

Croxley Rail Link

Demand Model and Forecasting Report

Report

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A TEMPRO GROWTH FACTORS

1 Introduction

The Scheme

- 1.1 The Croxley Rail Link (CRL) scheme is a proposed diversion and extension of the London Underground Limited Metropolitan Line to Watford Junction via Watford High Street. The scheme involves the construction of a viaduct to connect the existing Metropolitan Line to the disused Croxley Green Branch line, currently owned by Network Rail. Fully accessible stations will be provided at the new Ascot Road and Watford General Hospital station sites as well as the current Watford High Street and Watford Junction stations. The scheme also involves the closure to passenger services of the Metropolitan Line branch from Croxley to Watford Metropolitan station and Watford Metropolitan station itself.

General modelling structure

- 1.2 The modelling approach complies with WebTAG and DfT MSBC guidance¹, with the following key attributes:
- Modelled base year of 2010;
 - Two forecast years of 2016 and 2031;
 - Two modelling periods (AM peak and Interpeak); and
 - Segmentation by journey purpose (Commuting, Business and Other).
- 1.3 The overall modelling structure comprises a combined demand growth and incremental mode choice model with demand and cost information being provided by a CUBE/VOYAGER public transport assignment model² and a SATURN highway model³. The respective LMVRs for these models should be read in conjunction with this report to get a full understanding of the modelling suite employed for CRL demand forecasting.

This report

- 1.4 Following this introductory chapter, this report contains the following:
- Chapter 2 details the demand model structure and its operation;
 - Chapter 3 sets out the assumptions around demand growth;
 - Chapter 4 discusses the model parameters used;
 - Chapter 5 describes model and realism testing; and
 - Chapter 6 sets out the demand forecasts and wider transport impacts of CRL.

¹Major Scheme Business Cases: Value for Money Guidance for Development Pool Schemes, May 2011, DfT

² Croxley Rail Link, Public Transport Local Model Validation Report, Report, June 2011

³ Watford SATURN Model - Croxley Cordon, Local Model Validation Report, Report, June 2011

2 Demand model

Model structure

- 2.1 The demand model structure is a combined demand growth and incremental mode choice model. The model forecasts any future year scenario by pivoting off the Base year, using the change in costs arising from changes in the network and reference case demand to forecast the resulting change in mode shares. Whilst necessitating a full model run for each scenario test, rather than a simpler forecast year only test, it enables a single model structure to be developed, rather than a two stage process of Base Year to Future Reference or Do-Minimum and then to Do-Something.
- 2.2 The model structure is set out in Figure 2.1. It comprises a public transport assignment model (shown along the top row) and a highway assignment model (shown along the bottom row), with a demand growth process and the mode split model active after the Base year assignment and future year assignments respectively. Data for the TUBA analysis is provided at the end of the process.
- 2.3 No demand - supply iteration is undertaken; rather, a single pass is made assigning the Reference case demand to the respective networks to forecast the impacts on mode share and this is then reassigned to the respective networks.
- 2.4 The demand model is applied to the area of Watford and the surrounding area (zones 1-56 in the model). Longer distance trips, notably those to London, are assumed captive to their existing modes and are not in-scope for modal transfer.
- 2.5 The mode choice model is applied to the Commuting and Other journey purpose segments only; Business is assumed to be captive to existing modes. There is little business travel by public transport in and around the Watford area (as can be seen by the purpose level matrices contained in the LMVR) and it is expected that such travel would not provide a material contribution to the case for CRL. Previous CRL demand modelled was unable to robustly estimate modal transfer for this segment. Overall, this approach provides a conservative view of the case for CRL.

Distribution and time of day effects

- 2.6 The demand model only reflects changes in mode, driven by changes in generalised cost. Theory and empirical evidence indicates that these same changes in generalised cost will also potentially lead to other responses. WebTAG Unit 3.10.3 suggests other responses may be trip redistribution (changes in the origin or destination of trips) and time of day choice. These effects have not been modelled. The question is whether omitting these responses is materially significant when considering the CRL business case.
- 2.7 In this consideration, it is important to be cognisant of the direct network impacts of CRL and how this will affect generalised costs (on both the public transport and highway networks). The scheme provides a diversion and extension to the LUL Metropolitan Line via a disused rail corridor to terminate at an alternative point (Watford Junction). There is no direct impact on the highway network, nor will

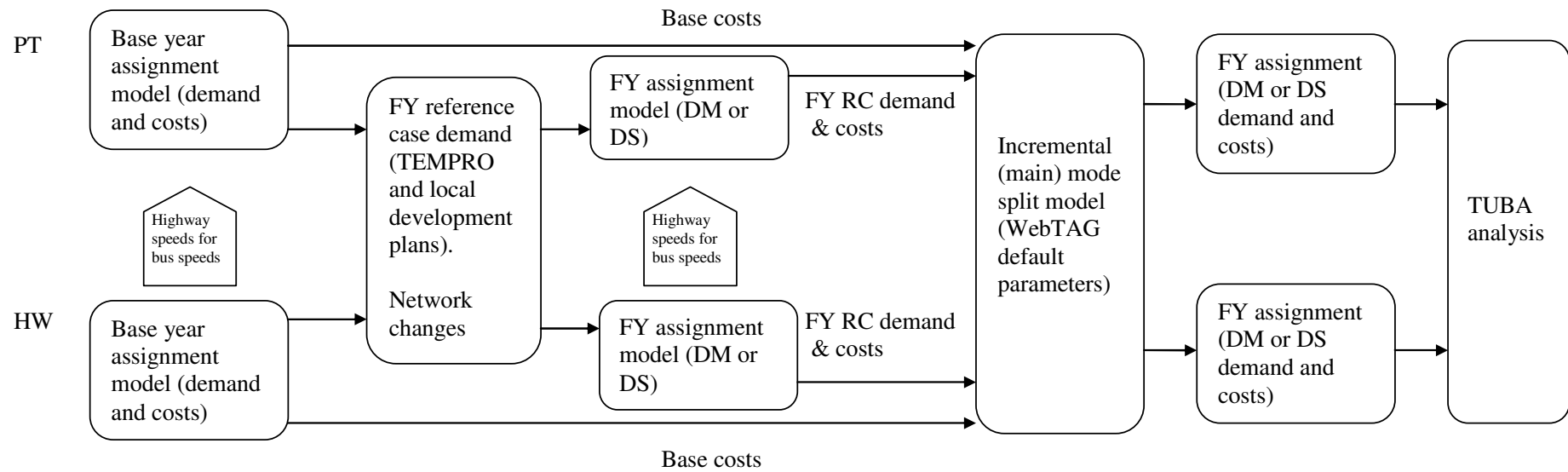
bus or rail services be affected. The core change in the public transport network offer will be improved accessibility to LUL services across central Watford, with some loss of access for certain users from the associated closure of the existing Watford Met station. So in summary, aside from some disbenefits from the closure of Watford Met station, the overwhelming impact will be beneficial. This is illustrated in the examples of journey time changes set out in Table 6.11.

As noted above, there is no direct highway impact from CRL. The only possible indirect impact will arise from a slight reduction in demand and congestion levels from modal shift to CRL. However, analysis to date shows this to be small (both in previous forecasts and in the current forecasts as set out in

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- 2.8 Table 6.8 and Table 6.9 for the AM peak and Interpeak hours respectively) and hence would not translate into material impacts on trip distribution or time of day travel of highway trips. There could potentially be some combined trip redistribution onto CRL from car; this would largely arise from the benefit of CRL and hence again contributes to the view that adding more responses will enhance, albeit marginally, the case for CRL.
- 2.9 In summary, the omission of trip redistribution and time of day responses will slightly underestimate the benefits of CRL. Some disbenefits will arise from the closure of Watford Met station, but this will be exceeded by the wider journey time benefits of CRL.

FIGURE 2.1 DEMAND MODEL STRUCTURE



3 Demand growth

TEMPRO

- 3.1 TEMPRO 6.2 has been used as the basis for forecasting reference case demand levels in the forecast years. Data was extracted by journey purpose, mode, time period and geographic location.
- 3.2 The extracted TEMPRO trip end data was disaggregated by mode (i.e. Car, Bus/Coach, Rail/Underground), by time period (AM and Interpeak), by journey purposes (Commuting, Business and Other), separately for the base (2010) and future years (2016 and 2031).
- 3.3 This data was used to derive growth factors for each forecast year (2016, 2031) relative to the base year (2010); Table 3.1 sets out the growth factors for Watford and Three Rivers councils. The derived growth factors were then allocated to the model zones with the aid of a correspondence relationship between the model zones and TEMPRO zones. As TEMPRO data is split by Origin (O) and Destination (D), the factors were averaged across OD's to arrive at growth factors to be applied to the demand matrices in the model.
- 3.4 This approach ensures that the output 2016 and 2031 matrices are compliant with TEMPRO 6.2, that is, the origin and destination growth rates in the 2016 and 2031 matrices match the TEMPRO 6.2 growth rates when compared at the TEMPRO zone level. This ensures that the forecasting process satisfies a key requirement stated in WebTAG Unit 3.15.2, namely that *“one model run should be undertaken on the basis of planning assumptions consistent with TEMPRO at study area level”*
- 3.5 As the demand model had input demand data split by Bus, LUL and Rail and as the TEMPRO data does not distinguish between LUL and Rail, the Rail/Underground factor was applied to both LUL and Rail demand matrices. The TEMPRO growth process has been illustrated in Figure 3.1 below and tables containing the final growth factors applied to the matrices, are in Appendix A.

FIGURE 3.1 TEMPRO GROWTH PROCESS

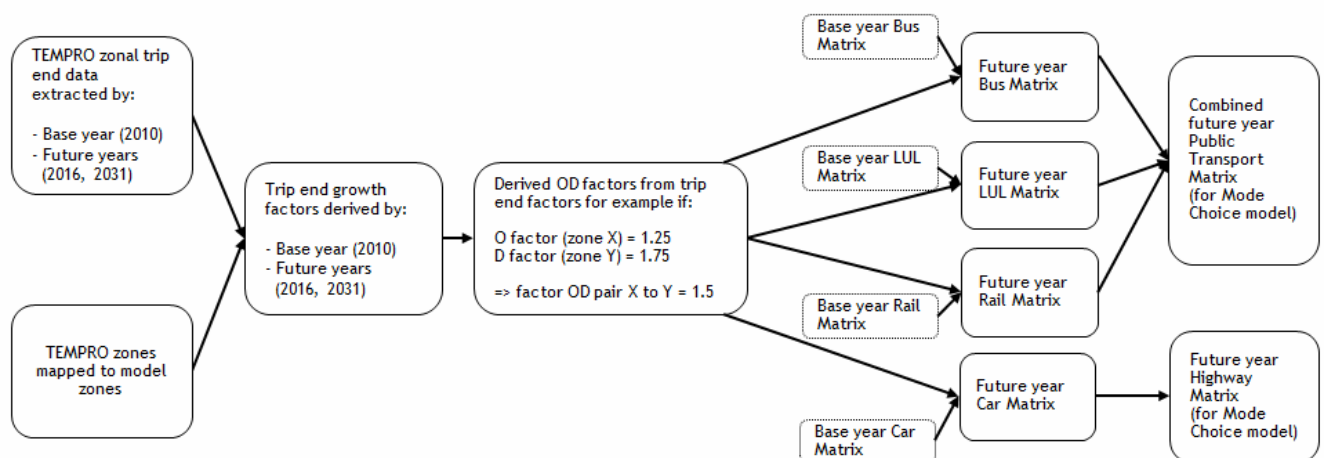


TABLE 3.1 GROWTH FACTORS DERIVED FROM TEMPRO DATA

Period	Purpose	Mode		2010-2016		2010-2031	
				Three Rivers	Watford	Three Rivers	Watford
AM	Commuting	ALL CAR	Origin	1.034	1.059	1.061	1.101
			Destination	1.072	1.046	1.084	1.121
		Bus/Coach	Origin	1.004	1.006	0.995	0.968
			Destination	1.021	1.001	0.981	1.009
		Rail/Underground	Origin	1.010	1.027	0.999	0.999
			Destination	1.030	1.015	0.987	1.009
	Business	ALL CAR	Origin	1.040	1.057	1.060	1.107
			Destination	1.076	1.050	1.090	1.124
		Bus/Coach	Origin	1.026	1.023	1.053	1.023
			Destination	1.000	1.056	1.000	1.056
		Rail/Underground	Origin	1.029	1.041	1.043	1.068
			Destination	1.000	1.043	1.000	1.087
	Other	ALL CAR	Origin	1.051	1.073	1.173	1.209
			Destination	1.082	1.073	1.236	1.225
	Bus/Coach	Origin	1.004	1.027	1.116	1.139	
		Destination	1.036	1.037	1.175	1.175	
	Rail/Underground	Origin	1.009	1.038	1.118	1.148	
		Destination	1.038	1.049	1.188	1.197	
IP	Commuting	ALL CAR	Origin	1.063	1.049	1.100	1.124
			Destination	1.051	1.049	1.078	1.117
		Bus/Coach	Origin	1.018	1.005	1.022	1.010
			Destination	1.002	1.001	0.992	0.982
		Rail/Underground	Origin	1.016	1.018	1.006	1.005
			Destination	1.009	1.022	0.997	0.994
	Business	ALL CAR	Origin	1.068	1.053	1.095	1.130
			Destination	1.067	1.051	1.086	1.120

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Period	Purpose	Mode		2010-2016		2010-2031	
				Three Rivers	Watford	Three Rivers	Watford
			Origin	1.043	1.037	1.086	1.099
			Destination	1.038	1.030	1.077	1.061
		Rail/Underground	Origin	1.044	1.041	1.067	1.102
			Destination	1.042	1.045	1.042	1.082
	Other	ALL CAR	Origin	1.073	1.064	1.236	1.219
			Destination	1.069	1.063	1.228	1.215
		Bus/Coach	Origin	1.025	1.016	1.203	1.164
			Destination	1.014	1.014	1.179	1.160
		Rail/Underground	Origin	1.034	1.034	1.192	1.161
			Destination	1.026	1.033	1.164	1.151

Table 3.2 and

- 3.6 Table 3.3 below, show the base year (2010) and forecast years (2016, 2031) hourly matrix totals for highway and public transport. These are the input matrix totals for each of the relevant years, based solely on the TEMPRO growth process. Reference to the growth factors derived from the TEMPRO data by purpose, mode and period above demonstrate adherence to the TEMPRO growth rates.

TABLE 3.2 AM DEMAND

Demand		2010 demand	2016 demand	2016 factor	2031 demand	2031 factor
Highway		64,294	68,306	1.062	72,942	1.135
PT	Bus	498	510	1.025	540	1.085
	Rail	2117	2177	1.028	2254	1.065
	LUL	873	896	1.026	936	1.072
	Total PT	3488	3583	1.027	3730	1.069

TABLE 3.3 IP DEMAND

Demand		2010 demand	2016 demand	2016 factor	2031 demand	2031 factor
Highway		102,900	109,097	1.060	118,356	1.150
PT	Bus	444	452	1.017	515	1.158
	Rail	854	882	1.033	934	1.094
	LUL	230	237	1.032	261	1.134
Total PT		1509	1551	1.028	1688	1.119

Local developments

- 3.7 TEMPRO provides the overall level of growth to be applied. A further step is considered of targeting the growth beyond the relatively coarse TEMPRO zones (each district is typically split into several distinct urban areas representing towns, plus a rural zone) to the detailed model zones, reflecting the actual locations where planned development will add to the travel demand from the respective zone.
- 3.8 Data was obtained for developments currently in the planning application process from the two key local authorities: Watford and Three Rivers. In both districts, the scale of most individual developments and their locations are not considered material to the case for CRL. In the case of Three Rivers, planned developments are dispersed and small in scale. The same applies to Watford, with the exception of the Watford Health Campus development and a major mixed use development at Watford Junction.
- 3.9 However, the status of these developments is uncertain. The Watford Health Campus, to be built on the site of the existing Watford Hospital site, has planning permission, but full funding has yet to be secured. The Watford Junction development has yet to gain planning permission and is dependent on the implementation of a local road improvement. In summary, the timing of these developments is uncertain.
- 3.10 In addition to these explicit sites, local planning policy is seeking to develop the Watford and Croxley Business Parks as foci of employment, with opportunities identified for development of vacant or underutilised sites. These include the Royal Mail site close to the CRL Ascot Road station. Overall, CRL will support and expedite such plans, even if at this stage no formal planning processes are underway.
- 3.11 Given the level of uncertainty of the known material developments and policy context supporting other possible developments, no local developments have been explicitly modelled. On balance, this will result in a conservative view of the case for CRL, since these developments are adjacent to and served by CRL.

4 Model parameters

Future travel cost assumptions

- 4.1 For the forecast years of 2016 and 2031, assumptions have been made about how the monetary elements of travel cost change from the 2010 Base year. In all parameters, the changes have been applied to reflect changes in real terms, excluding the effects of general inflation. Base year values used are set out in the respective LMVRs.

Value of time (VoT) growth

- 4.2 VoT growth was taken from WebTAG unit 3.5.6, reflecting the differential growth by segment.

PT fares growth

- 4.3 Following the McNulty value for money review of the rail industry, the DfT recently announced that rail fares would increase at RPI+3% in January 2012-14, reverting to RPI+1% thereafter. This has been employed in the CRL demand model.
- 4.4 LUL fares have assumed the same increases, given the interrelation with the Travelcard fare structure.
- 4.5 Bus fares were assumed to remain constant in real terms. All bus services in Watford are operated privately so there is considerable uncertainty with regard to future fare levels. This is a conservative assumption in terms of impact on the scheme business case, given that bus will act as a competitor to the Croxley Rail Link for some local journeys in Watford.

Parking charge growth

- 4.6 Parking charges are assumed to grow in line with value of time, typically around 1.5-2% per year.

Car operating costs

- 4.7 Monetary costs are not included in the highway assignment model.

Future year network assumptions

- 4.8 For the forecast years of 2016 and 2031, consideration has been given to the possible changes to the transport network supply that could affect the demand for CRL.
- 4.9 For bus, the deregulated nature of bus service provision in the Watford area makes it difficult to predict changes to the network. The ongoing development of the CRL scheme over recent years has not identified any material changes to the network and hence a stable network is assumed in the future. Furthermore, given the limited direct competition CRL has with the bus network, no changes are assumed with CRL in place.
- 4.10 Major upgrades are being undertaken to much of the LUL network. On the Metropolitan Line specifically, a new fleet of trains is being introduced and the sub-surface network resignalled. Various revised service patterns are being

developed by LUL to maximise the benefits of this investment, but at present there are no committed plans. A range of changes to the Watford service are possible and these are subject to testing with respect to CRL. No other changes are assumed to the Metropolitan or wider LUL network.

- 4.11 Major investment has been made on the former Watford DC lines, now rebranded London Overground (LOROL). These include a fleet of new Class 378 stock and material upgrades to stations along the route, including full integration into the LUL fares and ticketing regime. Much of this occurred before and during 2010 (notably the new trains were phased in during 2010) and so the modelled Base year will reflect these improvement and the associated demand changes. No further changes to the LOROL service are committed and hence no changes are assumed in the forecasting for CRL.
- 4.12 Options are currently being considered for the development of London Midland (LM) services as part of the High Level Output Specification (HLOS) process. However, given the commercial nature of the changes, no details are currently available, nor has any option been committed. On that basis, no changes to LM services or crowding levels have been assumed for CRL forecasting.
- 4.13 No changes to the highway network have been assumed, except for very minor junction revisions to reflect changing traffic levels and patterns.

5 Realism Testing

- 5.1 To demonstrate the robustness of the demand model, a realism test has been undertaken to assess the sensitivity of the model in response to a change in public transport fares.
- 5.2 This has been undertaken in line with guidance from WebTAG unit 3.10.4, assuming a 20% increase in all public transport fares and evaluating the resulting public transport demand response. From this information, the elasticity of public transport demand to fares can be assessed against the WebTAG recommended range of -0.2 (low sensitivity) to -0.9 (high sensitivity)
- 5.3 The realism test was firstly carried out on the model incorporating initial λ values obtained from the previous demand model estimation exercise (the 2009 MSBC submission, see Appendix K). The resulting elasticities were then assessed against the WebTAG range to inform on the adjustments necessary to ensure an appropriate sensitivity. This test is shown in Table 5.1, where it can be seen that these initial λ values result in a model where the elasticity is below the recommended range.

TABLE 5.1 PUBLIC TRANSPORT FARES REALISM TEST - INITIAL PARAMETERS

	AM Peak	InterPeak
Initial λ	0.0206 (commuters), 0.0227 (other)	0.0206 (commuters), 0.0227 (other)
PT demand standard fares	1,982	2,298
PT demand +20% fares	1,948	2,265
Elasticity	-0.10	-0.08

- 5.4 Consequently, a further test was executed where the λ values were increased to improve the model's sensitivity. These revised λ values and the corresponding realism test are shown below in Table 5.2 where it can be seen that the resulting elasticities have increased to around -0.18 for the AM peak period and -0.20 for the Interpeak.

TABLE 5.2 PUBLIC TRANSPORT FARES REALISM TEST - FINAL PARAMETERS

	AM Peak	InterPeak
Revised λ	0.0412 (commuters), 0.0454 (other)	0.0515 (commuters), 0.0568 (other)
PT demand standard fares	2,161	2,391
PT demand +20% fares	2,090	2,306
Elasticity	-0.18	-0.20

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- 5.5 The resulting fares elasticities of -0.18 for the AM Peak and -0.20 for the Interpeak are at the low end of the range set out in the guidance. This reflects the high proportion of bus users with concessionary passes. It also reflects that only a small proportion of bus users had a car available and so are captive to public transport.
- 5.6 In addition, a low elasticity will produce a conservative estimate for modal transfer to CRL and hence the scheme's impact on user benefits and net revenue to TfL. For these reasons, the λ values in Table 5.2 were adopted as the final values in the demand model.

6 Demand forecasts

Introduction

- 6.1 A range of tests have been undertaken to inform the development and Business Case for the CRL. These encompass the core service options and alternatives, including the split service option retaining services to Watford Met, and a range of tests to understand the sensitivity of the case for CRL to key variables.
- 6.2 The initial focus will be on reporting the impacts of the core option, namely of diverting the Watford Met service and known changes therein to Watford Junction. More summary results will then be provided for the service alternatives and the sensitivity tests.
- 6.3 Table 6.1 summarises the tests undertaken. There are two issues that affect the range of core options considered:
- The capacity of the CRL of 6tph; and
 - The possibility that the Metropolitan Line upgrade may include operating 10tph during peak times on the Watford branch. (In all cases, the options reflect that LUL have already committed to reduce off peak services to 4tph.)

TABLE 6.1 CRL OPTIONS TESTED

Option	Do-Minimum Watford Met service	Associated option
1	Current peak - 7 tph (average over 3 hour peak period) Future off peak - 4 tph	Divert all service to Watford Junction (7 tph peak, 4 tph off peak)
2	Current peak - 7 tph (average over 3 hour peak period) Future off peak - 4 tph	6 tph in peak diverted to Watford Junction (residual 1 tph diverted elsewhere on the Metropolitan Line - the disbenefit of reduced frequency in the Watford area is captured but the benefit elsewhere is not - representing a worst case assumption). 4 tph off peak diverted to Watford Junction
3 - Central Case	Future service - 6 tph peak, 4 tph off peak Additional peak 4 tph Met Line service enhancement allocated elsewhere on the Metropolitan Line	Divert all service to Watford Junction (6 tph peak, 4 tph off peak)
4	Future service - 10 tph peak, 4 tph off peak	Divert 6 tph in peak to Watford Junction. Residual 4 tph diverted elsewhere on the Metropolitan Line - the disbenefit of reduced frequency in the Watford area is captured but the benefit elsewhere is not - representing a worst case assumption. 4 tph off peak diverted to Watford Junction

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Option	Do-Minimum Watford Met service	Associated option
	<i>Sensitivity tests</i>	
5	As Option 3	Peak only split service option, with 3tph in the peaks to both Watford Junction and the existing Watford Met terminus. 4tph off-peak unchanged.
6	Option 3 with low and high growth	Option 3 with low and high growth
7	As Option 3 with bus fares at RPI+1%	As Option 3 with bus fares at RPI+1%
8	As Option 3	CRL +20% run times
9	As Option 3, with higher mode choice model λ s	As Option 3, with higher mode choice model λ s
10	As Option 3	No mode choice

6.4 These issues give rise to four options, albeit very similar in some cases, notably between 1 and 2. The central case for the CRL is option 3, a slight reduction to the current peak service to Watford Met. This is considered the most probable future service scenario, given the emerging options for the Metropolitan Line upgrade service pattern. In any event, the results do not show any material differences with option 1 (the current peak service assumed to continue operating). The sensitivities then test the option of retaining Watford Met station, growth assumptions and CRL run times.

6.5 Note that the following model results relate to the average hour of the 3-hour AM peak period and the 6-hour Interpeak(IP) period.

Uncertainty log

6.6 An uncertainty log has been developed which sets out the assumptions and inputs which may affect the forecasts and case for CRL; this is set out in Table 6.2. This has informed the range of sensitivity tests undertaken.

TABLE 6.2 UNCERTAINTY LOG

Input	Uncertainty	Comments
<i>Factors affecting underlying demand</i>		
Development of Watford Health Campus	Near certain	Watford Hospital station will serve the development.
Large housing development near Watford Junction (c1500 units)	Reasonably foreseeable	Site to the immediate east side of the station. Development necessitates new road access which is not yet committed. Will be served directly by CRL.

Input	Uncertainty	Comments
Uncertainty over background growth rates	Hypothetical	Inherent uncertainty over TEMPRO forecasts means growth rate subject to some degree of uncertainty. Use of sensitivity testing (+/- 2.5%/pa rising with the square root of the number of years).
<i>Factors affecting supply for transport</i>		
HLOS capacity improvement to London Midland rail services	More than likely	Options under development, so cannot test directly. Focus is on increasing capacity, rather than train service frequency and hence main impact will be on LM crowding levels. CRL testing assumed unchanged crowding levels; HLOS will counter increases in crowding arising from increased demand.
Bakerloo Line extension to Watford	Hypothetical	LUL currently have no plans to extend the Bakerloo Line
London Overground frequency increase to 4tph	Reasonably foreseeable	Longer term options for development of the system include a frequency increase to 4tph.
<i>Factors affecting cost of transport</i>		
Bus fares may increase above RPI.	Reasonably foreseeable	Model assumes bus fares rise in line with RPI; if fares increase at a greater rate, then this will marginally enhance case for CRL.
Parking charges may increase above RPI.	Reasonably foreseeable	Model assumes parking charges rise in line with RPI. If the rate of increase is higher, then this will marginally enhance case for CRL, given the lower parking charges at LUL stations.

Do-Minimum demand forecasts

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- 6.7 Table 6.3 and Table 6.4 show the base year (2010) and forecast years (2016, 2031) assigned demand for highway and public transport. Note that these numbers relate to assigned demand, not the input demand data as set out previously in Chapter 3. Overall transport demand shows very modest growth, with little change from the TEMPRO only forecasts.

TABLE 6.3 AMPEAK DO MINIMUM DEMAND

Demand		2010	2016	2031
Highway		21,431	22,804	24,351
PT	Bus	442	462	517
	Rail	1,967	2,056	2,128
	LUL	1,032	1,011	1,056
	Total PT	3,442	3,529	3,701

TABLE 6.4 IPDO MINIMUM DEMAND

Demand		2010	2016	2031
Highway		17,150	18,182	19,722
PT	Bus	276	288	333
	Rail	858	893	948
	LUL	259	250	270
	Total PT	1,393	1,431	1,551

- 6.8 The impact on LUL demand on the Watford branch is set out in Table 6.5. The slight reduction in service frequencies (AM Peak reduces from 7tph to 6tph and the IP from 6tph to 4tph) and real growth in fares leads to a slight dip in demand on the Watford branch by 2016, but by 2031 demand has increased slightly over 2010 levels.

TABLE 6.5 DO-MINIMUM WATFORD MET BRANCH DEMAND

Period and Direction	Station	2010	2016	2031
AM Southbound boards	Watford Met	298	271	280
	Croxley	231	234	244
AM Northbound alights	Watford Met	257	253	265
	Croxley	155	158	165
Total AM boardings and alightings		942	917	954
IPSouthbound boards	Watford Met	84	79	87
	Croxley	17	16	18

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IPNorthbound alights	Watford Met	79	74	79
	Croxley	34	34	36
Total IPboardings and alightings		214	203	220

Demand impacts of the central case CRL scheme

6.9 Table 6.6 and Table 6.7 show the base year (2010) and forecast years (2016, 2031) assigned matrix totals for highway and PT. These are the matrix totals as obtained after the assignment and mode choice forecasts for 2010 and 2016/2031 respectively.

TABLE 6.6 AM PEAK DO SOMETHING DEMAND

Demand		2010	2016	2031
Highway		21,431	22,761	24,311
PT	Bus	442	391	436
	Rail	1,967	1,924	1,995
	LUL	1,032	1,257	1,311
	Total PT	3,442	3,572	3,741

TABLE 6.7 IPDO SOMETHING ASSIGNED DEMAND

Demand		2010	2016	2031
Highway		17,150	18,162	19,703
PT	Bus	276	258	298
	Rail	858	850	901
	LUL	259	342	371
	Total PT	1,393	1,450	1,571

6.10

- 6.11 Table 6.8 and Table 6.9 below show the resulting demand impact of the CRL scheme. The CRL scheme results in a significant number of additional LUL trips. Taking the AM peak period in 2016 as an example, around half of the additional 246 trips are abstracted from rail (132 trips) whilst 72 are abstracted from bus and the remainder are transferred from car. A similar pattern can be seen for the IP and for year 2031.

TABLE 6.8 CHANGE IN DEMAND BY MODE - AM PEAK HOUR

Demand		2016	2031
Highway		-42	-40
PT	Bus	-72	-82
	Rail	-132	-133
	LUL	246	256
	Total PT	42	40

TABLE 6.9 CHANGE IN DEMAND BY MODE - INTERPEAK

Demand		2016	2031
Highway		-19	-20
PT	Bus	-30	-35
	Rail	-43	-46
	LUL	92	101
	Total PT	19	20

6.12 The total hourly demand in 2016 on the Watford Branch is set out in Table 6.10. In the AM peak, demand increases 58% and nearly doubles in the IP with the introduction of CRL.

TABLE 6.10 TOTAL DEMAND ON THE WATFORD BRANCH (2016)

Scenario	AM Hour	IP Hour
Do-Minimum	917	203
CRL	1,450	392
Difference	533 (+58%)	189 (+93%)

6.13 Figure 6.1 to Figure 6.4 below illustrate the demand profiles along the CRL line for forecast year 2016, as obtained after the assignment and mode choice forecasts. These illustrate that there is significant levels of local trips on the CRL, with material AM peak southbound alightings at Watford High Street and Watford Hospital; Ascot Road has substantial boardings, in part given its role as the replacement access station for Watford Met. In the AM peak northbound, demand is largely alighting the CRL. Interpeak demand is relatively modest, with line flows around 150 per hour.

FIGURE 6.1 CRL DEMAND PROFILE - 2016 AM PEAK SOUTHBOUND

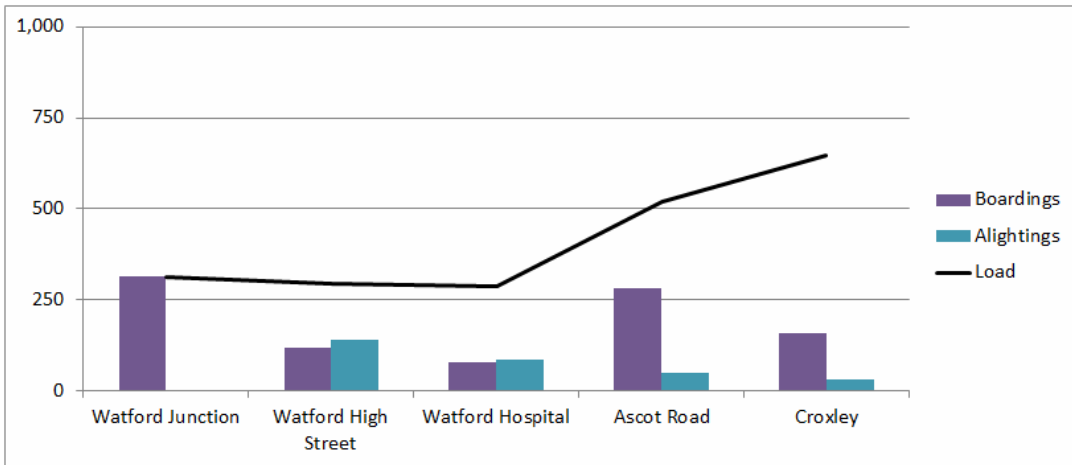


FIGURE 6.2 CRL DEMAND PROFILE - 2016 AM PEAK NORTHBOUND

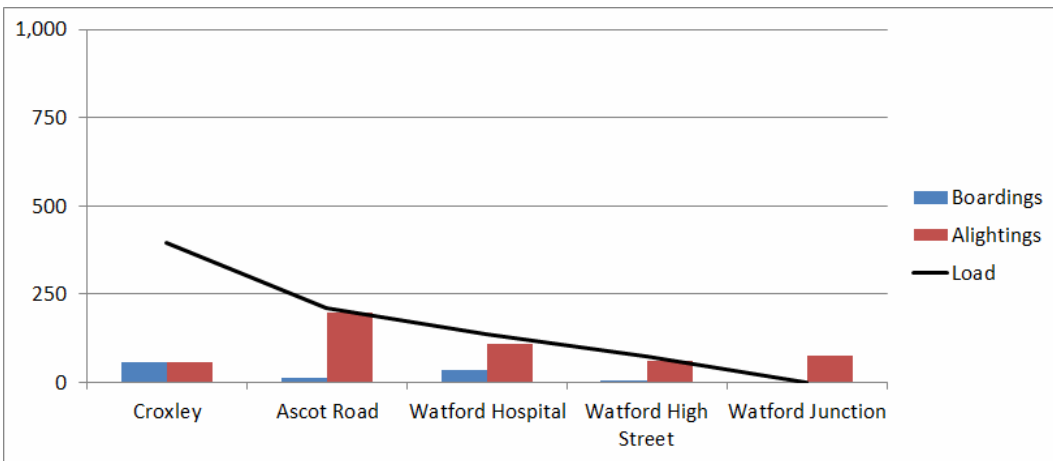


FIGURE 6.3 CRL DEMAND PROFILE - 2016 IPSOUTHBOUND

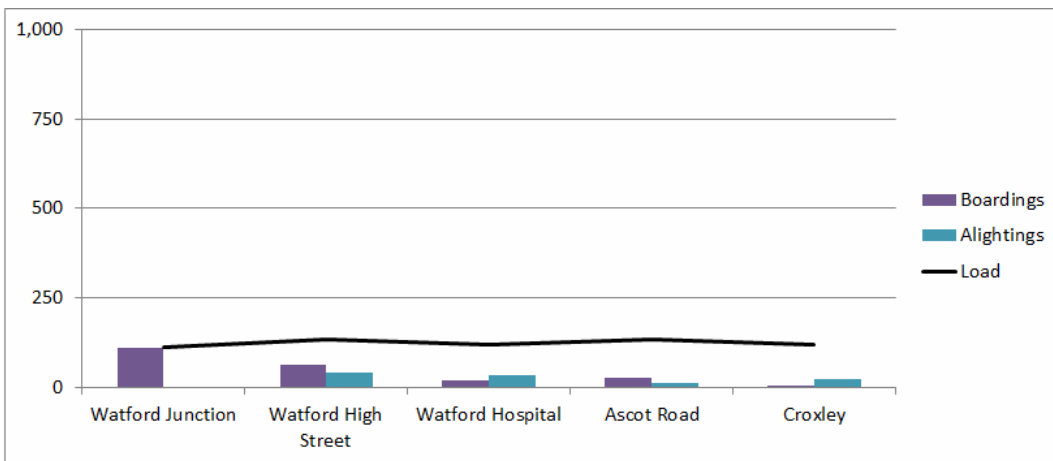
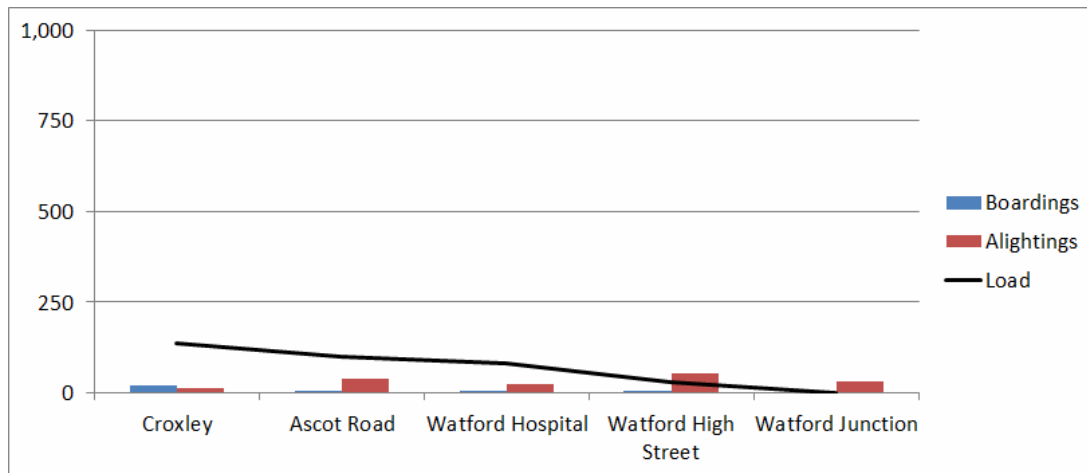


FIGURE 6.4 CRL DEMAND PROFILE - 2016 IPNORTHBOUND



6.14 The pattern of trip origins and destinations for CRL demand in the 2016 AM peak is illustrated in Figure 6.5 and Figure 6.6 for originating trips and destinating trips respectively. Much of the demand is travelling to or from the area served by CRL, with some demand using CRL to access areas over a wider area. Much destinating demand is in the London area, outside the area covered by the figure.

FIGURE 6.5 CRL DEMAND ORIGINS - 2016 AM PEAK

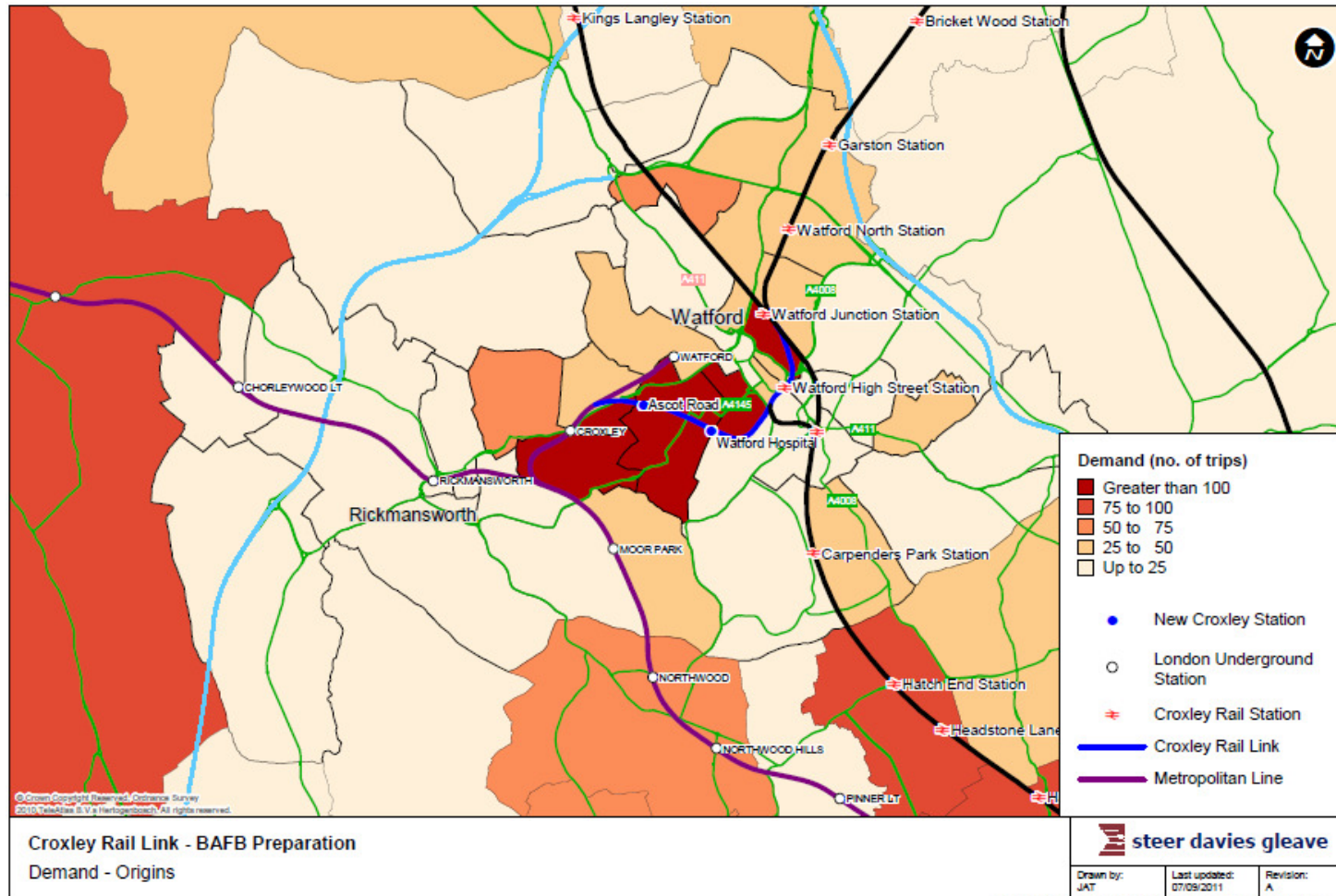
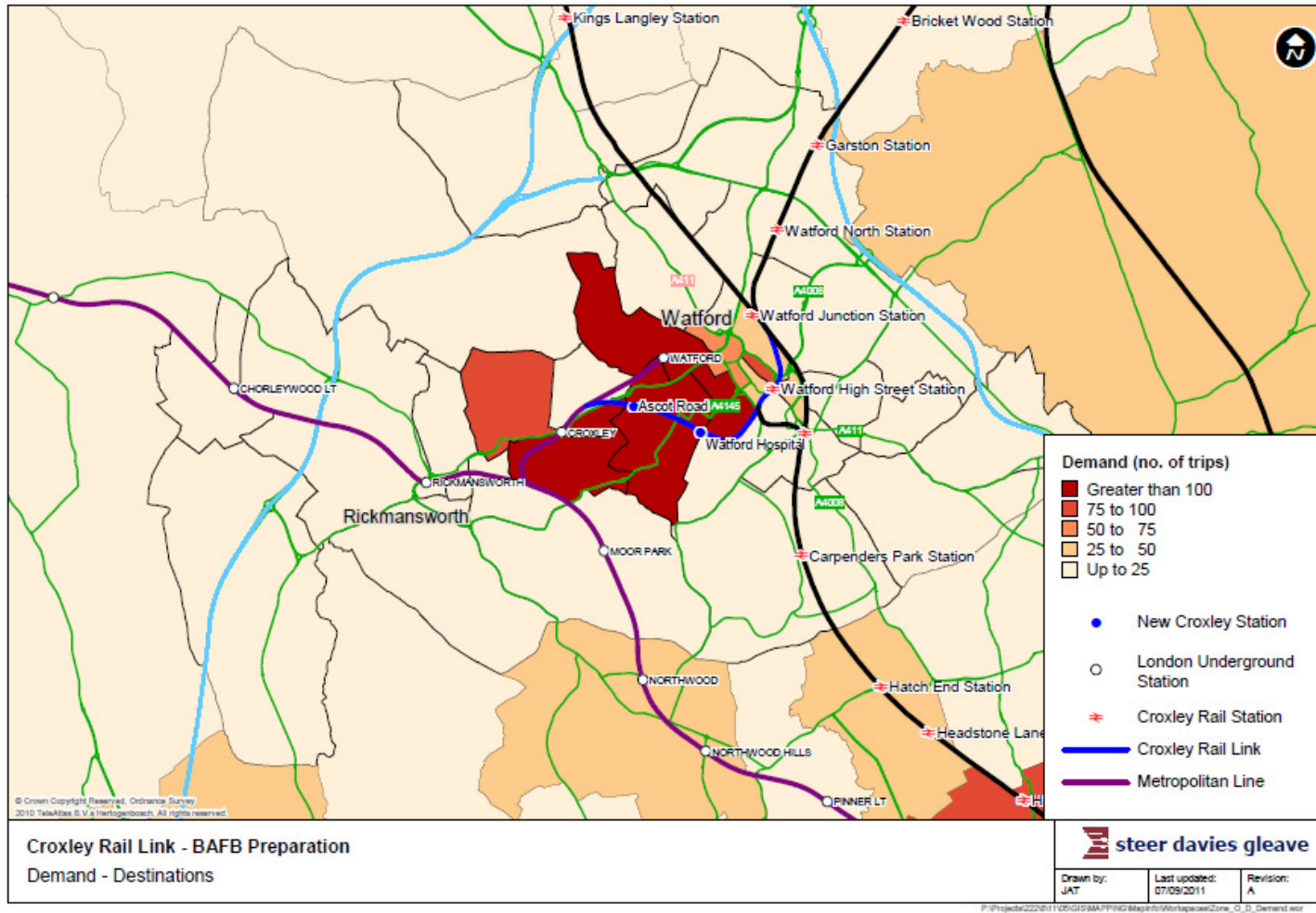


FIGURE 6.6 CRL DEMAND DESTINATIONS - 2016 AM



- 6.15 Table 6.11 below summarises the impact of introducing the CRL scheme on five specific origin destination pairs in the model. It outlines the route taken and the generalised journey time, both before (Do Minimum) and after (Do Something) the introduction of CRL.

TABLE 6.11 IMPACT OF CRL ON SELECTED JOURNEYS

Orig-Dest	DM Route (No CRL)	DM GJT	DS Route (With CRL)	DS GJT
16-12 (Watford Grammar - Moor Park)	Watford - Moor Park (Metropolitan Line)	41.83	Ascot Road - Moor Park (Metropolitan Line)	51.83
16-78 (Watford Grammar - Baker Street)	Watford - Baker Street (Metropolitan Line)	81.95	Ascot Road - Baker Street (Metropolitan Line)	91.94
12-15 (Moor Park - West Watford)	Moor Park - Watford (Metropolitan Line)	58.48	Moor Park - Ascot Road (Metropolitan Line)	50.23
12-26 (Moor Park - Central Watford)	Moor Park - Watford (Metropolitan Line)	94.97	Moor Park - Watford High Street (Metropolitan Line)	46.23
2-23 (Croxley Green - Watford General Hospital)	Bus route 320/321	69.58	Croxley - Watford High Street (Metropolitan Line)	62.89

- 6.16 It can be seen that the first two example journeys show a disbenefit when CRL is introduced. Both journeys originate from zone 16 in the model, where Watford Metropolitan Line station is situated. When CRL is built and hence Watford station is closed, users from zone 16 must walk further to Ascot Road Station. The remaining three journeys show a benefit. Users travelling to west Watford or Watford General Hospital will benefit from new Metropolitan Line services to two new stations (Ascot Road and Watford Hospital) that are closer to their destinations than the current Metropolitan Line station at Watford. Similarly, those travelling to central Watford gain a substantial benefit, with CRL serving Watford High Street station in the town centre, the current route via Watford Met necessitating a long walk or bus journey to access the town centre.

Other Core Options 1, 2 and 4

- 6.17 The results for the central case CRL scheme (Option 3) have been presented above; Table 6.12 shows the Watford branch demand for options 1 to 4 for comparison. The demand in the IP is the same across all four options. In the AM peak, the central case (Option 3) has the lowest DM demand, since it assumes the lowest frequency, with option 4 the highest demand, since it assumes the highest frequency (10tph). CRL demand is constant across all options except option 1, which has slightly higher demand reflecting the higher frequency operated (7tph).

TABLE 6.12 TOTAL DEMAND ON THE WATFORD BRANCH (2016)

Scenario	AM Hour	IP Hour
<i>Central Case (option 3)</i>		
Do-Minimum	917	203
CRL	1,450	392
Difference	533 (+58%)	189 (+93%)
<i>Options 1 and 2</i>		
Do-Minimum	965	203
CRL option 1	1,569	392
Difference	604 (+63%)	189 (+93%)
CRL option 2	1,450	392
Difference	485 (+50%)	189 (+93%)
<i>Option 4</i>		
Do-Minimum	1,018	203
CRL	1,450	392
Difference	485 (+50%)	189 (+93%)

- 6.18 In summary, the core options 1 to 4 all produce identical demand results in the IP, but a range in the AM peak (+485 to +604); the central case (Option 3) results in a demand increase on the Watford branch in the middle of this range.

Sensitivity tests

- 6.19 A set of sensitivity tests have been done to show the impact of retaining Watford Met and operating a split service, with both Watford Met and Watford Junction being served. In addition, tests have been carried out to understand the sensitivity of the case for CRL to key variables.

Split service (option5)

- 6.20 The split service option assumes that the service would be evenly split between the existing Watford Met station, which would remain open, and the new branch through to Watford Junction. This would provide a peak service of 3tph, with 2tph in the IP period. Table 6.13 sets out the demand on the Watford branches with the split service option. The results show that whilst serving an additional station, overall demand falls materially due to the lower service frequency, with the increase over the Do-Minimum being around half that of the central case scheme.

TABLE 6.13 TOTAL DEMAND ON THE WATFORD BRANCHES WITH A SPLIT SERVICE (2016)

Scenario	AM Hour	IP Hour
Do-Minimum	917	203
<i>Central Case (option 3)</i>		
CRL	1,450	392
Difference	533 (+58%)	189 (+93%)
<i>Split service option</i>		
CRL	1,170	296
Difference	253 (+28%)	93 (+46%)

Bus fare test

- 6.21 The Central Case assumes that bus fares rise in line with RPI. A test has been done assuming that bus fares rise in line with RPI+1%; the impact on CRL demand is set out in Table 6.14. The impact is very minor, with a slight increase in demand on the Watford branch in both the Do-Minimum and CRL scheme. The effect is marginally larger by 2031, but remains insignificant overall.

TABLE 6.14 TOTAL DEMAND ON THE WATFORD BRANCH (2016) - HIGHER BUS FARES

Scenario	AM Hour	IP Hour
<i>Central Case Option 3</i>		
Do-Minimum	917	203
CRL	1,450	392
Difference	533 (+58%)	189 (+93%)
<i>Bus fares RPI+1%</i>		
Do-Minimum	917	203
CRL	1,452	393
Difference	535 (+58%)	190 (+94%)

Run time test

- 6.22 The Central Case uses run times based on operational experience. A test has been done assuming that run times are 20% longer on the CRL section; the impact on CRL demand is set out in Table 6.15. The impact is very minor, with a slight reduction in demand on the CRL scheme. Given the size of the scheme, the

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increase in journey time is small at around 1 minute, a small proportion of total journey times.

TABLE 6.15 TOTAL DEMAND ON THE WATFORD BRANCH (2016) - LONGER RUN TIMES

Scenario	AM Hour	IP Hour
<i>Central Case Option 3</i>		
Do-Minimum	917	203
CRL	1,450	392
Difference	533 (+58%)	189 (+93%)
<i>Run times +20%</i>		
Do-Minimum	917	203
CRL	1,421	376
Difference	504 (+55%)	173 (+85%)

Scaling parameter tests

6.23 The Central Case uses mode choice model parameters calibrated to replicate empirical elasticities. However, the elasticities are at the low end of the acceptable range and so a test has been done to understand the impact of increasing the scaling parameters. This test assumes parameters twice the value used in the central case. As a secondary test, having scaling parameters of 0 has also been tested, to understand the case for CRL without any mode shift from car. Table 6.16 sets out the demand impacts. Note that these tests affect the Do-Minimum demand in each case as well.

TABLE 6.16 TOTAL DEMAND ON THE WATFORD BRANCH (2016) - HIGHER MODE CHOICE PARAMETER

Scenario	AM Hour	IP Hour
<i>Central Case Option 3</i>		
Do-Minimum	917	203
CRL	1,450	392
Difference	533 (+58%)	189 (+93%)
<i>Higher mode shift ($\lambda * 2$)</i>		
Do-Minimum	914	201
CRL	1,495	410
Difference	581 (+55%)	209 (+85%)
<i>No mode shift ($\lambda=0$)</i>		

Do-Minimum	920	204
CRL	1,411	375
Difference	491 (+53%)	171 (+84%)

The direct impact on CRL is to vary the demand symmetrically. Doubling the scaling parameters increases CRL demand by 45 trips in the AM and 18 trips in the IP. Conversely, removing mode choice reduces CRL demand by 39 trips and 17 trips respectively. The latter test indicates that there is a case for CRL without mode shift from car, but this is considered a very conservative position. These changes are consistent with the mode shift in the Central Case reported in

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6.24 Table 6.8 and Table 6.9.

APPENDIX

A

TEMPO GROWTH FACTORS

A1 TEMPRO GROWTH FACTORS

AM Growth Factors

A1.1 The following two tables list the AM TEMPRO growth factors for 2016 and 2031, derived by origin and destination for the model zones, disaggregated by journey purpose and mode. As mentioned in the main report, the factors were averaged across origins and destinations when converting to an OD level for example, if the individual O factor for zone X was 1.25 and D factor for zone Y was 1.75, then the factor for travelling from zones X to Y was 1.5.

APPENDIX TABLE A.1 2016 TEMPRO GROWTH FACTORS BY JOURNEY PURPOSE AND MODE

Zone	Commuting						Business						Other					
	Car		Bus/Coach		Rail/Underground		Car		Bus/Coach		Rail/Underground		Car		Bus/Coach		Rail/Underground	
	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D
1	1.03	1.07	1.00	1.02	1.00	1.02	1.04	1.06	1.00	1.00	1.00	1.00	1.05	1.08	1.01	1.04	1.00	1.00
2	1.03	1.07	1.00	1.02	1.00	1.02	1.04	1.06	1.00	1.00	1.00	1.00	1.05	1.08	1.01	1.04	1.00	1.00
3	1.03	1.07	1.00	1.02	1.00	1.02	1.04	1.06	1.00	1.00	1.00	1.00	1.05	1.08	1.01	1.04	1.00	1.00
4	1.03	1.07	1.02	1.05	1.01	1.04	1.03	1.08	1.00	1.00	1.00	1.50	1.04	1.07	1.01	1.02	1.01	1.05
5	1.04	1.07	1.00	1.03	1.01	1.03	1.04	1.08	1.00	1.00	1.00	1.00	1.06	1.08	1.01	1.04	1.01	1.05
6	1.04	1.07	1.00	1.03	1.01	1.03	1.04	1.08	1.00	1.00	1.00	1.00	1.06	1.08	1.01	1.04	1.01	1.05
7	1.04	1.07	1.00	1.03	1.01	1.03	1.04	1.08	1.00	1.00	1.00	1.00	1.06	1.08	1.01	1.04	1.01	1.05
8	1.04	1.07	1.00	1.03	1.01	1.03	1.04	1.08	1.00	1.00	1.00	1.00	1.06	1.08	1.01	1.04	1.01	1.05
9	1.03	1.07	1.02	1.05	1.01	1.04	1.03	1.08	1.00	1.00	1.00	1.50	1.04	1.07	1.01	1.02	1.01	1.05
10	1.04	1.07	1.00	1.03	1.01	1.03	1.04	1.08	1.00	1.00	1.00	1.00	1.06	1.08	1.01	1.04	1.01	1.05

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11	1.04	1.07	1.00	1.03	1.01	1.03	1.04	1.08	1.00	1.00	1.00	1.00	1.06	1.08	1.01	1.04	1.01	1.05
12	1.03	1.07	1.03	1.02	1.02	1.04	1.04	1.07	1.00	1.00	1.00	1.00	1.05	1.09	1.01	1.04	1.00	1.04
13	1.03	1.07	1.03	1.02	1.02	1.04	1.04	1.07	1.00	1.00	1.00	1.00	1.05	1.09	1.01	1.04	1.00	1.04
14	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
15	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
16	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
17	1.04	1.07	1.01	1.03	1.02	1.03	1.05	1.07	1.00	1.00	1.00	2.00	1.06	1.09	1.02	1.05	1.02	1.08
18	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
19	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
20	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
21	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
22	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
23	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
24	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
25	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
26	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
27	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
28	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
29	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05

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30	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
31	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
32	1.03	1.07	1.00	1.02	1.00	1.02	1.04	1.06	1.00	1.00	1.00	1.00	1.05	1.08	1.01	1.04	1.00	1.00
33	1.03	1.07	1.00	1.02	1.00	1.02	1.04	1.06	1.00	1.00	1.00	1.00	1.05	1.08	1.01	1.04	1.00	1.00
34	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
35	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
36	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
37	1.03	1.07	0.98	1.00	1.00	1.01	1.03	1.08	1.00	1.00	1.00	1.00	1.05	1.07	0.99	1.01	0.99	1.02
38	1.03	1.07	0.98	1.00	1.00	1.01	1.03	1.08	1.00	1.00	1.00	1.00	1.05	1.07	0.99	1.01	0.99	1.02
39	1.02	1.07	1.00	1.02	1.00	1.02	1.03	1.07	1.00	1.00	1.00	1.00	1.05	1.07	1.01	1.04	1.02	1.04
40	1.02	1.07	1.00	1.02	1.00	1.02	1.03	1.07	1.00	1.00	1.00	1.00	1.05	1.07	1.01	1.04	1.02	1.04
41	1.02	1.07	1.00	1.02	1.00	1.02	1.03	1.07	1.00	1.00	1.00	1.00	1.05	1.07	1.01	1.04	1.02	1.04
42	1.03	1.07	1.00	1.02	1.00	1.02	1.04	1.06	1.00	1.00	1.00	1.00	1.05	1.08	1.01	1.04	1.00	1.00
43	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
44	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
45	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
46	1.06	1.05	1.01	1.00	1.03	1.02	1.06	1.05	1.02	1.06	1.04	1.04	1.07	1.07	1.03	1.04	1.04	1.05
47	1.03	1.07	1.00	1.02	1.00	1.02	1.04	1.06	1.00	1.00	1.00	1.00	1.05	1.08	1.01	1.04	1.00	1.00
48	1.03	1.07	1.00	1.02	1.00	1.02	1.04	1.06	1.00	1.00	1.00	1.00	1.05	1.08	1.01	1.04	1.00	1.00

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49	1.03	1.07	1.00	1.02	1.00	1.02	1.04	1.06	1.00	1.00	1.00	1.00	1.05	1.08	1.01	1.04	1.00	1.00
50	1.03	1.07	1.00	1.02	1.00	1.02	1.04	1.06	1.00	1.00	1.00	1.00	1.05	1.08	1.01	1.04	1.00	1.00
51	1.03	1.07	1.00	1.02	1.00	1.02	1.04	1.06	1.00	1.00	1.00	1.00	1.05	1.08	1.01	1.04	1.00	1.00
52	1.04	1.07	1.01	1.03	1.02	1.03	1.05	1.07	1.00	1.00	1.00	2.00	1.06	1.09	1.02	1.05	1.02	1.08
53	1.03	1.07	1.02	1.05	1.01	1.04	1.03	1.08	1.00	1.00	1.00	1.50	1.04	1.07	1.01	1.02	1.01	1.05
54	1.03	1.07	1.02	1.05	1.01	1.04	1.03	1.08	1.00	1.00	1.00	1.50	1.04	1.07	1.01	1.02	1.01	1.05
55	1.03	1.07	1.02	1.05	1.01	1.04	1.03	1.08	1.00	1.00	1.00	1.50	1.04	1.07	1.01	1.02	1.01	1.05
56	1.04	1.07	1.01	1.03	1.02	1.03	1.05	1.07	1.00	1.00	1.00	2.00	1.06	1.09	1.02	1.05	1.02	1.08
57	1.07	1.08	1.04	1.04	1.05	1.07	1.07	1.07	1.05	1.05	1.06	1.06	1.06	1.09	1.02	1.05	1.02	1.04
58	1.07	1.08	1.04	1.04	1.05	1.07	1.07	1.07	1.05	1.05	1.06	1.06	1.06	1.09	1.02	1.05	1.02	1.04
59	1.07	1.08	1.04	1.04	1.05	1.07	1.07	1.07	1.05	1.05	1.06	1.06	1.06	1.09	1.02	1.05	1.02	1.04
60	1.05	1.06	1.02	1.01	1.03	1.02	1.05	1.06	1.04	1.04	1.04	1.05	1.06	1.07	1.02	1.04	1.03	1.05
61	1.05	1.06	1.02	1.01	1.03	1.02	1.05	1.06	1.04	1.04	1.04	1.05	1.06	1.07	1.02	1.04	1.03	1.05
62	1.05	1.06	1.02	1.01	1.03	1.02	1.05	1.06	1.04	1.04	1.04	1.05	1.06	1.07	1.02	1.04	1.03	1.05
63	1.05	1.06	1.02	1.01	1.03	1.02	1.05	1.06	1.04	1.04	1.04	1.05	1.06	1.07	1.02	1.04	1.03	1.05
64	1.05	1.06	1.02	1.01	1.03	1.02	1.05	1.06	1.04	1.04	1.04	1.05	1.06	1.07	1.02	1.04	1.03	1.05
65	1.05	1.07	1.03	1.00	1.02	1.03	1.05	1.08	2.00	-	1.00	1.00	1.08	1.11	1.04	1.06	1.08	1.08
66	1.07	1.08	1.04	1.04	1.05	1.07	1.07	1.07	1.05	1.05	1.06	1.06	1.06	1.09	1.02	1.05	1.02	1.04
67	1.07	1.08	1.04	1.04	1.05	1.07	1.07	1.07	1.05	1.05	1.06	1.06	1.06	1.09	1.02	1.05	1.02	1.04

Demand Model and Forecasting Report

68	1.08	1.05	1.03	1.01	1.05	1.03	1.07	1.04	1.02	1.01	1.05	1.03	1.06	1.05	1.00	1.00	1.01	1.01
69	1.09	1.05	1.02	1.00	1.04	1.02	1.08	1.06	1.03	1.03	1.06	1.05	1.11	1.10	1.05	1.04	1.06	1.06
70	1.09	1.05	1.02	1.00	1.04	1.02	1.08	1.06	1.03	1.03	1.06	1.05	1.11	1.10	1.05	1.04	1.06	1.06
71	1.03	1.07	0.98	1.02	0.99	1.02	1.04	1.07	1.00	1.00	1.04	1.14	1.06	1.08	1.01	1.04	1.01	1.04
72	1.09	1.07	1.05	1.02	1.07	1.04	1.09	1.08	1.06	1.06	1.08	1.07	1.09	1.08	1.05	1.04	1.06	1.06
73	1.09	1.05	1.02	1.00	1.04	1.02	1.08	1.06	1.03	1.03	1.06	1.05	1.11	1.10	1.05	1.04	1.06	1.06
74	1.10	1.08	1.02	1.03	1.04	1.04	1.09	1.07	1.03	1.03	1.05	1.05	1.08	1.05	1.01	0.99	1.02	1.01
75	1.12	1.09	1.03	1.04	1.06	1.05	1.12	1.09	1.04	1.04	1.07	1.06	1.11	1.08	1.03	1.02	1.04	1.04
76	1.07	1.06	1.01	1.02	1.03	1.03	1.07	1.08	1.02	1.03	1.04	1.05	1.07	1.06	1.01	1.00	1.02	1.02
77	1.11	1.07	1.03	1.02	1.05	1.03	1.10	1.06	1.03	1.02	1.04	1.04	1.08	1.05	1.01	0.99	1.02	1.01
78	1.11	1.07	1.03	1.02	1.05	1.03	1.10	1.06	1.03	1.02	1.04	1.04	1.08	1.05	1.01	0.99	1.02	1.01
79	1.10	1.08	1.02	1.03	1.04	1.04	1.09	1.07	1.03	1.03	1.05	1.05	1.08	1.05	1.01	0.99	1.02	1.01
80	1.11	1.07	1.03	1.02	1.05	1.03	1.10	1.06	1.03	1.02	1.04	1.04	1.08	1.05	1.01	0.99	1.02	1.01
81	1.07	1.06	1.01	1.02	1.03	1.03	1.07	1.08	1.02	1.03	1.04	1.05	1.07	1.06	1.01	1.00	1.02	1.02
82	1.10	1.08	1.02	1.03	1.04	1.04	1.09	1.07	1.03	1.03	1.05	1.05	1.08	1.05	1.01	0.99	1.02	1.01
83	1.12	1.09	1.03	1.04	1.06	1.05	1.12	1.09	1.04	1.04	1.07	1.06	1.11	1.08	1.03	1.02	1.04	1.04
84	1.11	1.07	1.03	1.02	1.05	1.03	1.10	1.06	1.03	1.02	1.04	1.04	1.08	1.05	1.01	0.99	1.02	1.01
85	1.13	1.11	1.07	1.06	1.07	1.07	1.11	1.11	1.07	1.07	1.07	1.08	1.13	1.09	1.09	1.04	1.07	1.06
86	1.10	1.05	1.01	1.00	1.04	1.01	1.10	1.04	1.02	1.00	1.05	1.02	1.08	1.05	1.00	0.99	1.01	1.01

Demand Model and Forecasting Report

87	1.15	1.10	1.05	1.05	1.09	1.06	1.15	1.09	1.06	1.04	1.09	1.06	1.13	1.10	1.04	1.03	1.06	1.05
88	1.19	1.13	1.09	1.07	1.12	1.09	1.17	1.11	1.09	1.06	1.12	1.09	1.18	1.12	1.08	1.06	1.09	1.07
89	1.19	1.13	1.09	1.07	1.12	1.09	1.17	1.11	1.09	1.06	1.12	1.09	1.18	1.12	1.08	1.06	1.09	1.07
90	1.06	1.06	1.03	1.02	1.04	1.03	1.06	1.06	1.03	1.03	1.05	1.04	1.05	1.05	1.01	1.01	1.02	1.01
91	1.08	1.05	1.02	1.01	1.04	1.02	1.07	1.06	1.03	1.02	1.05	1.04	1.09	1.08	1.03	1.04	1.04	1.05
92	1.08	1.07	1.03	1.02	1.05	1.04	1.08	1.07	1.04	1.03	1.06	1.05	1.08	1.07	1.03	1.02	1.04	1.04
93	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.01	1.01	1.03	1.03	1.06	1.06	1.01	1.01	1.01	1.01
94	1.05	1.08	1.01	1.03	1.03	1.05	1.06	1.08	1.03	1.03	1.05	1.06	1.06	1.07	1.02	1.03	1.02	1.05
95	1.04	1.09	1.00	1.05	1.02	1.06	1.06	1.10	1.03	1.06	1.03	1.10	1.05	1.08	1.02	1.04	1.02	1.06
96	1.07	1.10	1.01	1.05	1.05	1.07	1.09	1.09	1.04	1.00	1.07	1.08	1.08	1.10	1.03	1.05	1.04	1.08
97	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.01	1.01	1.03	1.03	1.06	1.06	1.01	1.01	1.01	1.01
98	1.07	1.05	1.01	1.01	1.04	1.03	1.07	1.06	1.04	1.03	1.06	1.05	1.08	1.08	1.05	1.04	1.04	1.06
99	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.01	1.01	1.03	1.03	1.06	1.06	1.01	1.01	1.01	1.01
100	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.01	1.01	1.03	1.03	1.06	1.06	1.01	1.01	1.01	1.01
101	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.01	1.01	1.03	1.03	1.06	1.06	1.01	1.01	1.01	1.01
102	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.01	1.01	1.03	1.03	1.06	1.06	1.01	1.01	1.01	1.01
103	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.01	1.01	1.03	1.03	1.06	1.06	1.01	1.01	1.01	1.01
104	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.01	1.01	1.03	1.03	1.06	1.06	1.01	1.01	1.01	1.01

APPENDIX TABLE A.2 2031 TEMPRO GROWTH FACTORS BY JOURNEY PURPOSE AND MODE

Zone	Commuting						Business						Other					
	Car		Bus/Coach		Rail/Underground		Car		Bus/Coach		Rail/Underground		Car		Bus/Coach		Rail/Underground	
	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D
1	1.05	1.15	0.98	1.02	0.98	1.02	1.07	1.15	1.00	1.00	1.00	1.00	1.18	1.23	1.13	1.18	1.12	1.17
2	1.05	1.15	0.98	1.02	0.98	1.02	1.07	1.15	1.00	1.00	1.00	1.00	1.18	1.23	1.13	1.18	1.12	1.17
3	1.05	1.15	0.98	1.02	0.98	1.02	1.07	1.15	1.00	1.00	1.00	1.00	1.18	1.23	1.13	1.18	1.12	1.17
4	1.05	1.10	1.03	1.00	1.01	1.01	1.05	1.11	1.25	1.00	1.00	1.50	1.15	1.20	1.12	1.15	1.12	1.18
5	1.06	1.09	0.98	0.99	0.99	0.99	1.06	1.10	1.17	1.00	1.00	1.00	1.18	1.24	1.12	1.18	1.13	1.21
6	1.06	1.09	0.98	0.99	0.99	0.99	1.06	1.10	1.17	1.00	1.00	1.00	1.18	1.24	1.12	1.18	1.13	1.21
7	1.06	1.09	0.98	0.99	0.99	0.99	1.06	1.10	1.17	1.00	1.00	1.00	1.18	1.24	1.12	1.18	1.13	1.21
8	1.06	1.09	0.98	0.99	0.99	0.99	1.06	1.10	1.17	1.00	1.00	1.00	1.18	1.24	1.12	1.18	1.13	1.21
9	1.05	1.10	1.03	1.00	1.01	1.01	1.05	1.11	1.25	1.00	1.00	1.50	1.15	1.20	1.12	1.15	1.12	1.18
10	1.06	1.09	0.98	0.99	0.99	0.99	1.06	1.10	1.17	1.00	1.00	1.00	1.18	1.24	1.12	1.18	1.13	1.21
11	1.06	1.09	0.98	0.99	0.99	0.99	1.06	1.10	1.17	1.00	1.00	1.00	1.18	1.24	1.12	1.18	1.13	1.21
12	1.06	1.07	1.04	0.96	1.02	0.98	1.05	1.06	1.00	1.00	1.00	1.00	1.17	1.24	1.11	1.18	1.10	1.22
13	1.06	1.07	1.04	0.96	1.02	0.98	1.05	1.06	1.00	1.00	1.00	1.00	1.17	1.24	1.11	1.18	1.10	1.22
14	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
15	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20

Demand Model and Forecasting Report

16	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
17	1.08	1.07	1.01	0.98	1.02	0.98	1.07	1.07	1.00	1.00	1.00	1.00	1.20	1.27	1.15	1.20	1.16	1.23
18	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
19	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
20	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
21	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
22	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
23	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
24	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
25	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
26	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
27	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
28	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
29	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
30	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
31	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
32	1.05	1.15	0.98	1.02	0.98	1.02	1.07	1.15	1.00	1.00	1.00	1.00	1.18	1.23	1.13	1.18	1.12	1.17
33	1.05	1.15	0.98	1.02	0.98	1.02	1.07	1.15	1.00	1.00	1.00	1.00	1.18	1.23	1.13	1.18	1.12	1.17
34	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20

Demand Model and Forecasting Report

35	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
36	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
37	1.04	1.08	0.94	0.96	0.95	0.96	1.05	1.10	1.00	1.00	1.00	1.00	1.15	1.19	1.06	1.11	1.06	1.11
38	1.04	1.08	0.94	0.96	0.95	0.96	1.05	1.10	1.00	1.00	1.00	1.00	1.15	1.19	1.06	1.11	1.06	1.11
39	1.04	1.15	0.99	1.03	0.99	1.01	1.06	1.15	1.00	1.00	1.00	1.00	1.16	1.21	1.13	1.17	1.13	1.16
40	1.04	1.15	0.99	1.03	0.99	1.01	1.06	1.15	1.00	1.00	1.00	1.00	1.16	1.21	1.13	1.17	1.13	1.16
41	1.04	1.15	0.99	1.03	0.99	1.01	1.06	1.15	1.00	1.00	1.00	1.00	1.16	1.21	1.13	1.17	1.13	1.16
42	1.05	1.15	0.98	1.02	0.98	1.02	1.07	1.15	1.00	1.00	1.00	1.00	1.18	1.23	1.13	1.18	1.12	1.17
43	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
44	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
45	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
46	1.10	1.12	0.97	1.01	1.00	1.01	1.11	1.12	1.02	1.06	1.07	1.09	1.21	1.22	1.14	1.18	1.15	1.20
47	1.05	1.15	0.98	1.02	0.98	1.02	1.07	1.15	1.00	1.00	1.00	1.00	1.18	1.23	1.13	1.18	1.12	1.17
48	1.05	1.15	0.98	1.02	0.98	1.02	1.07	1.15	1.00	1.00	1.00	1.00	1.18	1.23	1.13	1.18	1.12	1.17
49	1.05	1.15	0.98	1.02	0.98	1.02	1.07	1.15	1.00	1.00	1.00	1.00	1.18	1.23	1.13	1.18	1.12	1.17
50	1.05	1.15	0.98	1.02	0.98	1.02	1.07	1.15	1.00	1.00	1.00	1.00	1.18	1.23	1.13	1.18	1.12	1.17
51	1.05	1.15	0.98	1.02	0.98	1.02	1.07	1.15	1.00	1.00	1.00	1.00	1.18	1.23	1.13	1.18	1.12	1.17
52	1.08	1.07	1.01	0.98	1.02	0.98	1.07	1.07	1.00	1.00	1.00	1.00	1.20	1.27	1.15	1.20	1.16	1.23
53	1.05	1.10	1.03	1.00	1.01	1.01	1.05	1.11	1.25	1.00	1.00	1.50	1.15	1.20	1.12	1.15	1.12	1.18

Demand Model and Forecasting Report

54	1.05	1.10	1.03	1.00	1.01	1.01	1.05	1.11	1.25	1.00	1.00	1.50	1.15	1.20	1.12	1.15	1.12	1.18
55	1.05	1.10	1.03	1.00	1.01	1.01	1.05	1.11	1.25	1.00	1.00	1.50	1.15	1.20	1.12	1.15	1.12	1.18
56	1.08	1.07	1.01	0.98	1.02	0.98	1.07	1.07	1.00	1.00	1.00	1.00	1.20	1.27	1.15	1.20	1.16	1.23
57	1.14	1.16	1.09	1.08	1.08	1.13	1.14	1.14	1.11	1.10	1.12	1.12	1.21	1.32	1.13	1.24	1.12	1.21
58	1.14	1.16	1.09	1.08	1.08	1.13	1.14	1.14	1.11	1.10	1.12	1.12	1.21	1.32	1.13	1.24	1.12	1.21
59	1.14	1.16	1.09	1.08	1.08	1.13	1.14	1.14	1.11	1.10	1.12	1.12	1.21	1.32	1.13	1.24	1.12	1.21
60	1.07	1.11	1.01	1.01	1.01	1.01	1.08	1.13	1.05	1.08	1.05	1.10	1.16	1.20	1.13	1.16	1.12	1.19
61	1.07	1.11	1.01	1.01	1.01	1.01	1.08	1.13	1.05	1.08	1.05	1.10	1.16	1.20	1.13	1.16	1.12	1.19
62	1.07	1.11	1.01	1.01	1.01	1.01	1.08	1.13	1.05	1.08	1.05	1.10	1.16	1.20	1.13	1.16	1.12	1.19
63	1.07	1.11	1.01	1.01	1.01	1.01	1.08	1.13	1.05	1.08	1.05	1.10	1.16	1.20	1.13	1.16	1.12	1.19
64	1.07	1.11	1.01	1.01	1.01	1.01	1.08	1.13	1.05	1.08	1.05	1.10	1.16	1.20	1.13	1.16	1.12	1.19
65	1.12	1.09	1.06	0.95	1.05	0.97	1.10	1.09	2.00	-	1.00	1.00	1.28	1.32	1.21	1.26	1.25	1.31
66	1.14	1.16	1.09	1.08	1.08	1.13	1.14	1.14	1.11	1.10	1.12	1.12	1.21	1.32	1.13	1.24	1.12	1.21
67	1.14	1.16	1.09	1.08	1.08	1.13	1.14	1.14	1.11	1.10	1.12	1.12	1.21	1.32	1.13	1.24	1.12	1.21
68	1.17	1.09	1.04	1.00	1.07	1.03	1.15	1.07	1.04	1.02	1.10	1.05	1.19	1.15	1.07	1.08	1.09	1.09
69	1.19	1.10	1.03	0.99	1.06	1.00	1.17	1.11	1.05	1.06	1.12	1.09	1.29	1.28	1.19	1.21	1.21	1.25
70	1.19	1.10	1.03	0.99	1.06	1.00	1.17	1.11	1.05	1.06	1.12	1.09	1.29	1.28	1.19	1.21	1.21	1.25
71	1.06	1.15	0.94	1.03	0.96	1.02	1.08	1.15	1.06	1.00	1.04	1.14	1.19	1.23	1.11	1.18	1.11	1.18
72	1.20	1.16	1.12	1.04	1.13	1.06	1.19	1.18	1.14	1.13	1.17	1.16	1.26	1.24	1.21	1.19	1.23	1.24

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73	1.19	1.10	1.03	0.99	1.06	1.00	1.17	1.11	1.05	1.06	1.12	1.09	1.29	1.28	1.19	1.21	1.21	1.25
74	1.24	1.19	1.04	1.06	1.09	1.06	1.24	1.17	1.08	1.08	1.11	1.10	1.29	1.18	1.13	1.06	1.13	1.10
75	1.25	1.16	1.01	1.04	1.06	1.04	1.25	1.15	1.04	1.06	1.11	1.07	1.31	1.21	1.15	1.10	1.16	1.15
76	1.17	1.13	1.01	1.01	1.03	1.01	1.17	1.17	1.04	1.06	1.08	1.08	1.25	1.20	1.14	1.10	1.15	1.14
77	1.27	1.19	1.08	1.06	1.11	1.06	1.26	1.17	1.09	1.08	1.11	1.10	1.29	1.21	1.16	1.09	1.16	1.13
78	1.27	1.19	1.08	1.06	1.11	1.06	1.26	1.17	1.09	1.08	1.11	1.10	1.29	1.21	1.16	1.09	1.16	1.13
79	1.24	1.19	1.04	1.06	1.09	1.06	1.24	1.17	1.08	1.08	1.11	1.10	1.29	1.18	1.13	1.06	1.13	1.10
80	1.27	1.19	1.08	1.06	1.11	1.06	1.26	1.17	1.09	1.08	1.11	1.10	1.29	1.21	1.16	1.09	1.16	1.13
81	1.17	1.13	1.01	1.01	1.03	1.01	1.17	1.17	1.04	1.06	1.08	1.08	1.25	1.20	1.14	1.10	1.15	1.14
82	1.24	1.19	1.04	1.06	1.09	1.06	1.24	1.17	1.08	1.08	1.11	1.10	1.29	1.18	1.13	1.06	1.13	1.10
83	1.25	1.16	1.01	1.04	1.06	1.04	1.25	1.15	1.04	1.06	1.11	1.07	1.31	1.21	1.15	1.10	1.16	1.15
84	1.27	1.19	1.08	1.06	1.11	1.06	1.26	1.17	1.09	1.08	1.11	1.10	1.29	1.21	1.16	1.09	1.16	1.13
85	1.40	1.33	1.25	1.19	1.22	1.19	1.35	1.34	1.22	1.23	1.22	1.25	1.44	1.30	1.38	1.23	1.29	1.27
86	1.22	1.08	1.01	0.96	1.06	0.96	1.22	1.08	1.02	0.98	1.10	1.00	1.27	1.17	1.12	1.05	1.14	1.09
87	1.29	1.18	1.05	1.05	1.11	1.05	1.29	1.16	1.08	1.06	1.15	1.08	1.35	1.25	1.18	1.12	1.20	1.17
88	1.54	1.28	1.25	1.15	1.30	1.15	1.49	1.23	1.23	1.14	1.29	1.16	1.61	1.42	1.39	1.27	1.36	1.27
89	1.54	1.28	1.25	1.15	1.30	1.15	1.49	1.23	1.23	1.14	1.29	1.16	1.61	1.42	1.39	1.27	1.36	1.27
90	1.15	1.13	1.07	1.02	1.08	1.04	1.15	1.13	1.08	1.07	1.11	1.09	1.20	1.18	1.13	1.11	1.14	1.12
91	1.18	1.10	1.04	0.99	1.06	0.99	1.17	1.12	1.06	1.03	1.12	1.06	1.27	1.26	1.18	1.19	1.19	1.21

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92	1.17	1.13	1.04	1.02	1.07	1.02	1.17	1.14	1.07	1.07	1.11	1.09	1.23	1.22	1.15	1.15	1.16	1.17
93	1.11	1.11	0.98	0.98	1.06	1.06	1.12	1.12	1.04	1.04	1.09	1.09	1.19	1.19	1.07	1.07	1.09	1.09
94	1.04	1.21	0.95	1.10	0.99	1.13	1.10	1.23	1.08	1.13	1.05	1.12	1.18	1.27	1.12	1.22	1.16	1.25
95	1.04	1.23	0.95	1.13	1.00	1.16	1.10	1.24	1.07	1.16	1.05	1.17	1.16	1.26	1.11	1.22	1.15	1.26
96	1.13	1.21	1.00	1.10	1.07	1.14	1.17	1.21	1.08	1.08	1.13	1.17	1.25	1.31	1.17	1.26	1.22	1.31
97	1.11	1.11	0.98	0.98	1.06	1.06	1.12	1.12	1.04	1.04	1.09	1.09	1.19	1.19	1.07	1.07	1.09	1.09
98	1.15	1.14	1.04	1.05	1.09	1.09	1.16	1.16	1.12	1.12	1.13	1.12	1.30	1.30	1.25	1.26	1.30	1.33
99	1.11	1.11	0.98	0.98	1.06	1.06	1.12	1.12	1.04	1.04	1.09	1.09	1.19	1.19	1.07	1.07	1.09	1.09
100	1.11	1.11	0.98	0.98	1.06	1.06	1.12	1.12	1.04	1.04	1.09	1.09	1.19	1.19	1.07	1.07	1.09	1.09
101	1.11	1.11	0.98	0.98	1.06	1.06	1.12	1.12	1.04	1.04	1.09	1.09	1.19	1.19	1.07	1.07	1.09	1.09
102	1.11	1.11	0.98	0.98	1.06	1.06	1.12	1.12	1.04	1.04	1.09	1.09	1.19	1.19	1.07	1.07	1.09	1.09
103	1.11	1.11	0.98	0.98	1.06	1.06	1.12	1.12	1.04	1.04	1.09	1.09	1.19	1.19	1.07	1.07	1.09	1.09
104	1.11	1.11	0.98	0.98	1.06	1.06	1.12	1.12	1.04	1.04	1.09	1.09	1.19	1.19	1.07	1.07	1.09	1.09

Interpeak Growth Factors

A1.2 The following two tables list the Interpeak TEMPRO growth factors for 2016 and 2031, derived by origin and destination for the model zones, disaggregated by journey purpose and mode.

APPENDIX TABLE A.3 2016 TEMPRO GROWTH FACTORS BY JOURNEY PURPOSE AND MODE

Zone	Commuting						Business						Other					
	Car		Bus/Coach		Rail/Underground		Car		Bus/Coach		Rail/Underground		Car		Bus/Coach		Rail/Underground	
	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D
1	1.05	1.05	1.02	1.00	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.02	1.01	1.02	1.02
2	1.05	1.05	1.02	1.00	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.02	1.01	1.02	1.02
3	1.05	1.05	1.02	1.00	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.02	1.01	1.02	1.02
4	1.06	1.04	1.02	1.02	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.03	1.02	1.04	1.03
5	1.07	1.05	1.01	1.00	1.02	1.01	1.07	1.07	1.08	1.00	1.06	1.06	1.08	1.07	1.03	1.02	1.04	1.03
6	1.07	1.05	1.01	1.00	1.02	1.01	1.07	1.07	1.08	1.00	1.06	1.06	1.08	1.07	1.03	1.02	1.04	1.03
7	1.07	1.05	1.01	1.00	1.02	1.01	1.07	1.07	1.08	1.00	1.06	1.06	1.08	1.07	1.03	1.02	1.04	1.03
8	1.07	1.05	1.01	1.00	1.02	1.01	1.07	1.07	1.08	1.00	1.06	1.06	1.08	1.07	1.03	1.02	1.04	1.03
9	1.06	1.04	1.02	1.02	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.03	1.02	1.04	1.03
10	1.07	1.05	1.01	1.00	1.02	1.01	1.07	1.07	1.08	1.00	1.06	1.06	1.08	1.07	1.03	1.02	1.04	1.03
11	1.07	1.05	1.01	1.00	1.02	1.01	1.07	1.07	1.08	1.00	1.06	1.06	1.08	1.07	1.03	1.02	1.04	1.03
12	1.07	1.05	1.03	1.00	1.02	1.01	1.07	1.06	1.00	1.00	1.11	1.00	1.08	1.08	1.04	1.03	1.05	1.04

Demand Model and Forecasting Report

13	1.07	1.05	1.03	1.00	1.02	1.01	1.07	1.06	1.00	1.00	1.11	1.00	1.08	1.08	1.04	1.03	1.05	1.04
14	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
15	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
16	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
17	1.07	1.06	1.02	1.00	1.02	1.02	1.07	1.07	1.11	1.00	1.09	1.00	1.09	1.08	1.04	1.03	1.05	1.03
18	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
19	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
20	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
21	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
22	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
23	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
24	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
25	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
26	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
27	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
28	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
29	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
30	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
31	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03

Demand Model and Forecasting ReportDemand Model and Forecasting Report

32	1.05	1.05	1.02	1.00	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.02	1.01	1.02	1.02
33	1.05	1.05	1.02	1.00	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.02	1.01	1.02	1.02
34	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
35	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
36	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
37	1.05	1.04	0.99	0.98	0.99	0.99	1.06	1.07	1.13	1.00	1.09	1.00	1.06	1.06	1.00	0.99	1.01	1.01
38	1.05	1.04	0.99	0.98	0.99	0.99	1.06	1.07	1.13	1.00	1.09	1.00	1.06	1.06	1.00	0.99	1.01	1.01
39	1.05	1.04	1.01	1.00	1.01	1.00	1.06	1.06	1.09	1.00	1.00	1.00	1.06	1.06	1.02	1.01	1.03	1.02
40	1.05	1.04	1.01	1.00	1.01	1.00	1.06	1.06	1.09	1.00	1.00	1.00	1.06	1.06	1.02	1.01	1.03	1.02
41	1.05	1.04	1.01	1.00	1.01	1.00	1.06	1.06	1.09	1.00	1.00	1.00	1.06	1.06	1.02	1.01	1.03	1.02
42	1.05	1.05	1.02	1.00	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.02	1.01	1.02	1.02
43	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
44	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
45	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
46	1.05	1.05	1.00	1.00	1.02	1.02	1.05	1.05	1.04	1.03	1.04	1.05	1.06	1.06	1.02	1.01	1.03	1.03
47	1.05	1.05	1.02	1.00	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.02	1.01	1.02	1.02
48	1.05	1.05	1.02	1.00	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.02	1.01	1.02	1.02
49	1.05	1.05	1.02	1.00	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.02	1.01	1.02	1.02
50	1.05	1.05	1.02	1.00	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.02	1.01	1.02	1.02

Demand Model and Forecasting Report

51	1.05	1.05	1.02	1.00	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.02	1.01	1.02	1.02
52	1.07	1.06	1.02	1.00	1.02	1.02	1.07	1.07	1.11	1.00	1.09	1.00	1.09	1.08	1.04	1.03	1.05	1.03
53	1.06	1.04	1.02	1.02	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.03	1.02	1.04	1.03
54	1.06	1.04	1.02	1.02	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.03	1.02	1.04	1.03
55	1.06	1.04	1.02	1.02	1.02	1.01	1.06	1.06	1.00	1.00	1.00	1.00	1.06	1.06	1.03	1.02	1.04	1.03
56	1.07	1.06	1.02	1.00	1.02	1.02	1.07	1.07	1.11	1.00	1.09	1.00	1.09	1.08	1.04	1.03	1.05	1.03
57	1.07	1.07	1.04	1.03	1.06	1.05	1.07	1.07	1.06	1.05	1.07	1.07	1.08	1.08	1.03	1.02	1.03	1.04
58	1.07	1.07	1.04	1.03	1.06	1.05	1.07	1.07	1.06	1.05	1.07	1.07	1.08	1.08	1.03	1.02	1.03	1.04
59	1.07	1.07	1.04	1.03	1.06	1.05	1.07	1.07	1.06	1.05	1.07	1.07	1.08	1.08	1.03	1.02	1.03	1.04
60	1.05	1.05	1.01	1.02	1.03	1.03	1.06	1.06	1.03	1.04	1.05	1.05	1.06	1.06	1.02	1.02	1.04	1.03
61	1.05	1.05	1.01	1.02	1.03	1.03	1.06	1.06	1.03	1.04	1.05	1.05	1.06	1.06	1.02	1.02	1.04	1.03
62	1.05	1.05	1.01	1.02	1.03	1.03	1.06	1.06	1.03	1.04	1.05	1.05	1.06	1.06	1.02	1.02	1.04	1.03
63	1.05	1.05	1.01	1.02	1.03	1.03	1.06	1.06	1.03	1.04	1.05	1.05	1.06	1.06	1.02	1.02	1.04	1.03
64	1.05	1.05	1.01	1.02	1.03	1.03	1.06	1.06	1.03	1.04	1.05	1.05	1.06	1.06	1.02	1.02	1.04	1.03
65	1.07	1.07	1.06	1.00	1.04	1.03	1.08	1.07	1.00	1.00	1.00	1.00	1.10	1.10	1.06	1.05	1.07	1.07
66	1.07	1.07	1.04	1.03	1.06	1.05	1.07	1.07	1.06	1.05	1.07	1.07	1.08	1.08	1.03	1.02	1.03	1.04
67	1.07	1.07	1.04	1.03	1.06	1.05	1.07	1.07	1.06	1.05	1.07	1.07	1.08	1.08	1.03	1.02	1.03	1.04
68	1.05	1.06	1.01	1.01	1.03	1.04	1.05	1.05	1.02	1.02	1.04	1.04	1.04	1.04	0.99	0.99	1.01	1.01
69	1.06	1.07	1.01	1.01	1.03	1.03	1.06	1.06	1.03	1.03	1.05	1.05	1.09	1.10	1.04	1.04	1.05	1.06

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70	1.06	1.07	1.01	1.01	1.03	1.03	1.06	1.06	1.03	1.03	1.05	1.05	1.09	1.10	1.04	1.04	1.05	1.06
71	1.06	1.05	1.00	0.99	1.00	0.99	1.06	1.06	1.03	1.05	1.06	1.03	1.06	1.06	1.01	1.01	1.02	1.01
72	1.07	1.08	1.03	1.04	1.05	1.06	1.08	1.08	1.05	1.06	1.07	1.07	1.08	1.08	1.05	1.04	1.07	1.06
73	1.06	1.07	1.01	1.01	1.03	1.03	1.06	1.06	1.03	1.03	1.05	1.05	1.09	1.10	1.04	1.04	1.05	1.06
74	1.07	1.08	1.02	1.02	1.04	1.03	1.08	1.07	1.04	1.04	1.05	1.06	1.07	1.07	1.00	1.00	1.02	1.02
75	1.09	1.10	1.04	1.03	1.05	1.05	1.10	1.09	1.05	1.05	1.06	1.07	1.09	1.09	1.01	1.02	1.04	1.04
76	1.06	1.07	1.02	1.01	1.03	1.02	1.07	1.08	1.03	1.03	1.04	1.05	1.07	1.07	1.02	1.02	1.03	1.04
77	1.07	1.08	1.02	1.02	1.03	1.03	1.07	1.06	1.03	1.03	1.04	1.05	1.06	1.06	1.00	1.00	1.02	1.02
78	1.07	1.08	1.02	1.02	1.03	1.03	1.07	1.06	1.03	1.03	1.04	1.05	1.06	1.06	1.00	1.00	1.02	1.02
79	1.07	1.08	1.02	1.02	1.04	1.03	1.08	1.07	1.04	1.04	1.05	1.06	1.07	1.07	1.00	1.00	1.02	1.02
80	1.07	1.08	1.02	1.02	1.03	1.03	1.07	1.06	1.03	1.03	1.04	1.05	1.06	1.06	1.00	1.00	1.02	1.02
81	1.06	1.07	1.02	1.01	1.03	1.02	1.07	1.08	1.03	1.03	1.04	1.05	1.07	1.07	1.02	1.02	1.03	1.04
82	1.07	1.08	1.02	1.02	1.04	1.03	1.08	1.07	1.04	1.04	1.05	1.06	1.07	1.07	1.00	1.00	1.02	1.02
83	1.09	1.10	1.04	1.03	1.05	1.05	1.10	1.09	1.05	1.05	1.06	1.07	1.09	1.09	1.01	1.02	1.04	1.04
84	1.07	1.08	1.02	1.02	1.03	1.03	1.07	1.06	1.03	1.03	1.04	1.05	1.06	1.06	1.00	1.00	1.02	1.02
85	1.10	1.11	1.05	1.06	1.07	1.06	1.10	1.11	1.07	1.08	1.08	1.09	1.09	1.09	1.05	1.04	1.05	1.05
86	1.06	1.07	1.00	1.00	1.01	1.03	1.06	1.05	1.01	1.01	1.03	1.04	1.06	1.06	0.98	0.99	1.01	1.01
87	1.11	1.12	1.05	1.05	1.06	1.07	1.11	1.09	1.06	1.06	1.07	1.08	1.11	1.11	1.03	1.04	1.05	1.06
88	1.13	1.14	1.08	1.08	1.09	1.10	1.13	1.11	1.09	1.09	1.09	1.10	1.14	1.15	1.06	1.06	1.07	1.08

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89	1.13	1.14	1.08	1.08	1.09	1.10	1.13	1.11	1.09	1.09	1.09	1.10	1.14	1.15	1.06	1.06	1.07	1.08
90	1.05	1.06	1.02	1.02	1.03	1.03	1.06	1.06	1.03	1.04	1.04	1.04	1.05	1.05	1.00	1.00	1.02	1.02
91	1.06	1.06	1.01	1.01	1.02	1.03	1.06	1.06	1.03	1.03	1.04	1.04	1.07	1.07	1.02	1.02	1.03	1.04
92	1.07	1.07	1.02	1.02	1.04	1.04	1.07	1.07	1.04	1.04	1.05	1.05	1.07	1.07	1.02	1.02	1.04	1.04
93	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.03	1.03	1.04	1.04	1.06	1.06	1.00	1.00	1.02	1.02
94	1.07	1.06	1.02	1.02	1.04	1.04	1.07	1.07	1.06	1.05	1.06	1.06	1.07	1.07	1.03	1.03	1.05	1.05
95	1.07	1.06	1.02	1.03	1.05	1.05	1.09	1.09	1.06	1.06	1.05	1.06	1.06	1.06	1.03	1.02	1.05	1.04
96	1.09	1.08	1.03	1.03	1.06	1.06	1.10	1.09	1.06	1.03	1.09	1.06	1.08	1.08	1.03	1.02	1.06	1.05
97	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.03	1.03	1.04	1.04	1.06	1.06	1.00	1.00	1.02	1.02
98	1.06	1.06	1.01	1.02	1.04	1.04	1.06	1.06	1.04	1.04	1.06	1.06	1.08	1.08	1.04	1.04	1.06	1.05
99	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.03	1.03	1.04	1.04	1.06	1.06	1.00	1.00	1.02	1.02
100	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.03	1.03	1.04	1.04	1.06	1.06	1.00	1.00	1.02	1.02
101	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.03	1.03	1.04	1.04	1.06	1.06	1.00	1.00	1.02	1.02
102	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.03	1.03	1.04	1.04	1.06	1.06	1.00	1.00	1.02	1.02
103	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.03	1.03	1.04	1.04	1.06	1.06	1.00	1.00	1.02	1.02
104	1.05	1.05	0.99	0.99	1.03	1.03	1.05	1.05	1.03	1.03	1.04	1.04	1.06	1.06	1.00	1.00	1.02	1.02

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APPENDIX TABLE A.4 2031 TEMPRO GROWTH FACTORS BY JOURNEY PURPOSE AND MODE

Zone	Commuting						Business						Other					
	Car		Bus/Coach		Rail/Underground		Car		Bus/Coach		Rail/Underground		Car		Bus/Coach		Rail/Underground	
	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D
1	1.13	1.11	1.02	1.00	1.00	0.98	1.14	1.13	1.14	1.00	1.11	1.00	1.22	1.21	1.20	1.18	1.18	1.15
2	1.13	1.11	1.02	1.00	1.00	0.98	1.14	1.13	1.14	1.00	1.11	1.00	1.22	1.21	1.20	1.18	1.18	1.15
3	1.13	1.11	1.02	1.00	1.00	0.98	1.14	1.13	1.14	1.00	1.11	1.00	1.22	1.21	1.20	1.18	1.18	1.15
4	1.10	1.08	1.06	1.04	1.02	1.01	1.10	1.10	1.14	1.50	1.00	1.00	1.21	1.20	1.21	1.18	1.20	1.17
5	1.10	1.08	1.01	0.98	1.00	0.99	1.10	1.09	1.08	1.20	1.06	1.06	1.24	1.23	1.20	1.19	1.20	1.17
6	1.10	1.08	1.01	0.98	1.00	0.99	1.10	1.09	1.08	1.20	1.06	1.06	1.24	1.23	1.20	1.19	1.20	1.17
7	1.10	1.08	1.01	0.98	1.00	0.99	1.10	1.09	1.08	1.20	1.06	1.06	1.24	1.23	1.20	1.19	1.20	1.17
8	1.10	1.08	1.01	0.98	1.00	0.99	1.10	1.09	1.08	1.20	1.06	1.06	1.24	1.23	1.20	1.19	1.20	1.17
9	1.10	1.08	1.06	1.04	1.02	1.01	1.10	1.10	1.14	1.50	1.00	1.00	1.21	1.20	1.21	1.18	1.20	1.17
10	1.10	1.08	1.01	0.98	1.00	0.99	1.10	1.09	1.08	1.20	1.06	1.06	1.24	1.23	1.20	1.19	1.20	1.17
11	1.10	1.08	1.01	0.98	1.00	0.99	1.10	1.09	1.08	1.20	1.06	1.06	1.24	1.23	1.20	1.19	1.20	1.17
12	1.09	1.07	1.03	1.00	1.02	1.01	1.08	1.06	1.00	1.00	1.11	1.00	1.24	1.24	1.21	1.18	1.20	1.18
13	1.09	1.07	1.03	1.00	1.02	1.01	1.08	1.06	1.00	1.00	1.11	1.00	1.24	1.24	1.21	1.18	1.20	1.18
14	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
15	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15

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16	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
17	1.10	1.08	1.04	1.00	1.02	1.02	1.09	1.07	1.11	1.00	1.09	1.00	1.26	1.26	1.22	1.21	1.22	1.19
18	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
19	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
20	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
21	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
22	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
23	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
24	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
25	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
26	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
27	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
28	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
29	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
30	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
31	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
32	1.13	1.11	1.02	1.00	1.00	0.98	1.14	1.13	1.14	1.00	1.11	1.00	1.22	1.21	1.20	1.18	1.18	1.15
33	1.13	1.11	1.02	1.00	1.00	0.98	1.14	1.13	1.14	1.00	1.11	1.00	1.22	1.21	1.20	1.18	1.18	1.15
34	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15

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35	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
36	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
37	1.08	1.06	0.97	0.93	0.95	0.95	1.09	1.09	1.13	1.00	1.09	1.00	1.20	1.19	1.14	1.12	1.14	1.11
38	1.08	1.06	0.97	0.93	0.95	0.95	1.09	1.09	1.13	1.00	1.09	1.00	1.20	1.19	1.14	1.12	1.14	1.11
39	1.12	1.10	1.02	1.00	1.00	0.99	1.14	1.13	1.18	1.00	1.07	1.00	1.22	1.20	1.20	1.18	1.19	1.16
40	1.12	1.10	1.02	1.00	1.00	0.99	1.14	1.13	1.18	1.00	1.07	1.00	1.22	1.20	1.20	1.18	1.19	1.16
41	1.12	1.10	1.02	1.00	1.00	0.99	1.14	1.13	1.18	1.00	1.07	1.00	1.22	1.20	1.20	1.18	1.19	1.16
42	1.13	1.11	1.02	1.00	1.00	0.98	1.14	1.13	1.14	1.00	1.11	1.00	1.22	1.21	1.20	1.18	1.18	1.15
43	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
44	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
45	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
46	1.12	1.12	1.01	0.98	1.00	0.99	1.13	1.12	1.10	1.06	1.10	1.08	1.22	1.22	1.16	1.16	1.16	1.15
47	1.13	1.11	1.02	1.00	1.00	0.98	1.14	1.13	1.14	1.00	1.11	1.00	1.22	1.21	1.20	1.18	1.18	1.15
48	1.13	1.11	1.02	1.00	1.00	0.98	1.14	1.13	1.14	1.00	1.11	1.00	1.22	1.21	1.20	1.18	1.18	1.15
49	1.13	1.11	1.02	1.00	1.00	0.98	1.14	1.13	1.14	1.00	1.11	1.00	1.22	1.21	1.20	1.18	1.18	1.15
50	1.13	1.11	1.02	1.00	1.00	0.98	1.14	1.13	1.14	1.00	1.11	1.00	1.22	1.21	1.20	1.18	1.18	1.15
51	1.13	1.11	1.02	1.00	1.00	0.98	1.14	1.13	1.14	1.00	1.11	1.00	1.22	1.21	1.20	1.18	1.18	1.15
52	1.10	1.08	1.04	1.00	1.02	1.02	1.09	1.07	1.11	1.00	1.09	1.00	1.26	1.26	1.22	1.21	1.22	1.19
53	1.10	1.08	1.06	1.04	1.02	1.01	1.10	1.10	1.14	1.50	1.00	1.00	1.21	1.20	1.21	1.18	1.20	1.17

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54	1.10	1.08	1.06	1.04	1.02	1.01	1.10	1.10	1.14	1.50	1.00	1.00	1.21	1.20	1.21	1.18	1.20	1.17
55	1.10	1.08	1.06	1.04	1.02	1.01	1.10	1.10	1.14	1.50	1.00	1.00	1.21	1.20	1.21	1.18	1.20	1.17
56	1.10	1.08	1.04	1.00	1.02	1.02	1.09	1.07	1.11	1.00	1.09	1.00	1.26	1.26	1.22	1.21	1.22	1.19
57	1.17	1.16	1.09	1.08	1.12	1.09	1.16	1.13	1.14	1.11	1.14	1.13	1.28	1.28	1.20	1.19	1.18	1.18
58	1.17	1.16	1.09	1.08	1.12	1.09	1.16	1.13	1.14	1.11	1.14	1.13	1.28	1.28	1.20	1.19	1.18	1.18
59	1.17	1.16	1.09	1.08	1.12	1.09	1.16	1.13	1.14	1.11	1.14	1.13	1.28	1.28	1.20	1.19	1.18	1.18
60	1.11	1.09	1.02	1.02	1.02	1.01	1.12	1.12	1.08	1.08	1.08	1.09	1.19	1.18	1.17	1.16	1.16	1.15
61	1.11	1.09	1.02	1.02	1.02	1.01	1.12	1.12	1.08	1.08	1.08	1.09	1.19	1.18	1.17	1.16	1.16	1.15
62	1.11	1.09	1.02	1.02	1.02	1.01	1.12	1.12	1.08	1.08	1.08	1.09	1.19	1.18	1.17	1.16	1.16	1.15
63	1.11	1.09	1.02	1.02	1.02	1.01	1.12	1.12	1.08	1.08	1.08	1.09	1.19	1.18	1.17	1.16	1.16	1.15
64	1.11	1.09	1.02	1.02	1.02	1.01	1.12	1.12	1.08	1.08	1.08	1.09	1.19	1.18	1.17	1.16	1.16	1.15
65	1.12	1.10	1.12	1.00	1.04	1.07	1.10	1.09	1.25	1.00	1.20	1.00	1.31	1.32	1.29	1.30	1.27	1.27
66	1.17	1.16	1.09	1.08	1.12	1.09	1.16	1.13	1.14	1.11	1.14	1.13	1.28	1.28	1.20	1.19	1.18	1.18
67	1.17	1.16	1.09	1.08	1.12	1.09	1.16	1.13	1.14	1.11	1.14	1.13	1.28	1.28	1.20	1.19	1.18	1.18
68	1.11	1.13	1.01	1.01	1.03	1.05	1.10	1.09	1.05	1.04	1.06	1.07	1.15	1.16	1.08	1.08	1.09	1.09
69	1.14	1.15	1.03	1.02	1.03	1.05	1.14	1.13	1.08	1.06	1.10	1.08	1.28	1.29	1.23	1.23	1.22	1.22
70	1.14	1.15	1.03	1.02	1.03	1.05	1.14	1.13	1.08	1.06	1.10	1.08	1.28	1.29	1.23	1.23	1.22	1.22
71	1.13	1.12	1.00	0.97	0.98	0.96	1.15	1.13	1.10	1.05	1.11	1.09	1.22	1.22	1.18	1.16	1.16	1.13
72	1.18	1.18	1.08	1.10	1.11	1.12	1.18	1.19	1.14	1.14	1.16	1.16	1.26	1.26	1.24	1.24	1.26	1.25

Demand Model and Forecasting Report

73	1.14	1.15	1.03	1.02	1.03	1.05	1.14	1.13	1.08	1.06	1.10	1.08	1.28	1.29	1.23	1.23	1.22	1.22
74	1.19	1.22	1.07	1.05	1.06	1.06	1.20	1.18	1.10	1.11	1.10	1.12	1.24	1.25	1.12	1.15	1.13	1.15
75	1.17	1.20	1.04	1.03	1.04	1.04	1.19	1.16	1.07	1.09	1.08	1.10	1.24	1.25	1.12	1.14	1.13	1.14
76	1.15	1.15	1.03	1.01	1.02	1.02	1.16	1.18	1.07	1.08	1.07	1.09	1.23	1.22	1.17	1.17	1.16	1.16
77	1.19	1.22	1.07	1.07	1.06	1.07	1.20	1.18	1.09	1.12	1.09	1.12	1.24	1.24	1.15	1.16	1.15	1.16
78	1.19	1.22	1.07	1.07	1.06	1.07	1.20	1.18	1.09	1.12	1.09	1.12	1.24	1.24	1.15	1.16	1.15	1.16
79	1.19	1.22	1.07	1.05	1.06	1.06	1.20	1.18	1.10	1.11	1.10	1.12	1.24	1.25	1.12	1.15	1.13	1.15
80	1.19	1.22	1.07	1.07	1.06	1.07	1.20	1.18	1.09	1.12	1.09	1.12	1.24	1.24	1.15	1.16	1.15	1.16
81	1.15	1.15	1.03	1.01	1.02	1.02	1.16	1.18	1.07	1.08	1.07	1.09	1.23	1.22	1.17	1.17	1.16	1.16
82	1.19	1.22	1.07	1.05	1.06	1.06	1.20	1.18	1.10	1.11	1.10	1.12	1.24	1.25	1.12	1.15	1.13	1.15
83	1.17	1.20	1.04	1.03	1.04	1.04	1.19	1.16	1.07	1.09	1.08	1.10	1.24	1.25	1.12	1.14	1.13	1.14
84	1.19	1.22	1.07	1.07	1.06	1.07	1.20	1.18	1.09	1.12	1.09	1.12	1.24	1.24	1.15	1.16	1.15	1.16
85	1.31	1.36	1.20	1.21	1.19	1.18	1.32	1.35	1.22	1.28	1.22	1.27	1.33	1.34	1.26	1.27	1.23	1.24
86	1.12	1.15	0.99	0.99	0.99	1.02	1.13	1.11	1.01	1.03	1.03	1.06	1.21	1.23	1.11	1.12	1.11	1.12
87	1.20	1.23	1.07	1.05	1.06	1.08	1.21	1.17	1.09	1.10	1.10	1.12	1.29	1.30	1.17	1.19	1.18	1.20
88	1.33	1.37	1.20	1.20	1.17	1.21	1.32	1.24	1.19	1.21	1.19	1.21	1.49	1.52	1.38	1.40	1.31	1.33
89	1.33	1.37	1.20	1.20	1.17	1.21	1.32	1.24	1.19	1.21	1.19	1.21	1.49	1.52	1.38	1.40	1.31	1.33
90	1.13	1.14	1.05	1.05	1.06	1.07	1.14	1.14	1.08	1.09	1.10	1.10	1.19	1.19	1.15	1.15	1.15	1.15
91	1.14	1.14	1.02	1.02	1.03	1.05	1.14	1.13	1.06	1.07	1.09	1.10	1.25	1.26	1.20	1.20	1.19	1.19

Demand Model and Forecasting Report

92	1.15	1.15	1.04	1.04	1.04	1.05	1.16	1.15	1.08	1.10	1.09	1.11	1.23	1.23	1.18	1.18	1.17	1.17
93	1.12	1.12	0.99	0.99	1.06	1.06	1.13	1.13	1.07	1.07	1.10	1.10	1.20	1.20	1.07	1.07	1.12	1.12
94	1.17	1.12	1.07	1.08	1.11	1.10	1.20	1.20	1.16	1.13	1.12	1.08	1.25	1.24	1.25	1.22	1.24	1.22
95	1.17	1.14	1.08	1.10	1.11	1.17	1.21	1.21	1.17	1.14	1.12	1.14	1.22	1.20	1.20	1.17	1.21	1.19
96	1.20	1.19	1.09	1.10	1.13	1.18	1.21	1.19	1.16	1.10	1.18	1.14	1.27	1.26	1.21	1.20	1.24	1.23
97	1.12	1.12	0.99	0.99	1.06	1.06	1.13	1.13	1.07	1.07	1.10	1.10	1.20	1.20	1.07	1.07	1.12	1.12
98	1.17	1.16	1.08	1.09	1.12	1.12	1.17	1.17	1.15	1.14	1.15	1.14	1.33	1.33	1.30	1.29	1.31	1.31
99	1.12	1.12	0.99	0.99	1.06	1.06	1.13	1.13	1.07	1.07	1.10	1.10	1.20	1.20	1.07	1.07	1.12	1.12
100	1.12	1.12	0.99	0.99	1.06	1.06	1.13	1.13	1.07	1.07	1.10	1.10	1.20	1.20	1.07	1.07	1.12	1.12
101	1.12	1.12	0.99	0.99	1.06	1.06	1.13	1.13	1.07	1.07	1.10	1.10	1.20	1.20	1.07	1.07	1.12	1.12
102	1.12	1.12	0.99	0.99	1.06	1.06	1.13	1.13	1.07	1.07	1.10	1.10	1.20	1.20	1.07	1.07	1.12	1.12
103	1.12	1.12	0.99	0.99	1.06	1.06	1.13	1.13	1.07	1.07	1.10	1.10	1.20	1.20	1.07	1.07	1.12	1.12
104	1.12	1.12	0.99	0.99	1.06	1.06	1.13	1.13	1.07	1.07	1.10	1.10	1.20	1.20	1.07	1.07	1.12	1.12

CONTROL SHEET

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