Monthly Regional Tourism Estimates (MRTEs) 2.0 Methodology

November 2023

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Glossary of Terms

ECT Data- Electronic Card Transaction Data. Card transactions are payments using a credit or debit card. This does not include transactions such as ApplePay, AliPay (or similar electronic transactions), bank-to-bank transfers or online payments

RTIs - Regional Tourism Indicators. Developed by MBIE in 2012 to give a better indication of spending in the regions of NZ. It used ECT Data, but generated an index rather than actual dollar estimates. It was published at a monthly resolution

RTEs - Regional Tourism Estimates. Developed by MBIE in 2013 to give actual dollar estimates of tourism expenditure at region and product groupings. It was published at a annual resolution

MRTEs - Monthly Regional Tourism Estimates. These evolved from the RTEs and were first published in 2016. The MRTEs are intended to provide actual dollar estimates of tourism expenditure at region and product level at a monthly resolution

TSA - Tourism Satellite Account. This represents the official figures on the contribution of tourism to the New Zealand national accounts

IVS - International Visitor Survey. This measures the expenditure, characteristics and behaviours of international visitors to New Zealand

QA - Quality Assurance. Data Ventures has a Five Gate QA process (5GQA) that utilises multiple stages or 'gates' with automated and manual reporting, interventions and spot analysis

YEMar - Year Ending March

RTO - Regional Tourism Organisation. RTOs are acknowledged and respected as the key regional agencies responsible for fostering and promoting regional tourism development in New Zealand. Each RTO has an associated geographical region. These regions do not align, or aggregate to, Regional Council geographic boundaries

Region - Refers to the geographical region under administration by a given Regional Council

MTA - Modified Territorial Authority. These are based on Territorial Authority boundaries, but have been modified such that they aggregate to RTO and/or Region boundaries

Reference Period - The analysis and subsequent classification of any domestic transaction from a unique card uses a Reference Period, set as the 90-day window preceding the current reporting month. If a card has no transactions within the Reference Period, but has transactions within the current report month, they will be classified as Local Spending and therefore excluded from any MRTEs output for that month. The 90-day window was chosen as it balanced computational efficiency with providing a clear window of time for analysis of spending patterns. Having a longer window (e.g. six months), would result in less flexibility and scenarios where cardholders may move to new environments but their spending in the new environments would not be classified correctly as Local Spending for up to six months.

ANZSIC - Australia and New Zealand Standard Industrial Classification. Standardised codes used to enable comparison of economic data across industrial groups at different hierarchical levels

Primary Environment - Any postcode centroid within a 40 kilometre radius from the centroid of the postcode where the card in question was used most frequently within the Reference Period

Secondary Environment - Any postcode centroid within a 40 kilometre radius from the centroid of a postcode (separate to the geographic area identified as the Primary Environment) where the card in question was used at least 20% of total days the card was used within the Reference Period. Additional criteria set out in the Detailed Methodology section must also be met to ensure that transactions made on one-off trips, such as holidays, are not misidentified as Local Spending

Usual Environment - Geographic area/s where a card is used most often, as this is assumed to reflect a cardholder's regular life routines. The Usual Environment consists of a Primary Environment and, for some cards with spending patterns that meet the criteria, a Secondary Environment/s. These Primary and Secondary Environments do not have to be geographically contiguous

Domestic Tourism - Any transaction that occurs outside of the unique Usual Environment defined for that card (relative to the Reference Period)

International Tourism - Any transaction on a card with a country of origin outside of New Zealand where the card was first used in New Zealand less than one year ago, preceding the current month. Any transaction on a card with a country of origin outside of New Zealand that was first used in New Zealand more than one year ago, preceding the current year, but has had a nine-month gap in spending in the last year, preceding the current month, will be included as International Tourism as these spend patterns predominantly represent those of repeat international tourists

Local Spending - Any transaction that occurs inside of the unique Usual Environment defined for that card (relative to the Reference Period)

Introduction

History of the MRTEs

The Tourism Data Domain plan of 2011 identified that published regional indicators for tourism spend were not fit for purpose. This prompted the development of the Regional Tourism Indicators (RTIs) in 2012. The RTIs used an innovative approach to identify tourism spending from Electronic Card Transaction Data (ECT Data). The RTIs were published as an indicator series intended to provide tourism operators with a regional, timely guide to trends and patterns in tourism spending.

A major limitation of the RTIs was that they did not estimate actual dollar spend estimates. This led to the development of the Regional Tourism Estimates (RTEs) in 2013. The RTEs provided annual estimates of actual tourism spend using the RTIs, International Visitor Survey (IVS) and provisional data from the Tourism Satellite Account (TSA).

The Monthly Regional Tourism Estimates (MRTEs) were developed after a review of the RTIs and RTEs. The intent of the MRTEs was to estimate actual dollar spend on tourism at a regional level on a monthly frequency.

The original MRTEs were discontinued in 2020 after methodological complications arising from COVID-19, and were temporarily replaced by the Tourism Electronic Card Transactions (TECTs). Since their introduction, the TECTs have been serving as an indicator of high-level tourism expenditure trends rather than providing data that can be attributed to total tourism expenditure.

This revision of the original MRTEs methodology[1] aims to reinstate the attributable insights and information to tourism stakeholders across New Zealand, with additional improvements to the level of accuracy, resilience and alignment with global standards.

MRTEs Content

The MRTEs are published every month and include summary statistics covering geographic regions of spending, TSA product categories, and origin of visitors. Separate MRTE datasets cover geographic expenditure by Regional Council area, Regional Tourism Organisation (RTO), and Modified Territorial Authority (MTA). Tourist origin is defined as the country of origin for international tourists, or the Regional Council of origin for domestic tourists. The Regional Tourism Organisation, Regional Council and Modified Territorial Authority tables below illustrate the combinations available at annual and monthly levels of summary.

MRTEs Table Outputs

All output tables are generated for each month, however only the Regional Tourism Organisation (RTO), and Regional Council tables include expenditure by month. The Modified Territorial Authority and Territorial Authority tables only include annual spend due to the need to protect the privacy of businesses in smaller areas.

Annual expenditures are published for the rolling twelve month period previous to the current month. Expenditure figures are in millions of dollars (NZD). No CPI adjustments are applied.

Regional Tourism Organisation table - Example

Date	RTO	Product	Visitor Type	Origin	Annual Spend	Monthly Spend
31/10/2022	ChristchurchNZ	Accommodation	International	China	0.25	0.003
30/09/2022	Hurunui Tourism	Other	Domestic	Auckland	0.45	0.04

Regional Council table - Example

Date	Region	Product	Visitor Type	Origin	Annual Spend	Monthly Spend

[1] MRTE User Guide (mbie.govt.nz)

31/10/2022	Auckland	Accommodation	International	Australia	0.15	0.002
30/09/2022	Tasman	Other	Domestic	Tasman	0.35	0.03

Territorial Authority table - Example

Date	TA	Product	Visitor Type	Origin	Annual Spend
31/10/2022	Auckland	Accommodation	International	USA	0.15
30/09/2022	Waikato District	Other	Domestic	Wellington	0.9

Modified Territorial Authority table - Example

Date	MTA	Product	Visitor Type	Origin	Annual Spend
31/10/2022	Ashburton District	Accommodation	International	USA	0.05
30/09/2022	Central Otago	Other	Domestic	Wellington	0.12

The complete MRTEs series is revised each year at the same time the most recent TSA data is added. Any changes to business classifications, or methodological updates, are applied at this time. Revisions are not considered errors. Statistics are often systematically amended to reflect more complete information. The Revision Timeline below details what is updated in each release.

Revision Timeline

Frequency	Which values are updated
Monthly	Postcode-Area Concordances
Monthly	Australian and New Zealand Standard Industrial Classification (ANZSIC) for businesses
Quarterly	International Visitor Survey (IVS) provisional and final spend values
Yearly	Tourism Satellite Account (TSA) provisional

	and final spend values

Guidance on Use

The MRTEs have been developed using a combination of various data sources including commercial and administrative data. The methodology is described in detail in this document, but users should be aware that the statistics produced in the MRTEs are **estimates only**.

Given the lack of customer-centric ECT Data in the MRTEs, and the availability of only merchant-centric postcode-based data, some generalisations and assumptions to transform card transactions to determine 'touristic' movements is necessary. This may, in some isolated cases, result in transactions being classified incorrectly as 'false positives' or 'false negatives'.

'False positives' relate to '*a transaction that has been classified as Domestic Tourism but in actuality is Local Spending*'. 'False negatives' relate to '*a transaction that has been classified as Local Spending but in actuality is Domestic Tourism*'.

Datasets such as the IVS and TSA should be viewed as complementary to the MRTEs. The MRTEs have been designed such that the overall national totals align with the TSA, but due to deliberate introduction of noise in the data for anonymisation purposes (see pages 7-8), the regional totals should be considered estimates only. The IVS totals will not align as they have been scaled as part of the development process (see page 21).

Data at higher resolutions (MTA level) will naturally have higher levels of uncertainty due to greater influence of outliers and possible sample size limitations for some product groupings. MTA-level estimates of product and origin combination should be viewed with more caution than broader groupings.

While best efforts have been made to ensure the reliability of data in individual products such as the MRTEs, or the Monthly Unique Regional Population Estimates (MURPEs); it is important to know that these products may use different underlying datasets (ECT Data vs cell tower data) and employ different methods of estimation. This means that users should be cautious when combining different datasets.

Privacy and Confidentiality

As the MRTEs use ECT Data that could potentially identify individual businesses in areas where there are small numbers of specific business types, the ECT Data processing uses the Stats NZ noised counts and magnitudes method to perturb the data slightly to ensure privacy[2].
The specific privacy treatment is as follows:

- Each card token is assigned a fixed random number which is used to generate noise such that each individual value is perturbed by approximately +/- 10%. Noise is equally likely to be applied positively or negatively.
- Therefore, in cells where a large number of card tokens have contributed, the noise will cancel out, while those cells with a small number of contributing card tokens are more protected.

Impact of Covid-19

Part of the processing of the MRTEs involves a forecast of monthly expenditures as a means to estimate annual totals in absence of published TSA and/or IVS data. Forecasting algorithms can be influenced by outliers in a series and the international contribution to tourism has been much lower in recent years due to Covid-19. The recovery in international tourism that has occurred recently could influence the medium-term forecasts which could lead to an unexpectedly high weighting factor. This will be monitored closely over the coming years, but users should be aware that tourism estimates for international visitors may be skewed.

[2] (PDF) Confidentialising Business Demography outputs using the Noise for Counts and Magnitudes (NCM) method (researchgate.net)

Methodology

Source Datasets

The MRTEs use three primary data sources, augmented with secondary data. The primary data sources are:

- Electronic Card Transaction (ECT) data
- International Visitor Survey (IVS)
- Tourism Satellite Account (TSA)

ECT Data:
ECT Data is sourced from two data providers (Provider One and Provider Two). This data covers approximately 90% of in-store card transactions, but excludes cash transactions and online transactions like bank-to-bank transfer or online credit card payments, as well as other platforms such as ApplePay and AliPay. Although the absence of cash and online transactions represent a significant portion of spending in the modern tourism industry, they are accounted for through methodology Steps 2-5 and the associated assumptions are also documented (see pages 27-28).

ECT Data is provided to Data Ventures in anonymised form with unique alphanumeric card tokens instead of card numbers to protect the privacy of cardholders. The raw ECT Data includes merchant postcode information sufficient to allow identification of purchase locations in >99% of cases. No information is available that could identify the unique home location of each card. Determining the Usual Environment of a card is a critical requirement for identification of Domestic Tourism spending and is inferred through the analysis of its geographic spending patterns.

The raw ECT Data also includes information on the country of issue of the card. This is used to help identify the country of origin for each card and thereby accurately classify transactions as either International Tourism or Domestic Tourism.

The business rules applied to the ECT Data are covered in the Detailed Methodology section of this document.

IVS Data:
The IVS is sourced from the Ministry of Business, Innovation and Employment (MBIE). It is the source of expenditure by country of origin and relies on self-reporting by tourists that agreed to participate in the survey.

TSA Data:

The TSA is sourced from Statistics New Zealand. The TSA is a Tier One statistic[3] and is subject to high levels of quality assurance. The TSA totals represent the official values of tourism expenditure and are used as the target for all weightings of other data sources at a national level. Data for the MRTEs is drawn from Table 12 of the TSA, however some categories from the TSA are excluded from the MRTEs as the TSA sources these from third-parties (airlines, accommodation brokers etc). These are:

- Air passenger transport: as most flights are purchased overseas and online, ECT Data does not adequately cover this area so this category is excluded.
- Imputed rental on holiday homes: ECT Data does not adequately cover this area so this category is excluded.
- Education services: as this category covers students in New Zealand for up to 12 months it is difficult to distinguish their spending from the domestic population so this category is excluded.

Supplementary Data

The ECT, IVS, and TSA data form the basis of the data used to generate summary statistics at various groupings. Other data sources are required at various stages of the development cycle. These data sources are sourced from Statistics New Zealand and include:

- Spatial data such as Territorial Authority boundaries (current & historic), RTO boundaries, Regional Council boundaries, and postcode boundaries (see Annex Three).
- ANZSIC-TSA concordance (see Annex Two)

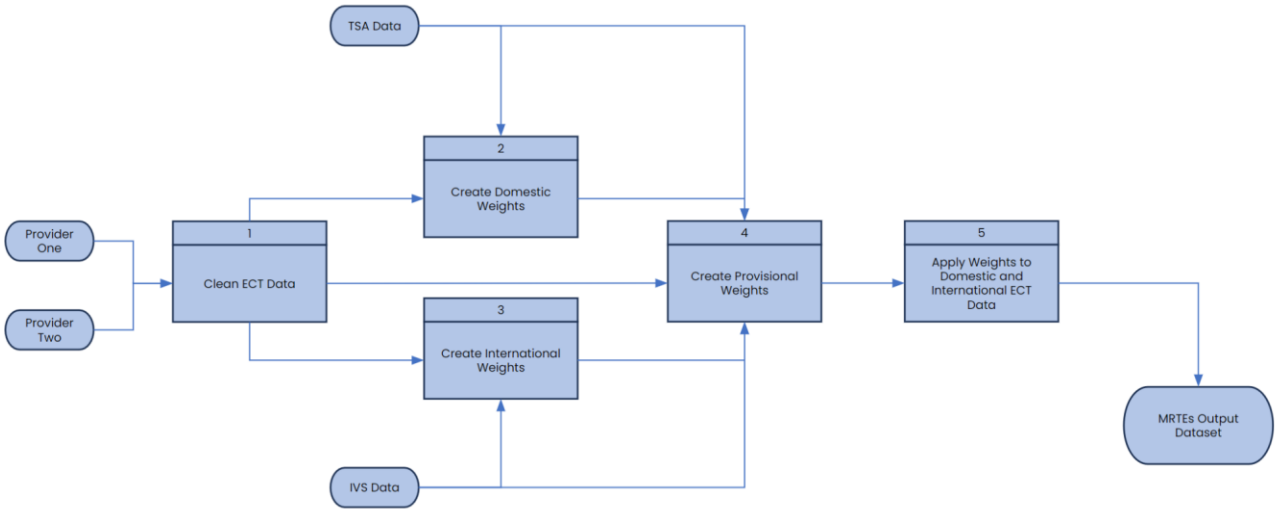
Overview and General Approach

In broad terms, the MRTEs aim to apportion estimates of national tourism expenditure to a product and regional level at a monthly resolution. This is achieved through a combination of various datasets that each provide a part of the picture, and then applying various weightings to the data such that the overall totals for all combinations align with the accepted national totals.

Figure A below shows the high-level process for creating the MRTEs.

[3] Official statistics - data.govt.nz

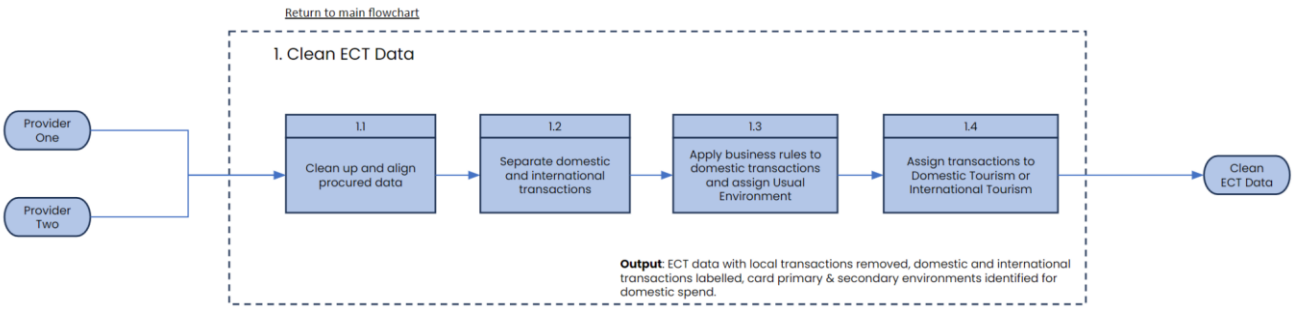
Figure A: MRTEs Overall Process Map



Detailed Methodology

Step 1: Clean ECT Data

Figure B: Step 1 Process Map



1.1 - Clean up and align procured data

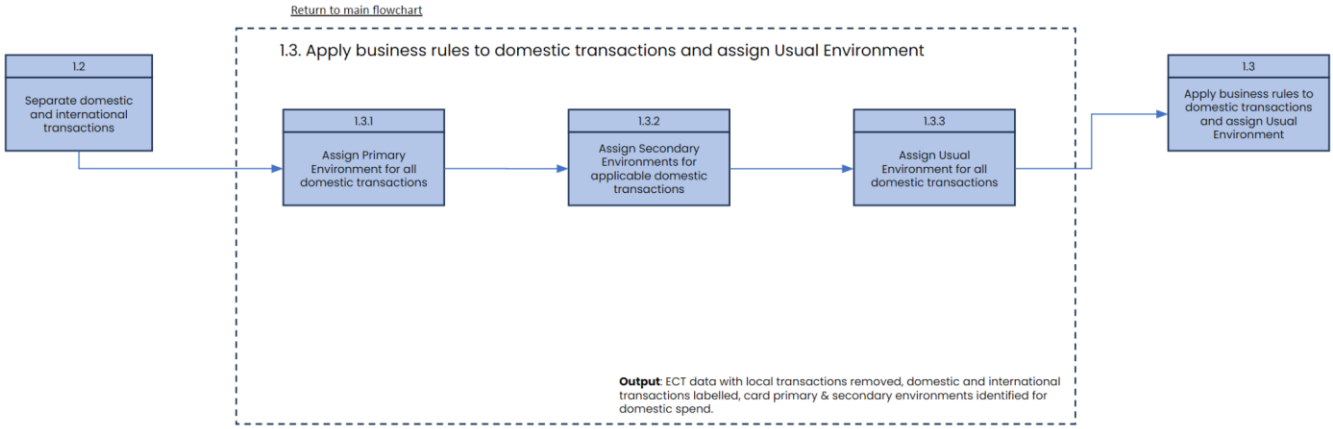
Data Ventures receives ECT Data from Provider One and Provider Two. The data must be cleaned to prepare it for use in subsequent steps. This cleaning includes correcting or removing incorrect records. Removed records are detailed in Annex Five. Materiality and the potential impact to the overall dataset of removed records is closely monitored through automated QA processes.

1.2 - Separate domestic and international transactions

After initial cleaning and alignment of the ECT Data, the dataset is split into two, one dataset with all transactions that meet the criteria of International Tourism, and the other dataset with all remaining domestic transactions. This allows for the domestic transactions to be filtered further to determine whether transactions are Local Spending or Domestic Tourism. Additionally, there are separate weighting processes that have to be applied to the two datasets. The two domestic and international datasets are kept separate until Step 5.2.3.

1.3 - Apply business rules to domestic transactions and assign Usual Environment

Figure C: Step 1.3 Process Map



1.3.1 - Primary Environment

After the separation of domestic and international transactions, each card with domestic transactions is assigned a Primary Environment. This Primary Environment is the 40 kilometre radius (geographic area) around the centroid of the postcode where the card in question was used most frequently within the Reference Period.

Figure D: How a Primary Environment is determined

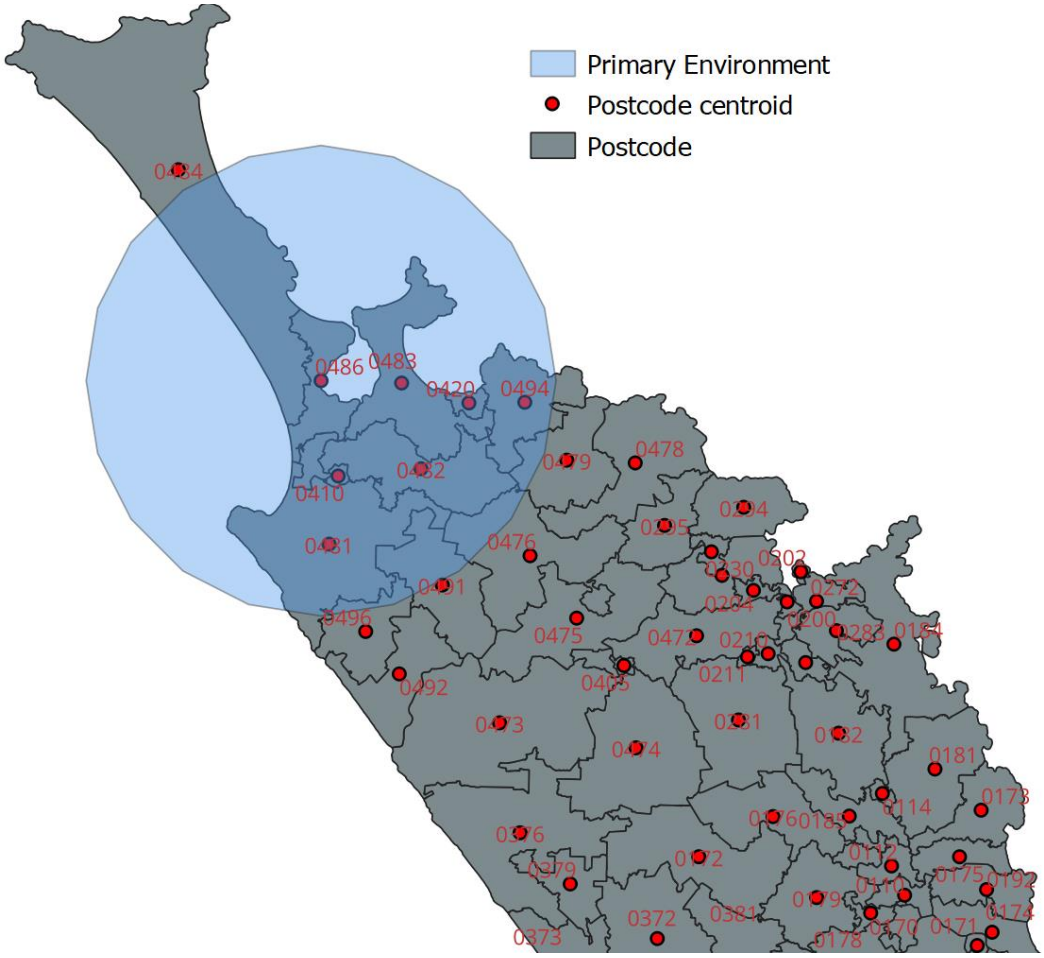
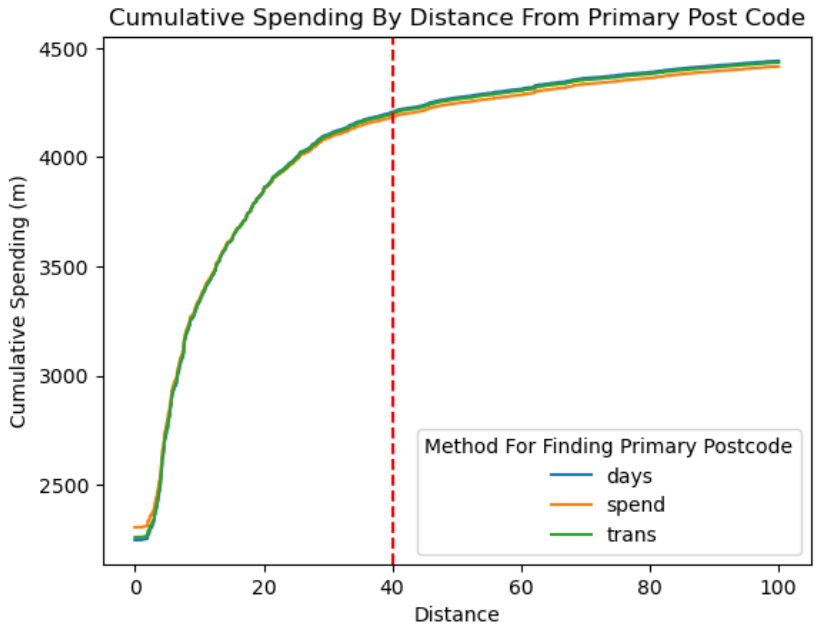


Figure D above is an example of how a Primary Environment is determined. Postcode 0486 was the postcode which was used most frequently by a unique electronic card within the Reference Period. Any postcode centroid within the 40 kilometre geographic area surrounding postcode 0486 is considered to be part of that card's Primary Environment. Any transaction from a postcode within this Primary Environment is considered Local Spending.

The use of a 40 kilometre radius is to distinguish whether domestic transactions have the relative characteristics of either Local Spending or Domestic Tourism. For Local Spending, which represents the majority of cardholders total spending, cardholders see the cost of travel as being greater and therefore are not likely to travel beyond a certain distance. While for Domestic Tourism, which represents a much smaller portion of cardholders total spending, cardholders are willing to travel greater distances. This hypothesis is supported by the data in Figure E below.

Figure E: The relationship between cardholder travel distance and ECT spending



1.3.2 - Secondary Environment

Some cards may be assigned a Secondary Environment if the card in question is used in another postcode (separate to the geographic area identified as the Primary Environment), at least 20% of total days the card was used in the Reference Period. Establishing Secondary Environments enables more precise classifications for Local Spending and Domestic Tourism.

Additionally, to accurately distinguish between commuter spending (Figure F) and holiday spending (Figure G), the first and last transaction date in this 'other' postcode is calculated. If the calculation shows that the card in question had spent more than 40% of its time in this other postcode, it is assigned as their Secondary Environment.

This is detailed in the equation below:

$$(max_{td} - min_{td}) > (40\% \times tcad) = secondary\ environment$$

$$max_{td} = maximum\ transaction\ date\ in\ second\ postcode\ (within\ ref\ period)$$
$$min_{td} = minimum\ transaction\ date\ in\ second\ postcode\ (within\ ref\ period)$$
$$tcad = total\ card\ active\ days\ (within\ ref\ period)$$

Figure F: Characteristics of commuter spending - multiple trips (Secondary Environment)

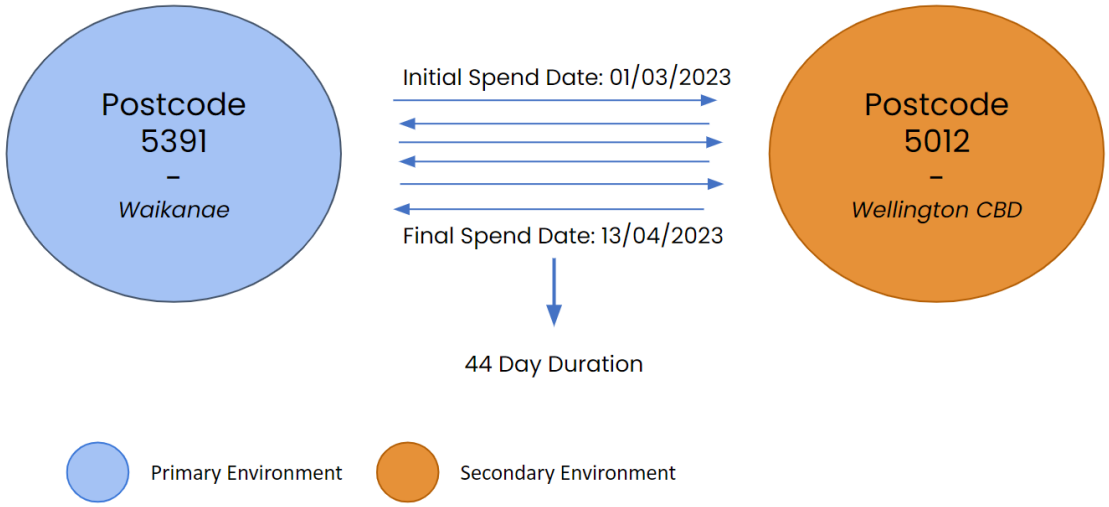
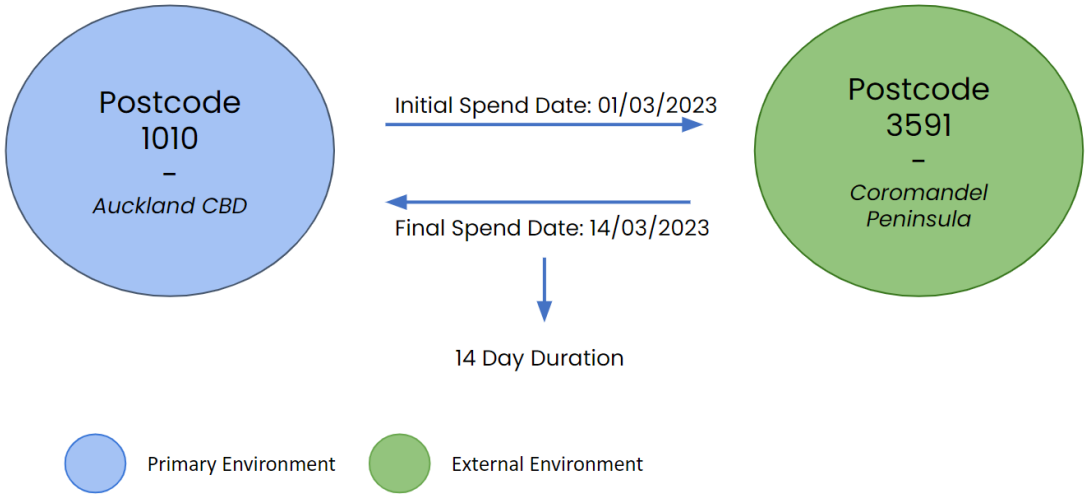


Figure G: Characteristics of holiday spending - single trip (Domestic Tourism)



1.3.3 - Usual Environment

A card's Usual Environment is considered to be the geographic area/s where a card is used most often within the Reference Period, as this is assumed to reflect the individual associated with a card's life routines. The Usual Environment consists of the Primary Environment and, for some cards with spending patterns that meet the definitions in Step 1.3.2, a Secondary

Environment/s. These Primary and Secondary Environments can be, but are not required to be, geographically contiguous.

Figure H below illustrates an example of a cardholder living in postcode 5391 who regularly commutes to postcode 5012 for work. These two environments together (Primary Environment + Secondary Environment) constitute this cardholder's unique Usual Environment (See Figure I). Any transactions within this Usual Environment will be classified as Local Spending.

Figure H: Example of a card's Primary and Secondary Environment

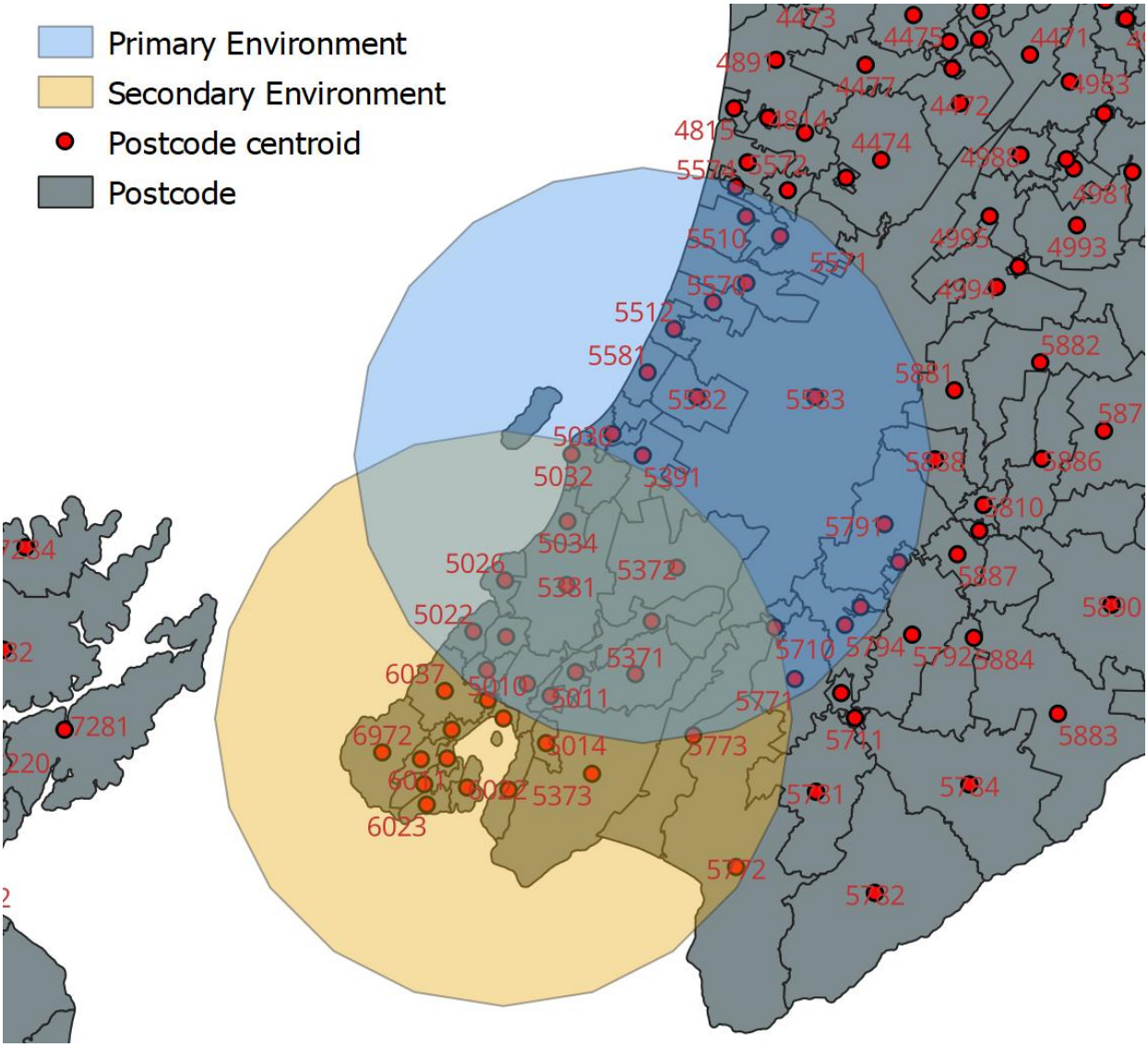
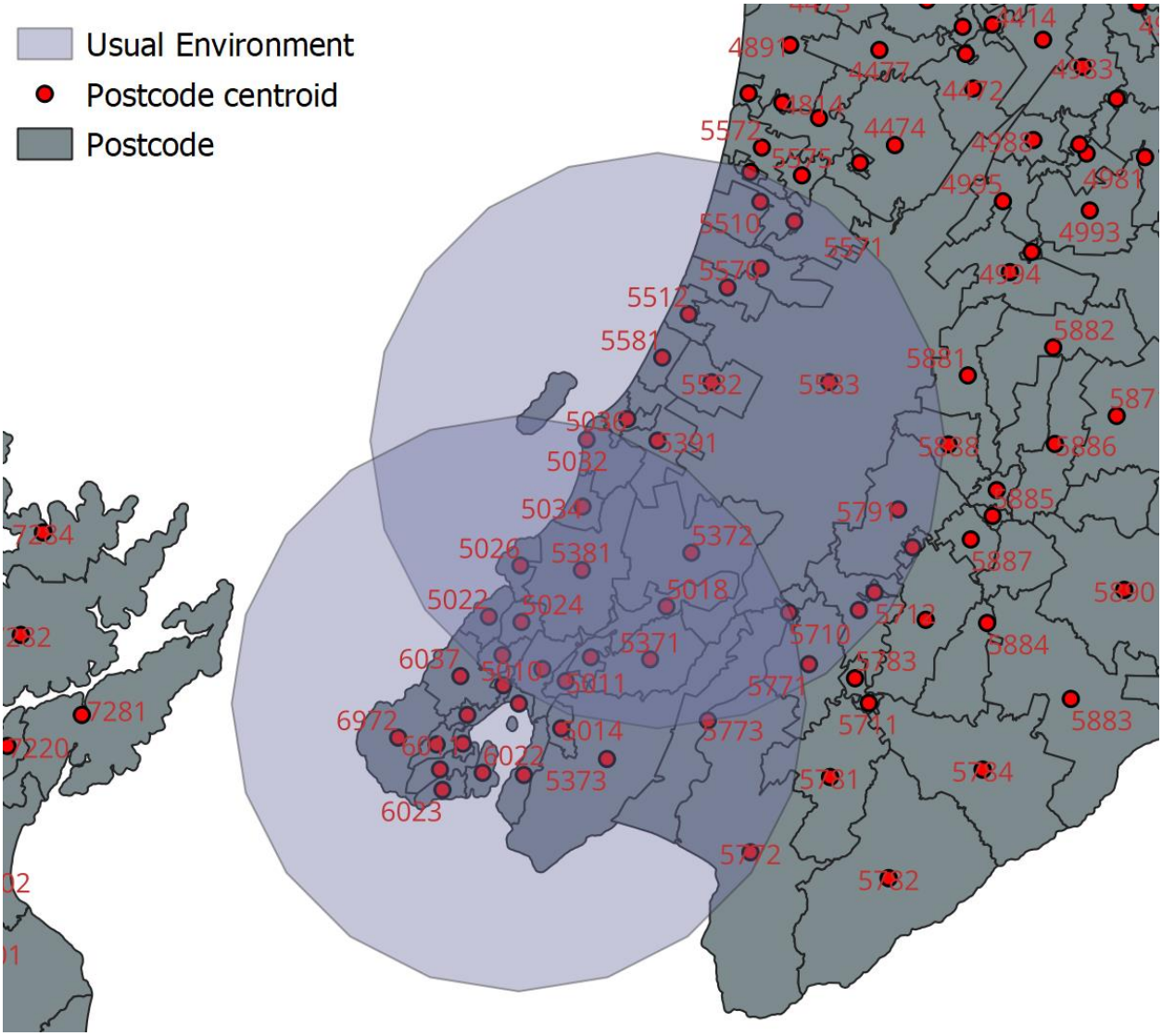


Figure I: Example of a card's Usual Environment



1.4 - Assign transactions to Domestic Tourism or International Tourism

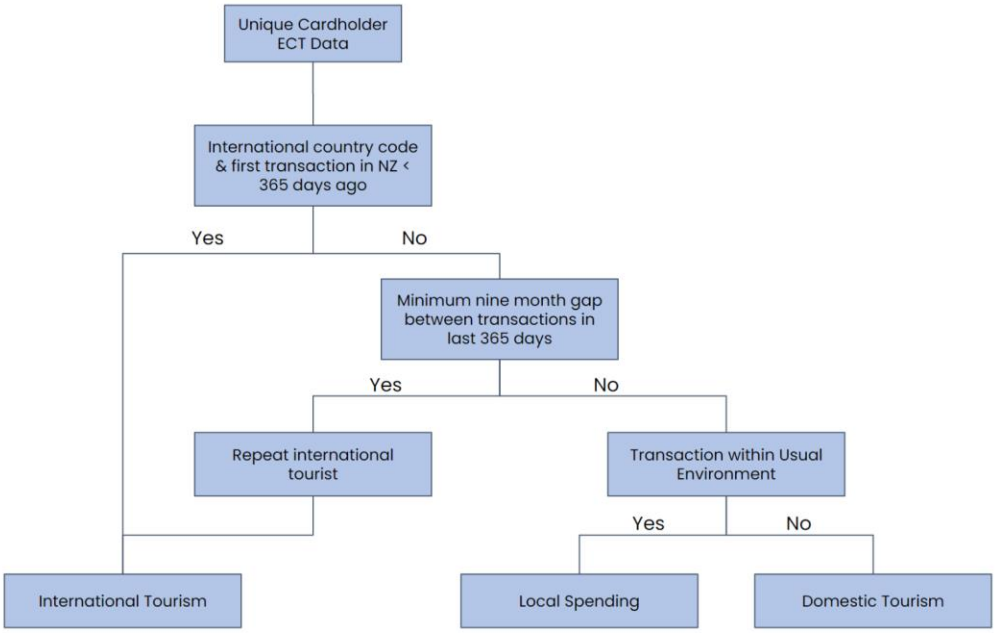
Once a card's Usual Environment is established, it is possible to identify transactions as being Local Spending, Domestic Tourism, or International Tourism.

- Local Spending is any transaction that occurs inside of the Usual Environment defined for that card (relative to the Reference Period)
- Domestic Tourism spending is any transaction that occurs outside of the card in question's unique Usual Environment (relative to the Reference Period)
- International Tourism spending is classified in two parts:

- Firstly, it is any transaction on a card with a country of origin outside of New Zealand where the card was first used in New Zealand less than one year ago, preceding the current month
- Secondly, it is any transaction on a card with a country of origin outside of New Zealand that was first used in New Zealand more than one year ago, preceding the current year, that has had a nine-month gap in spending in the last year, preceding the current month. These will be included as International Tourism as these spend patterns predominantly represent those of repeat international tourists

The segmentation of Local Spending, Domestic Tourism spending and International Tourism spending is illustrated below.

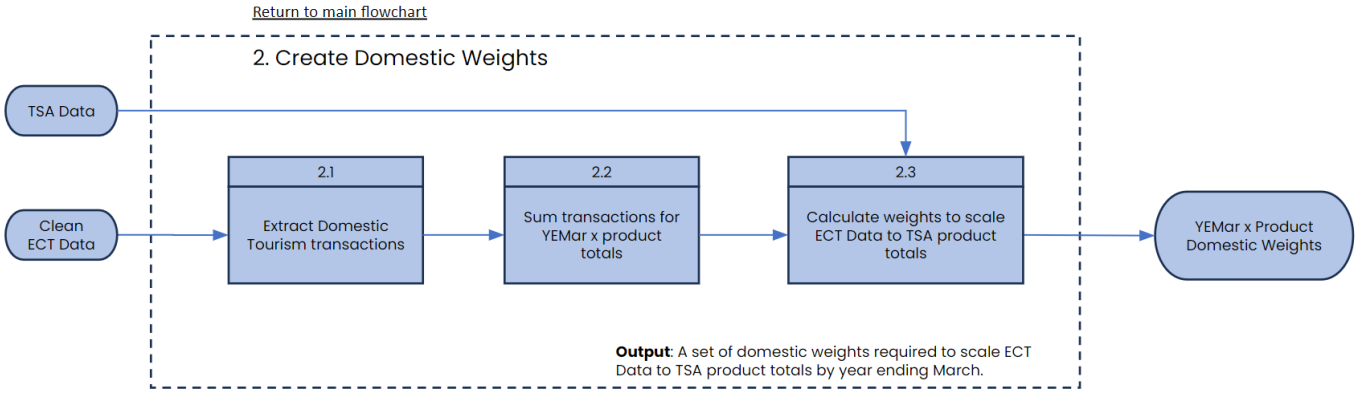
Figure J: ECT Data Spending Classification Tree



Step 2: Create Domestic Weights

Following the cleaning and classification of ECT Data, calculation of the weights needed to scale the ECT Data to align with TSA product totals for YEMar begins.

Figure K: Step 2 Process Map



2.1 - Extract Domestic Tourism transactions

All ECT Data transactions that have been identified as Domestic Tourism through Step 1 are extracted.

2.2 - Sum transactions for YEMar x product totals

The Domestic Tourism transactions are aggregated to totals for each YEMar and product combination.

2.3 - Calculate weights to scale ECT Data to TSA product totals

Now that the Domestic Tourism transactions derived from the ECT Data are of the appropriate scale, weights for each YEMar and product combination can be calculated.

The formula for each weight is:

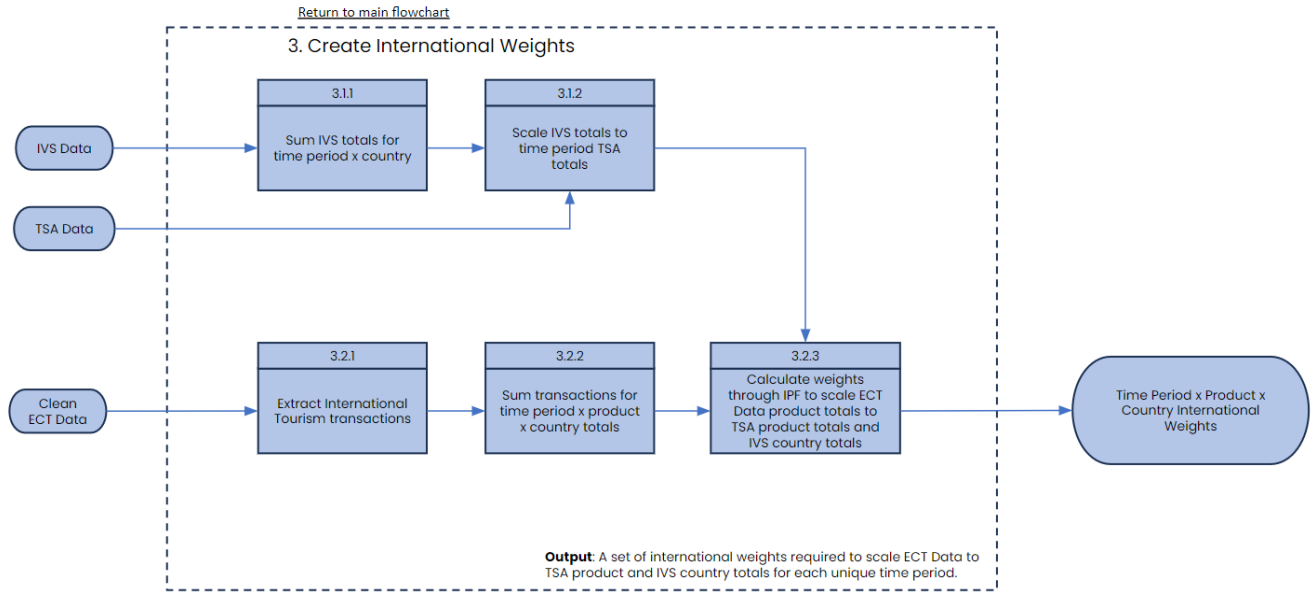
$$weight_{YEMar,product} = \frac{Domestic\ Tourism\ spend_{YEMar,product}}{TSA\ Domestic\ \ spend_{YEMar,product}}$$

The result from this step is a weight for each YEMar and product combination that can be applied in Step 5.

Step 3: Create International Weights

As with Domestic Tourism, weights are required to scale the ECT Data for International Tourism to align with the International Tourism component of the TSA. This involves two stages.

Figure L: Step 3 Process Map



3.1.1 - Sum IVS totals for time period x country

Firstly, the annual IVS totals are aggregated to annual totals for each time period and country combination.

3.1.2 - Scale IVS totals to time period TSA totals

Scale up IVS totals to align with each time period's TSA international totals. This is an important step as the marginal totals used in Step 3.2.3 need to sum to the same grand total. The formula for this step is as follows:

$$adjusted\ IVS_{time\ period,country} = IVS_{time\ period,country} \times \frac{TSA\ International\ spend_{time\ period}}{IVS\ total_{time\ period}}$$

At this point there is now an adjusted IVS dataset with country level expenditure that aligns with the time period TSA totals.

3.2.1 - Extract International Tourism transactions

All ECT Data transactions that have been identified as International Tourism through Step 1 are extracted.

3.2.2 - Sum transactions for time period x product x country totals

The International Tourism transactions are aggregated to totals for each time period, product and country combination.

3.2.3 - Calculate weights through IPF to scale ECT Data to TSA product totals and IVS country totals

Iterative Proportional Fitting[4] (IPF) (also called raking) is a critical part of the MRTEs methodology, as it takes disaggregated representative samples of total tourism spending (ECT Data) and iteratively scales them to align with national totals of tourism spending (TSA).

Using IPF, the International Tourism transactions aggregated through Steps 3.1.1-3.2.2, are then scaled up to produce estimates for each time period, product and country combination, such that their totals match the target TSA totals. This is achieved by the IPF algorithm calculating weights based on the proportional change from the initial ECT Data to the adjusted value for that cell.

IPF is required for scaling the aggregated International Tourism transactions as, unlike the Domestic Tourism transactions, the adjusted IVS data provides marginal totals by country, and the TSA data provides marginal totals for product grouping.

The creation of weights for the time periods when the IVS was suspended (due to the impacts of Covid-19) will ignore Steps 3.1-3.2 and instead solely utilise the TSA totals, similar to the approach in Step 2 for creating the domestic weights. The country of origin groupings, normally determined through the IVS, will be determined using the existing country codes within the supplied ECT Data. This approach is necessary to ensure the final outputs provide accurate and unskewed international tourism spending figures across all time periods.

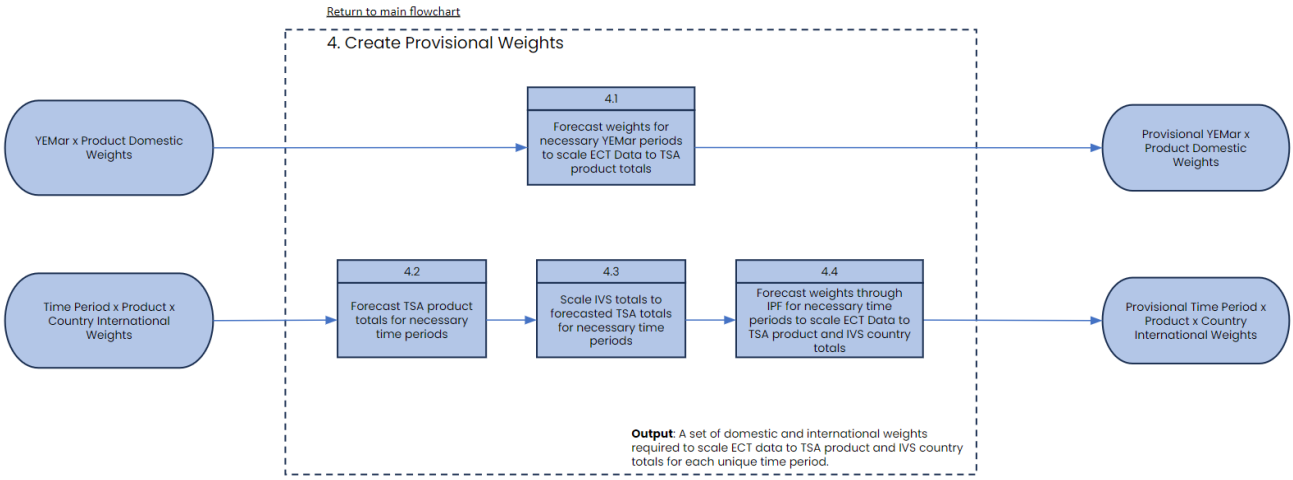
The result from this step is a weight for each time period, product and country combination that can be applied in Step 5.

[4] https://u.demog.berkeley.edu/~eddieh/IPFDescription/AKDOLWDIPFTWOD.pdf

Step 4: Create Provisional Weights

The TSA is published annually for the YEMar period. The data is typically released around November each year for the previous YEMar. Since annual weights that align with the monthly ECT Data are required, it is necessary to create provisional weights from historically available TSA data for each recent month that does not yet have corresponding published TSA data. This is achieved differently for domestic and international weights.

Figure M: Step 4 Process Map



4.1 - Forecast weights for necessary YEMar periods to scale ECT Data to TSA product totals

For Domestic Tourism spend, the provisional weights for each necessary YEMar and product combination are calculated based on the formula below:

$$provisional\ weight_{YEMar,product} = \frac{Domestic\ Tourism\ spend_{YEMar,product}}{Domestic\ Tourism\ \ spend_{YEMar^{-1},product}}$$

* If the previous year (YEMar-1) is not yet available for a YEMar period, then the next available year is applied (YEMar-2)

4.2 - Forecast TSA product totals for necessary time periods

For International Tourism spend, the provisional weights for each necessary time period, product and country combination are calculated through steps 4.2-4.4. The initial step is to forecast the TSA product totals for the necessary time periods based on the formula below:

$$provisional\ TSA\ International\ spend_{time\ period} = TSA\ International\ spend_{scaling\ period*} \times \frac{International\ \ Tourism\ spend_{time\ period}}{International\ \ Tourism\ \ spend_{scaling\ period*}}$$

* The most recent ***scaling period*** available is used. Due to the impacts of Covid-19, the IVS was suspended for several years. As a result, the period directly prior to ***time period*** is not always available and, in these scenarios, a previous period is used as the ***scaling period***

4.3 - Scale IVS totals to forecasted TSA totals for necessary YEMar periods

As in Step 3.1.2, the IVS totals for the necessary YEMar periods need to be scaled up to align with the YEMar provisional TSA International spend totals. This is an important step as the marginal totals used in Step 4.4 need to sum to the same grand total. The formula for this step is as follows:

$$adjusted\ provisional\ IVS_{time\ period,country} = IVS_{scaling\ period*,country} \times \frac{provisional\ TSA\ International\ spend_{time\ period}}{adjusted\ IVS\ total_{scaling\ period*}}$$

* The most recent ***scaling period*** available is used. Due to the impacts of Covid-19, the IVS was suspended for several years. As a result, the period directly prior to ***time period*** is not always available and, in these scenarios, a previous period is used as the ***scaling period***

At this point there is now an adjusted provisional IVS dataset with country level expenditure that aligns with the provisional TSA international totals for all necessary YEMar periods.

4.4 - Forecast weights through IPF for necessary YEMar periods to scale ECT Data to TSA product and IVS country totals

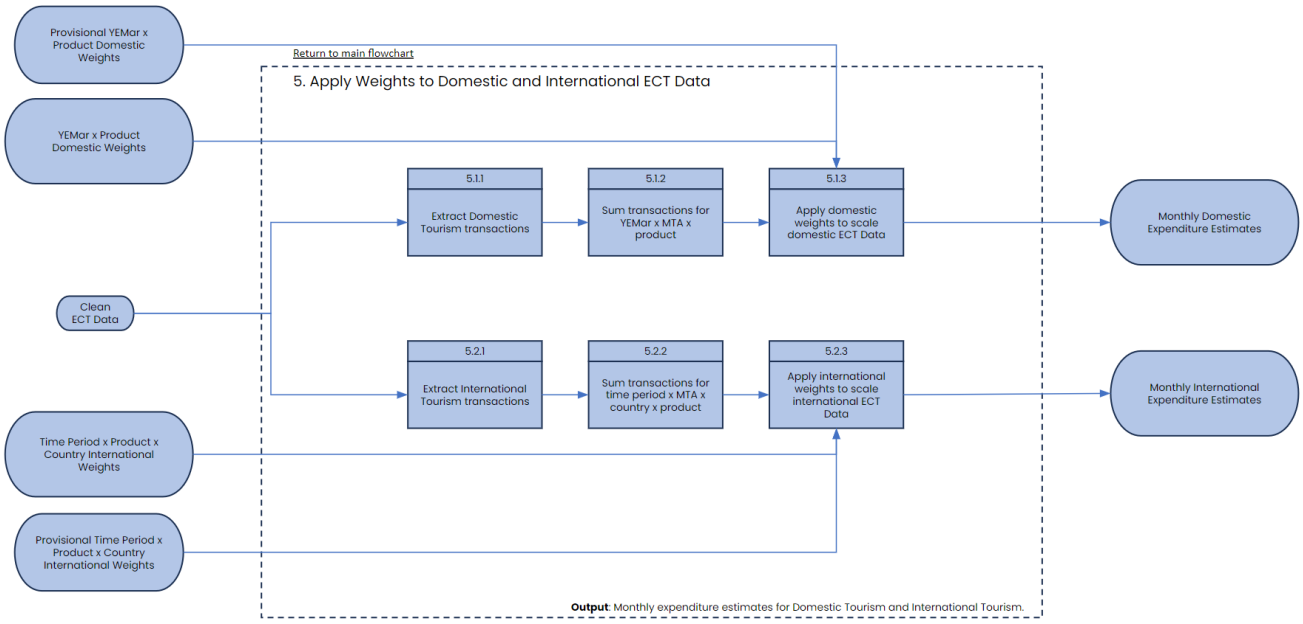
As in Step 3.2.3, using IPF, the adjusted provisional IVS totals by time period and country, as well as the provisional TSA international totals by time period and product, are fed into the IPF algorithm to calculate provisional weights for each necessary time period, product and country combination based on the proportional change from the initial ECT Data to the adjusted value for that cell.

The results from this step are provisional weights for each necessary time period, product and country combinations that can be applied in Step 5.

Step 5: Apply Weights to Domestic and International ECT Data

After the comprehensive weights (provisional + actual) for both Domestic Tourism spend and International Tourism spend are calculated, the ECT Data is scaled up to align with the national totals from the TSA. These weights are cascaded down and applied to the aggregated ECT Data at the MTA aggregation level (the lowest level), so that outputs at all higher levels of aggregation will also be attributable to national totals.

Figure N: Step 5 Process Map



5.1.1 - Extract Domestic Tourism transactions

All ECT Data transactions that have been identified as Domestic Tourism through Step 1 are extracted.

5.1.2 - Sum transactions for YEMar x MTA x product

ECT Data is aggregated to create spend totals by month, MTA, and product combinations for all Domestic Tourism transactions.

5.1.3 - Apply domestic weights to aggregated domestic ECT Data

The domestic weights from the calculations in Step 2 are now applied. The domestic weights are applied to the monthly aggregated spend using the unique YEMar and product combinations as keys.

5.2.1 - Extract International Tourism transactions

All ECT Data transactions that have been identified as International Tourism through Step 1 are extracted.

5.2.2 - Sum transactions for time period x MTA x country x product

ECT data is aggregated to create expenditure totals by time period, MTA, country and product combinations for all International Tourism transactions.

5.2.3 - Apply international weights to aggregated international ECT Data

The annual weights from the calculations in Step 3 are now applied. The international weights are joined to the monthly aggregated spending using the unique time period, country and product combinations as keys.

The result of this step is monthly regional expenditure estimates for both Domestic and International Tourism that are attributable to IVS and TSA totals. The final dataset is then saved and processed into the various formats required for publication.

Quality Assurance:

Following the processing of the ECT Data through Steps 1-5, the final outputs receive extensive quality assurance checks through Data Ventures' Five Gate QA (5GQA) model. This model has multiple stages or 'gates' with automated and manual reporting, interventions and spot analysis to ensure that the final outputs are clear, consistent and correct.

Methodological Assumptions:

As stated in the Guidance on Use, the MRTEs are estimates only. As it is not possible to procure data on every monetary transaction that occurs in New Zealand, certain methodological assumptions must be made to enable both the granular detail for regional and product level insights, and the attribution to national totals. The methodological assumptions and their potential limitations for stakeholders are outlined below.

Assumption:
ECT spend patterns (proportion of ECT spend vs unattributable spend) are geographically consistent across all regions of New Zealand.

Limitation:
There is a high likelihood that variances in ECT spend patterns exist, caused by diversity in the regional social and geographical factors within New Zealand.

Example A: Regions/Modified Territorial Authorities with a rural-based population may have higher uses of cash payments due to limited internet availability.

Example B: Regions/Modified Territorial Authorities with an urban-based population may have higher uses of online payments due to events such as concerts, sporting events and shows.

Assumption:
ECT spend patterns (proportion of ECT spend vs unattributable spend) are consistent across all international tourists.

Limitation:
There is a high likelihood that variances in ECT spend patterns exist, caused by diversity in the payment methods used by tourists from differing origins

Example A: Consultation with tourism stakeholders have indicated that international tourists from China are known to disproportionately use cash when visiting New Zealand.

Assumption:
ECT spend patterns are an indicative sample of all tourism spending (i.e. they accurately represent online tourism spending)

Limitation:
There is a high likelihood that online spending (including pre-trip purchases) has different spending patterns to the sample of ECT Data used.

Example A: Tourists who visit New Zealand on a packaged tour will spend more directly with a tour operator, than across different industries.

Acknowledgement of Methodological Limitations

Centralised accounts:
Some merchants, such as car rental companies, often have accounts that centralise all transactions to a single location. For example, a rental company could have outlets all over the country, yet all transactions are shown as occurring in Auckland if their headquarters are located there. For these types of companies, spending is attributed to the location of their centralised accounts.

Unattributable online spend:
Some spending cannot be attributed to a specific TSA product category and is classified as unattributable online spend. This spending is excluded from any calculations that assign spending to explicit regions and is spread uniformly across all regions by the weighting process at national level that aligns totals with the TSA.

Multi-currency virtual cards:
Modern multi-currency cards are emerging as a cost-effective alternative to traditional eftpos/credit cards issued by traditional banks, especially for international tourists. The raw ECT Data for MRTEs has no clear way of distinguishing transactions made on these multi-currency cards from traditional cards. Certain large players within the multi-currency card market, can be identified through their Bank Identification Number (BIN). For example, any transaction made in New Zealand on a Wise card (regardless of the billing address of the cardholder) will show as originating from the United Kingdom (as this is where Wise is registered) through their BIN. However, as these multi-currency cards are still in their infancy, they represent less than 0.001% of total transactions and the impact of these on the final MRTEs output is, at this stage, immaterial. The materiality of these cards will continue to be monitored through automated QA processes (see Annex Five).

Annex One: Comparison of the MRTEs with other tourism data sources

	Tourism Satellite Account (TSA)	International Visitor Survey (IVS)	Monthly Regional Tourism Estimates (MRTE)
Purpose	Information on tourism's contribution to the New Zealand economy in terms of expenditure and employment	Estimating visitor expenditure for the national accounts	Estimating regional tourism spend
Depends on	Annual surveys including the IVS	A sample of international visitors completing an online survey	Electronic card transaction data, IVS, TSA
Published	Yearly in October for the preceding year ending March	Quarterly	Monthly
Measures	Expenditure, value add, employment, domestic and international	Travel patterns and expenditure of international visitors	Regional monthly expenditure on tourism from both international and domestic consumers
Able to be broken down by	Tourism product, purpose of visit, country, year, international/domestic	Purpose of visit, country, year, quarter	Region, RTO, TA, tourism product, year, month, international/domestic
What's excluded		▪ International airfares ▪ Spending of international students in NZ for less than one year ▪ Pre-paid package expenses for countries other than NZ which are visited on the same trip ▪ Any money spent by the visitor on other international visitors ▪ Purchase and maintenance of a house, flat or timeshare in NZ ▪ Costs associated with a cruise ship visit to NZ	▪ GST ▪ International airfares ▪ Education services ▪ Imputed rentals of holiday homes

Annex Two: Australian and New Zealand Standard Industrial Classification (ANZSIC) Codes

A core step of the methodology is grouping the ECT Data into the relevant TSA products for scaling and final outputting. Each transaction has an ANZSIC code associated with it. The concordance below enables each ANZSIC code in the list to be associated with a TSA product (Level 2 Grouping). The ANZSIC codes that are not included in the list below are considered to be related to 'non-touristic' activities and are therefore excluded from any MRTEs output.

Code	TSA Product Label
H4400	Accommodation services
I4900	Air passenger transport
R9003	Cultural, recreation, and gambling services
R9111	Cultural, recreation, and gambling services
R9131	Cultural, recreation, and gambling services
R9201	Cultural, recreation, and gambling services
J6010	Cultural, recreation, and gambling services
R9001	Cultural, recreation, and gambling services
R9112	Cultural, recreation, and gambling services
R9113	Cultural, recreation, and gambling services
R9139	Cultural, recreation, and gambling services
R9209	Cultural, recreation, and gambling services
R8910	Cultural, recreation, and gambling services
R8921	Cultural, recreation, and gambling services
R8922	Cultural, recreation, and gambling services
R9202	Cultural, recreation, and gambling services
P8212	Education services
P8211	Education services
P8219	Education services
H4511	Food and beverage serving services
H4513	Food and beverage serving services
H4512	Food and beverage serving services
H4520	Food and beverage serving services
H4530	Food and beverage serving services
I4720	Other passenger transport
I4820	Other passenger transport
I5010	Other passenger transport
N7220	Other passenger transport
I4623	Other passenger transport
L6611	Other passenger transport

L6619	Other passenger transport
I4621	Other passenger transport
I4622	Other passenger transport
Q8534	Other tourism products
S9411	Other tourism products
S9491	Other tourism products
S9533	Other tourism products
J5513	Other tourism products
J5522	Other tourism products
Q8511	Other tourism products
Q8512	Other tourism products
Q8520	Other tourism products
Q8533	Other tourism products
Q8539	Other tourism products
Q8591	Other tourism products
Q8599	Other tourism products
S9511	Other tourism products
S9531	Other tourism products
S9539	Other tourism products
Q8531	Other tourism products
Q8532	Other tourism products
S9412	Other tourism products
S9429	Other tourism products
C1174	Other tourism products
L6639	Other tourism products
N7299	Other tourism products
S9419	Other tourism products
S9422	Other tourism products
S9499	Other tourism products
S9559	Other tourism products
T999999	Other tourism products
G4121	Retail sales - alcohol, food, and beverages
G4122	Retail sales - alcohol, food, and beverages
G4123	Retail sales - alcohol, food, and beverages
G4110	Retail sales - alcohol, food, and beverages
G4129	Retail sales - alcohol, food, and beverages
G4000	Retail sales - fuel and other automotive products
G3922	Retail sales - fuel and other automotive products
G3911	Retail sales - other
G4213	Retail sales - other
G4245	Retail sales - other
G4251	Retail sales - other
G4259	Retail sales - other
G4272	Retail sales - other
G4279	Retail sales - other
G4211	Retail sales - other
G4221	Retail sales - other
G4229	Retail sales - other
G4241	Retail sales - other
G4242	Retail sales - other

G4242	Retail sales - other
G4243	Retail sales - other
G4271	Retail sales - other
G4273	Retail sales - other
G4274	Retail sales - other
G3912	Retail sales - other
G4231	Retail sales - other
G4232	Retail sales - other
G4244	Retail sales - other
G4252	Retail sales - other
G3913	Retail sales - other
G3921	Retail sales - other
G4212	Retail sales - other
G4214	Retail sales - other
G4222	Retail sales - other
G4253	Retail sales - other
G4260	Retail sales - other
G4320	Retail sales - other

Annex Three: Area Concordance

Calculations in the MRTEs dataset are made at the Modified Territorial Authority (MTA) level and aggregated up to Territorial Authority (TA), Regional Tourism Organisation (RTO) or Region where required. Below is the concordance between the most granular level (MTA), and the aggregate areas of TA, RTO and Region.

TA, RTO and Region are based on official datasets from Statistics New Zealand. MTA is a derivative of TA, modified to accommodate for certain scenarios where:

- One TA overlaps multiple Regions
- One TA overlaps multiple RTOs
- One Region overlaps multiple TAs
- One Region overlaps multiple RTOs
- One RTO overlaps multiple TAs
- One RTO overlaps multiple Regions

*the concurrence of multiple scenarios above is also considered in the derivation of MTA
*the Auckland TA is independently split into seven MTAs based off of the 2006 district councils which preceded their amalgamation into one 'Super City'.

This area concordance below is representative of the area data joined with the ECT Data during Step 1.1 of the Detailed Methodology. This is achieved through the use of a spatial join between the centroid of each unique postcode and the associated MTA. This enables, for each ECT Data transaction, the identification of the associated MTA, TA, RTO and Region which is later used for various levels of aggregation.

Modified Territorial Authority (MTA)	Territorial Authority (TA)	Regional Tourism Organisation (RTO)	Region
South Waikato District	South Waikato District	No RTO	Waikato Region
Kaipara District	Kaipara District	Northland Inc	Northland Region
Far North District	Far North District	Northland Inc	Northland Region
Whangarei District	Whangarei District	Northland Inc	Northland Region
Auckland - Franklin District	Auckland	Tataki Auckland Unlimited	Auckland Region
Auckland - Rodney District	Auckland	Tataki Auckland Unlimited	Auckland Region
Auckland - Papakura District	Auckland	Tataki Auckland Unlimited	Auckland Region
Auckland - Manukau City	Auckland	Tataki Auckland Unlimited	Auckland Region
Auckland - Auckland City	Auckland	Tataki Auckland Unlimited	Auckland Region
Auckland - Waitakere City	Auckland	Tataki Auckland Unlimited	Auckland Region
Auckland - North Shore City	Auckland	Tataki Auckland Unlimited	Auckland Region
Waitomo District - Waikato	Waitomo District	Hamilton & Waikato Tourism	Waikato Region
Waitomo District - Manawatu-Whanganui	Waitomo District	Hamilton & Waikato Tourism	Manawatu-Whanganui Region
Waikato District	Waikato District	Hamilton & Waikato Tourism	Waikato Region
Waipa District	Waipa District	Hamilton & Waikato Tourism	Waikato Region
Hamilton City	Hamilton City	Hamilton & Waikato Tourism	Waikato Region
Matamata-Piako District	Matamata-Piako District	Hamilton & Waikato Tourism	Waikato Region
Otorohanga District	Otorohanga District	Hamilton & Waikato Tourism	Waikato Region
Thames-Coromandel District	Thames-Coromandel District	Destination Hauraki Coromandel	Waikato Region
Hauraki District	Hauraki District	Destination Hauraki Coromandel	Waikato Region
Whakatane District - Bay of Plenty	Whakatane District	Tourism Bay of Plenty	Bay of Plenty Region
Western Bay of Plenty District	Western Bay of Plenty District	Tourism Bay of Plenty	Bay of Plenty Region
Tauranga City	Tauranga City	Tourism Bay of Plenty	Bay of Plenty Region
Buller District	Buller District	Development West Coast	West Coast Region
Westland District	Westland District	Development West Coast	West Coast Region
Grey District	Grey District	Development West Coast	West Coast Region
Kaikoura District	Kaikoura District	Destination Kaikoura	Canterbury Region
Hurunui District	Hurunui District	Visit Hurunui	Canterbury Region
Christchurch City	Christchurch City	ChristchurchNZ	Canterbury Region
Selwyn District	Selwyn District	ChristchurchNZ	Canterbury Region
Waimakariri District	Waimakariri District	ChristchurchNZ	Canterbury Region
Ashburton District	Ashburton District	No RTO	Canterbury Region
Timaru District	Timaru District	Venture Timaru	Canterbury Region
Mackenzie District	Mackenzie District	Mackenzie Tourism	Canterbury Region
Waimate District	Waimate District	No RTO	Canterbury Region
Waitaki District - North	Waitaki District	Tourism Waitaki	Canterbury Region
Waitaki District - South	Waitaki District	Tourism Waitaki	Otago Region
Central Otago District	Central Otago District	Tourism Central Otago	Otago Region
Queenstown-Lakes District - Wanaka	Queenstown-Lakes District	Lake Wanaka Tourism	Otago Region

Queenstown-Lakes District	Queenstown-Lakes District	Destination Queenstown	Otago Region
Dunedin City	Dunedin City	Enterprise Dunedin	Otago Region
Clutha District	Clutha District	Clutha Development	Otago Region
Southland District - Central/Eastern	Southland District	Visit Southland	Southland Region
Invercargill City	Invercargill City	Visit Southland	Southland Region
Gore District	Gore District	Visit Southland	Southland Region
Southland District - Fiordland	Southland District	Visit Fiordland	Southland Region
Wellington City	Wellington City	WellingtonNZ	Wellington Region
Whakatane District - Tairawhiti	Whakatane District	Trust Tairawhiti	Bay of Plenty Region
Chatham Islands Territory	Chatham Islands	No RTO	Canterbury Region
Kawerau District	Kawerau District	Tourism Bay of Plenty	Bay of Plenty Region
Rotorua District - Waikato	Rotorua District	RotoruaNZ	Waikato Region
Rotorua District - Bay of Plenty	Rotorua District	RotoruaNZ	Bay of Plenty Region
Taupo District - Waikato	Taupo District	Destination Great Lake Taupo	Waikato Region
Taupo District - Bay of Plenty	Taupo District	Destination Great Lake Taupo	Bay of Plenty Region
Gisborne District	Gisborne District	Trust Tairawhiti	Gisborne Region
Opotiki District	Opotiki District	Trust Tairawhiti	Bay of Plenty Region
Wairoa District	Wairoa District	Hawke's Bay Tourism	Hawke's Bay Region
Central Hawke's Bay District	Central Hawke's Bay District	Hawke's Bay Tourism	Hawke's Bay Region
Hastings District	Hastings District	Hawke's Bay Tourism	Hawke's Bay Region
Napier City	Napier City	Hawke's Bay Tourism	Hawke's Bay Region
Ruapehu District	Ruapehu District	Visit Ruapehu	Manawatu-Whanganui Region
South Taranaki District	South Taranaki District	Venture Taranaki	Taranaki Region
New Plymouth District	New Plymouth District	Venture Taranaki	Taranaki Region
Stratford District - Taranaki	Stratford District	Venture Taranaki	Taranaki Region
Stratford District - Manawatu-Whanganui	Stratford District	Venture Taranaki	Manawatu-Whanganui Region
Whanganui District	Whanganui District	Whanganui & Partners	Manawatu-Whanganui Region
Rangitikei District	Rangitikei District	No RTO	Manawatu-Whanganui Region
Manawatu District	Manawatu District	Central Economic Development Agency (CEDA)	Manawatu-Whanganui Region
Palmerston North City	Palmerston North City	Central Economic Development Agency (CEDA)	Manawatu-Whanganui Region
Tararua District	Tararua District	No RTO	Manawatu-Whanganui Region
Masterton District	Masterton District	Destination Wairarapa	Wellington Region
Carterton District	Carterton District	Destination Wairarapa	Wellington Region
South Wairarapa District	South Wairarapa District	Destination Wairarapa	Wellington Region
Horowhenua District	Horowhenua District	No RTO	Manawatu-Whanganui Region
Kapiti Coast District	Kapiti Coast District	WellingtonNZ	Wellington Region
Porirua City	Porirua City	WellingtonNZ	Wellington Region
Lower Hutt City	Lower Hutt City	WellingtonNZ	Wellington Region

Upper Hutt City	Upper Hutt City	WellingtonNZ	Wellington Region
Marlborough District	Marlborough District	Destination Marlborough	Marlborough Region
Tasman District	Tasman District	Nelson Regional Development Agency (NRDA)	Tasman Region
Nelson City	Nelson City	Nelson Regional Development Agency (NRDA)	Nelson Region

Annex Four: Countries Concordance

The scaling of the International Tourism expenditure subset of ECT Data up to the IVS totals and then the TSA international totals is a central part of the methodology. As the IVS outputs its totals at a grouped country level (Group), the ECT Data must be aggregated into these groups for scaling and final outputting. This concordance outlines these country groupings.

Group	Country
Africa and Middle East	Algeria
Africa and Middle East	Angola
Africa and Middle East	Bahrain
Africa and Middle East	Botswana
Africa and Middle East	Burundi
Africa and Middle East	Cameroon
Africa and Middle East	Comoros
Africa and Middle East	Congo, Dem. Rep.
Africa and Middle East	Congo, Rep.
Africa and Middle East	Cote d'Ivoire
Africa and Middle East	Egypt, Arab Rep.
Africa and Middle East	Eritrea
Africa and Middle East	Gabon
Africa and Middle East	Ghana
Africa and Middle East	Iran, Islamic Rep.
Africa and Middle East	Iraq
Africa and Middle East	Israel
Africa and Middle East	Jordan
Africa and Middle East	Kenya
Africa and Middle East	Kuwait
Africa and Middle East	Lebanon
Africa and Middle East	Liberia
Africa and Middle East	Libya
Africa and Middle East	Madagascar
Africa and Middle East	Malawi
Africa and Middle East	Mali
Africa and Middle East	Mauritania
Africa and Middle East	Mauritius
Africa and Middle East	Morocco
Africa and Middle East	Mozambique
Africa and Middle East	Namibia
Africa and Middle East	Nigeria
Africa and Middle East	Oman
Africa and Middle East	Qatar
Africa and Middle East	Reunion
Africa and Middle East	Rwanda
Africa and Middle East	Saudi Arabia
Africa and Middle East	Seychelles
Africa and Middle East	Somalia
Africa and Middle East	South Africa
Africa and Middle East	Sudan
Africa and Middle East	Swaziland
Africa and Middle East	Tanzania
Africa and Middle East	Tunisia
Africa and Middle East	Turkey

Africa and Middle East	Uganda
Africa and Middle East	United Arab Emirates
Africa and Middle East	Zambia
Africa and Middle East	Zimbabwe
Africa and Middle East	Togo
Africa and Middle East	The Gambia
Africa and Middle East	Guinea-Bissau
Africa and Middle East	Senegal
Africa and Middle East	Suriname
Africa and Middle East	Burkina Faso
Africa and Middle East	Cabo Verde
Africa and Middle East	Yemen
Africa and Middle East	Equatorial Guinea
Africa and Middle East	Palestine
Africa and Middle East	Benin
Africa and Middle East	South Sudan
Africa and Middle East	Niger
Africa and Middle East	Lesotho
Africa and Middle East	Guinea
Africa and Middle East	Chad
Africa and Middle East	Syrian Arab Republic
Africa and Middle East	Central African Republic
Africa and Middle East	Djibouti
Africa and Middle East	Ethiopia
Africa and Middle East	Mayotte
Africa and Middle East	Saint Helena
Africa and Middle East	Sao Tome and Principe
Africa and Middle East	Sierra Leone
Africa and Middle East	Western Sahara
Australia	Australia
Australia	Norfolk Island
Australia	Christmas Island
Australia	Cocos (Keeling) Islands
Australia	Heard Island and Mcdonald Islands
Canada	Canada
China	China, People's Republic of
Germany	Germany
Japan	Japan
Korea, Republic of	Korea, Republic of
New Zealand	New Zealand
Rest of Americas	Argentina
Rest of Americas	Barbados
Rest of Americas	Belize
Rest of Americas	Bermuda
Rest of Americas	Bolivia
Rest of Americas	Brazil
Rest of Americas	Cayman Islands

Rest of Americas	Chile
Rest of Americas	Colombia
Rest of Americas	Costa Rica
Rest of Americas	Cuba
Rest of Americas	Dominica
Rest of Americas	Ecuador
Rest of Americas	Falkland Islands
Rest of Americas	Guadeloupe
Rest of Americas	Guatemala
Rest of Americas	Jamaica
Rest of Americas	Martinique
Rest of Americas	Mexico
Rest of Americas	Netherlands Antilles
Rest of Americas	Nicaragua
Rest of Americas	Panama
Rest of Americas	Paraguay
Rest of Americas	Peru
Rest of Americas	Puerto Rico
Rest of Americas	St Lucia
Rest of Americas	Trinidad and Tobago
Rest of Americas	Turks and Caicos Islands
Rest of Americas	Uruguay
Rest of Americas	Venezuela
Rest of Americas	Virgin Islands, British
Rest of Americas	Saint Kitts and Nevis
Rest of Americas	Dominican Republic
Rest of Americas	El Salvador
Rest of Americas	Honduras
Rest of Americas	Antigua and Barbuda
Rest of Americas	Aruba
Rest of Americas	Saint Vincent and the Grenadines
Rest of Americas	Haiti
Rest of Americas	The Bahamas
Rest of Americas	Grenada
Rest of Americas	Curacao
Rest of Americas	Anguilla
Rest of Americas	Sint Maarten
Rest of Americas	Guyana
Rest of Americas	French Guiana
Rest of Americas	Montserrat
Rest of Americas	Saint Barthelemy
Rest of Americas	Saint Martin
Rest of Asia	India
Rest of Asia	Indonesia
Rest of Asia	Kazakhstan
Rest of Asia	Korea, Democratic People's Republic of
Rest of Asia	Laos

Rest of Asia	Macao (Special Administrative Region)
Rest of Asia	Malaysia
Rest of Asia	Maldives
Rest of Asia	Mongolia
Rest of Asia	Nepal
Rest of Asia	Pakistan
Rest of Asia	Philippines
Rest of Asia	Singapore
Rest of Asia	Sri Lanka
Rest of Asia	Taiwan
Rest of Asia	Thailand
Rest of Asia	Timor-Leste
Rest of Asia	Uzbekistan
Rest of Asia	Vietnam
Rest of Asia	Afghanistan
Rest of Asia	Armenia
Rest of Asia	Bangladesh
Rest of Asia	Bhutan
Rest of Asia	Brunei Darussalam
Rest of Asia	Cambodia
Rest of Asia	Georgia
Rest of Asia	Hong Kong (Special Administrative Region)
Rest of Asia	Myanmar
Rest of Asia	Azerbaijan
Rest of Asia	Tajikistan
Rest of Asia	Kyrgyzstan
Rest of Asia	Korea, Republic of
Rest of Asia	Timor-Leste
Rest of Asia	Turkmenistan
Rest of Asia	Palau
Rest of Europe	Albania
Rest of Europe	Austria
Rest of Europe	Belarus
Rest of Europe	Belgium
Rest of Europe	Poland
Rest of Europe	Portugal
Rest of Europe	Romania
Rest of Europe	Russian Federation
Rest of Europe	Serbia
Rest of Europe	Slovakia
Rest of Europe	Slovenia
Rest of Europe	Spain
Rest of Europe	Sweden
Rest of Europe	Switzerland
Rest of Europe	Ukraine
Rest of Europe	Bosnia and Herzegovina
Rest of Europe	Bulgaria

Rest of Europe	Croatia
Rest of Europe	Cyprus
Rest of Europe	Czech Republic
Rest of Europe	Denmark
Rest of Europe	Estonia
Rest of Europe	Finland
Rest of Europe	France
Rest of Europe	Gibraltar
Rest of Europe	Greece
Rest of Europe	Greenland
Rest of Europe	Hungary
Rest of Europe	Iceland
Rest of Europe	Ireland
Rest of Europe	Italy
Rest of Europe	Latvia
Rest of Europe	Liechtenstein
Rest of Europe	Lithuania
Rest of Europe	Luxembourg
Rest of Europe	Malta
Rest of Europe	Moldova
Rest of Europe	Monaco
Rest of Europe	Netherlands
Rest of Europe	Norway
Rest of Europe	Andorra
Rest of Europe	North Macedonia
Rest of Europe	Montenegro
Rest of Europe	Vatican City
Rest of Europe	San Marino
Rest of Europe	Aland Islands
Rest of Europe	Faroe Islands
Rest of Europe	Svalbard and Jan Mayen
Rest of Oceania	Antarctica
Rest of Oceania	Cook Islands
Rest of Oceania	Fiji
Rest of Oceania	French Polynesia
Rest of Oceania	Guam
Rest of Oceania	Kiribati
Rest of Oceania	Marshall Islands
Rest of Oceania	Micronesia, Federated States of
Rest of Oceania	Nauru
Rest of Oceania	New Caledonia
Rest of Oceania	Niue
Rest of Oceania	Northern Mariana Islands
Rest of Oceania	Papua New Guinea
Rest of Oceania	Samoa
Rest of Oceania	Samoa, American
Rest of Oceania	Solomon Islands

Rest of Oceania	Tokelau
Rest of Oceania	Tonga
Rest of Oceania	Tuvalu
Rest of Oceania	Vanuatu
Rest of Oceania	Wallis and Futuna
Rest of Oceania	Pitcairn
UK	England
UK	Isle of Man
UK	Northern Ireland
UK	Scotland
UK	Wales
UK	Great Britain
UK	Guernsey
UK	Jersey
USA	United States of America

Annex Five: Removed Records

Certain records within the raw ECT Data lack the information required by the methodological processes to output accurate results for the MRTEs. These records are therefore removed at Step 1.1 to not adversely affect the subsequent methodological steps. The reasons for record removal and their associated materiality to the final MRTEs outputs are detailed in the table below for September 2023. The ongoing materiality of these removals are monitored through automated QA processes.

September 2023 Record Removal Table:

Record Removed	Reason for Removal	Proportion Removed	Materiality	Improvement Plan
Individual transactions with 'null' postcode values	Transactions with 'null' postcode values cannot be processed through the algorithms necessary to output MRTEs correctly	0.01%	Immaterial	N/A
Individual transactions with unaligned Bank Identification Numbers (BINs) or 'null' country code values	Transactions with BINs that can't concord to country_codes, or with 'null' country code values cannot be processed through algorithms necessary to output MRTEs correctly	2.10%	Immaterial	Future improvement initiatives are backlogged
Total		2.11%	Immaterial	