REGIONAL MODELLING SYSTEM

Modelling Services Framework

Mid-West Regional Model

Active Modes Model Development Report

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National Transport Authority

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Foreword

The NTA has developed a Regional Modelling System (RMS) for Ireland that allows for the appraisal of a wide range of potential future transport and land use alternatives. The RMS was developed as part of the Modelling Services Framework (MSF) by the National Transport Authority (NTA), SYSTRA and Jacobs Engineering Ireland.

The National Transport Authority's (NTA) Regional Modelling System comprises the National Demand Forecasting Model, five large-scale, technically complex, detailed and multi-modal regional transport models and a suite of Appraisal Modules covering the entire national transport network of Ireland. The five regional models are focussed on the travel-to-work areas of the major population centres in Ireland, i.e. Dublin, Cork, Galway, Limerick, and Waterford.

The development of the RMS followed a detailed scoping phase informed by NTA and wider stakeholder requirements. The rigorous consultation phase ensured a comprehensive understanding of available data sources and international best practice in regional transport model development.

The five discrete models within the RMS have been developed using a common framework, tied together with the National Demand Forecasting Model. This approach used repeatable methods; ensuring substantial efficiency gains; and, for the first time, delivering consistent model outputs across the five regions.

The RMS captures all day travel demand, thus enabling more accurate modelling of mode choice behaviour and increasingly complex travel patterns, especially in urban areas where traditional nine-to-five working is decreasing. Best practice, innovative approaches were applied to the RMS demand modelling modules including car ownership; parking constraint; demand pricing; and mode and destination choice. The RMS is therefore significantly more responsive to future changes in demographics, economic activity and planning interventions than traditional models.

The models are designed to be used in the assessment of transport policies and schemes that have a local, regional and national impact and they facilitate the assessment of proposed transport schemes at both macro and micro level and are a pre-requisite to creating effective transport strategies.

1 Introduction

1.1 Regional Modelling System

The NTA has developed a Regional Modelling System for the Republic of Ireland to assist in the appraisal of a wide range of potential future transport and land use options. The Regional Models (RM) are focused on the travel-to-work areas of the major population centres of Dublin, Cork, Galway, Limerick, and Waterford. The models were developed as part of the Modelling Services Framework by NTA, SYSTRA and Jacobs Engineering Ireland.

An overview of the 5 regional models is presented below in Table 1.1 and Figure 1.1.

Table 1.1 List of Regional Models

Model Name	Standard Abbreviation	Counties
West Regional Model	WRM	Galway, Mayo, Roscommon, Sligo, Leitrim, Donegal
East Regional Model	ERM	Dublin, Wicklow, Kildare, Meath, Louth, Wexford, Carlow, Laois, Offaly, Westmeath, Longford, Cavan, Monaghan
Mid-West Regional Model	MWRM	Limerick, Clare, Tipperary North
South East Regional Model	SERM	Waterford, Wexford, Carlow, Tipperary South
South West Regional Model	SWRM	Cork and Kerry

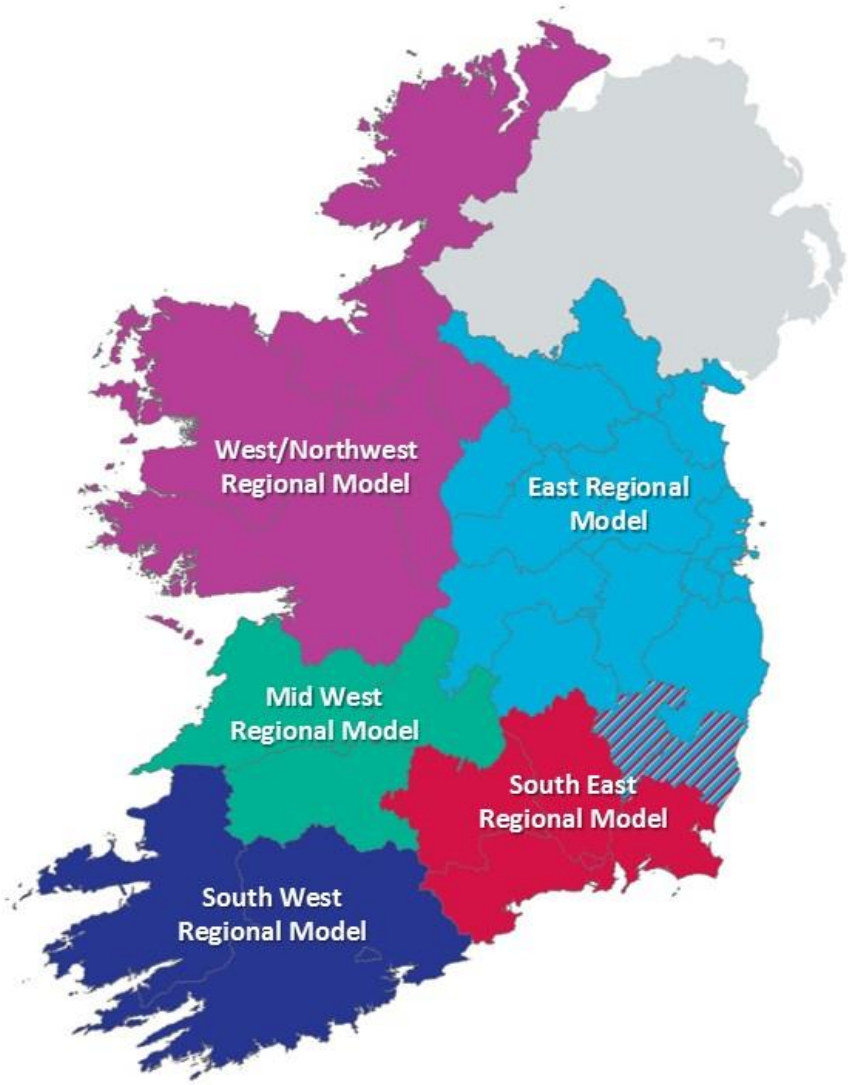

Figure 1.1 Regional Model Areas

1.2 Regional Modelling System Structure

The Regional Modelling System is comprised of three main components, namely:

- The National Demand Forecasting Model (NDFM)
- 5 regional models; and
- A suite of Appraisal Modules

The modelling approach is consistent across each of the regional models. The general structure of the SERM (and the other regional models) is shown below in Figure 1.2. The main stages of the regional modelling system are described below.

1.2.1 National Demand Forecasting Model (NDFM)

The NDFM is a single, national system that provides estimates of the total quantity of daily travel demand produced by and attracted to each of the 18,488 Census Small Areas. Trip generations and attractions are related to zonal attributes such as population, number of employees and other land-use data. See the NDFM Development Report for further information.

1.2.2 Regional Models (RM)

A regional model is comprised of the following key elements:

Trip End Integration

The Trip End Integration module converts the 24 hour trip ends output by the NDFM into the appropriate zone system and time period disaggregation for use in the Full Demand Model (FDM).

The Full Demand Model (FDM)

The FDM processes travel demand and outputs origin-destination travel matrices by mode and time period to the assignment models. The FDM and assignment models run iteratively until an equilibrium between travel demand and the cost of travel is achieved.

See the RMS Spec Full Demand Model Specification Report, RM Full Demand Model Development Report and SERM Full Demand Model Calibration Report for further information.

Assignment Models

The Road, Public Transport, and Active Modes assignment models receive the trip matrices produced by the FDM and assign them in their respective transport networks to determine route choice and the generalised cost for origin and destination pair.

The Road Model assigns FDM outputs (passenger cars) to the road network and includes capacity constraint, traffic signal delay and the impact of congestion. See the RM Spec Road Model Specification Report for further information.

The Public Transport Model assigns FDM outputs (person trips) to the PT network and includes the impact of capacity restraint, such as crowding on PT vehicles, on people's perceived cost of travel. The model includes public transport networks and services for all

PT sub-modes that operate within the modelled area. See the RM Spec Public Transport Model Specification Report for further information.

Secondary Analysis

The secondary analysis application can be used to extract and summarise model results from each of the regional models.

1.2.3 Appraisal Modules

The Appraisal Modules can be used on any of the regional models to assess the impacts of transport plans and schemes. The following impacts can be informed by model outputs (travel costs, demands and flows):

- Economy;
- Safety;
- Environmental;
- Health; and
- Accessibility and Social Inclusion.

Further information on each of the Appraisal Modules can be found in the following reports:

- Economic Module Specification Report;
- Safety Module Specification Report;
- Environmental Module Specification Report;
- Health Module Specification Report; and
- Accessibility and Social Inclusion Module Specification Report.

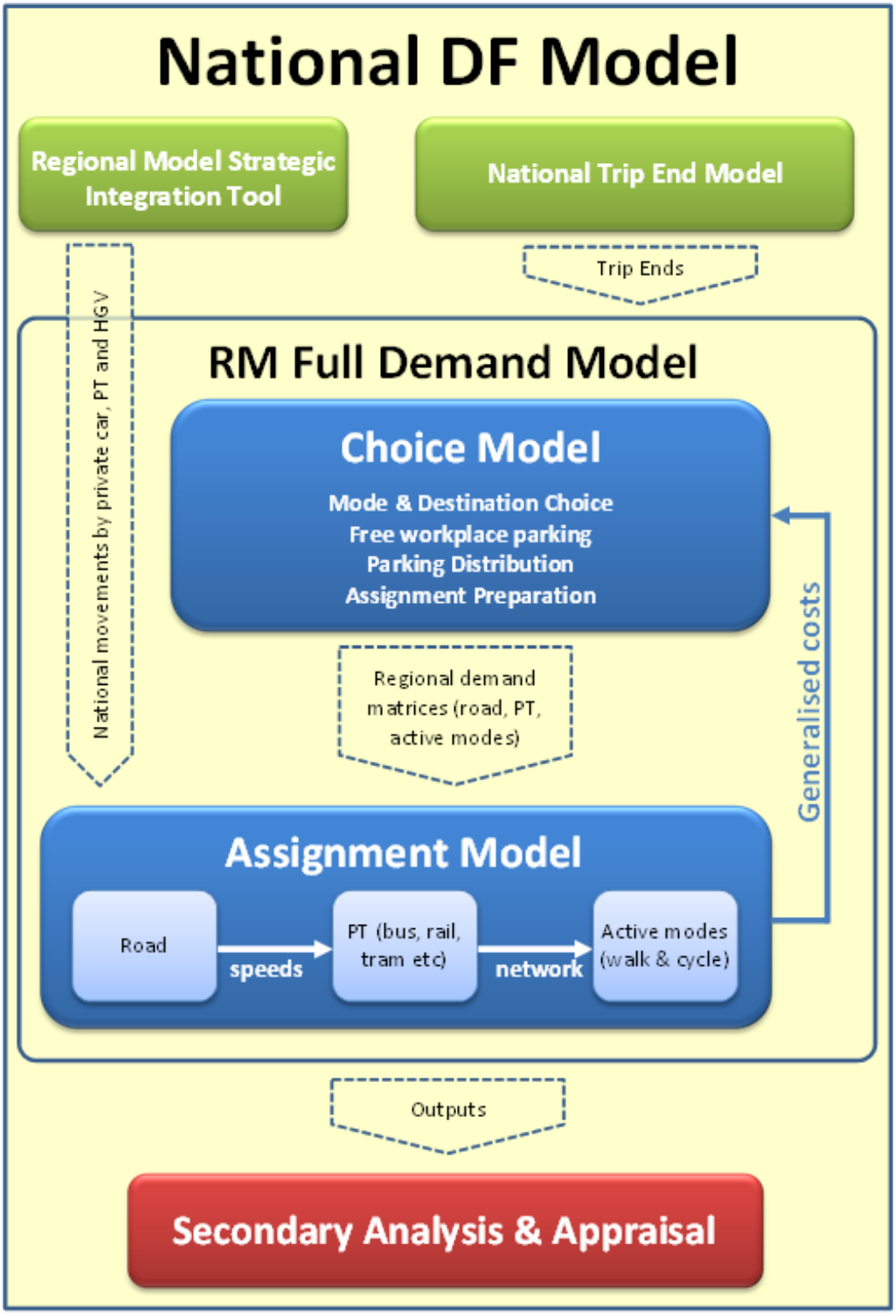

Figure 1.2 National and Regional Model Structure

1.3 MWRM Active Modes Model

The development of the Mid-West Regional Model (MWRM) Active Modes Model (AMM) is based on the specification of RMS Active Modes Report. The AMM implementation described within this report for the MWRM relates only to Version 1 of the MWRM model. The AMM component of MWRM v1 differs from this original specification in that it was necessary to reduce the number of time periods to be consistent with the MWRM v1 PT Model (see the Public Transport Model Specification Report).

1.3.1 MWRM Zone System

The AMM zone system is consistent with the overall ERM as described in the MWRM Zone System Development Report, and illustrated in **Error! Reference source not found.**.

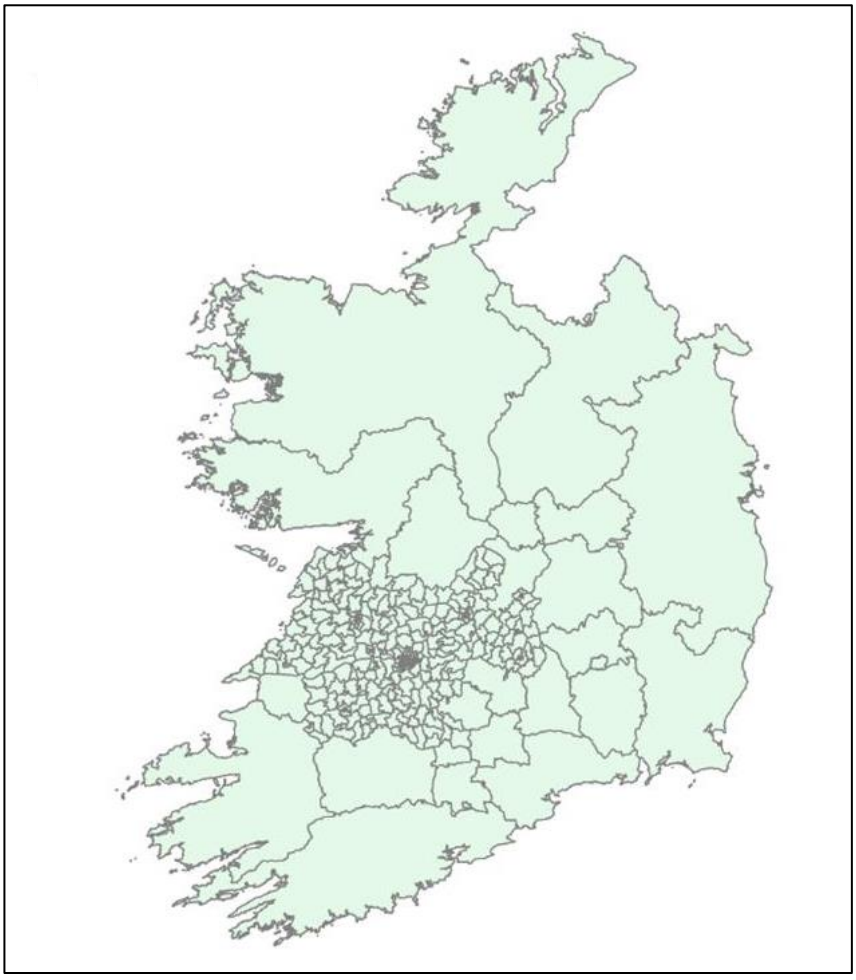

Figure 1.3 MWRM Zone System

The key zone system statistics include:

- Total zones: 456

- Limerick City zones: 94;
- Limerick County zones: 126;
- Clare County zones: 131;
- North Tipperary County: 77;
- External zones: 26; and.
- Special zones: 2.
- The high level of zonal detail allows the AMM to be modelled to a greater degree of accuracy. Increased zonal density in urban areas such as Limerick City allows for the accurate representation of walk and cycle times. This allows the cost of travel by active modes to be calculated with greater accuracy within the model.

1.3.2 Base Year

The base year of the model is 2012 with a nominal month of April. This is largely driven by the date of the Census (POWSCAR) and other travel surveys (e.g. the National Household Travel Survey). It should be noted that the POWSCAR dates to 2011 but the travel patterns are assumed to be broadly the same in 2012.

1.3.3 Time Periods

The five weekday periods modelled in the MWRM are detailed in Table 1.2. The periods allow the relative differential in travel cost to be represented. Travel cost by active modes is the same through all time periods as no congestion is represented for walk and cycle in the model. The five time periods have been kept to be consistent with the other assignment models (Road and PT), and to allow mode share comparison across all time periods.

The table below also shows the period to hour factors employed to reduce the period demand (output by the demand model) to the assignment demand (1-hour demand to be assigned to the network). The period to peak hour factors were derived from count data.

Table 1.2 MWRM Time Periods

Period	Demand Model Full Period	Assignment Period	Period To Peak Hour Factors (walk)	Period To Peak Hour Factors (cycle)
AM Peak	07:00-10:00	Peak hour (factored from period)	0.447	0.519
Morning Interpeak (IP1)	10:00-13:00	Average hour from full period	0.333	0.333
Afternoon Interpeak	13:00-16:00	Average hour from full period	0.333	0.333

(IP2)				
PM Peak	16:00-19:00	Peak hour (factored from period)	0.342	0.421
Off Peak	19:00-07:00	Not Assigned	N/A	N/A

1.4 This Report

This report focuses on the development of the Active Modes Model (AMM) within the Mid-West Regional Model (MWRM) and includes the following chapters:

- Chapter 2: MWRM AMM Development provides information on the specification of the AMM and an overview of its development;
- Chapter 3: MWRM AMM Validation sets out the specification and execution of the model validation process; and
- Chapter 4: Conclusion and Recommendations outlines the key points of the AMM development and next steps required to improve the modelling of active modes.

2 MWRM AMM Development

2.1 Overview

As per Section 3.9 of the AMM Specification Report, the MWRM AMM network comprises a number of input components, as follows:

- Road network links (e.g. the same links database that holds the road component of the PT Cube Voyager network);
- Walking links (e.g. any walk links included in the MWRM PT model plus any further links that allow walk access);
- Cycle speeds on any cycle accessible link – these were set as per Section 3.9.3 of the AMM Specification Report; and
- Zone connectors (the connection points from zone centroids to 'physical' network) – these are completely consistent with the PT Model; therefore, please see MWRM Public Transport Model Development Report for further information.

2.1.1 Cycle Speeds

As the MWRM does not have any coded cycle links there is not a cycle infrastructure diagram detailing the cycle quality of service for the Mid-West region.

Average walk and cycle speeds differ by age. To take this into account in the AMM, three age categories have been defined and average walk and cycle speeds calculated based on NHTS 2012 data. Age categories considered are:

- 0 to 20 years;
- 20 to 60 years; and
- Over 60 years.

Default walk and cycle speeds coded in the AMM are values corresponding to the 20 to 60 years age category. Additional factors are applied to walk and cycle speeds for Education (EDU) and Retired (RET) user classes. The youngest age category (0-20 years) speeds are used for EDU and the oldest age category (over 60 years) speeds are used for RET. Table 2.1 provides walk and cycle speed factors used in the AMM.

Table 2.1 Default Walk and Cycle speed factors coded in the AMM

User Class	Walk Speed Factor	Cycle Speed Factor
EMP, COM and OTH	1.00	1.00
EDU	0.96	0.83
RET	0.86	0.79

2.1.2 Pedestrian Only Links

Certain links are restricted to pedestrians only, and do not allow access for cyclists. These links are defined as inputs to the model in the file PED_ONLY.DBF. This information has been coded based on local knowledge, supported by a review of mapping / Street View.

No such links have been coded in the MWRM.

2.2 MWRM AMM Cube Voyager Implementation

Error! Reference source not found. below is a screenshot of the AMM Cube Application. It shows the different steps and the sequential order different tasks are executed.

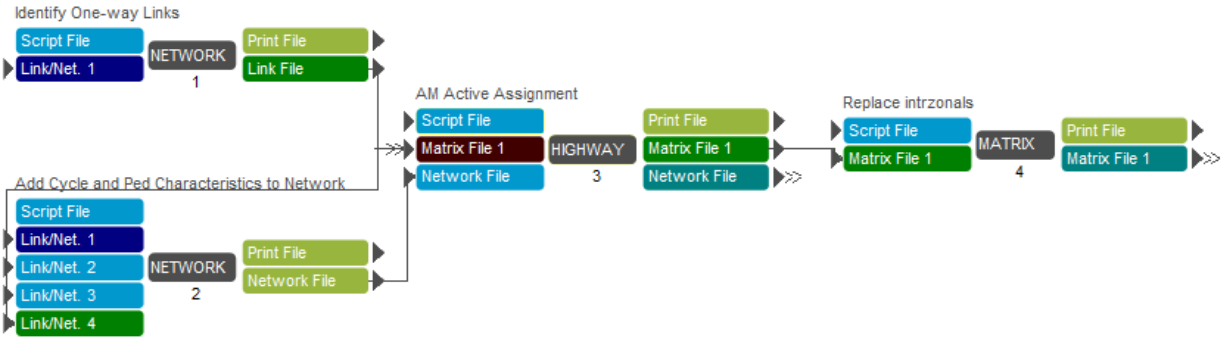

Figure 2.1 Screenshot of the Active Modes Cube application

The role of the Cube application modules shown in Figure 2.1**Error! Reference source not found.** are detailed below:

- Network module (execution order 1): Take the network links from the PT model, delete the rail links (no walking or cycling on those links) and generate reversed links for walking.
- Network module (execution order 2): Add cycle speeds (when defined) to the network, delete links banned from walking/cycling (such as motorways). Pedestrian only links (as discussed in 2.1.2) and specific Cycle speed (as discussed in 2.1.1) are input at that stage.
- Highway module (execution order 3): All-or-nothing assignment of both walk and cycle matrices onto the network. Fastest path considered. Different speeds by user class (as discussed in 2.1.1) are coded in that module.
- Matrix module (execution order 4): Calculate intrazonal cost as the minimum between 40% of the quickest route and 30 minutes.

3 MWRM AMM Validation

3.1 Introduction

This section presents the validation of the MWRM v1 Active Modes Model. As discussed in the AMM Specification report individual link flows are not calibrated and direct matrix estimation is not used. However, the modelled flows can be compared against count data as a sense check. In the case of MWRM v1, walking and cycle data was available in the Limerick city area. Pedestrian and cyclist counts were undertaken in November 2014.

3.2 Active Modes Demand

The overall walk and cycle demands are compared to the National Household Travel Survey (NHTS) 2012, by time period. For further information on the demand, please refer to RM Full Demand Model Development Report.

Figure 3.1 and Figure 3.2 below are extracted from the demand dashboard.

For each time period, total Walk demand modelled is within +/- 25% of the factored NHTS demand, which is used as the reference the model should replicate.

The cycle demand is overestimated in the model for each time period, and overall by 65%.

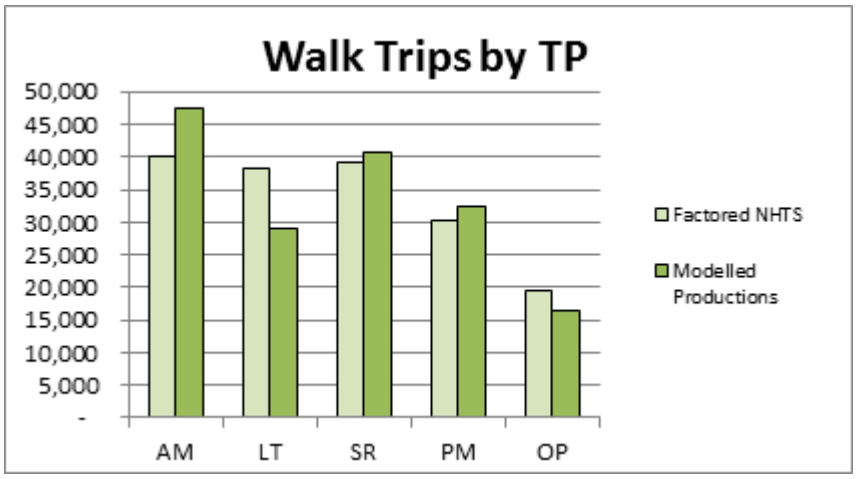

Figure 3.1 Total Walk trips by Time Period – Demand dashboard

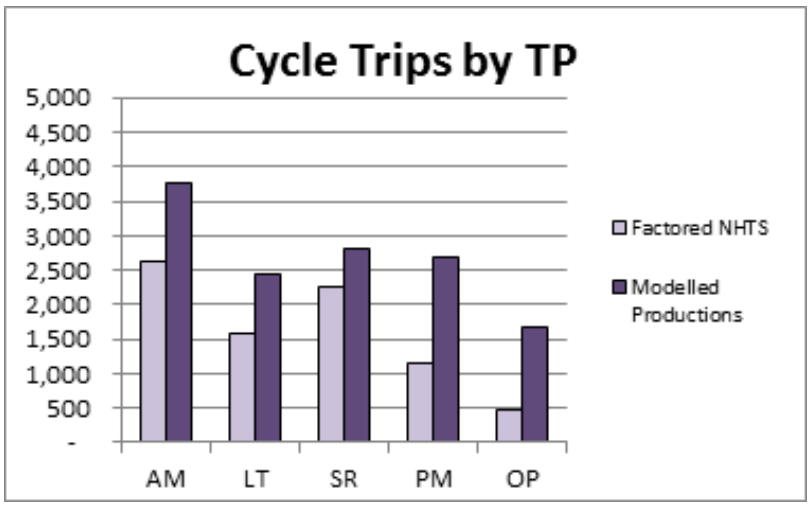

Figure 3.2 Total Cycle trips by Time Period – Demand dashboard

3.3 Walk mode

Walk flows output from the Public Transport model (walk trips between zones and PT stops) have to be considered in the validation process as observed data includes those flows. Both flows (from the AMM and the PT model) are then added and compared against counts, as detailed in table below.

3.3.1 AM Inbound

Table 3.1 Modelled Walk Flows vs. Counts - AM peak hour Inbound

Location		Walk Flow (AMM)	Walk Flow (PT model)	Total Walk Flow	Count	Diff	GEH
181	Ballinacurra Road	103	133	236	163	73	5.2
181	Ballinacurra Road	447	247	694	100	594	29.8
181	Father Russel Road	304	171	476	32	444	27.9
181	Father Russel Road	41	34	76	19	57	8.3
181	St Nessan's Road	161	54	216	13	202	18.9
181	St Nessan's Road	78	61	139	189	-50	3.9
184	Ballinacurra Road	56	13	69	21	48	7.2
184	Ballinacurra Road	361	17	378	44	334	23.0
184	Ballinacurra	457	23	479	52	427	26.2

	Road						
184	Ballinacurra Road	84	16	99	23	77	9.8
184	Childers Road	27	4	32	3	29	7.0
184	Childers Road	96	7	103	9	94	12.5
185	Rosbrien Road	33	27	60	35	25	3.7
185	Rosbrien Road	92	49	141	72	69	6.6
185	Childers Road	108	7	115	56	59	6.4
185	Childers Road	31	4	35	42	-7	1.1
185	Greenfields	33	14	47	52	-5	0.8
185	Greenfields	12	17	29	13	16	3.4
185	Childers Road	90	40	129	71	58	5.8
185	Childers Road	129	17	146	84	62	5.8
186	Lower Mallow Street	29	17	46	85	-39	4.9
186	Lower Mallow Street	54	56	111	76	35	3.6
186	O'Connell Street	122	18	140	143	-3	0.3
186	O'Connell Street	142	44	185	131	55	4.4
186	Mallow Street	32	56	88	84	4	0.4
186	Mallow Street	22	23	46	84	-38	4.7
186	O'Connell Street	135	39	174	113	61	5.1
186	O'Connell Street	99	7	106	153	-47	4.1
187	Upper William Street	53	7	60	299	-239	17.8
187	Upper William Street	69	2	72	274	-203	15.4
187	Roxboro Road	38	0	38	121	-83	9.4
187	Roxboro Road	31	1	32	184	-152	14.6
187	Newtown Mahon	74	19	93	154	-61	5.5
187	Newtown Mahon	58	14	72	133	-61	6.0
187	Old Windmill Road	36	7	43	114	-70	7.9
187	Old Windmill Road	43	16	59	71	-12	1.5
188	Upper William Street	115	21	136	211	-75	5.7
188	Upper William Street	184	7	191	263	-72	4.8
188	Upper Gerald Griffin Str	103	38	142	89	53	5.0
188	Upper Gerald Griffin Str	274	14	288	94	194	14.0

188	Upper William Street	123	2	125	186	-61	4.9
188	Upper William Street	85	7	93	234	-141	11.0
188	Lower Gerald Griffin Str	336	18	354	155	199	12.5
188	Lower Gerald Griffin Str	133	52	186	75	111	9.7
189	Sexton Street	94	43	136	58	79	8.0
189	Sexton Street	29	4	33	84	-51	6.7
189	Upper Gerald Griffin Str	237	222	459	332	127	6.4
189	Upper Gerald Griffin Str	489	73	562	211	351	17.8
189	Sexton Street	270	80	350	125	225	14.6
189	Sexton Street	55	43	98	233	-136	10.5
189	Upper Gerald Griffin Str	274	14	288	95	193	14.0
189	Upper Gerald Griffin Str	103	38	142	72	70	6.8
194	Golf Links Road North	9	1	10	0	10	4.2
194	Golf Links Road North	104	8	112	1	111	14.7
194	Ballysimon Road East	2	0	2	0	2	1.9
194	Ballysimon Road East	9	0	9	0	9	4.2
194	Golf Links Road South	29	8	37	0	36	8.4
194	Golf Links Road South	5	0	6	0	6	3.3
194	Ballysimon Road West	87	0	87	0	87	13.1
194	Ballysimon Road West	9	1	9	0	9	4.3
205	Lord Edward Street	79	337	415	63	352	22.7
205	Lord Edward Street	204	84	288	117	171	12.0
205	Lord Edward Street	261	62	323	68	255	18.2
205	Lord Edward	104	148	251	54	197	16.0

	Street						
205	Upper Mallow Street	25	32	57	89	-32	3.8
205	Upper Mallow Street	57	199	255	31	224	18.7
	TOTAL	**7,669**	**2,838**	**10,507**	**6,255**	**4,252**	**46**

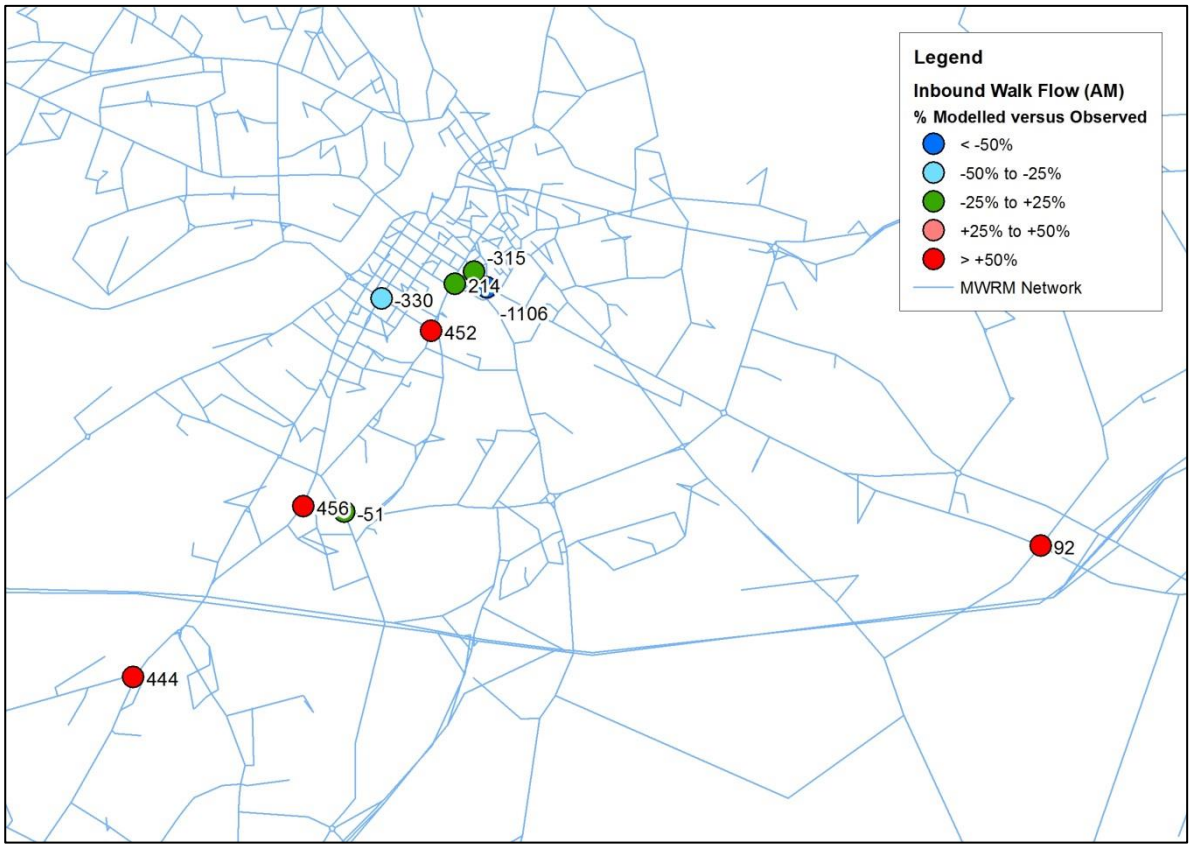

Figure 3.3 Modelled Walk Flows vs. Counts - AM peak hour Inbound

3.3.2 PM Outbound

Table 3.2 Modelled Walk Flows vs. Counts - PM peak hour Outbound

Location		Walk Flow (AMM)	Walk Flow (PT model)	Total Walk Flow	Count	Diff	GEH
181	Ballinacurra Road	380	105	485	82	402	23.9
181	Ballinacurra Road	133	112	245	83	162	12.7
181	Father Russel Road	58	48	105	28	77	9.4
181	Father Russel Road	254	54	308	41	266	20.2
181	St Nessan's Road	95	45	140	18	121	13.6
181	St Nessan's Road	137	38	175	68	107	9.7
184	Ballinacurra Road	307	24	330	63	267	19.0
184	Ballinacurra Road	91	6	97	49	48	5.6
184	Ballinacurra Road	127	13	140	50	90	9.3
184	Ballinacurra Road	394	26	420	73	348	22.2
184	Childers Road	88	4	92	12	79	11.0
184	Childers Road	36	7	44	11	33	6.3
185	Rosbrien Road	64	30	93	22	71	9.4
185	Rosbrien Road	28	12	40	25	15	2.6
185	Childers Road	41	7	48	94	-46	5.5
185	Childers Road	98	4	102	91	11	1.1
185	Greenfields	10	8	18	36	-18	3.4
185	Greenfields	25	12	37	43	-7	1.0
185	Childers Road	116	8	124	86	38	3.7
185	Childers Road	80	25	105	75	31	3.2
186	Lower Mallow Street	44	21	64	114	-49	5.2
186	Lower Mallow Street	35	23	58	118	-60	6.4
186	O'Connell Street	117	14	130	185	-55	4.4

186	O'Connell Street	110	17	127	219	-92	7.0
186	Mallow Street	19	20	39	77	-38	5.0
186	Mallow Street	25	23	48	81	-33	4.1
186	O'Connell Street	91	13	105	227	-122	9.5
186	O'Connell Street	100	5	105	211	-106	8.4
187	Upper William Street	60	2	62	248	-186	15.0
187	Upper William Street	51	5	56	213	-157	13.5
187	Roxboro Road	29	0	29	69	-40	5.7
187	Roxboro Road	32	2	34	90	-55	7.0
187	Newtown Mahon	56	16	72	129	-56	5.6
187	Newtown Mahon	64	9	73	144	-71	6.8
187	Old Windmill Road	37	9	46	29	17	2.7
187	Old Windmill Road	34	12	45	46	0	0.1
188	Upper William Street	158	11	169	360	-191	11.7
188	Upper William Street	118	9	127	271	-143	10.2
188	Upper Gerald Griffin Str	231	19	250	102	148	11.2
188	Upper Gerald Griffin Str	120	9	130	133	-4	0.3
188	Upper William Street	85	5	90	253	-163	12.4
188	Upper William Street	105	2	108	276	-169	12.2
188	Lower Gerald Griffin Str	153	13	166	116	50	4.2
188	Lower Gerald Griffin Str	284	28	312	149	163	10.8
189	Sexton Street	30	8	37	156	-118	12.0
189	Sexton Street	61	3	64	109	-45	4.8
189	Upper Gerald Griffin Street	430	61	492	192	300	16.2
189	Upper Gerald	252	106	358	279	79	4.4

	Griffin Str						
189	Sexton Street	78	26	104	76	28	3.0
189	Sexton Street	215	35	250	54	196	15.9
189	Upper Gerald Griffin Str	120	9	130	90	40	3.8
189	Upper Gerald Griffin Str	231	19	250	80	171	13.3
194	Golf Links Road North	102	2	104	2	102	14.0
194	Golf Links Road North	20	2	21	1	20	6.2
194	Ballysimon Road East	9	0	9	0	9	4.1
194	Ballysimon Road East	3	0	3	0	2	1.8
194	Golf Links Road South	9	2	11	0	10	4.4
194	Golf Links Road South	28	0	28	0	28	7.5
194	Ballysimon Road West	16	0	16	0	16	5.5
194	Ballysimon Road West	86	2	88	2	86	12.9
205	Lord Edward Street	164	102	266	113	153	11.1
205	Lord Edward Street	83	102	184	101	83	6.9
205	Lord Edward Street	107	57	165	82	83	7.4
205	Lord Edward Street	206	49	255	60	196	15.6
205	Upper Mallow Street	43	48	90	75	15	1.6
205	Upper Mallow Street	25	56	81	101	-20	2.1
	TOTAL	**7,038**	**1,564**	**8,601**	**6,484**	**2,117**	**24**

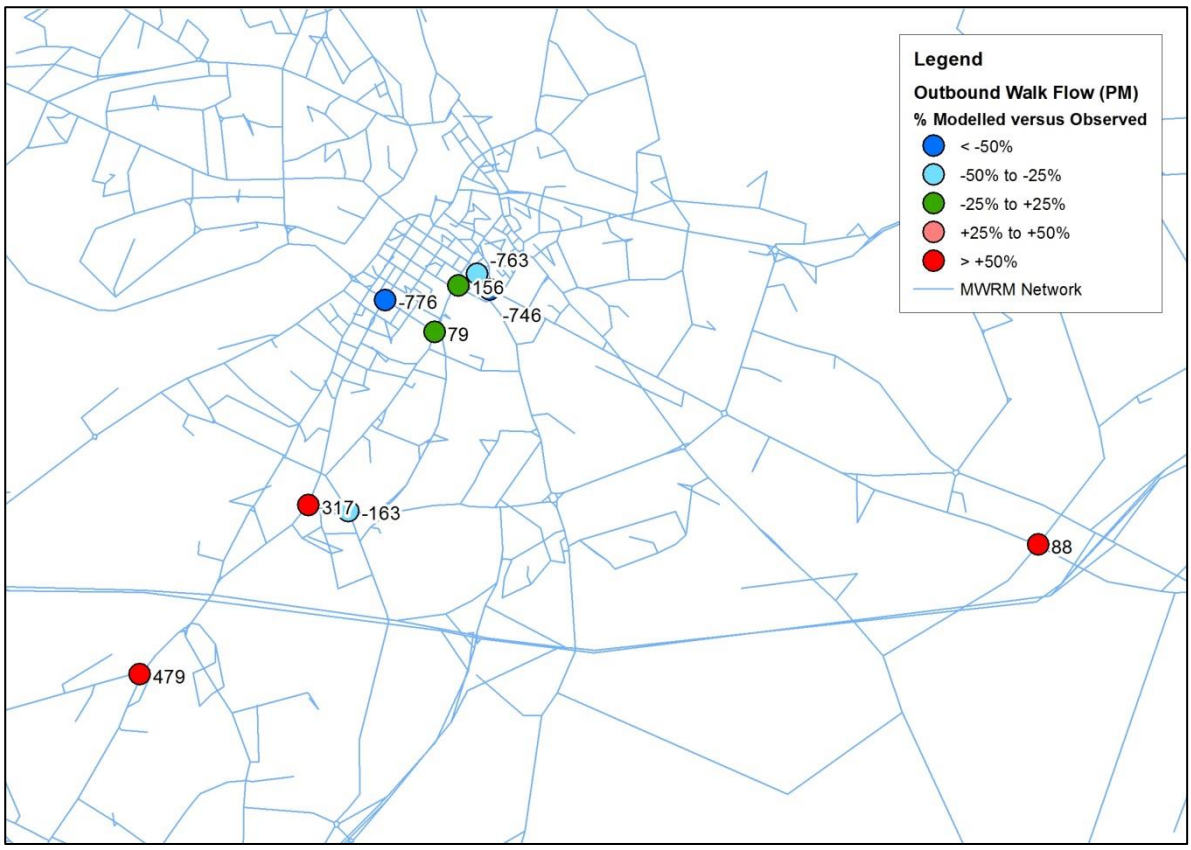

Figure 3.4 Modelled Walk Flows vs. Counts - PM peak hour Outbound

3.4 Cycle mode

Cycle flows considered in the validation are shown in the table below.

3.4.1 AM Inbound

Table 3.3 Modelled Cycle Flows vs. Counts - AM peak hour Inbound

Location		Cycle Flow (AMM)	Count	Difference	GEH
181	Ballinacurra Road	33	16	17	3.4
181	Ballinacurra Road	56	9	47	8.3
181	Father Russel Road	30	4	27	6.5
181	Father Russel Road	10	0	10	4.5
181	St Nessan's Road	29	6	23	5.5
181	St Nessan's Road	24	17	7	1.7
184	Ballinacurra Road	38	7	31	6.6
184	Ballinacurra Road	25	8	18	4.3
184	Ballinacurra Road	44	9	35	6.8
184	Ballinacurra Road	48	9	39	7.2
184	Childers Road	13	3	10	3.7
184	Childers Road	21	1	20	6.1
185	Rosbrien Road	0	0	0	0
185	Rosbrien Road	16	1	15	5.1
185	Childers Road	23	3	20	5.7
185	Childers Road	13	2	11	4.2
185	Greenfields	7	1	6	2.9
185	Greenfields	1	0	1	1.6
185	Childers Road	22	2	20	5.9
185	Childers Road	22	3	19	5.4
186	Lower Mallow Street	0	0	0	0
186	Lower Mallow Street	12	4	8	3.0
186	O'Connell Street	2	3	0	0.2
186	O'Connell Street	26	11	15	3.4
186	Mallow Street	8	2	6	2.8
186	Mallow Street	0	1	-1	1.4
186	O'Connell Street	27	11	16	3.7
186	O'Connell Street	0	0	0	0
187	Upper William Street	28	6	21	5.2
187	Upper William Street	0	0	0	0
187	Roxboro Road	13	1	13	4.8
187	Roxboro Road	0	0	0	0
187	Newtown Mahon	0	0	0	0
187	Newtown Mahon	30	6	23	5.5

187	Old Windmill Road	0	0	0	1.0
187	Old Windmill Road	12	1	11	4.5
188	Upper William Street	58	6	52	9.1
188	Upper William Street	0	0	0	0
188	Upper Gerald Griffin Str	0	0	0	0
188	Upper Gerald Griffin Str	57	5	52	9.4
188	Upper William Street	0	0	0	0
188	Upper William Street	28	6	22	5.4
188	Lower Gerald Griffin Str	46	5	42	8.3
188	Lower Gerald Griffin Str	20	1	20	6.1
189	Sexton Street	0	0	0	0
189	Sexton Street	2	1	1	1.1
189	Upper Gerald Griffin Str	0	0	0	0
189	Upper Gerald Griffin Str	74	7	67	10.5
189	Sexton Street	34	5	29	6.5
189	Sexton Street	0	0	0	0
189	Upper Gerald Griffin Str	57	3	54	9.9
189	Upper Gerald Griffin Str	0	0	0	0
194	Golf Links Road North	1	1	1	0.8
194	Golf Links Road North	18	3	15	4.7
194	Ballysimon Road East	1	0	1	1.4
194	Ballysimon Road East	1	0	1	1.6
194	Golf Links Road South	10	1	9	3.8
194	Golf Links Road South	0	1	0	0.0
194	Ballysimon Road West	11	2	9	3.4
194	Ballysimon Road West	4	1	3	2.2
205	Lord Edward Street	0	0	0	0
205	Lord Edward Street	43	14	29	5.4
205	Lord Edward Street	52	2	49	9.5
205	Lord Edward Street	0	1	-1	1.4
205	Upper Mallow Street	2	13	-11	4.1
205	Upper Mallow Street	11	0	11	4.6
	TOTAL	**1,160**	**217**	**944**	**36**

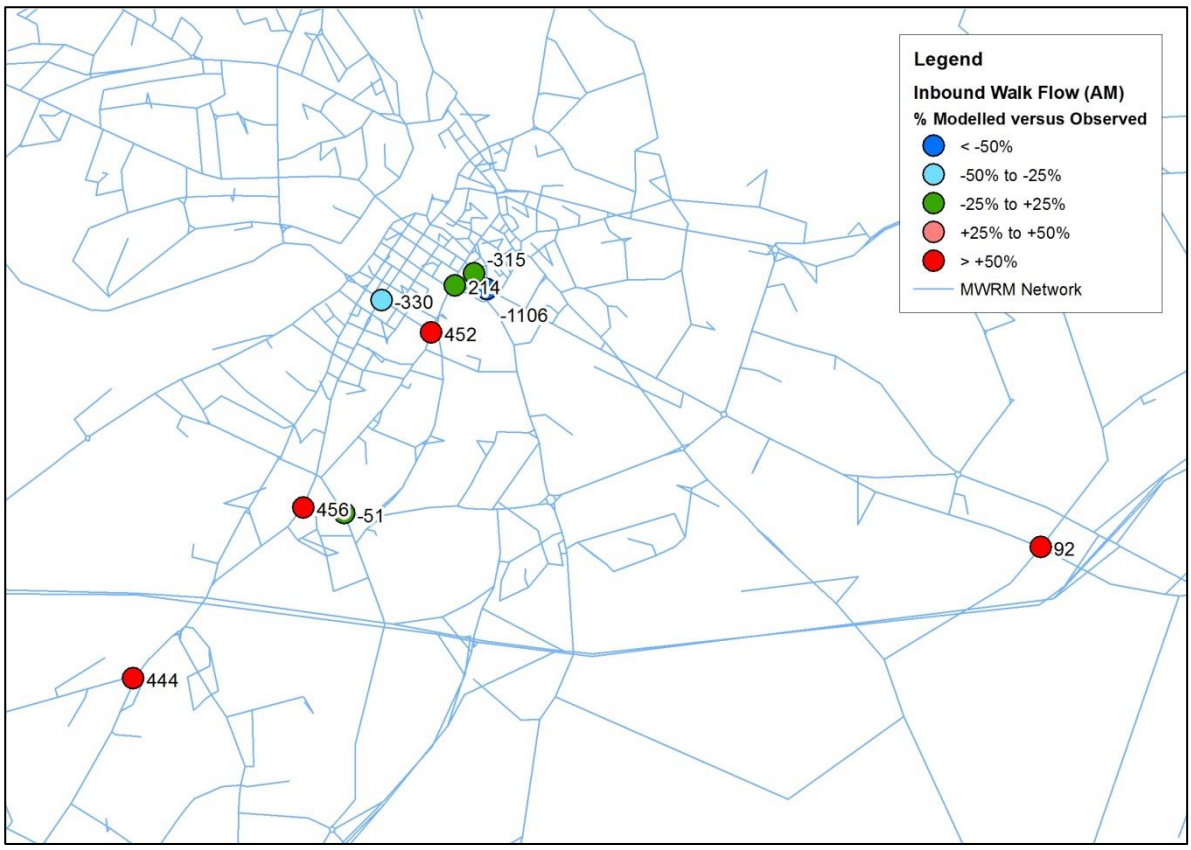

Figure 3.5 Modelled Cycle Flows vs. Counts - AM peak hour Inbound

3.4.2 PM Outbound

Table 3.4 Modelled Cycle Flows vs. Counts - PM peak hour Outbound

Location		Cycle Flow (AMM)	Count	Difference	GEH
181	Ballinacurra Road	45	5	40	7.9
181	Ballinacurra Road	56	8	48	8.4
181	Father Russel Road	30	1	29	7.4
181	Father Russel Road	10	1	9	3.7
181	St Nessan's Road	29	8	21	4.9
181	St Nessan's Road	24	4	20	5.3
184	Ballinacurra Road	38	10	28	5.8
184	Ballinacurra Road	25	2	23	6.3
184	Ballinacurra Road	44	3	41	8.3
184	Ballinacurra Road	48	12	36	6.5
184	Childers Road	13	3	10	3.5
184	Childers Road	21	2	20	5.8
185	Rosbrien Road	0	0	0	0
185	Rosbrien Road	16	1	15	5.2
185	Childers Road	23	3	20	5.7
185	Childers Road	13	3	10	3.5
185	Greenfields	7	0	6	3.4
185	Greenfields	1	0	1	0.9
185	Childers Road	22	3	19	5.2
185	Childers Road	22	2	19	5.6
186	Lower Mallow Street	0	0	0	0
186	Lower Mallow Street	12	5	7	2.4
186	O'Connell Street	2	1	1	0.8
186	O'Connell Street	26	8	18	4.4
186	Mallow Street	8	2	6	2.7
186	Mallow Street	0	0	0	0
186	O'Connell Street	27	9	18	4.2
186	O'Connell Street	0	0	0	0
187	Upper William Street	28	3	25	6.5
187	Upper William Street	0	0	0	0
187	Roxboro Road	13	0	13	5.1
187	Roxboro Road	0	0	0	0
187	Newtown Mahon	0	0	0	0
187	Newtown Mahon	30	3	27	6.6
187	Old Windmill Road	0	0	0	0.1
187	Old Windmill Road	12	0	12	4.8
188	Upper William Street	58	3	55	9.9

188	Upper William Street	0	0	0	0
188	Upper Gerald Griffin Str	0	0	0	0
188	Upper Gerald Griffin Str	57	6	50	9.0
188	Upper William Street	0	0	0	0
188	Upper William Street	28	3	25	6.5
188	Lower Gerald Griffin Str	46	5	41	8.0
188	Lower Gerald Griffin Str	20	0	20	6.3
189	Sexton Street	0	0	0	0
189	Sexton Street	2	0	2	1.7
189	Upper Gerald Griffin Str	0	0	0	0
189	Upper Gerald Griffin Str	74	10	64	9.9
189	Sexton Street	34	3	31	7.1
189	Sexton Street	0	0	0	0
189	Upper Gerald Griffin Str	57	7	50	8.9
189	Upper Gerald Griffin Str	0	0	0	0
194	Golf Links Road North	1	1	0	0.4
194	Golf Links Road North	18	1	16	5.3
194	Ballysimon Road East	1	0	1	0.7
194	Ballysimon Road East	1	0	1	0.9
194	Golf Links Road South	10	0	10	4.2
194	Golf Links Road South	0	1	0	0.4
194	Ballysimon Road West	11	1	10	4.1
194	Ballysimon Road West	4	0	4	2.7
205	Lord Edward Street	0	0	0	0
205	Lord Edward Street	43	3	39	8.2
205	Lord Edward Street	52	1	50	9.8
205	Lord Edward Street	0	3	-3	2.6
205	Upper Mallow Street	2	5	-4	1.9
205	Upper Mallow Street	11	0	11	4.6
	TOTAL	**1,173**	**160**	**1,013**	**39**

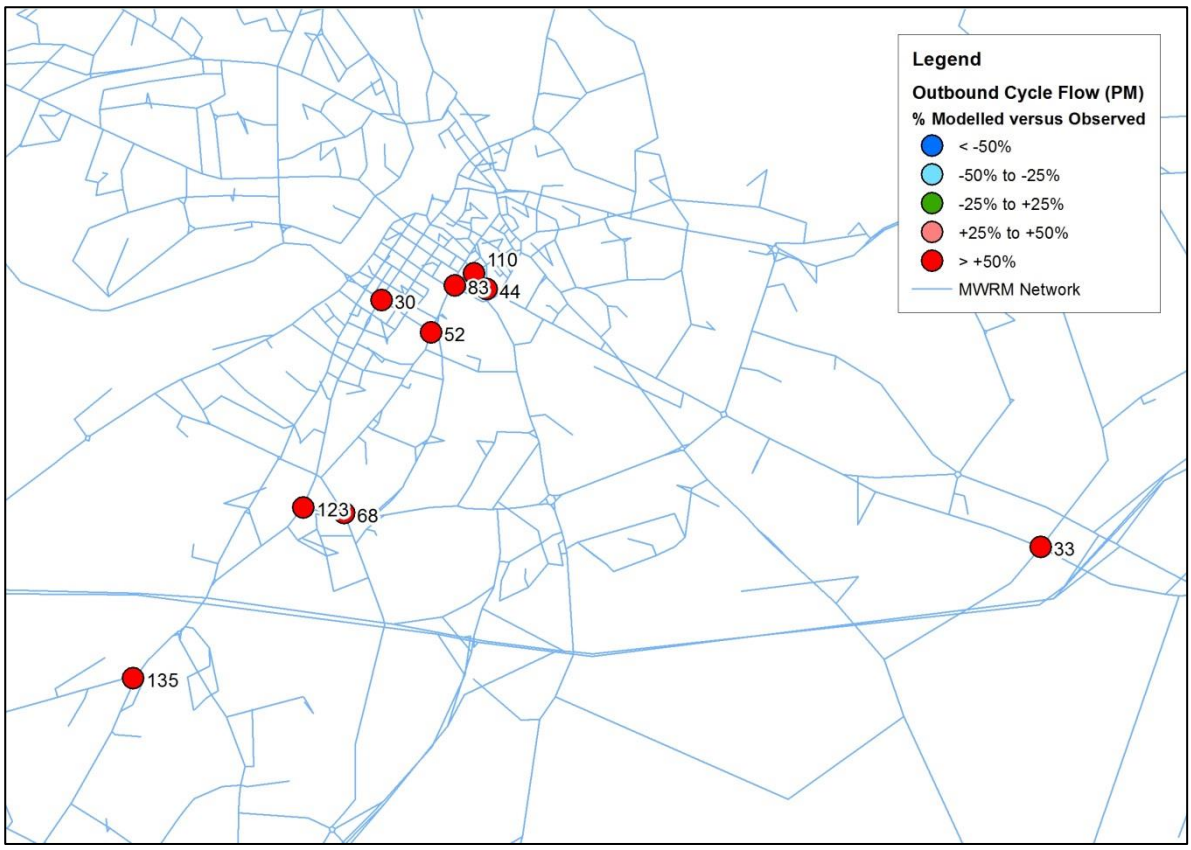

Figure 3.6 Modelled Cycle Flows vs. Counts - PM peak hour Outbound

4 Conclusion and Recommendations

4.1 Overview

This report provides information on the development and validation of the Active Modes Model component of the Mid-West Regional Model. This section summarises the key points of the model development, the strength and weakness of the model and a set of recommendations for possible further enhancements.

4.2 Model Development – Key points

The AMM network is the aggregation of different networks (road and walking), with equivalent node, link, zone connectors, and numbering convention.

Network speeds are set based on fixed assumptions for walking and on a rule-based approach for cycling. Walking is assumed at a constant rate of 5.1kph, independent of link type, for Employee (EMP), Commuter (COM) and Others (OTH) user classes. Following similar approach as for cycling (see 2.1.1), Education and Retired user classes walk speeds are factored (by 0.96 for EDU and by 0.86 for RET). Assignment is based on a shortest distance path.

For cycling, a system was developed during model specification to assign speeds based on link type, where information on Quality of Service, and/or or descriptions of other characteristics (road type, presence of marked cycle lanes, etc.) were used to assign speeds of between 12kph and 20kph. As for walking, assignment is based on shortest path. For both walk and cycle, no account of congestion is taken account of in determining route choice.

The Active Modes Model is used to output costs skims, based purely on time travelled, to the demand model. Otherwise, it is not intended for analysis of actual walking and cycling journeys, as there is insufficient representation of the on-the-ground conditions that influence the speed and routing of such trips.

4.3 Model Validation

Modelled flows at each of the count locations are low for walk in both the AM and PM compared against the observed data, while modelled cycle flows are higher than the observed data in both time periods. No attempt has been made to address this, but is deemed acceptable for this version of the MWRM.

4.4 Recommendations

Following the development and the calibration/validation of the overall MWRM, some areas have been identified where potential improvements could be made, as follows:

- Conduct surveys of walking and cycling speeds and routing across a range of road users, which would allow development of more refined assignment;

- Conduct surveys which differentiate visitors from the standard modelled journey purposes;
- Consider how cyclists in particular are affected by congestion effects and/or particular characteristics of junctions; and
- Classify links using pedestrian oriented characteristics (pedestrianized area, number of shops, large sidewalks) to reflect their attractiveness for walking in the assignment.

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