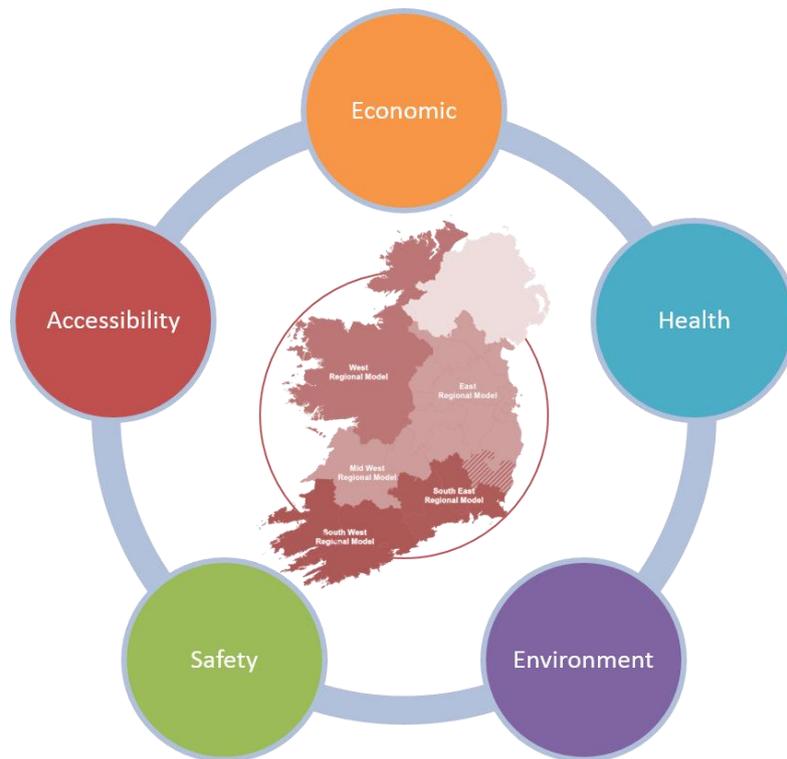




# Údarás Náisiúnta Iompair National **Transport** Authority



## **Accessibility & Social Inclusion Module**

### **User Guide**

March 2021 (v3.1.0)

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## Foreword

This document is designed to guide both new and experienced users through the main processes of the Accessibility and Social Inclusion Module as part of the NTA's Appraisal Toolkit. Note this tool and User Guide have been designed and developed for the V3 RMS models. It includes a troubleshooting section to help guide the user through any known issues that may arise through its use. For more detailed information on the module please see the Accessibility and Social Inclusion Module Development Report and Version Control Log.

It is assumed the user has prior CUBE and Accessibility and Social Inclusion assessment experience.

## 1 Introduction

### 1.1 Background

The Accessibility and Social Inclusion Appraisal Module forms part of the NTA's Appraisal Toolkit, which has been built for efficient manipulation of regional model outputs that will support strategy development, assessment and scheme appraisal.

This document is designed to guide both new and experienced users through the Accessibility and Social Inclusion Module of the NTA's Appraisal Toolkit. This document is split into sections that each describe an element of the process. The process is described below and where relevant the user is directed to the relevant section of the user guide.

### 1.2 Overview of the Module

The Accessibility and Social Inclusion Appraisal Module analyses of the impacts of transport interventions on accessibility and social inclusion with respect to the impact on people rather than on the transport modes. It uses Cube Voyager and ArcPy, leading to the reporting of outputs in ArcGIS.

The Cube Voyager element processes transport model outputs that are used to derive the Accessibility and Social Inclusion measures, which are then used in the GIS process.

The GIS script element automates these results to present them on a map base, along with socio-demographic data and location of key activity areas.

Three measures are used to assess accessibility and social inclusion changes between a With and Without-Scheme (Do Something / Do Minimum) forecast scenario. These are:

- Travel Time Measure for the Accessibility assessment;
- Simple Hansen Measure for the Accessibility assessment, and;
- Income-based Geographic User Benefits Indicator for the Social Inclusion assessment.

The non-modelled inputs to the process are base year population and employment levels, income-based deprivation indices (obtained from POBAL Haase and Pratschke (HP), September 2017) and locations of key activity / service areas.

### 1.3 Components of the Process

Figure 1.1 shows the process and the interactions between each element. Orange boxes represent Regional Modelling System (RMS) outputs required, the processes (Cube and ArcGIS) are shown in the blue boxes, whilst the outputs from these shown in the green boxes.



## **RMS Outputs**

To run the Accessibility and Social Inclusion Module a complete RMS model run is required. The modelling inputs required to run the Accessibility and Social Inclusion Module are travel times and generalised costs by mode and user class. The Economic Module (a different module of the NTA's Appraisal Toolkit) will also need to be run to obtain TUBA output files, which are also required to run the Accessibility and Social Inclusion Module. These are listed in detail in Appendix A.

## **Cube Process**

The Cube element of the tool processes the transport model outputs and informs the Accessibility and Social Inclusion Measures, with the user required to enter parameters in the Catalog Keys (figures 3.6 & 3.7), which informs which elements of the Cube sub-application are run.

An overview of the Cube process and its components are described in **Sections 2.1** and **2.2**, whilst the process to use the Cube application can be found in **Section 2.3**

## **Outputs from Cube**

The outputs created from the Cube process include travel times, Hansen indices and travel time benefits which are required as inputs to the GIS process. These are listed in detail in Appendix B.

## **ArcGIS Process**

The ArcGIS element of the tool automates the mapping of the Measures produced within the Cube Process. An overview of the ArcGIS process and its components are described in **Sections 3.1** and **3.2**, with the process described in **Section 3.3**.

## **Outputs from ArcGIS**

Shapefiles are produced from the ArcGIS process, displaying the Accessibility and Social Inclusion Measures in ArcGIS. Example outputs of these are shown in **Section 4**.

## **1.4 Required Programs**

To run the Accessibility and Social Inclusion Module the following programs must be installed on the local machine;



**CUBE Voyager V6 or above**



**ArcGIS v10.7.1 or above with ArcPy installed**



**Microsoft Excel – macros need to be enabled**

The latest version of the Accessibility and Social Inclusion Module is stored here;

**NDFM:\04\_Data\Appraisal Tools\Appraisal\_Modules\_Version\_3\Accessibility and Social Inclusion**

The 0\_Version\_Control subfolder contains the Version Control Log.

The 1\_Program subfolder contains the Module files for the latest version.



## 1.5 Troubleshooting

A troubleshooting guide has been included listing common issues when running the Accessibility and Social Inclusion Tool. This list will be kept up to date with new issues, and is found in Section 5.

## 1.6 Contents

This document is structured by the different elements of the process, as shown in **Error! Reference source not found.** These are broken down as follows:

Section 1 – Location of the Accessibility and Social Inclusion module, required programmes and macro settings

Section 2 – CUBE process

Section 3 – GIS process

Section 4 – Output GIS Files

Section **Error! Reference source not found.** – Troubleshooting

Appendix A – Input from RMS

Appendix B – CUBE Process outputs

Appendix C – RMS Lambda Values

Appendix D – Model machine matrix



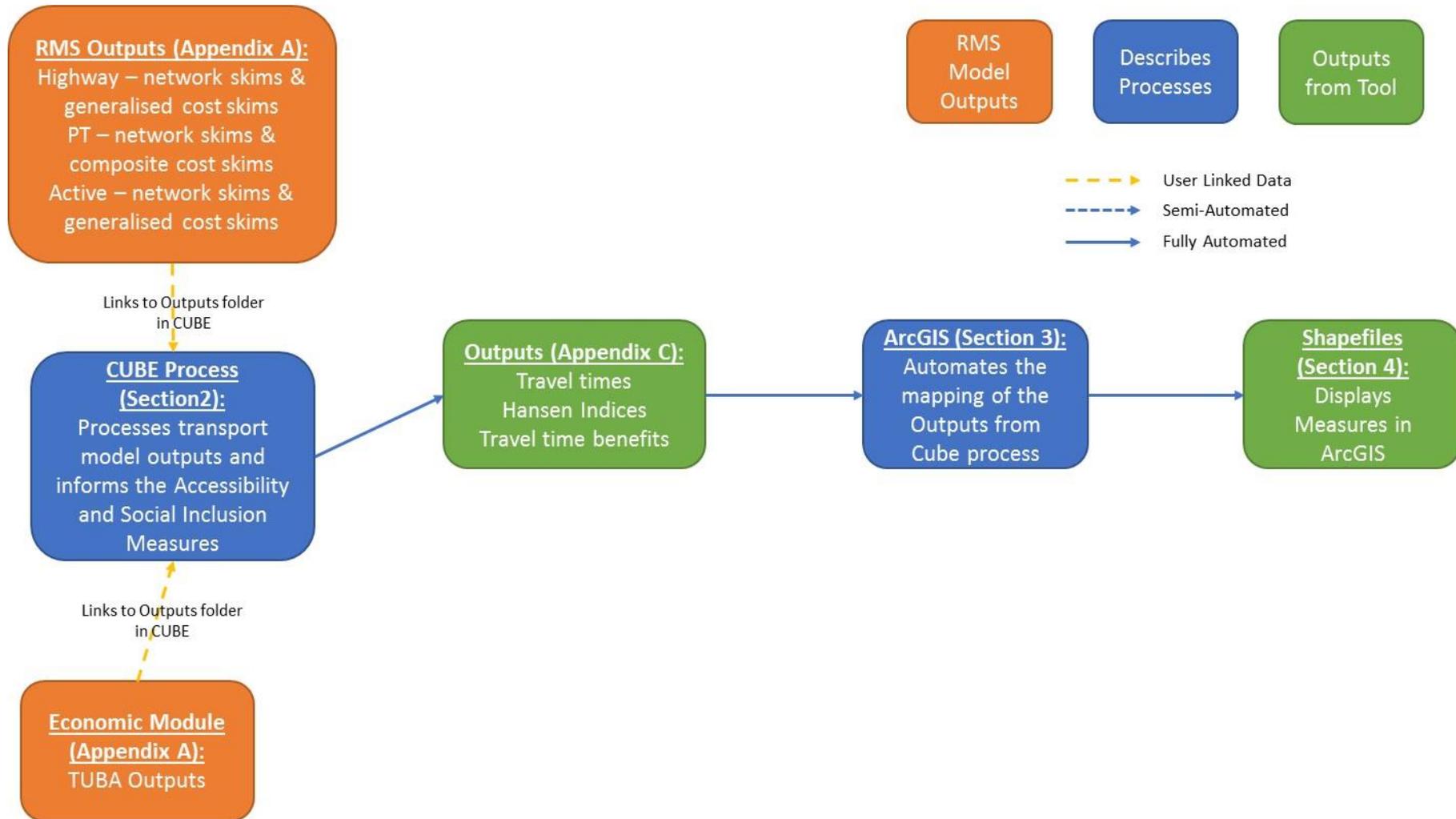


Figure 1.1 Overview of Accessibility and Social Inclusion Process



## 2 CUBE Process

### 2.1 Overview

#### User Input

The required user input to the Cube process are the catalog key values that determine the different model type to run (Base, Do Minimum or Do Something), and which element of the process to run (Accessibility and/or Social Inclusion). After selecting the appropriate catalogue key values, the user then runs the overall Cube application. The components of this Cube application are described below (Section 0).

This is followed by a step by step process of how to run the Cube Voyager element of the Accessibility and Social Inclusion Module (see Section 2.3). These steps include opening up the Cube catalog, creating a new scenario, the Cube catalog keys and running the Cube application.

### 2.2 Components

#### Cube Application Components

There are seven sub-application components (see Figure 2.2) that run depending on the key values that are entered within the main user interface of the Cube Voyager catalog; these sub-applications are:

- **Make Directory and Jump to Model Type:** The first sub-application is a PILOT box that creates the directories for storing the outputs, and determines which loops of the Cube process are required dependent on which model type has been selected (Base, Do Minimum or Do Something).
- **Travel Time Measure:** The 2<sup>nd</sup> sub-application extracts and adjusts travel times (in minutes) from the transport model for car, active travel and public transport modes by user class
- **Simple Hansen Measure:** The 3<sup>rd</sup> sub-application creates the Simple Hansen Measure indices and covers car, active travel and public transport.
- **Format Accessibility Outputs:** The 4<sup>th</sup> sub-application converts the format of the Travel Times and Hansen Indices from the .CSV format to .TXT format for use with ArcGIS. This also converts the transport model zone system into ArcGIS hierarchical zone system.
- **User Benefits Indicator:** The 5<sup>th</sup> sub-application extracts non-business user benefits from the Economic Appraisal Tool output and converts the format for use with ArcGIS (from .CSV to .TXT, and zone conversion to hierarchical).
- **END / Set Up GIS Templates:** The 6<sup>th</sup> and 7<sup>th</sup> sub-applications are PILOT boxes that end the process, and copies layer templates into relevant folders for the GIS Automation Tool.



## 2.3 Running the Cube Application

This section describes how the user runs the Cube application elements of the Accessibility and Social Inclusion Tool.

The latest version of the Accessibility and Social Inclusion Module is stored here:

MWRM:\LIVE2-TBC\04\_Data\Appraisal Tools\Appraisal\_Modules\_Version\_3\Accessibility and Social Inclusion

- 1) Open up the Cube Voyager catalog – Accessibility and Social Inclusion Module.Cat
- 2) Allow it to update all file paths if required (Figure 3.1)

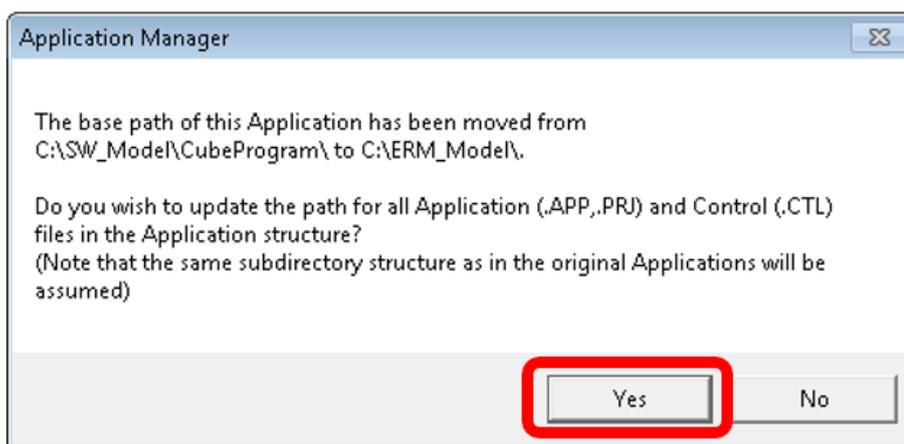


Figure 2.1 Cube prompt to update links

Figure 2.2 shows the main Cube view which is seen by the user.

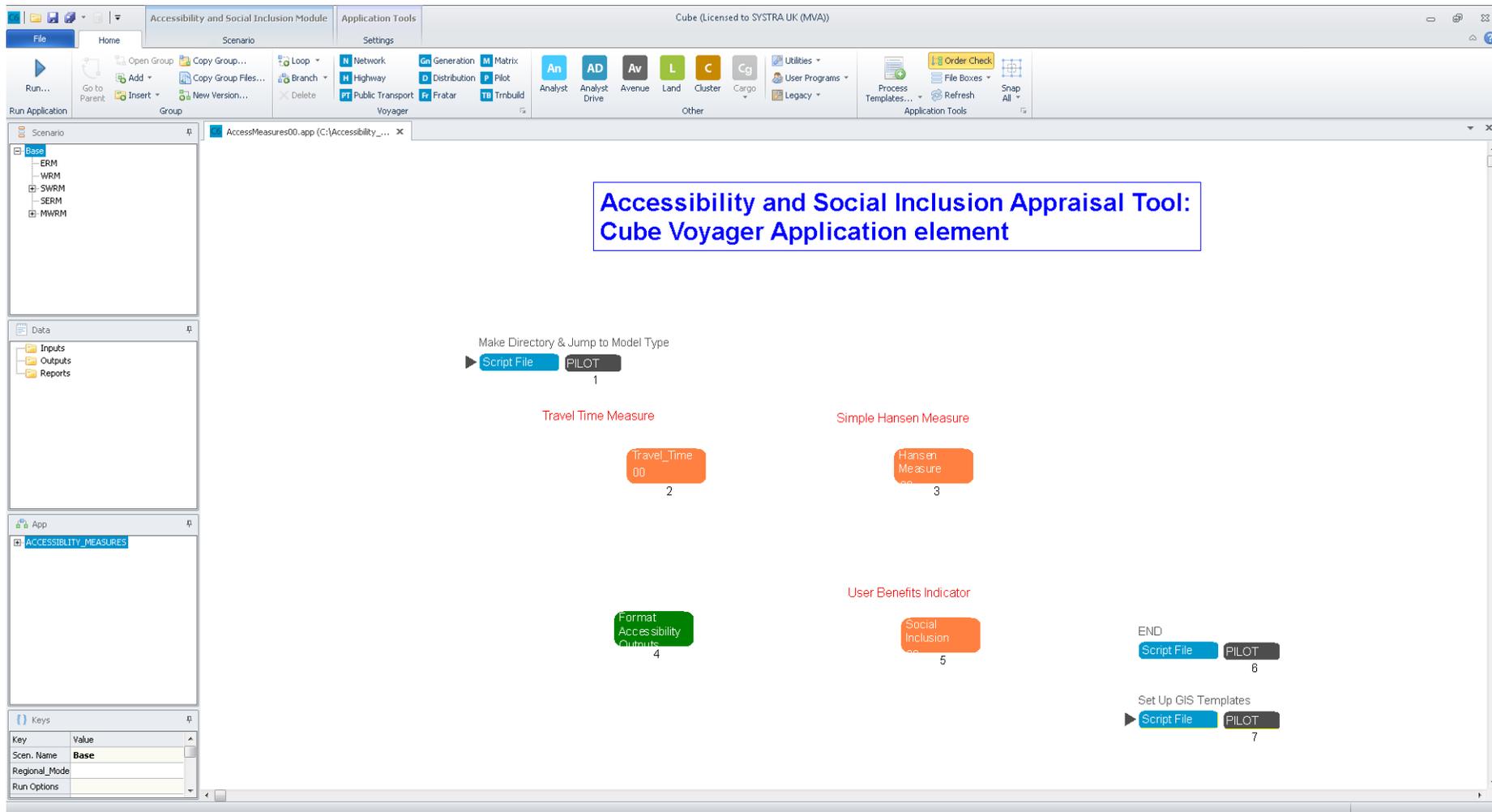


Figure 2.2 Cube process



For each model scenario that requires analysis, a “child” needs to be created, which is then run through the Cube process.

- 3) On the main user interface (as shown in Figure 2.2), within the columns on the left-hand side, in the Scenario section, right click on the appropriate regional model, and click “Add Child” (Figure 3.3)

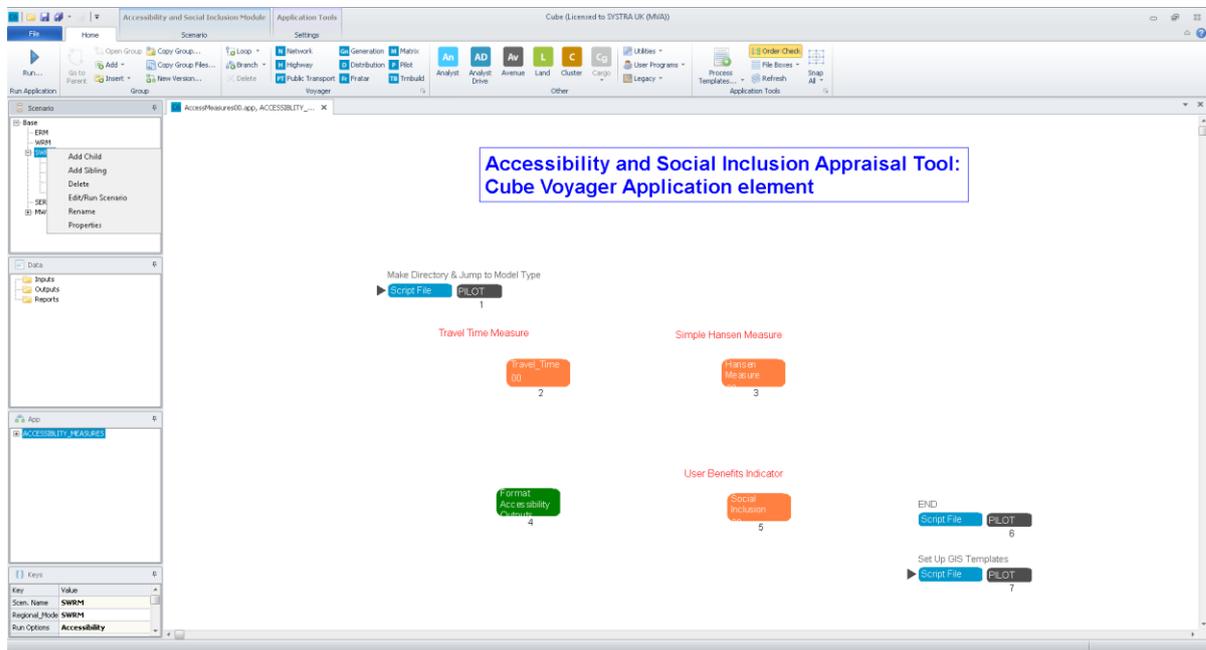


Figure 2.3 Add Child



- 4) Enter the model name of the scenario and any other key information to identify the scenario (such as forecast year or growth) (Figure 3.4).

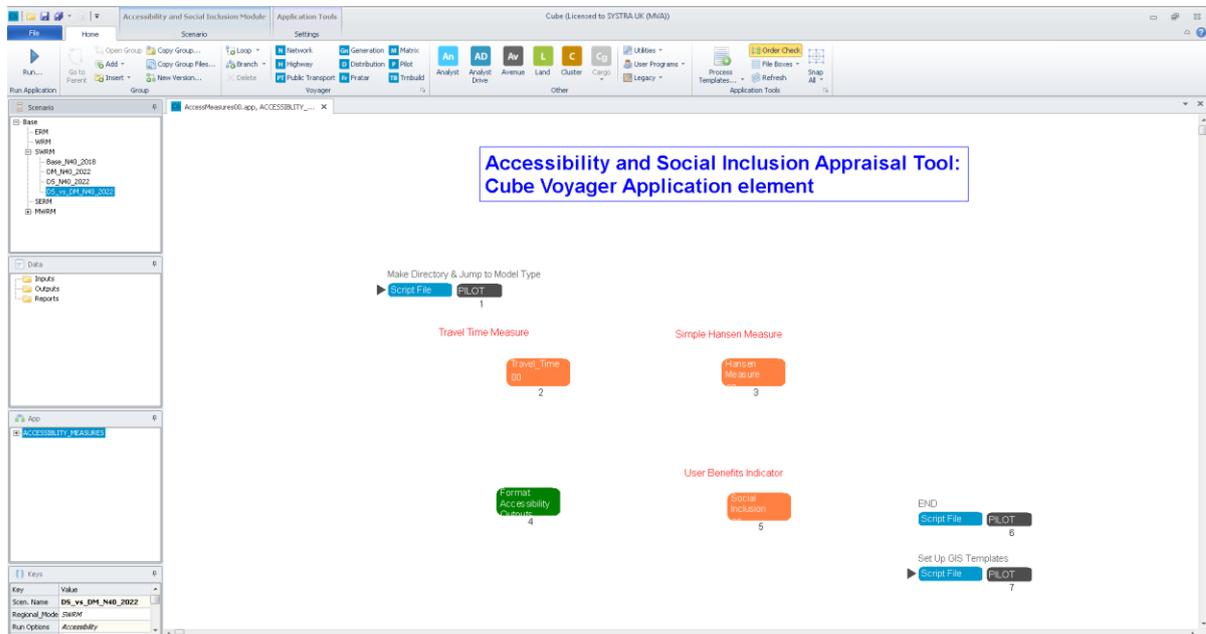


Figure 2.4 Re-naming Child

- 5) Enter any further properties to identify the scenario (Figure 3.5). Press OK, and this will open up the Cube catalog keys.

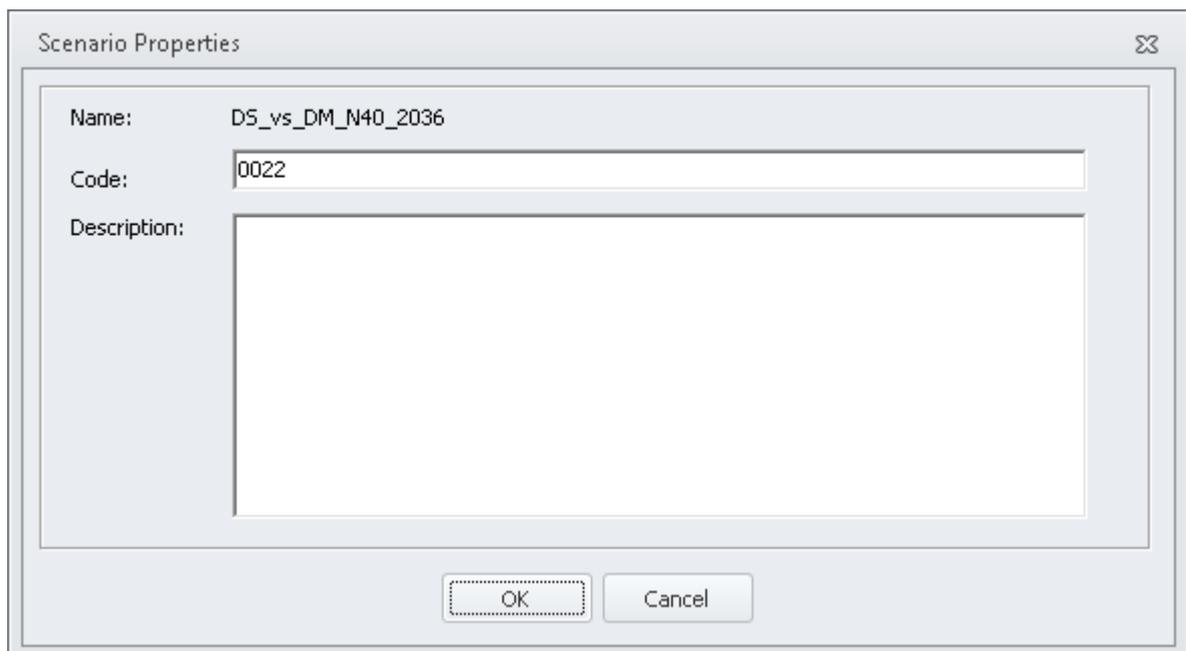


Figure 2.5 Scenario Properties



- 6) Open the new scenario key entry and complete the two pages of catalog keys using the tables below as a guide, only values labelled as a User Specified should be changed by the user. The user view of the keys pages are shown in Figure 3.6 and 3.7.

Catalog Keys Page 1 (Figure 3.6)			
Catalog Key	Value to be Entered	Description	User Specified
<b>Regional Model</b>	ERM, SWRM, SERM, WRM, MWORM	Which regional model is the scenario assessing	Yes
<b>Run Options</b>	Accessibility, Social Inclusion, All	Which type of analysis to undertake (All includes running both the Accessibility and Social Inclusion analysis in sequential order)	Yes
<b>Model Type</b>	Base, Do Minimum, Do Something	Describes the transport model type	Yes
<b>Show DS vs DM Difference (applies to Do_Something Model Type only)</b>	Yes, No	Calculates Accessibility and Social Inclusion measure differences between the Do Minimum and Do Something model type (only if Model Type Do Something is selected)	Yes
<b>Zones</b>	1953 (ERM), 836 (WRM), 834 (SWRM), 654 (SERM), 650 (MWORM)	Total number of zones in each regional model – default values need to be checked	Yes
<b>Time Period</b>	AM, LT, PM, SR, ALL	Time period for which results to show. All means all four time periods will be run in sequential order	Yes
<b>Lambda Car</b>	0.141	Cost deterrence lambda value for Car (default values provided in the CUBE Catalog)	No
<b>Lambda PT</b>	0.024	Cost deterrence lambda value for Public Transport (default values provided in the CUBE Catalog)	No
<b>Lambda Walk Cycle</b>	0.077	Cost deterrence lambda value for Active Travel (default values provided in the CUBE Catalog)	No
<b>Forecast Year 1 TUBA Out CSV</b>	File path and file name of TUBA output.csv file	Location of TUBA outputs required for formatting benefits into GIS	Yes

Note: The Lambda values in the table above represent the Lambda values for the ERM. Appendix C at the bottom has the Lambda values for the other regional models. These values will need to be changed by the user if running a different model than the ERM.



Catalog Keys Page 2 (Figure 3.7)			
Catalogue Key	Value to be Entered	Description	User Specified
<b>Base Run Settings – only enter values if running a Base Year Model Type</b>			
Run Base from remote location	✓	✓ if not running Base Model on the RMS network	Yes
Catalog Directory	Model Run Catalog Directory	Location of where the Cube Catalog is saved if Run Base from remote location ✓	Yes
Base Run ID	Base Model Run ID	The Run ID for the Base Year transport model	Yes
Base Model Year	YY	Base Year in YY format (currently 18)	Yes
Base Demand Scenario	Base Demand Scenario ID	The Base travel demand scenario ID	Yes
<b>Future Run Settings – only enter values if running either a Do Minimum or Do Something Model Type</b>			
Forecast Growth	Forecast Growth Scenario ID	The forecast growth travel demand scenario ID	Yes
First Forecast Year	YY	1 <sup>st</sup> forecast year of model input	Yes
Second Forecast Year	YY	2 <sup>nd</sup> forecast year of model inputs, enter 0 if only 1 forecast year	Yes
Third Forecast Year	YY	3 <sup>rd</sup> forecast year of model inputs – enter 0 if only 1 or 2 forecast years	Yes
<b>Do Minimum Settings – only enter values if running a Do Minimum or a Do Something that compares against a Do Something Model Type</b>			
Run Do Min from remote location?	✓	✓ will tell Cube to use the next key, Catalog Directory, as the location for module inputs	Yes
Catalog Directory	Model Run Catalog Directory	Location of where the Cube Catalog is saved if Run Do Min from remote location ✓	Yes
Do Minimum Run ID	Do Minimum Run ID	The Run ID for the Do Minimum transport model	Yes



Catalog Keys Page 2 (Figure 3.7)			
Catalogue Key	Value to be Entered	Description	User Specified
<b>Do Something Settings – only enter values if running a Do Something Model Type</b>			
<b>Run Do Something from remote location?</b>	✓	✓ will tell Cube to use the next key, Catalog Directory, as the location for module inputs	Yes
<b>Catalog Directory</b>	Model Run Catalog Directory	Location of where the Cube Catalog is saved if Run Do Something from remote location ✓	Yes
<b>Do Something Run ID</b>	Do Something Run ID	The Run ID for the Do Something transport model	Yes



The screenshot displays the 'Accessibility and Social Inclusion Module' software interface. The title bar indicates 'Cube (Licensed to SYSTRA UK (MVA))'. The interface is divided into several sections:

- Menu and Toolbar:** Includes options like 'File', 'Run Multiple...', 'Run Script...', 'Append Sibling', 'Insert Sibling', 'Add Report...', 'Edit Report...', 'Export Report...', 'Delete Scenario', 'Add Child', and 'Delete Scenario'.
- Scenario Tree (Left):** Shows a hierarchy starting with 'Base', containing 'ERM', 'WRM', 'SWRM', 'Base\_N40\_2018', 'DM\_N40\_2022', 'DS\_N40\_2022', 'DS\_vs\_DM\_N40\_2022', 'SERM', and 'MWRM'.
- Data Section (Left):** Contains folders for 'Inputs', 'Outputs', and 'Reports'.
- App Section (Left):** Shows 'ACCESSIBILITY\_MEASURES'.
- Keys Table (Bottom Left):**

Key	Value
Scen. Name	DS_vs_DM_N40_2022
Regional_Mode	SWRM
Run Options	Accessibility
- Configuration Panel (Center):**
  - Regional Model:** SWRM
  - Run Options:** Accessibility, Social Inclusion, All (selected)
  - Model Type:** Base, Do\_Minimum, Do\_Something (selected)
  - Show DS vs DM Differences:** Yes (selected), No
  - Zones:** 792
  - Time Period:** ALL
  - Lambda Car:** 0.3087
  - Lambda PT:** 0.352
  - Lambda Walk Cycle:** 0.5415
  - Forecast Year 1 TUBA Out CSV:** C:\TUBAOut.csv
- Buttons (Bottom Center):** Save, Close, Next..., Back..., Run

Figure 2.6 Catalog Keys Page 1



**Base Run Settings**

Run Base from remote location?

Catalog Directory: C:\SW\_Model\CubeProgram

Base Run ID: AAF

Base Model Year: 18

Base Demand Scenario: N40

**Future Year Settings**

Forecast Growth: N40

First Forecast Year: 22

Second Forecast Year: 0

Third Forecast Year: 0

**Do Minimum Settings**

Run Do Min from remote location?

Catalog Directory: C:\SW\_Model\CubeProgram

Do Minimum Run ID: AAH

**Do Something Settings**

Run Do Something from remote location?

Catalog Directory: C:\SW\_Model\CubeProgram

Do Something Run ID: AAI

Key	Value
Scen. Name	DS_vs_DM_N40_2022
Regional_Mode	SWRM
Run Options	Accessibility

Buttons: Save, Close, Next..., Back..., Run

Figure 2.7 Catalog Keys Page 2



The following are checks that are recommended before undertaken the Accessibility and Social Inclusion Cube process:

- Are you using the latest version of the tool taken from the network?
- Do the zone numbers entered in the key match the number of zones in the model?
- Have you selected the correct Run Option?
- Have you selected the correct Model Type?

7) Once these checks are complete, either press “Run” on the keys page or F2 on the main Cube view. The following prompt is displayed, ensure that Run Current Group Only box is ticked, and click OK (Figure 2.8).

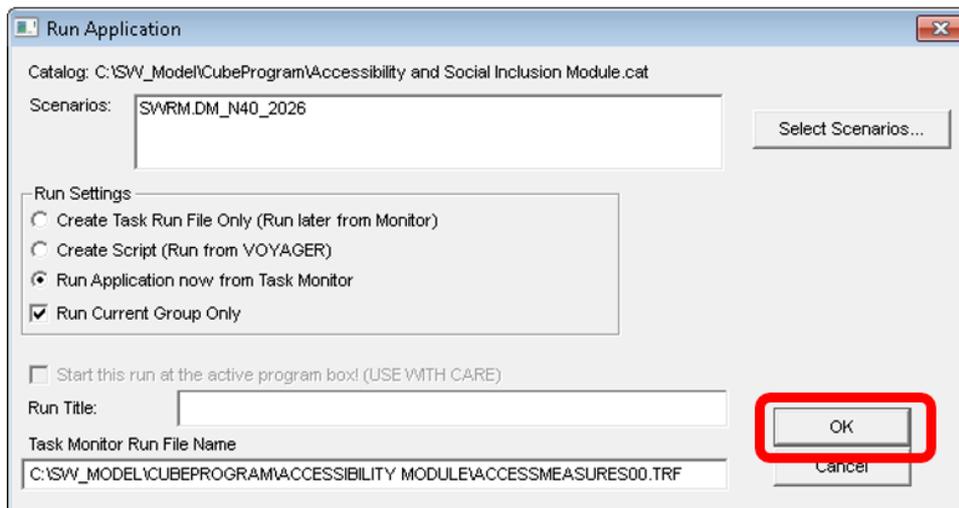
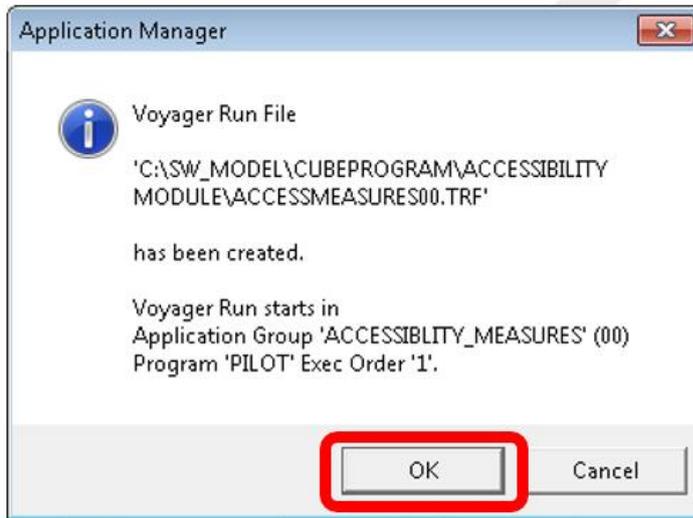


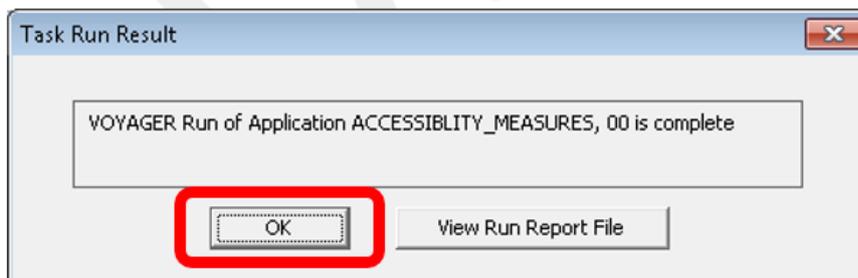
Figure 2.8 Running Cube Application (1)

The following prompt is then displayed, click on OK to start the module (Figure 2.9).



**Figure 2.9 Running Cube Application (2)**

Once the model has run successful, the following message will be displayed in Cube Voyager (Figure 2.10).



**Figure 2.10 Finished Cube Application**

The outputs created following the Cube Voyager application are described in Appendix B and are used to inform the GIS process.

## 3 GIS Process

### 3.1 Overview

The GIS element of the Accessibility and Social Inclusion Module automates the mapping of the Measures produced within the Cube Process (Section 2).

The components of the GIS process are described below, followed by a step by step guide of how to run the GIS element of the Accessibility and Social Inclusion Module. This includes using the ArcGIS process, the GIS Automation Toolbox Tool and shows example outputs.

### 3.2 Components

The GIS process automates the mapping, via a graphical user interface, of the Accessibility and Social Inclusion Measures produced within the Cube Process

The GIS script element of the Accessibility and Social Inclusion Appraisal Module has been developed using ArcGIS Desktop 10.7.1 and the Python 2.7.16 programming language. The script is designed to automate the display of results from the Cube Voyager element of the tool along with socio - demographic data and location of key activity areas using functions from the Python package ArcPy.

The main inputs to the script are the formatted output files from the Cube Voyager element of the appraisal tool (those output files can be imported directly into the script), the Regional Master Shapefiles, Layer Property Template files (which format how the output shapefiles are displayed), and the ArcGIS Template file / ArcMap Document in which the results are displayed.

The Regional Master Shapefiles should be stored in the GIS folder within the scenario results folder. The co-ordinate system of the shapefiles does not affect the script but it is considered best practice to use Irish Transverse Mercator (ITM).



### 3.3 Using the ArcGIS Process

- 1) Open ArcCatalog as shown below in Figure 4.1

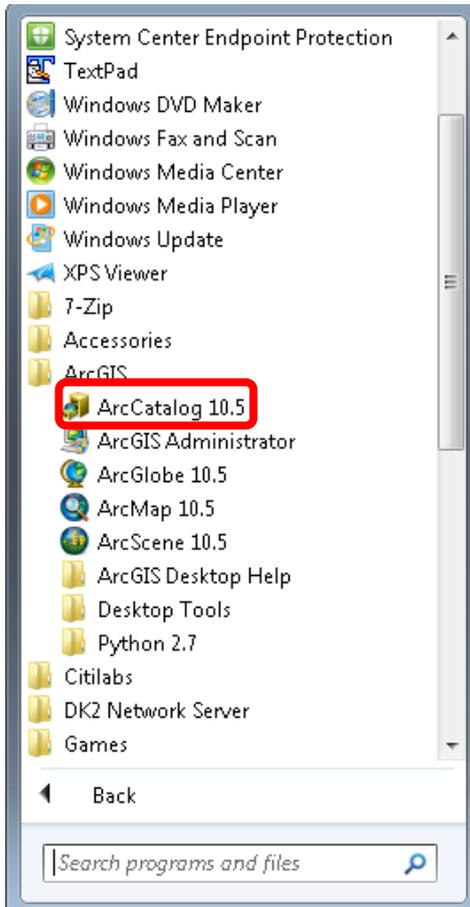


Figure 3.1 Opening ArcCatalog

- 2) The folder that contains both the CUBE catalog and the ArcGIS script needs to be added to the folder connections within the ArcGIS Catalog. This is done by right clicking on Folder Connections within the Catalog Tree on the left-hand column, and Connect to Folder, as shown below in Figure 3.2.

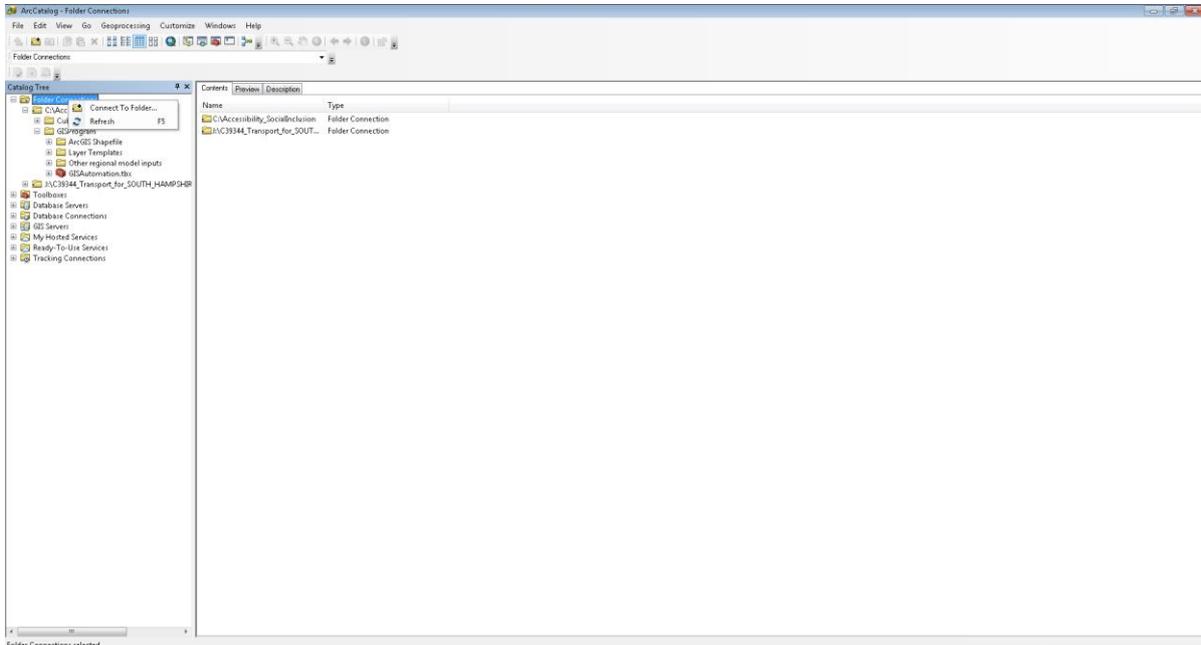


Figure 3.2 Adding a New Folder Connection

- 3) Open the GIS Automation Toolbox Tool, which is saved in \GISProgram\GISAutomation.tbx, as shown below in Figure 3.3.

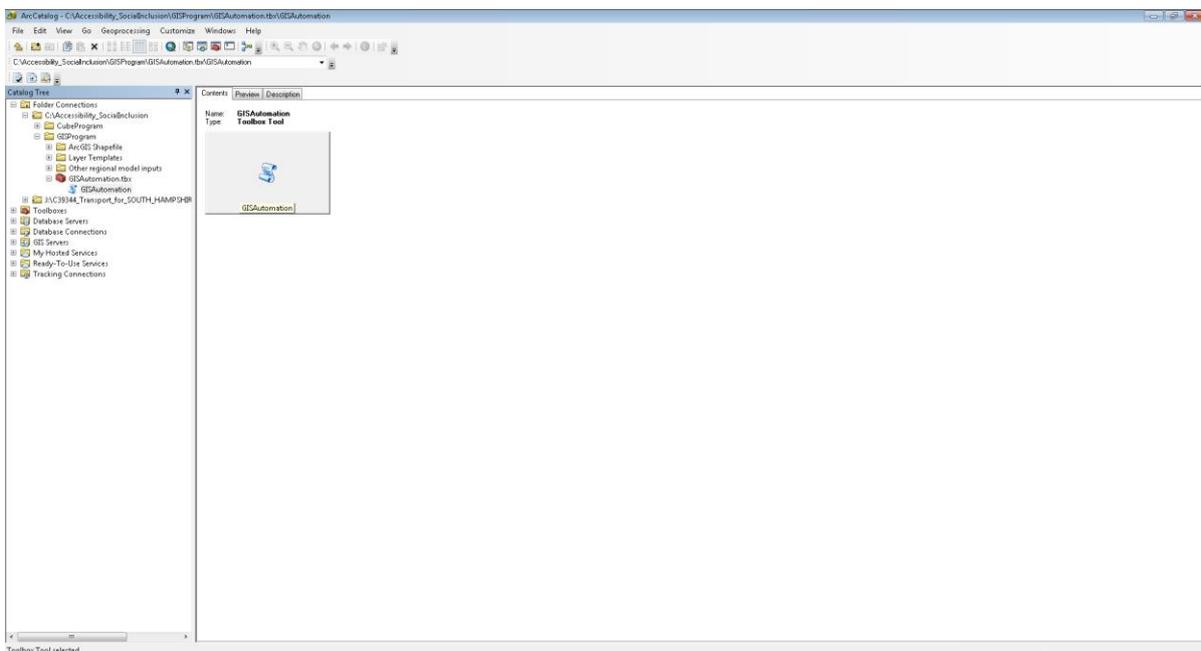


Figure 3.3 Navigating to the GIS Automation Toolbox Tool



The GIS Automation Toolbox Tool contains the parameters to select which results to display in the final formatted ArcGIS map. The main parameter the user can change is which Measure to display, either the Accessibility or Social Inclusion measures. The other measures that can be selected are all dependent on which overall measure the user wishes to display, with the drop-down boxes only permitting the appropriate selections.

- 4) Open the GIS Automation Toolbox Tool and complete the ArcGIS parameters. Table 3.1 lists the parameters, the value to be entered along with a description, whilst these are shown as viewed by the user in Figure 3.4.
- 5) After the parameters have been selected, click on OK which runs the scripting process. If there are any errors detected in the parameters, the GIS tool will display an error warning and a red 'X' warning symbol beside the incorrect parameter. The script will not run until all parameters have a value.
- 6) Once the script has run, the final formatted ArcMap will automatically open, and the user can view the results within the map. The map opens in layout view centred on the origin zone of interest.

**Table 3.1: ArcGIS Parameters**

Parameter	Value to be Entered				Description
<b>Measure</b>	Accessibility, Social Inclusion				Allows the user to select between displaying Accessibility or Social Inclusion measures
<b>Measure Type</b>	Accessibility - Simple Hansen Measure, Travel Times by Mode		Social Inclusion - Travel Time Benefits, Vehicle Operating Cost Benefits		Based on the Measure parameter, the user can select which specific measure they wish to view.
<b>Background Information</b>	Simple Hansen Measure – Large Employment Area	Travel Times by Mode – Primary Education, Secondary Education, Tertiary Education, Hospital, Large Supermarket, Sport Centre	Travel Time Benefits – Deprivation Index	Vehicle Operating Cost Benefits – Deprivation Index	Based on both the Measure and Measure Type, the user can select additional information layers which will be displayed
<b>Time Period</b>	AM, LT, SR, PM				Time period for which results to show
<b>Mode</b>	Active, Road, PT				Mode for which results to show. Options vary dependent on which Measure and Measure Type are selected
<b>Modal Choice</b>	Walk, Cycle, Car, Rail, Bus, Tram				Modal choice for which results to show. These vary dependent on which Mode is selected



Parameter	Value to be Entered			Description	
<b>User Group</b>	Simple Hansen Measure – Commuter	Travel Times by Mode – Commuter, Education, Other	Travel Time Benefits – Commuter, Other	Vehicle Operating Cost Benefits – Commuter, Other	User group for which results to show. These vary dependent on which Measure and Measure Type are selected
<b>Regional Master Shapefile</b>	Navigate to correct RMS model shapefile			Select the formatted shapefile for the region	
<b>Origin Zone</b>	Select Origin Zone from which to display results			The GIS tool will generate a list of available zone numbers based on the Regional Master Shapefile. The user can then select the Origin Zone from which to display results	
<b>Modelling Output Folder</b>	\RUNS\ (Region)\YY\ (RunID)\4_Outputs_ (Region)_ (Year)_ (GrowthScenario)_ (Scenario)_Input_ (VersionNumber)\Appraisal_Tools			The user must select the Appraisal Tools folder where the results from the Cube Voyager process are stored	



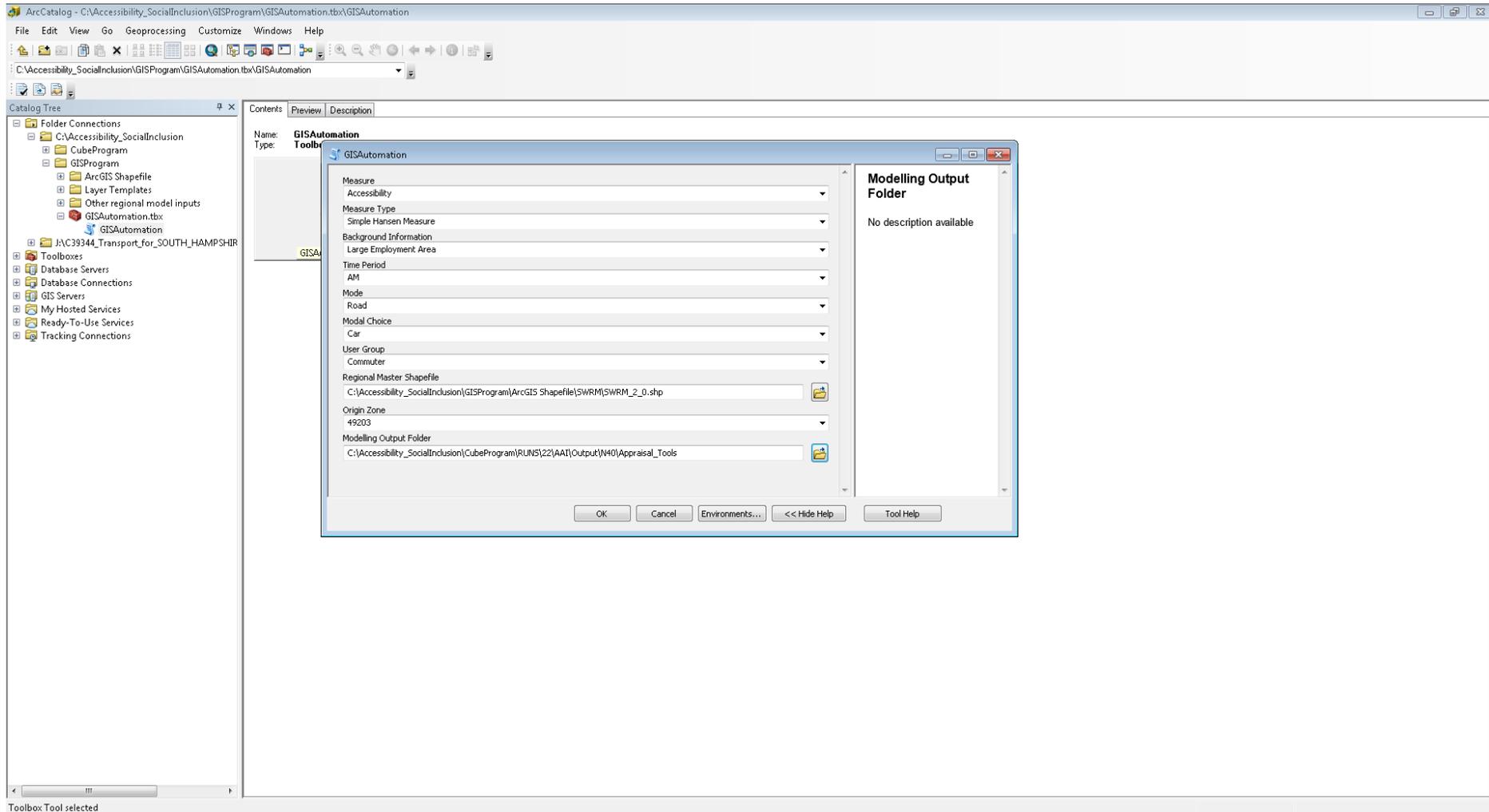
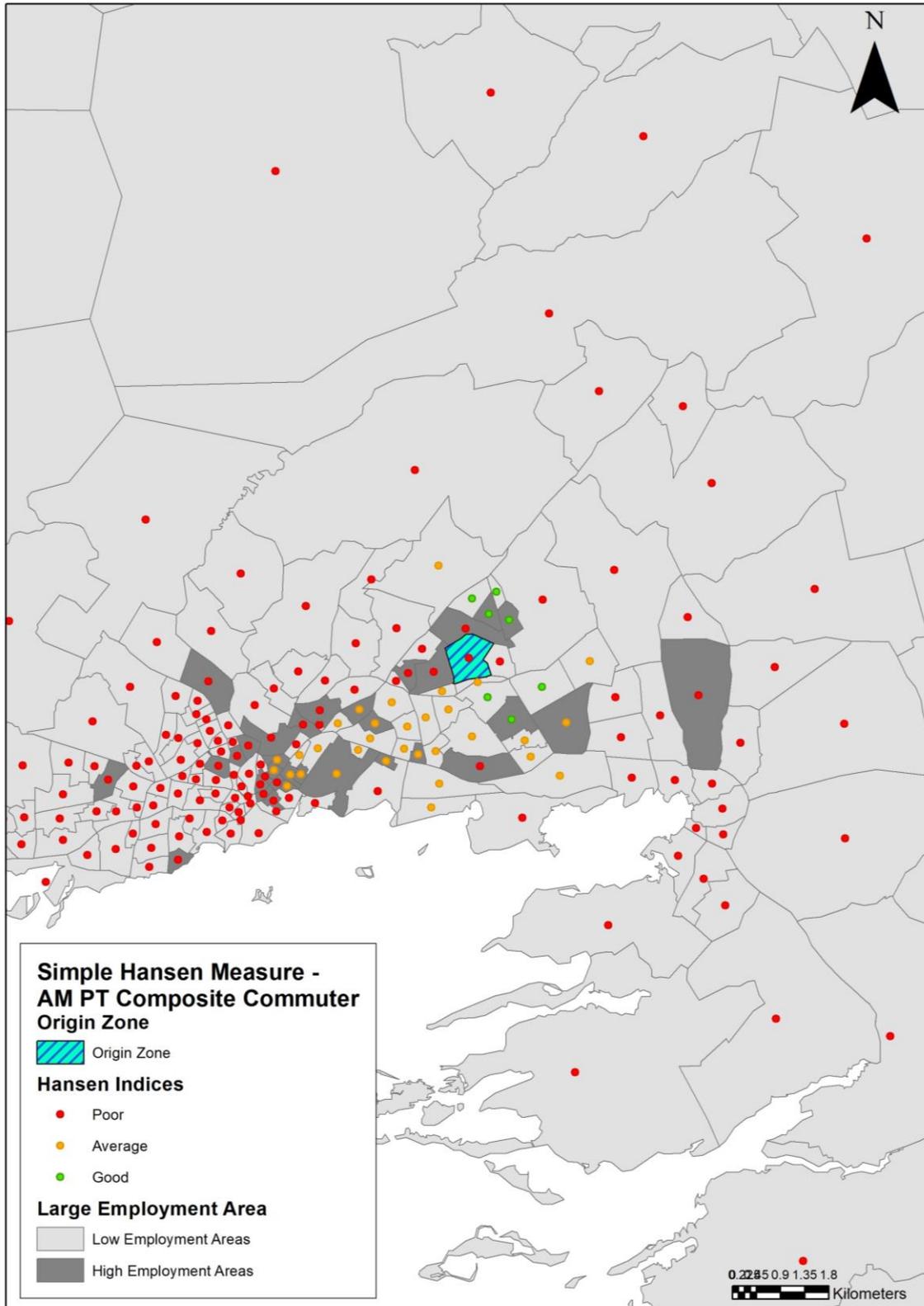


Figure 3.4 GIS Parameters



## 4 Output GIS Files

This section is intended to offer a visual guide to the variety of outputs produced by the Accessibility and Social Inclusion tool. Following completion of the processes described in this user guide, GIS analysis is produced, examples of which are shown below.



- **Figure 4.1** displays an Accessibility output showing the Simple Hansen Measure for a large employment area during the AM peak for public transport commuters for a zone in the South West Regional Model.
- **Figure 4.2** shows the other Accessibility output which can be produced, travel times by mode for secondary education during the school run for active (walking) education trips for a zone in the East Regional Model.
- Error! Reference source not found. presents a Social Inclusion output, showing travel time benefits during the PM peak for public transport other trips for a zone in the East Regional Model.
- **Figure 4.4** shows the other Social Inclusion output, vehicle operating cost benefits during the AM peak for road (car) commuter trips for a zone in the East Regional Model.

All output shapefiles and map documents that are produced are stored, within a folder for each zone analysis produced, at the following location:

**RUNS\(\Region)\YY\(\RunID)\4\_Outputs\_(Region)\_(Year)\_(GrowthScenario)\_(Scenario)\_Input\_(VersionNumber)\Appraisal\_Tools\GIS\GIS Outputs**

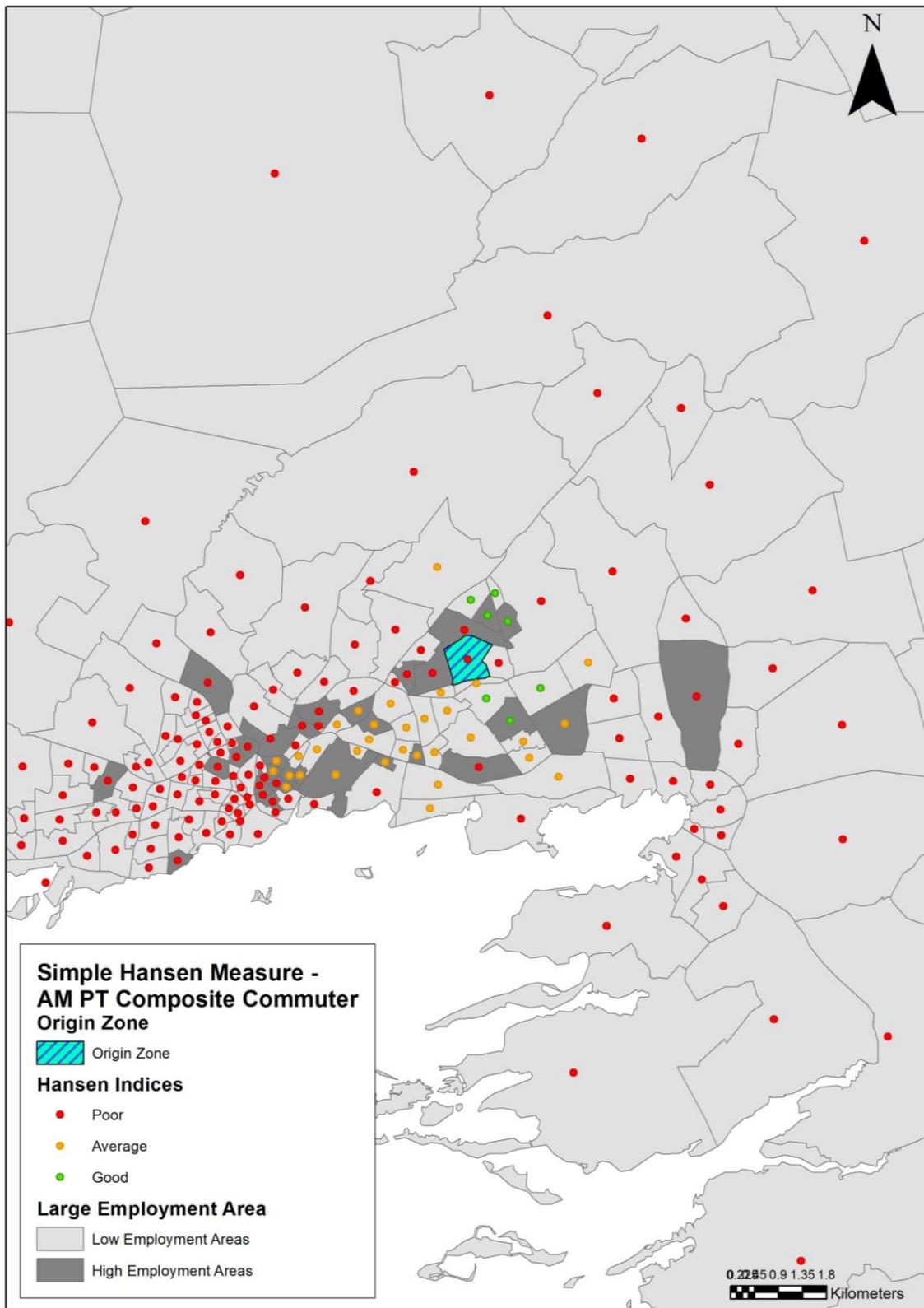


Figure 4.1 Accessibility GIS Output – Simple Hansen Measure

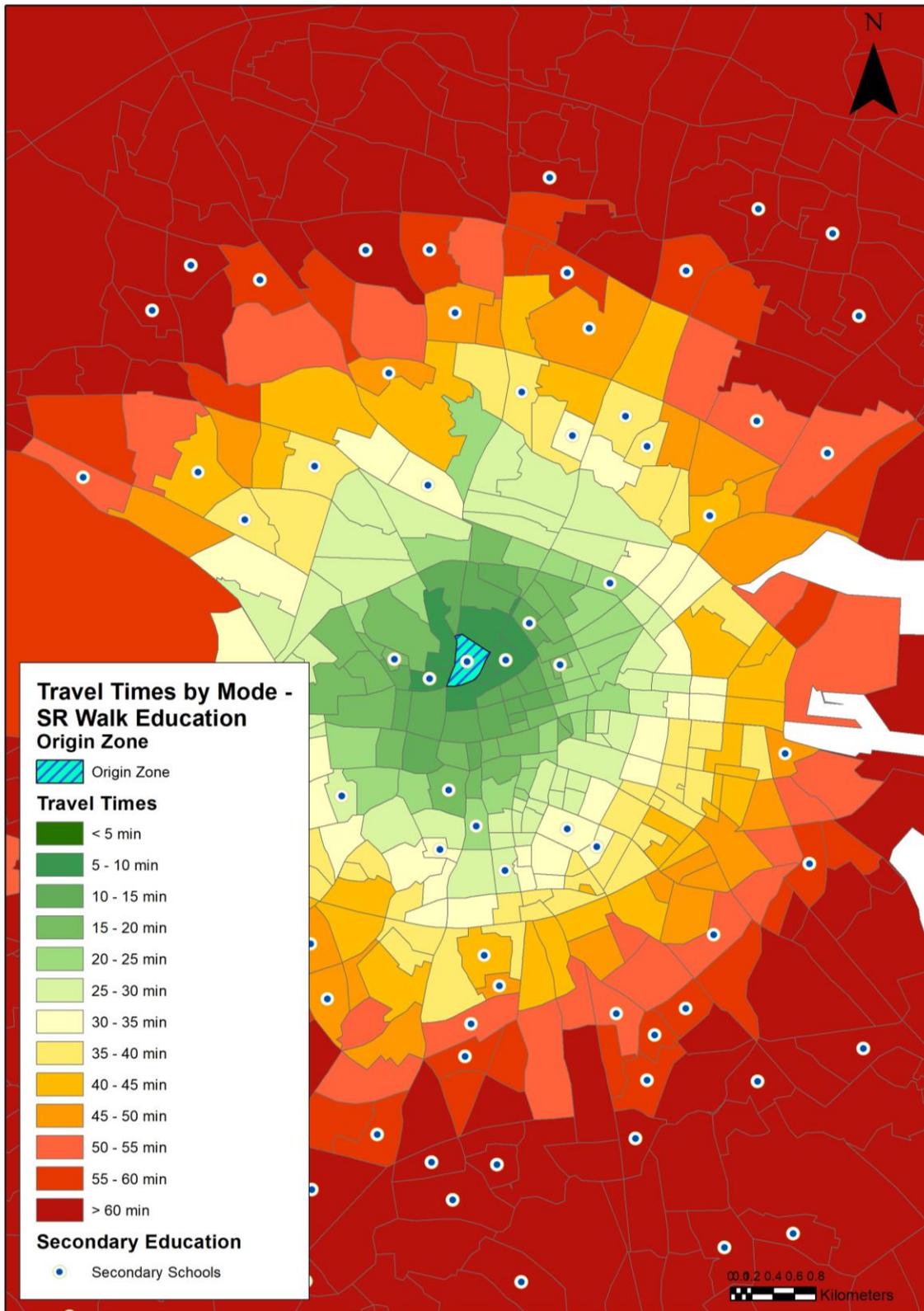


Figure 4.2 Accessibility GIS Output – Travel Times by Mode



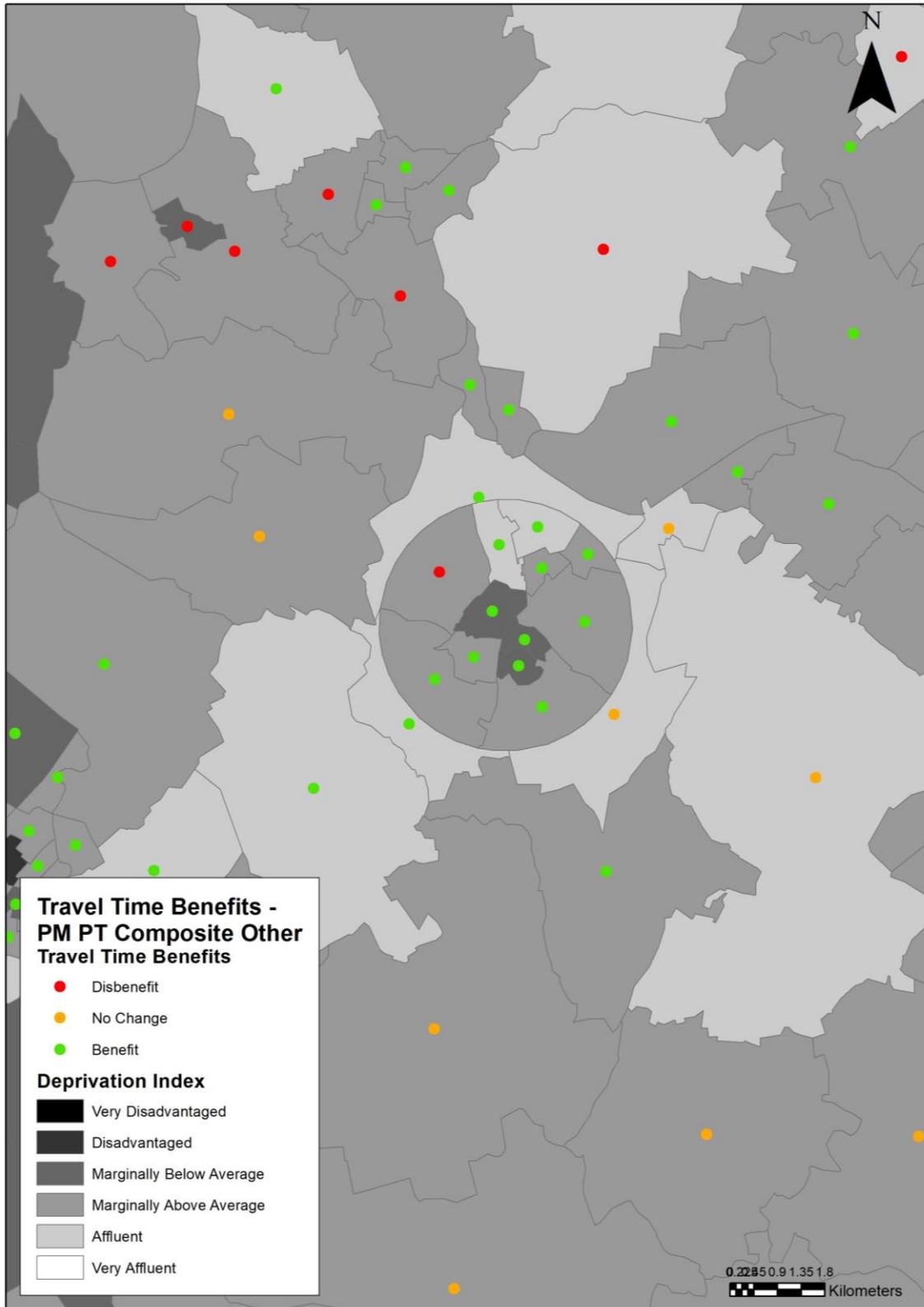


Figure 4.3 Social Inclusion GIS Output – Travel Times Benefits



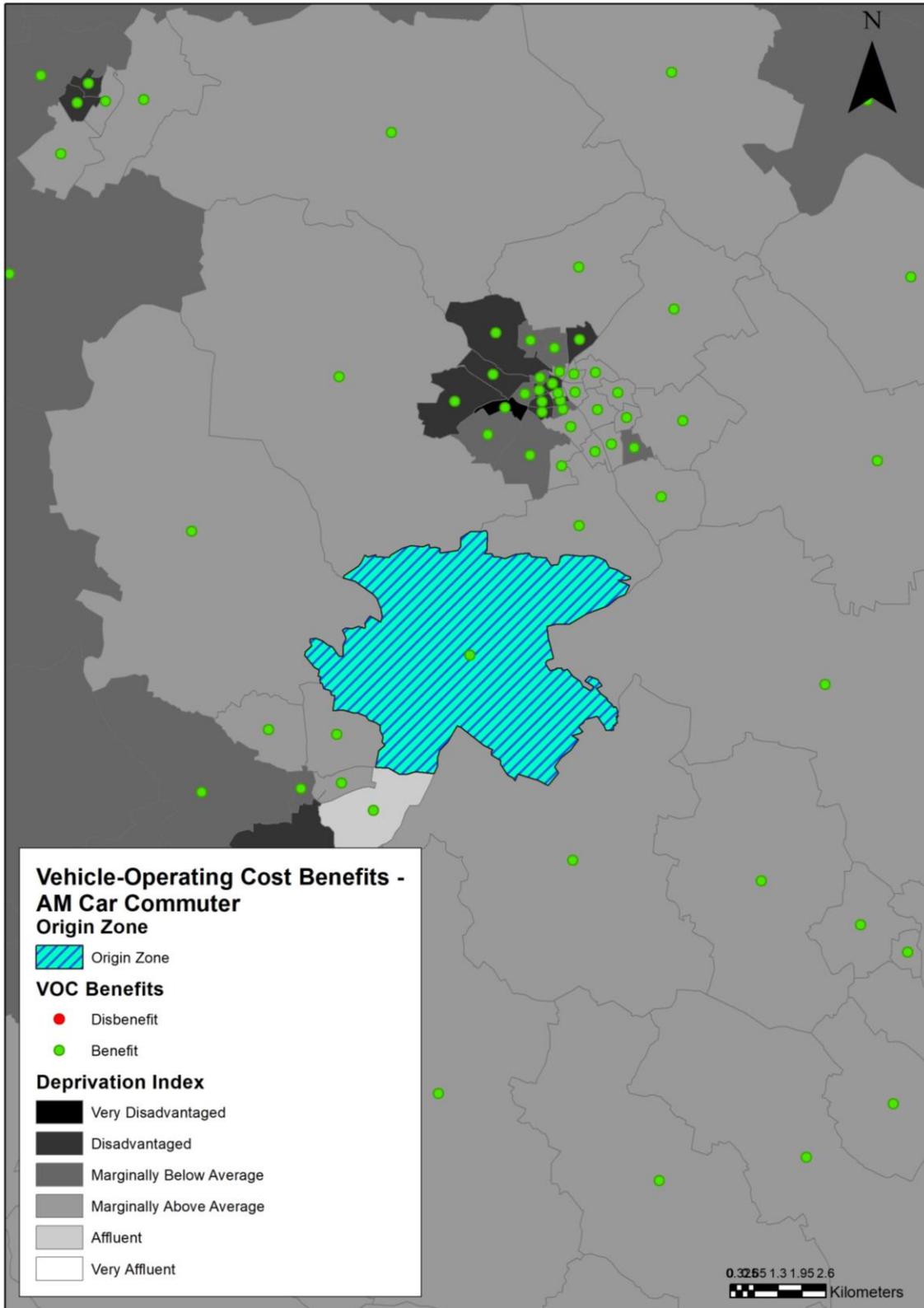


Figure 4.4 Social Inclusion GIS Output – Vehicle Operating Cost Benefits



## 5 Troubleshooting

In the CUBE Voyager cases the print files (.prn) will provide the best clues as to why the run has not worked.

PROBLEM SOFTWARE	PROBLEM	SOLUTION
CUBE	Tool crashes as files missing	Check all files are named and stored correctly
Excel	Not able to run macro	Check macros are enabled
Excel	File remaining open and macro not finished.	Rerun the macro manually for the Accessibility folder from the toolkit. Once the Macro has started running, wait until it has finished before using the machine (this runs better on remote machines that can be left to run, it can take up to 3 hours for larger models)
ArcGIS	Tool hangs	Re-start ArcGIS
ArcGIS	Tool won't open	The ArcGIS script can only be opened once, tool may be already open so will need to close
ArcGIS	If no PT trips, this shows as 0 and is displayed in lowest band and shows outputs that are not representative of model results	Set thresholds in ArcGIS

If the problem cannot be resolved from the print files or troubleshooting table please email [ntamodel@nationaltransport.ie](mailto:ntamodel@nationaltransport.ie) to get technical support.



## 6 Appendix A - Inputs from RMS

### 6.1 Folder structure

The latest RMS output folder structure is: {CATALOG\_DIR}\Runs\{(Region)\(Year)\(Scenario)\4\_Outputs\_(Region)\_(Year)\_(Growth Scenario)\_(Scenario)\_Input\_(Version number)

Within the RMS output folder, the toolkit is set to create two additional folders on two different levels; the 'Appraisal\_Tools' folder (upper level) and the 'Accessibility and social inclusion' folder (lower level) where the toolkit's outputs are saved. An example of the final folder structure is shown below:

Windows (C:) > NTA > AppraisalTools > Accessibility > RUNS > ERM > 20 > Metro1 > 4\_Outputs\_ERM\_20\_G30\_Metro1\_Input\_v0001 > Appraisal\_Tools > Accessibility

Windows (C:) > NTA > AppraisalTools > Accessibility > RUNS > ERM > 20 > Metro1 > 4\_Outputs\_ERM\_20\_G30\_Metro1\_Input\_v0001 > Appraisal\_Tools > Social Inclusion

Where: {CATALOG\_DIR}<sup>1</sup> = C:\NTA\AppraisalTools\Access\_Tool

{Region} = ERM (variable)

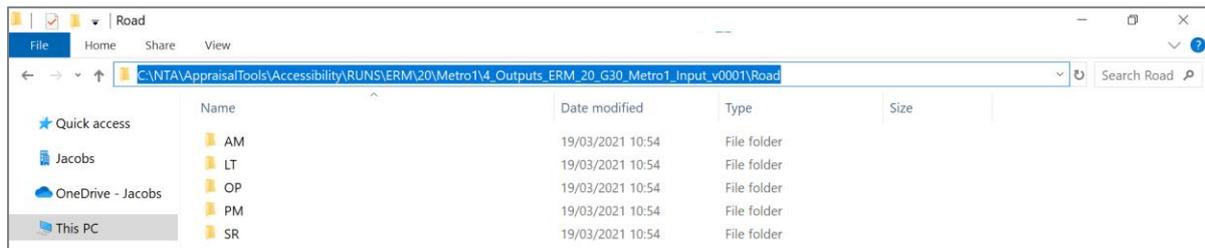
{Model Year} = 20 (variable)

{Run ID} = Metro1 (variable)

{Growth Scenario} = G30 (variable)

{Version number} = v0001 (variable) (not a capital v)

The model files for each of the modes (Road/PT/Active) need to go in the respective scenario/time period folders such as below. The full list of these files is found in section 6.2 of this Appendix.



### 6.2 Input files

The model files by time period are used as inputs to the Accessibility Module. The complete list of input files required to test the Module are presented below:

#### Road

- (AM/LT/SR/PM)\_{Run ID}{Growth}{Model Year}.UFC
- (AM/LT/SR/PM)\_{Run ID}{Growth}{Model Year}.UFM
- (AM/LT/SR/PM)\_{Run ID}{Growth}{Model Year}.UFS
- ROAD\_(AM/LT/SR/PM)\_{Run ID}{Growth}{Model Year}.HWM
- Road\_Skims\_(AM/LT/SR/PM)\_{Run ID}{Growth}{Model Year}.MAT
- Road\_(AM/LT/SR/PM)\_{Run ID}{Growth}{Model Year}.NET
- Road\_(AM/LT/SR/PM)\_{Run ID}{Growth}{Model Year}.RCM
- (AM/LT/SR/PM)\_{Run ID}{Growth}{Model Year}.BUS

<sup>1</sup> The {CATALOG\_DIR} is user specific (usually saved on C: Drive).



- (AM/LT/SR/PM)\_{Run ID}{Growth}{Model Year}.ERL

### **PT**

- (AM/LT/SR/PM)\_PT\_EMP.MAT for each {Run ID},{Growth} and {Model Year} combo
- (AM/LT/SR/PM)\_PT\_COM.MAT for each {Run ID},{Growth} and {Model Year} combo
- (AM/LT/SR/PM)\_PT\_COMP CST.MAT for each {Run ID},{Growth} and {Model Year} combo
- (AM/LT/SR/PM)\_PT\_OTH.MAT for each {Run ID},{Growth} and {Model Year} combo
- (AM/LT/SR/PM)\_PT\_EDU.MAT for each {Run ID},{Growth} and {Model Year} combo
- (AM/LT/SR/PM)\_PT\_RET.MAT for each {Run ID},{Growth} and {Model Year} combo
- (AM/LT/SR/PM)\_PT\_WKONLYTRIPS.MAT for each {Run ID},{Growth} and {Model Year} combo
- PT\_{AM/LT/SR/PM}\_{Run ID}{Growth}{Model Year}.PTM
- (AM/LT/SR/PM)\_ALL\_LOADINGS.DBF for each {Run ID},{Growth} and {Model Year} combo
- (AM/LT/SR/PM)\_RAIL\_B&A.DBF for each {Run ID},{Growth} and {Model Year} combo
- (AM/LT/SR/PM)\_RAIL\_B&A\_split.DBF for each {Run ID},{Growth} and {Model Year} combo
- (AM/LT/SR/PM)\_PT\_LOADED.NET for each {Run ID},{Growth} and {Model Year} combo

### **Active**

- AAM\_{AM/LT/SR/PM}\_{Run ID}{Growth}{Model Year}.NET
- AAM\_{AM/LT/SR/PM}\_{Run ID}{Growth}{Model Year}\_Skims.MAT
- Active\_{AM/LT/SR/PM}\_{Run ID}{Growth}{Model Year}.AAM

These files for each of the modes are needed for every forecast year used.



## 7 Appendix B - CUBE Process outputs

The CUBE process produces CSV files with Accessibility and Social Inclusion outputs. These files are then formatted to TXT files and stored within a separate folder. These files serve as an input to GIS tool for producing plots.

The full list of outputs from the CUBE process are presented below.

### Accessibility – Travel Times and Hansen Indices:

#### Road

- (AM/LT/SR/PM) Hansen Indices for Car Commuters
- (AM/LT/SR/PM)\_Car Commuter Travel Times
- (AM/LT/SR/PM)\_Car Education Travel Times
- (AM/LT/SR/PM)\_Car Other Travel Times

#### PT

- (AM/LT/SR/PM) Hansen Indices for PT Commuters
- (AM/LT/SR/PM)\_Bus Commuter Travel Times
- (AM/LT/SR/PM)\_Bus Education Travel Times
- (AM/LT/SR/PM)\_Bus Other Travel Times
- (AM/LT/SR/PM)\_Bus Retired Travel Times
- (AM/LT/SR/PM)\_Rail Commuter Travel Times
- (AM/LT/SR/PM)\_Rail Education Travel Times
- (AM/LT/SR/PM)\_Rail Other Travel Times
- (AM/LT/SR/PM)\_Rail Retired Travel Times
- (AM/LT/SR/PM)\_Tram Commuter Travel Times
- (AM/LT/SR/PM)\_Tram Education Travel Times
- (AM/LT/SR/PM)\_Tram Other Travel Times
- (AM/LT/SR/PM)\_Tram Retired Travel Times

#### Active

- (AM/LT/SR/PM) Hansen Indices for Cycle
- (AM/LT/SR/PM) Hansen Indices for Walk
- (AM/LT/SR/PM)\_Cycle Times Commuter
- (AM/LT/SR/PM)\_Cycle Times Education
- (AM/LT/SR/PM)\_Cycle Times Other
- (AM/LT/SR/PM)\_Cycle Times Retired
- (AM/LT/SR/PM)\_Walk Times Commuter
- (AM/LT/SR/PM)\_Walk Times Education
- (AM/LT/SR/PM)\_Walk Times Other
- (AM/LT/SR/PM)\_Walk Times Retired

### Social Inclusion – Travel Time Benefit and Vehicle Operating Costs:

#### Road

- AM\_Car Commuters Travel Time Benefits
- AM\_Car Commuters VOC Benefits
- AM\_Car Others Travel Time Benefits
- AM\_Car Others VOC Benefits



**PT**

- AM\_PT Commuters Travel Time Benefits
- AM\_PT Others Travel Time Benefits

## 8 Appendix C - RMS Lambda Values

RMS values for each regional model, broken down by travel type.

Mode	ERM	WRM	SWRM	MWRM	SERM
<b>Car</b>	0.141	0.104	0.133	0.113	0.115
<b>PT</b>	0.024	0.033	0.037	0.028	0.031
<b>Active</b>	0.077	0.063	0.081	0.072	0.063

## 9 Appendix D – Model machine matrix

Model Machine	NTA-Mod-01	NTA-Mod-02	NTA-Mod-03	NTA-Mod-04	NTA-Mod-05	NTA-Mod-06	NTA-Mod-07	NTA-Mod-08	NTA-Mod-09	NTA-Mod-10
Cube Version	6.4.2	6.4.2	6.4.2	6.4.2	6.4.2	6.4.2	6.4.2	6.4.2	6.4.2	6.4.2
ArcGIS Version	10.4	10.4	10.4	10.4	10.4	10.4	10.5	10.5	10.5	10.5
Accessibility and Social Inclusion	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

The table above shows which NTA model machine can currently run the Accessibility and Social Inclusion module.

