

Appendix H: Model Statement for Agreement

Northern Gateway Transport Model - Summary of Agreed Modelling Approach

April 2024

The Northern Gateway development in Heywood has complex transport related aspects and is set in a complex Highways and Active Travel network. The Northern Gateway development is made up of two key allocations within the recently approved Greater Manchester Strategic Plan 'Places for Everyone' (PfE):

- JPA1.1. – Mixed Use Employment (1.2m sqm Advanced Manufacturing / B2 / B8) & Residential (200 dwellings) Allocation on land to the North of the M62 motorway
- JPA1.1. – Residential Allocation (1550 dwellings) on land to the North of the M62 motorway, split either side of the A6045 Manchester Road.

It is recognised that as time passes, the highways, traffic and active travel aspects of the development elements and surrounding transport network will evolve, but it is also recognised that a sound basis must be established and adhered to, in order to inform the evaluation of the development and its transport related impacts.

It was agreed at an early stage, that to produce traffic analyses suitable to inform decision makers, it is first necessary to have agreed traffic forecasts, and that in turn has necessitated the building of a wider transport network model, which all parties accept can be relied upon.

A Transport Steering Group (TSG) comprising of key stakeholders (See Appendix A) has overseen the production of the Northern Gateway Transport Model (NGTM) model by WSP. The TSG has met on 9 occasions between February 2022 and April 2024 to discuss and contribute to the building of the model.

In summary, the Northern Gateway Traffic Model (NGTM) is an updated version of the Transport for Greater Manchester (TfGM) Strategic SATURN Model, focused into a study area appropriate for the assessment of the Northern Gateway allocations and validated to a 2022 Base Year, as opposed to the 2019 Base Reference Year which under-pins the TfGM Strategic Model. The NGTM model uses the 2019 TfGM model as a based and improves the network and matrix structure with the model study area to provide additional details to better represent the highway network within the study area.

In addition to providing the appropriate data to inform the Transport Assessment, it will also provide the agreed traffic volumes for use in other models which are being undertaken by National Highways and the Districts.

This document details the particulars of the methodology adopted to derive the following key elements of NGTM model namely;

- NGTM Base year (2022) and
- NGTM forecast years

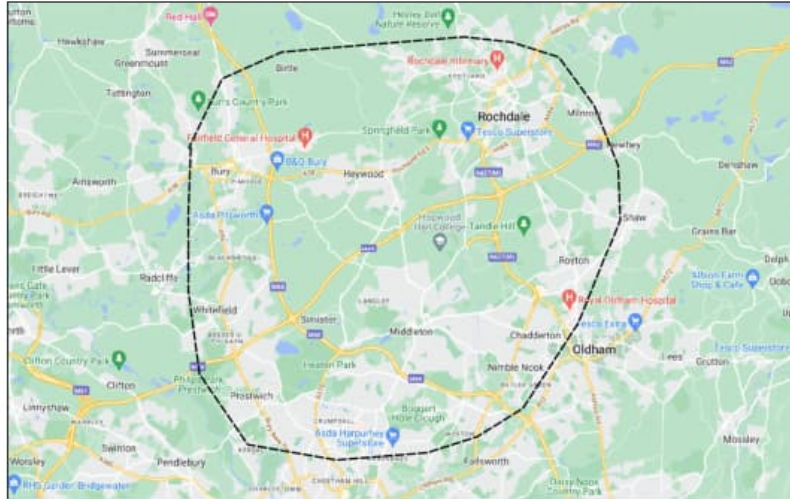
The table below summarises the key elements of the modelling approach for the NGTM agreed by all members of the TSG.

ITEM	SUBJECT	Date
1	Model Specification Report (MSR) All TSG members agreed to the MSR which summaries the key assumptions and methodology to be adopted in the NGTM base year and forecast model build.	February 2023
2	NGTM Base year 2022	February 2023

The Base year model has been developed using the TfGM 2019 model shared with WSP in December 2022.

The key area of focus (study area) from the 2019 TfGM base year model used to develop the NGTM is shown in the figure below.

Figure 2-1 - NGTM Study area



It was agreed with TSG members that this study area was sufficient to allow for the assessment of likely material traffic impacts associated with the NG allocations.

The highway network and zone structure from the TfGM model within the study area has been infilled to improve the network and zone representation. The chosen 2022 Base year includes for the newly open Queen Elizabeth II Way (QEII Way).

November 2022 traffic surveys (turning counts & ATC stations) have been used to validate / calibrate within the study area, along with additional journey time information (Tom-Tom data).

The model peak hours are adopted from TfGM's 2019 model for consistency. These are

- AM peak – 08:00-09:00.
- Average IP – 10:00-16:00 and
- PM peak – 17:00-18:00

WSP has reviewed TfGM's modelled network and has updated the coding to represent the November 2022 highway network.

In addition to this updated network coding, WSP produced a technical note summarising the key observations from the review of the 2019 TfGM model review, the mitigation related network and the improvements to HGV distribution within the study area. This Technical Note was agreed with TfGM's representative and TSG. This update has been applied within the 2022 base year model.

The 2019 Base year matrices shared by TfGM in April 2023 have been used as starting point to produce the 2022 NGTM base matrix (which was updated in the study area).

User Classes in the SATURN models:

- Car – Commute
- Car – Business
- Car – Other

February/
August
2023

August
2023

	LGV HGV	
3	NGTM Base year calibration/ validation results WSP presented the improved calibration/validation results against the draft results shared in December 2023 (against TAG criteria) for the 2022 Base year during TSG 8 meeting on 2/2/24. WSP also highlighted key challenges in journey time calibration along the M62 and Pilsworth Road corridors. Although the overall journey time results are within the TAG guidance, significant work has been undertaken to try to address and resolve this resulting in some improvement in the statistics. All members agreed with the 2022 Base year calibration/ validation results and WSP progressed and produced the Local Model Validation Report (LMVR) A copy of the LMVR will be shared with TSG in May 2024. The key NGTM 2022 base year results are included in Appendix C of this note along with the LMVR. TSG has confirmed that the 2022 Base year model can be considered fit for purpose to assess the impact of Northern Gateway development.	February 2024
4	Proposed Assessment Scenarios - <u>'Without Scheme'</u> – which includes development identified within the development log (except Northern Gateway development) as is likely to be present by the respective forecast years. Network growth will be included. See sections 5, 6, 7, 8, 9 and 10 for details of the development of the 'Without Scheme' Scenarios - <u>'With Scheme'</u> – which includes Northern Gateway development in addition to the 'Without Scheme' scenario. See Section 11 for details of the development of the 'With Scheme' Scenario. - A policy "off" approach will be undertaken for the forecast year model runs to allow for a robust assessment of network traffic demand levels. Policy "off" ignores the material shifts towards active travel and network vehicular trip reductions over the wider Greater Manchester transport network, which policy strives to achieve. - A policy "on" approach will also be undertaken as a sensitivity test in the 2039 forecast year, to reflect how policy should have taken effect over that timeframe.	
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5	NGTM Future Years 'Without Scheme'- Forecasting approach Key inputs to the future years 'Without Scheme' forecast models are: - forecast future years (2028, 2032, 2039) - development log (strategic land use, infrastructure changes with the study area) - Trip rates associated with the committed sites within the development log that are to be explicitly modelled - Trip distribution associated with the committed sites within the development log that are to be explicitly modelled.	

	- Residual Growth (post inclusion of developments within development log) These are described in sections 6 to 10.	
6	Forecast Future Years The proposed core Future Years to be assessed have been chosen as: - 2028 – Scheme opening year - 2032 – First forecast year (Intermediate) - 2039 – Second forecast year (to align with end of PFE period)	
7	Development /Uncertainty Log (For Deriving the ‘Without Scheme’ Scenario) Development or Uncertainty log contains the key inputs to the forecast models as it summarises the information on land use and infrastructure changes anticipated between the model Base year (2022) and the model forecast years. The development log has been compiled based on the information provided by all TSG members. Input from Bury Council, Rochdale Council and Northern Gateway (developer) were key, as together they form the study area of the NGTM model. As agreed during the various Transport Steering group (TSG) meetings TfGM’s 2019 development log was used as a starting point. The development log for NGTM will be used to document development land use and network changes planned for the modelled area (study area). These details have been supplied by local planning authorities Bury and Rochdale Council who form the majority of the study area. The growth from other councils will be derived and controlled to NTEM 8. A version of the development log was shared with the TSG in November 2023 for review and comment. BC and RC have advised that all the sites identified with the development log (including PFE sites) within Bury and Rochdale should be included in the forecast models. Hence, all the sites outlined by BC and RC will be included in the ‘Without Scheme’ modelling, subject to forecast build out completions by the year being modelled. To account for the strategic nature of the model, a threshold of 50 2-way trips per hour will be applied at a zone level, taking into account the respective development delivery at each forecast year.	MSR Feb 2023 and MSR Feb 2024 March 2024
8	Trip Rates for Developments within Development Log (For Deriving the ‘Without Scheme’ Scenario) Trip rates for various future land uses identified within the development log have been adopted from TfGM model (i.e. 2019 Development log) to ensure consistency of approach with the PFE assessments. <u>The TfGM’s development log includes trip rates “per person trips” and WSP has converted these to “vehicle trip rates” based on methodology received from TfGM.</u>	MSR and August 2023

	A copy of the vehicular trip rates based on TfGM's person trip rates is included in Appendix B of this note.	
9	Trip Distribution for Developments within Development Log (For Deriving the 'Without Scheme' Scenario) It was agreed with TSG members that the trips for the new developments will be distributed by adopting distributions of zones with a similar land use within the study area (near to geographical location). This approach will be applied to the developments in the "without" scheme scenarios.	MSR
10	Residual Growth (post inclusion of developments within development log) - NTEM - (For Deriving the 'Without Scheme' Scenario) The background growth will be based on core growth estimates from the Department for Transport (DfT's) National Trip End Model (NTEM) v8.1 datasets accessed via the Trip End Model Presentation Program (TEMPro) v8.1 program at MSOA level. TEMPro constraint will be applied to the forecast 'Without Scheme' scenarios. i.e the growth will be controlled to NETM as per TAG guidelines. The background growth factors calculated using NTEM have been adjusted to remove double counting as NTEM program has inputs local SHLAA datasets. The adjusted growth factors have been calculated using the inputs on housing and jobs calculated from the development log. NRTP 2022 – Background LGV and HGV forecasts for the future years has been derived from DfT's National Road traffic projections 2022 (NRTP 2022) which is produced by the DfT from the National Transport Model (NTM). This has been applied at a regional level.	MSR
11	'With Scheme' Scenarios The 'With Scheme' scenarios are to be carried out ahead of a planning submission, to allow an assessment of the traffic impacts of the proposals. The forecast 'With Scheme' scenarios will be built by adding the Northern Gateway development to the respective 'Without Scheme' forecasts (i.e. the 'With Scheme' models will be unconstrained, i.e. trips from NGTM will be additional over the w/o scheme). The 'With Scheme' assessment will be subject to the following inputs: - Land use schedule - Trip Rates for the Development Proposals (yet to be agreed, but to be agreed ahead of the commencement of the 'With Scheme' modelling. This includes the South Heywood as it forms phase 1 of the wider JPA1.1 site. - Trip Distribution for the Development Proposals will be based on suitable donor similar to the "without scheme" within the study area. - Development Traffic Assignment: The development traffic will be assigned to the access points, with appropriate weightings based on the layout of the site, the positioning of the units and the layout of the on-site road network.	

12	Agreed Model Approach Over the period Feb 2022 to April 2024, WSP, in collaboration with the TSG, have compiled the NGTM model by applying the approach and parameters detailed in this note. The NGTM is therefore agreed as being a suitable tool for use in evaluating the Highways and Transport aspects of the Northern Gateway Development at planning application.	
13	Variable Demand Modelling (VDM) As part of the MSR, it was agreed that VDM would be excluded from the model for its use as a planning application tool. It is however recognised the VDM may be included for other purposes in the future.	Feb 2023
14	Potential Comparative Assessments At the time of preparing this note, the content of the comparative assessments cannot be finalised, primarily due to the fact that the exact highway improvement mitigations are not yet known. Nevertheless, it is agreed the NGTM will be used to undertake comparative assessments generally in line with the following schedule. For JPA1.1 and then cumulatively with JPA1.2: - 2028 – Scheme opening year ‘Without Scheme’ test and With full development in the ‘With Scheme’ test at the request of NH) based on existing network but including committed Simister Island Improvements. - 2032 – First forecast year (Intermediate) as above, then ‘Without Scheme’ excluding Birch Junction and the ‘With Scheme’ including Birch Junction - 2039 – Second forecast year (to align with end of PFE period) as intermediate tests but forecast to 2039 - It will be necessary to repeat the ‘With Scheme’ model runs to test the benefits of local highways improvements which the development may bring forward. - It may also be necessary to test the ‘With Scheme’ scenario without the Birch Junction. For JPA1.2, the same tests will be undertaken but without Birch junction mitigation. It may also be necessary to use the agreed model to assess the developments at different phases of their delivery.	

List of Appendices

Appendix A – TSG members confirmation

Appendix B – Trip rate information

Appendix C – NGTM 2022 Base Year results summary

Appendix A TSG members

	REPRESENTED BY	SIGNATURES
Northern Gateway JV		
Transport for Greater Manchester (TfGM)		
Rochdale Council		
Bury Council		
National Highways		
Tetra Tech (NG Transport Planning consultants)		
WSP – Acting for National Highways		
Focus Transport Planning		
WSP – Acting for JV		

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Appendix B – Trip rate information

Trip Rate (vehicular) derived from TfGM's person trip rates

	Per	Highway - All Vehs (Peak Hour)						Car (only)						LGV						HGV					
		AM		IP		PM		AM		IP		PM		AM		IP		PM		AM		IP		PM	
		In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Apartments/TC	1 dwelling	0.032	0.081	0.045	0.044	0.081	0.054	0.024	0.066	0.032	0.033	0.069	0.045	0.006	0.012	0.011	0.010	0.010	0.008	0.002	0.003	0.002	0.002	0.002	0.001
Houses/TC	1 dwelling	0.122	0.214	0.151	0.136	0.234	0.197	0.092	0.175	0.106	0.100	0.199	0.165	0.024	0.031	0.036	0.029	0.030	0.029	0.007	0.008	0.008	0.007	0.005	0.003
B1c/B2/B8/TC	100 sqm	0.298	0.167	0.211	0.218	0.107	0.238	0.221	0.057	0.101	0.118	0.057	0.210	0.033	0.051	0.049	0.049	0.020	0.011	0.044	0.060	0.061	0.051	0.030	0.017
B1a/TC	100 sqm	0.442	0.066	0.108	0.102	0.052	0.417	0.337	0.024	0.067	0.066	0.030	0.386	0.059	0.029	0.026	0.025	0.015	0.013	0.046	0.014	0.015	0.010	0.008	0.018
B1c/B8/TC	100 sqm	0.140	0.047	0.076	0.081	0.035	0.129	0.104	0.015	0.038	0.045	0.020	0.113	0.015	0.013	0.016	0.017	0.006	0.006	0.021	0.018	0.022	0.018	0.009	0.010
B8/TC	100 sqm	0.039	0.017	0.032	0.034	0.016	0.033	0.028	0.005	0.012	0.016	0.009	0.027	0.003	0.003	0.006	0.006	0.001	0.002	0.008	0.010	0.014	0.012	0.006	0.003
B1c/TC	100 sqm	0.243	0.074	0.113	0.123	0.052	0.221	0.185	0.027	0.070	0.080	0.030	0.204	0.032	0.032	0.027	0.030	0.015	0.007	0.025	0.015	0.016	0.013	0.008	0.009
B2/B8/TC	100 sqm	0.317	0.201	0.248	0.254	0.128	0.244	0.232	0.066	0.103	0.124	0.066	0.211	0.031	0.048	0.056	0.055	0.018	0.012	0.053	0.086	0.089	0.075	0.044	0.021
B2/TC	100 sqm	0.455	0.283	0.350	0.360	0.184	0.346	0.340	0.104	0.154	0.182	0.083	0.310	0.050	0.097	0.095	0.088	0.040	0.013	0.065	0.083	0.101	0.090	0.061	0.023
B1c/B2/TC	100 sqm	0.139	0.045	0.071	0.077	0.034	0.128	0.106	0.016	0.044	0.050	0.019	0.118	0.018	0.019	0.017	0.019	0.009	0.004	0.014	0.009	0.010	0.008	0.005	0.005
Apartments/NonTC	1 dwelling	0.057	0.184	0.089	0.093	0.222	0.140	0.043	0.151	0.063	0.068	0.188	0.117	0.011	0.026	0.021	0.020	0.028	0.021	0.003	0.007	0.005	0.005	0.005	0.002
Houses/NonTC	1 dwelling	0.117	0.292	0.170	0.159	0.323	0.222	0.088	0.240	0.120	0.117	0.274	0.185	0.023	0.042	0.041	0.034	0.041	0.032	0.007	0.011	0.009	0.008	0.007	0.004
B1c/B2/B8/NonTC	100 sqm	0.298	0.167	0.211	0.218	0.107	0.238	0.221	0.057	0.101	0.118	0.057	0.210	0.033	0.051	0.049	0.049	0.020	0.011	0.044	0.060	0.061	0.051	0.030	0.017
B1a/NonTC	100 sqm	1.053	0.287	0.415	0.413	0.237	0.927	0.803	0.105	0.257	0.270	0.134	0.858	0.140	0.124	0.100	0.100	0.066	0.030	0.110	0.058	0.058	0.042	0.036	0.039
B1c/B8/NonTC	100 sqm	0.140	0.047	0.076	0.081	0.035	0.129	0.104	0.015	0.038	0.045	0.020	0.113	0.015	0.013	0.016	0.017	0.006	0.006	0.021	0.018	0.022	0.018	0.009	0.010
B8/NonTC	100 sqm	0.039	0.017	0.032	0.034	0.016	0.033	0.028	0.005	0.012	0.016	0.009	0.027	0.003	0.003	0.006	0.006	0.001	0.002	0.008	0.010	0.014	0.012	0.006	0.003
B1c/NonTC	100 sqm	0.243	0.074	0.113	0.123	0.052	0.221	0.185	0.027	0.070	0.080	0.030	0.204	0.032	0.032	0.027	0.030	0.015	0.007	0.025	0.015	0.016	0.013	0.008	0.009
B2/B8/NonTC	100 sqm	0.317	0.201	0.248	0.254	0.128	0.244	0.232	0.066	0.103	0.124	0.066	0.211	0.031	0.048	0.056	0.055	0.018	0.012	0.053	0.086	0.089	0.075	0.044	0.021
B2/NonTC	100 sqm	0.455	0.283	0.350	0.360	0.184	0.346	0.340	0.104	0.154	0.182	0.083	0.310	0.050	0.097	0.095	0.088	0.040	0.013	0.065	0.083	0.101	0.090	0.061	0.023
B1c/B2/NonTC	100 sqm	0.139	0.045	0.071	0.077	0.034	0.128	0.106	0.016	0.044	0.050	0.019	0.118	0.018	0.019	0.017	0.019	0.009	0.004	0.014	0.009	0.010	0.008	0.005	0.005

Trip rate Information received from TfGM

Trip Rates

- 1.1 The Trips rates used are based on the Trafford Park Metrolink business case trips rates, which are based on TRICS. They are peak period (AM: 0700-1000, IP: 1000-1600, PM: 1600-1900) and are the number of person trips. There are separate rates for arrivals and departures.
- 1.2 OP rates have been applied, which are assumed to be 0.19 the hourly IP rate. The OP period is 1900-2300.
- 1.3 Rates are split such that areas within town centres (TC) and outside town centres (non-TC) use different rates.
- 1.4 The following town/city/hub centres have used the TC trip rates:
 - The City Centre (the area within the Inner Ring Road)
 - Manchester Airport.
 - Wigan
 - Bolton
 - Bury
 - Oldham
 - Rochdale
 - Ashton-under Lyne
 - Stockport
 - Eccles
 - Altrincham

1.5 The rates used are shown in the two tables below:

		Arrival trips for period								
		Highway			Public Transport			Active		
	Per	AM	IP	PM	AM	IP	PM	AM	IP	PM
Apartments/TC	1 dwelling	0.13	0.41	0.33	0.00	0.09	0.14	0.12	0.67	0.64
Houses/TC	1 dwelling	0.49	1.38	0.95	0.02	0.07	0.06	0.12	0.30	0.32
B1c/B2/B8/TC	100 sqm	1.17	1.74	0.40	0.01	0.00	0.00	0.10	0.14	0.04
B1a/TC	100 sqm	1.75	0.95	0.20	3.45	0.60	0.08	1.45	7.46	0.82
B1c/B8/TC	100 sqm	0.55	0.63	0.13	0.01	0.00	0.00	0.07	0.12	0.02
B8/TC	100 sqm	0.15	0.25	0.06	0.01	0.00	0.00	0.02	0.02	0.00
B1c/TC	100 sqm	0.96	1.00	0.20	0.02	0.01	0.00	0.11	0.21	0.04
B2/B8/TC	100 sqm	1.24	1.98	0.47	0.01	0.00	0.00	0.09	0.11	0.04
B2/TC	100 sqm	1.79	2.85	0.67	0.01	0.00	0.00	0.13	0.15	0.05
B1c/B2/TC	100 sqm	0.55	0.63	0.13	0.01	0.00	0.00	0.07	0.12	0.02
Apartments/NonTC	1 dwelling	0.23	0.82	0.90	0.00	0.04	0.05	0.06	0.26	0.24
Houses/NonTC	1 dwelling	0.47	1.56	1.31	0.01	0.04	0.04	0.13	0.38	0.25
B1c/B2/B8/NonTC	100 sqm	1.17	1.74	0.40	0.01	0.00	0.00	0.10	0.14	0.04
B1a/NonTC	100 sqm	4.17	3.66	0.91	1.12	0.37	0.09	0.82	1.78	0.19
B1c/B8/NonTC	100 sqm	0.55	0.63	0.13	0.01	0.00	0.00	0.07	0.12	0.02
B8/NonTC	100 sqm	0.15	0.25	0.06	0.01	0.00	0.00	0.02	0.02	0.00
B1c/NonTC	100 sqm	0.96	1.00	0.20	0.02	0.01	0.00	0.11	0.21	0.04
B2/B8/NonTC	100 sqm	1.24	1.98	0.47	0.01	0.00	0.00	0.09	0.11	0.04

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B2/NonTC	100 sqm	1.79	2.85	0.67	0.01	0.00	0.00	0.13	0.15	0.05
B1c/B2/NonTC	100 sqm	0.55	0.63	0.13	0.01	0.00	0.00	0.07	0.12	0.02

		Departure trips for period								
					Public Transport			Active		
	Per	AM	IP	PM	AM	IP	PM	AM	IP	PM
Apartments/TC	1 dwelling	0.33	0.41	0.22	0.12	0.08	0.03	0.30	0.72	0.30
Houses/TC	1 dwelling	0.87	1.26	0.80	0.06	0.09	0.04	0.22	0.31	0.15
B1c/B2/B8/TC	100 sqm	0.61	1.85	0.96	0.00	0.01	0.01	0.02	0.15	0.09
B1a/TC	100 sqm	0.25	0.91	1.70	0.09	0.80	3.23	0.42	7.46	1.84
B1c/B8/TC	100 sqm	0.17	0.69	0.52	0.00	0.02	0.01	0.01	0.17	0.06
B8/TC	100 sqm	0.06	0.28	0.13	0.00	0.01	0.01	0.00	0.04	0.01
B1c/TC	100 sqm	0.28	1.10	0.90	0.00	0.04	0.02	0.02	0.30	0.10
B2/B8/TC	100 sqm	0.72	2.10	0.98	0.00	0.01	0.01	0.02	0.10	0.09
B2/TC	100 sqm	1.05	3.01	1.40	0.00	0.00	0.01	0.04	0.13	0.13
B1c/B2/TC	100 sqm	0.17	0.69	0.52	0.00	0.02	0.01	0.01	0.17	0.06
Apartments/NonTC	1 dwelling	0.75	0.86	0.57	0.06	0.02	0.01	0.16	0.29	0.13
Houses/NonTC	1 dwelling	1.19	1.47	0.90	0.04	0.04	0.01	0.25	0.34	0.18
B1c/B2/B8/NonTC	100 sqm	0.61	1.85	0.96	0.00	0.01	0.01	0.02	0.15	0.09
B1a/NonTC	100 sqm	1.08	3.70	3.78	0.04	0.68	0.88	0.21	1.82	0.78
B1c/B8/NonTC	100 sqm	0.17	0.69	0.52	0.00	0.02	0.01	0.01	0.17	0.06
B8/NonTC	100 sqm	0.06	0.28	0.13	0.00	0.01	0.01	0.00	0.04	0.01

B1c/NonTC	100 sqm	0.28	1.10	0.90	0.00	0.04	0.02	0.02	0.30	0.10
B2/B8/NonTC	100 sqm	0.72	2.10	0.98	0.00	0.01	0.01	0.02	0.10	0.09
B2/NonTC	100 sqm	1.05	3.01	1.40	0.00	0.00	0.01	0.04	0.13	0.13
B1c/B2/NonTC	100 sqm	0.17	0.69	0.52	0.00	0.02	0.01	0.01	0.17	0.06

2 Jobs density

- 2.1 Where Office or Industry and Warehouse floorspace has been converted to a number of jobs, densities have been derived from the Homes and Community Agency Employment Density Guide 2015. In some cases, the density guide has more than one density per use class, and so an average has been used.

Unique Use Classes	Square metres per job
B1a (Office)	11
B1c (Light Industrial)	47
B2 (Industrial and Manufacturing)	36
B8 (Storage and Distribution)	81

3 Population density

- 3.1 Where a number of houses or apartments has been converted to population, average rates of occupancy have been derived from the 2011 Census. The assumed number of people per house is 2.454, and the assumed number of people per apartment is 1.409.

Appendix C – NGTM 2022 Base Year results summary



TSG meeting 8, 02/02/2024

Update from WSP on NGTM 2022 Base year model results

- Key TAG criteria
 - Link flow validation
 - Screenline/ Cordon calibration/ validation
 - Journey time validation
 - Impacts of Matrix estimation

Link Flow Validation

Criteria	Description	Acceptability Guideline
1	Individual flows within 100 veh/hr of counts for flows less than 700 veh/hr	> 85% of cases
	Individual flows within 15% of counts for flows from 700 veh/hr to 2,700 veh/hr	> 85% of cases
	Individual flows within 400 veh/hr of counts for flows more than 2,700 veh/hr	> 85% of cases
2	GEH < 5 for individual flows	> 85% of cases

TAG Criteria

- Criteria 1: Link flows
- Criteria 2: GEH less than 5
- Pass TAG: Either criteria 1 or 2 are met
- Required to meet TAG for 85% of all links, which is achieved in all cases

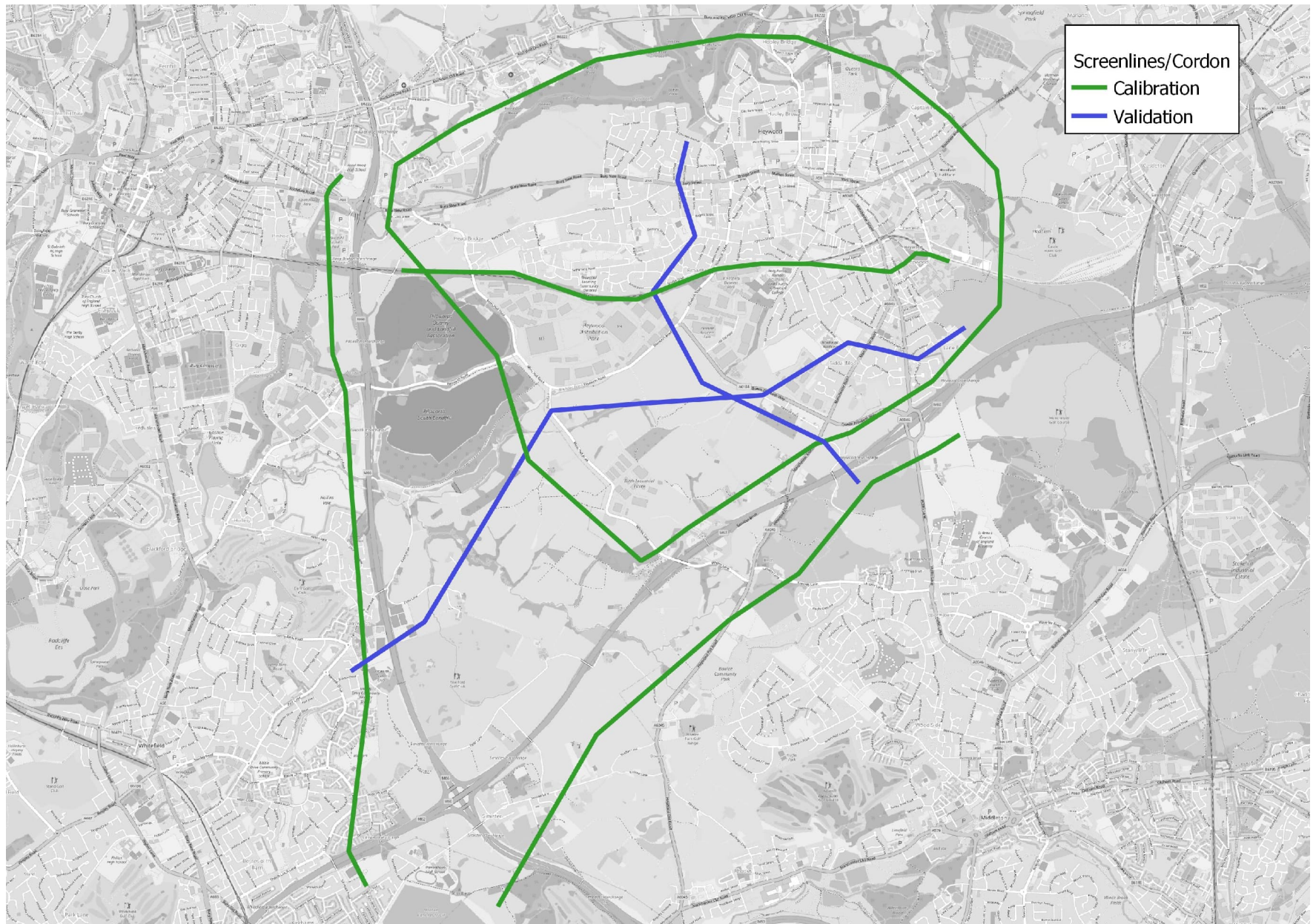
Calibration Counts

Measure	All Vehicles			Cars		
(189 counts)	AM Peak	Inter Peak	PM Peak	AM Peak	Inter Peak	PM Peak
Pass Criteria 1	91%	93%	93%	90%	95%	93%
Pass Criteria 2	92%	93%	92%	91%	91%	91%
Pass TAG	92%	94%	94%	91%	95%	94%

Validation Counts

Measure	All Vehicles			Cars		
(72 counts)	AM Peak	Inter Peak	PM Peak	AM Peak	Inter Peak	PM Peak
Pass Criteria 1	88%	90%	93%	89%	96%	94%
Pass Criteria 2	88%	90%	89%	83%	92%	92%
Pass TAG	92%	90%	94%	89%	96%	96%

Screenlines/Cordons for NGTM



Screenlines/Cordon Validation

Calibration Screenline/Cordon

Measure	All Vehicles			Cars		
	AM Peak	Inter Peak	PM Peak	AM Peak	Inter Peak	PM Peak
Calibration Screenlines and Cords (8)						
Within 5% or GEH < 4 (‘Green’ validation)	100%	100%	100%	75%	100%	88%
Within 7.5% or GEH < 5 (‘Amber’ validation)	100%	100%	100%	100%	100%	100%

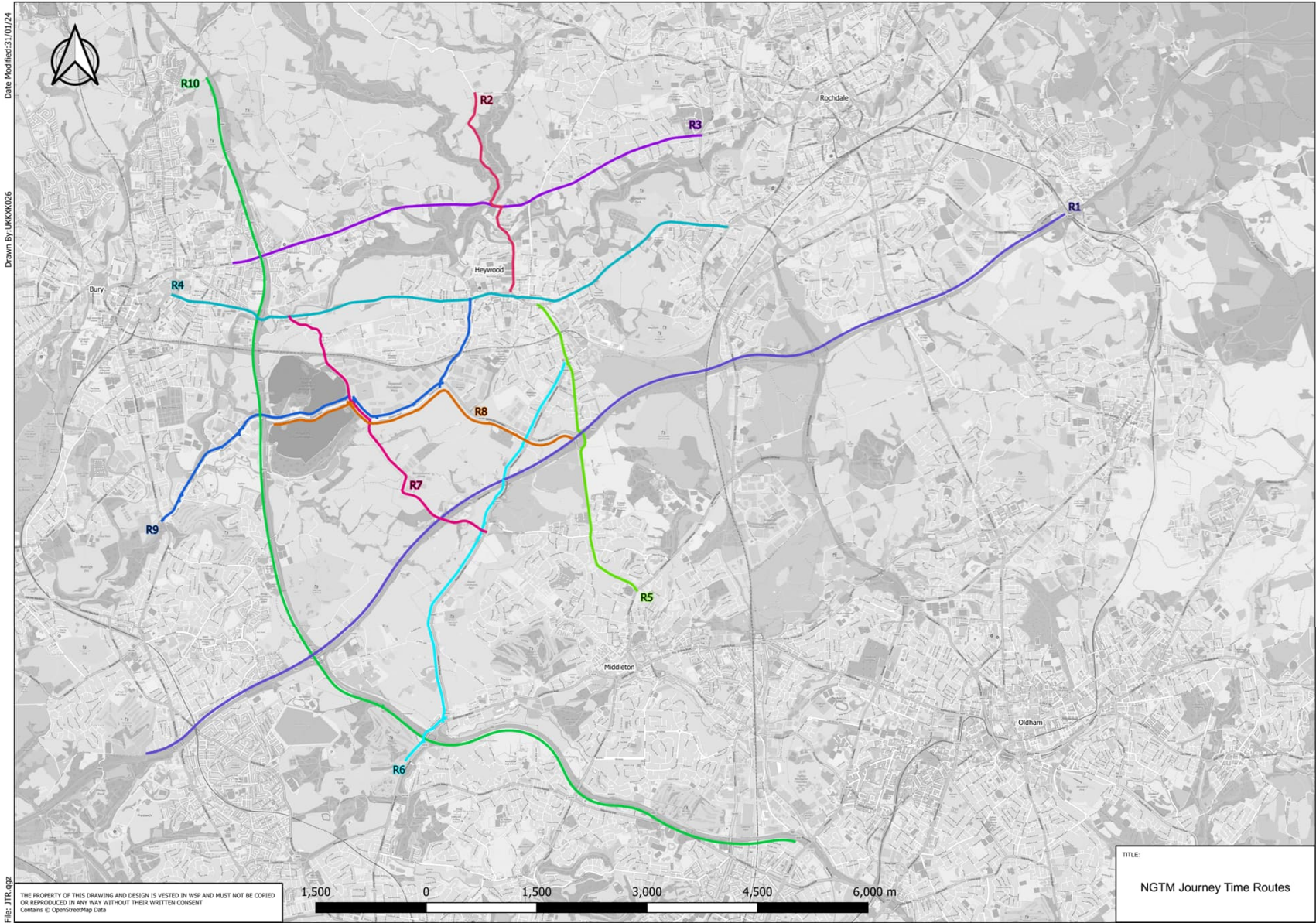
- Green Validation: Within 5% flow or less than 4 GEH
- Amber Validation: Within 5% flow or less than 5 GEH
- TAG criteria is met when a relaxed ‘Amber’ validation criteria is used

8

Validation Screenlines/Cordon

Measure	All Vehicles			Cars		
	AM Peak	Inter Peak	PM Peak	AM Peak	Inter Peak	PM Peak
Validation Screenlines and Cords (4)						
Within 5% or GEH < 4 (‘Green’ validation)	100%	75%	100%	75%	100%	100%
Within 7.5% or GEH < 5 (‘Amber’ validation)	100%	100%	100%	100%	100%	100%

Journey Time Routes map



Journey Time Route Validation

Performance Measure (20 routes)	AM Peak	Inter Peak	PM Peak
Routes within 15% or 1 min of Observed Times ('Green' validation)	85%	95%	85%
Within 20% - Near Pass ('Amber' validation)	95%	95%	85%

TAG Criteria

- 85% of all routes meet the 'Green' validation criteria
- 95% of all routes meet a relaxed 'Amber' validation criteria for AM and Inter Peak
- Where some routes fail to meet the criteria, it was difficult to replicate observed delays within SATURN (for example M62 WB AM and PM peaks and Pilsworth Road)

Impact on Matrix Estimation

Impacts of matrix estimation on trip matrices by time period:

- Matrix Changes at Sector Level
- Impact on Trip Length Distributions
- Matrix Zonal Trip Ends
- Matrix Zonal Cell values

Impacts of Matrix Estimation: AM Peak

Sector:		PDiff
	Total	0.1%
	Business	-0.4%
	Commute	-0.5%
	Other	-0.4%
	LGVs	2.7%
	HGVs	0.8%

Table 5 Significance of Matrix Estimation Changes	
Measure	Significance Criteria
Matrix zonal cell values	Slope within 0.98 and 1.02 Intercept near zero R ₂ in excess of 0.95
Matrix zonal trip ends	Slope within 0.99 and 1.01 Intercept near zero R ₂ in excess of 0.98
Trip length distributions	Means within 5% Standard deviations within 5%
Sector to sector level matrices	Differences within 5%

		Pdiff - Mean	Pdiff - SD
Trip Lengths:	Total	0.1%	0.0%
	Business	-1.1%	-0.4%
	Commute	-1.3%	-0.5%
	Other	-1.6%	-1.1%
	LGVs	3.1%	0.1%
	HGVs	4.0%	0.6%

		Origin RSq	Origin Slope	Origin Intercept	Dest RSq	Dest Slope	Dest Intercept
Trip End:	Total	0.99	1.00	1.653	0.99	0.99	3.484
	Business	1.00	0.99	0.256	0.99	0.99	0.750
	Commute	1.00	0.99	0.033	0.99	0.99	0.106
	Other	0.99	0.99	0.728	0.99	0.99	1.918
	LGVs	0.99	1.01	0.590	0.99	1.02	0.414
	HGVs	0.98	1.00	0.045	0.98	1.00	0.145

		RSq	Slope	Intercept
Cell Values:	Total	0.99	1.00	0.000
	Business	0.99	1.00	-0.001
	Commute	0.99	1.00	0.000
	Other	0.99	1.00	-0.002
	LGVs	0.98	1.00	0.003
	HGVs	0.94	0.99	0.001

Impacts of Matrix Estimation: Inter Peak

Sector:	Total	PDiff	0.0%				
	Business	-0.3%					
	Commute	-0.3%					
	Other	-0.3%					
	LGVs	1.6%					
	HGVs	-0.1%					
		Pdiff - Mean	Pdiff - SD				
Trip Lengths:	Total	-0.4%	-0.2%				
	Business	-1.3%	-0.4%				
	Commute	-1.4%	-0.5%				
	Other	-1.3%	-0.4%				
	LGVs	1.5%	0.2%				
	HGVs	2.1%	0.5%				
Trip End:	Total	Origin RSq	Origin Slope	Origin Intercept	Dest RSq	Dest Slope	Dest Intercept
	Business	0.99	1.00	0.791	0.99	1.00	2.642
	Commute	0.99	0.99	0.090	0.99	0.99	0.194
	Other	0.99	0.99	0.052	0.99	0.99	0.112
	LGVs	0.99	1.01	0.957	0.99	0.99	2.085
	HGVs	0.99	1.01	0.125	0.99	1.01	0.283
				Intercept			
Cell Values:	Total	RSq	Slope				
	Business	0.98	1.01				
	Commute	0.98	1.01				
	Other	0.98	1.01				
	LGVs	0.99	1.00				
	HGVs	0.98	0.99				

Table 5 Significance of Matrix Estimation Changes	
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Matrix zonal trip ends	Slope within 0.99 and 1.01 Intercept near zero R ₂ in excess of 0.98
Trip length distributions	Means within 5% Standard deviations within 5%
Sector to sector level matrices	Differences within 5%

Table 5 Significance of Matrix Estimation Changes

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Trip length distributions	Means within 5% Standard deviations within 5%
Sector to sector level matrices	Differences within 5%

Impacts of Matrix Estimation: PM Peak

Sector:	Total	PDiff	-0.2%				
	Business		-0.3%				
	Commute		-0.5%				
	Other		-0.3%				
	LGVs		1.0%				
	HGVs		-1.0%				
		Pdiff - Mean	Pdiff - SD				
Trip Lengths:	Total	-0.6%	-0.1%				
	Business	-1.1%	-0.3%				
	Commute	-1.4%	-0.4%				
	Other	-1.2%	-0.4%				
	LGVs	2.0%	0.5%				
	HGVs	3.2%	0.9%				
Trip End:	Total	Origin RSq	Origin Slope	Origin Intercept	Dest RSq	Dest Slope	Dest Intercept
	Business	0.99	1.00	-0.169	0.99	0.99	1.584
	Commute	0.99	1.00	0.098	0.99	0.99	0.458
	Other	1.00	0.99	0.033	0.99	0.99	0.100
	LGVs	0.99	1.00	0.172	0.99	0.99	0.869
	HGVs	0.99	1.02	-0.192	0.99	1.01	0.097
Cell Values:	Total	RSq	Slope	Intercept			
	Business	0.99	1.01	-0.010			
	Commute	0.99	1.00	-0.003			
	Other	0.99	1.00	0.000			
	LGVs	0.99	1.01	-0.006			
	HGVs	0.99	1.00	0.001			
		RSq	Slope	Intercept			
		0.99	1.01	-0.010			
		0.99	1.01	-0.003			
		0.99	1.00	0.000			
		0.99	1.01	-0.006			
		0.99	1.00	0.001			
		0.94	0.98	0.000			

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