Prenton Road West / Prenton Lane	Y	Y	Y
5866	B5151 Mount Road / Broadway	N	Y	Y
5868	King's Road / Kings Lane / Broadway	Y	N	N
5873	A5027 Upton Way / Warren Drive	Y	N	Y
5881	B5151 Boundary Road / Worcester Road / Vyner Road North	Y	N	N
5885	A553 Hoylake Road / B5151 Bidston Village Road / Valley Road	Y	Y	Y
5891	A553 Hoylake Road / A553 Fender Lane / A554 Roundabout, A554 Entrance	N	N	Y
5895	B5148 Bebington Road / B5149 Old Chester Road / King's Lane	Y	Y	Y
5896	Beford Drive / The Wiend / Mount Road	Y	N	N
5905	New Chester Road / Boundary Road	Y	N	Y
5907	Bebington Road / B5149 Old Chester Road	Y	Y	Y
5908	A41 New Chester Road / Port Causeway / Sunlight Way	N	N	Y
5913	Mount Road / Village Road / Rest Hill Road	Y	N	N
5914	The Village / Bromborough Road / Church Road	Y	N	N
5916	Bromborough Road / Ellen's Lane	Y	N	Y
5921	B5137 Brimstage Road / B516 Church Road / B5137 Spital Road / Poulton Road	Y	Y	Y
5922	B5137 Spital Road / Mark Rake / Bromborough Village Road	Y	Y	Y
5926	A41 New Ferry By-Pass / A41 New Chester Road / B5136 New Chester Road Roundabout, New Ferry By-Pass Entrance	Y	N	N
5927	A41 New Ferry By-Pass / A41 New Chester Road / B5136 New Chester Road Roundabout, New Chester Road Entrace	Y	N	Y
5929	A41 New Chester Road / Old Court House Road	Y	Y	Y
5931	Bromborough Road / B5137 Spital Road	N	N	Y
5932	Bromborough Village Road / The Cross	Y	N	N
5933	Bromborough Village Road / Croft Avenue East	Y	N	N
5935	A41 New Chester Road / Caldbeck Road / Coft Avenue East	Y	Y	Y
5938	A41 New Chester Road / Bridle Road	Y	N	Y
5939	A41 New Chester Road / Old Hall Road	Y	Y	N
5941	A41 New Chester Road / Allport Road	Y	N	Y
5943	Allport Lane / Bridle Road / Allport Road	Y	N	N
5947	A41 New Chester Road / B5132 Eastham Vilage Road	Y	Y	N
5950	A41 New Chester Road / Magazine Road / Mill Road	Y	N	N
5951	A41 New Chester Road / Eastham Rake	Y	Y	Y
5961	A41 New Chester Road / Bromborough Village Road	Y	Y	Y
5963	Old Court House Road / Dock Road South / Thermal Road	Y	N	Y
5972	Hoylake Road / Worcester Road	Y	N	N
5981	Upton Road / Alderley Avenue / Park Road West	Y	N	N
5992	Egerton Road / Park Road South / Palm Grove	Y	N	N
6000	B5151 Bidston Road / Silverdale Road	N	N	Y

Node	Location	AM	IP	PM
6009	A5027 Oxton Road / B5145 Poulton Road / Gorsey Lane	N	N	Y
6011	B5145 Breck Road / Mill Lane / B5145 Poulton Road / A5088 Poulton Bridge Road	Y	Y	Y
6013	Torrington Road / Mill Lane / Woodstock Road	Y	Y	Y
6015	A551 St Alban's Road / A551 Mill Lane	N	Y	Y
6017	A551 Mill Lane / Liscard Crescent / Liscard Road	Y	Y	Y
6021	B5143 Liscard Village / A551 Liscard Crescnet	Y	Y	Y
6023	Wallasey Road / Belvidere Road / Torrington Road	N	Y	Y
6025	A551 Wallasey Road / A51 St Alban's Road	N	N	Y
6031	A551 Leasowe Road / Mosslands Drive	Y	N	N
6053	A551 Pasture Road / A553 Hoylake Road / A551 Upton Road Roundabout	Y	N	N
6055	A55 Hoylake Road / Borrowdale Road	Y	N	N
6057	Market Street / Hoyle Road / A553 Birkenhead Road	Y	N	N
6059	A540 Grange Road / Westbourne Road	N	N	Y
6061	A540 Grange Road / B5139 Black Horse Hill / A540 Column Road	Y	Y	Y
6063	B531 Frankby Road / Well lane / Pump Lane Roundabout	Y	N	N
6073	Moreton Road / M53 Moreton Spur Slip	Y	Y	Y
6075	Upton Bypass / M53 Moreton Spur Roundabout, Upton Bypas Entrance	Y	Y	Y
6076	Moreton Road / M53 Moreton Spur Roundabout, M53 Moreton Spur Exit	N	N	Y
6078	Upton Bypass / B5192 Saughall Massie Road	Y	Y	Y
6082	Upton Road / Ford Road	Y	N	N
6083	A551 Moreton Road / Ford Road / Arrowe Park Road / Old Greasby Road	Y	Y	Y
6087	A551 Arrow Park Road / Pool Lane	N	N	Y
6089	A551 Arrow park Road / A552 Woodchurch Road / Church Lane	Y	Y	Y
6097	A540 Telegraph Road / B5138 Pensby Road	Y	Y	N
6099	A540 Telegraph Road / Downham Road South / Rocky Lane	Y	N	N
6109	B5151 Mount Road / Clatterbridge Road Roundabout, B5151 Mount Road Entrance	Y	N	N
6111	B5136 Thornton Common Road / B5151 Clatterbridge Road / B5151 Willaston Road	Y	N	Y
6115	Willasten Road / Raby Mere Road	Y	N	N
6119	A540 Chester High Road / B5136 Liverpool Road	Y	N	N
6200	A551 Barnston Road / Storeton Lane	Y	N	Y
6201	Station Road / Lever Causeway / Red Hill Road Roundabout	Y	N	N
6454	A552 Woodchurch Road / Duck Pond Lane	N	Y	N
6484	A552 Borough Road / Willmer Road / Ball's Road East	N	Y	Y
6860	Hinderton Road / Green Lane / Queen Street	N	N	Y
8009	M53 J1 Southbound / A5139 On-Slip	N	N	Y
8028	M53 J4 Southbound / B5151 Mount Road Off-Slip Exit	Y	Y	Y
8030	B5151 Mount Road / B5137 Birmstage Road Roundabout, B5151 Mount Road Entrance	Y	N	Y
8032	B5137 Birmstage Road / B5151 Mount Road Roundabout, B5137 Entrance	N	N	Y
8034	M53 J4 Northbound / B5151 Mount Road Off-Slip Exit	Y	N	N
8035	M53 J4 Roundabout / B5151 Mount Road Southbound Roundabout Exit	Y	N	N
8036	M53 J4 Roundabout / B5151 Mount Road Southbound Roundabout Entrance	Y	Y	Y
8038	M53 J4 Roundabout / B517 Brimstage Road Westbound Roundabout Entrance	Y	N	N

Node	Location	AM	IP	PM
8041	M53 J5 Southbound / New Chester Road Off-Slip Entrance	Y	N	Y
8042	M53 J5 Southbound / New Chester Road Off-Slip Exit	Y	Y	Y
8044	New Church Road Roundabout	Y	N	N
8047	M53 J6 Southbound Off-Slip Entrance	Y	N	Y
8132	M53 J5 Northbound Off-Slip Entrance	Y	N	Y
8137	M53 J5 Northbound On-Slip Exit	Y	N	Y
8139	M53 J4 Northbiund On-Slip Exit	Y	N	N
8142	M53 Southbound / M53 Moreton Spur On-Slip Exit	Y	N	N
8143	M53 Northbound / M53 Moreton Spur On-Slip Exit	Y	N	N
8146	M53 Northbound J1 Off-Slip Entrance	Y	N	Y
8147	M53 Northbound J1 / A5139 Off-Slip Entrance	Y	N	N
20069	A553 Fender Lane / A554 / Hoylake Road Roundabout, A54 Entrance	Y	N	Y
20127	A5027 Upton Road / Salacre Lane / Houghton Road	Y	Y	Y
20133	A552 Woodchurch Road / Ackers Road	Y	N	Y
20173	B5137 Spital Road / Croft Ave	Y	N	N
20176	A41 New Chester Road / Coronation Drive	Y	N	N
50045	B5137 Brimstage Road / Beechway	Y	N	Y
50077	Caldbeck Road / Welton Road	Y	N	N
50087	Allport Road / Greenfields Avenue / Plymyard Avenue	Y	N	N
50245	Poulton Bridge Road / Limekiln Lane	Y	N	Y
50291	Frankby Road / Greasby Road	Y	Y	Y
50293	B5192 Saughall Massie Road / Saughall Massie Road to Overchurch Road	Y	N	Y
50295	A551 Arrowe Park Road / Wirral Teaching Hospital	Y	Y	Y
50299	A551 Leasowe Road / Greenleas Road	Y	Y	Y
50325	Ball's Road / Oxton Road / Ball's Road East / Woodchurch Road	N	N	Y
50337	Hamilton Street / A4554 / A41 Chester Street Roundabout, Hamilton Road Entrance	N	N	Y
50341	B5151 Mount Road / Brackenwood Road	N	N	Y
50345	A553 onway Street / Adelphi Street / Claughton Road	Y	Y	Y
50347	Upton Road / Noctorum Avenue	Y	Y	Y
50349	A552 Woodchurch Road / Singleton Avenue	N	Y	N
50383	B5151 Mount Road / Lever Causeway	Y	Y	Y
50385	B5151 Mount Road / Thornton Road	Y	Y	Y
50435	A5137 Brimstage Road / Manor Road	N	N	Y
50439	Poulton Hall Road / Thornton Common Road	N	N	Y
50441	Poulton Road / Poulton Hall Road	N	N	Y
50449	B5138 Pensby Road / Irby Road	Y	N	Y
50451	Thingwall Road / Mill Hill Road	Y	N	Y
50455	B5192 Saughall Massie Road / Pump Lane / Heron Road	Y	N	Y
50457	A553 Birkenhead Road / Heron Road	Y	Y	Y
50459	A551 Arrowe Park Road / Arrowe Brook Road	Y	Y	Y
50465	A551 Barnston Road / Gills Lane	Y	N	N
50477	A554 Kings Parade / Atherton Street	Y	Y	Y
50483	A554 Cannin Street / Shore Road	N	N	Y
50503	A41 New Chester Road / Torr Drive	Y	Y	Y
60043	Thurstaston Road / Thinwall Road	Y	N	Y

Node	Location	AM	IP	PM
60045	A540 Telegraph Road / Thurstaston Road / Station Road Roundabout	Y	N	N
60048	A540 Telegraph Road / Thurstaston Road (near Quarry Road West)	N	N	Y
60053	A540 Barnston Road / Well Lane	Y	Y	N
60058	Roman Road / Meols Parade	Y	N	Y
60065	A553 Market Street / Alderley Road	N	N	Y
60072	Hoylake Road / Saughall Road / Millhouse Lane	Y	Y	Y
60074	Upton Road / Manor Drive	N	N	Y
60083	A551 Leasowe Road / Gardenside	Y	N	N
60084	Hoylake Road / Digg Lane	Y	N	Y
60085	Town Meadon Lane / Maryland Lane	Y	Y	Y
60086	Pasture Road / Maryland Lane	Y	N	N
60115	Arrowe Road / Arrowe Brook Lane / Arrowe Brook Road	Y	N	Y
60117	B5139 Greasby Road / Cortsway West	N	N	Y
60120	Pensby Road / Sparks Lane	N	N	Y
60128	Barnston Road / Acre Lane	N	N	Y
60216	A552 Woodchurch Road / Ackers Road	Y	N	Y
60218	A551 Arrowe Park Road / A552 Woodchurch Road / Church Lane	Y	N	Y
60219	A551 Arrowe Park Road / Pool Lane	Y	N	Y

F. Glossary

This appendix provides a glossary of key terms.

- Background Traffic Growth – Traffic Growth predicted to occur between base and future years without developments in place
- Base Year Calibration – The process of ensuring the model accurately reflects observed base year conditions
- LGV – Light Goods Vehicle
- Network – The road network that the traffic model represents
- OGV – Other Goods Vehicle
- PCU – Passenger Carrying Unit – used to represent the space that different types of vehicles take up. Car/LGV has a PCU factor of 1, whilst HGV has a PCU factor of 2.3.
- Scenario – A term used to describe the inputs to a model run
- TRICS – an industry recognised database providing details of trip generation for a variety of land-uses based on survey information
- Trip Generation – The number of trips predicted to go to/from each zone
- Volume/Capacity – A measure of the congestion on a road comparing the volume of traffic to its theoretical capacity
- WebTAG – Transport Analysis Guidance produced by the Department for Transport (DfT)
- Zone – A way of defining areas from which trips go to/from in the model
- Zone Connector/Loading – The means by which traffic enters the transport network from the zone

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