



# Vehicle Tyres

## Market Overview

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**EUROPE & SCOTLAND**  
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## Glossary

The definitions used in this report are in line with those detailed in the Waste Framework Directive<sup>1</sup> and are as follows:

- Waste:** any substance or object, which the holder discards or intends or is required to discard. For tyres in the UK, all used tyres arising are considered to be waste.
- Collection:** the gathering of waste, including the preliminary sorting and preliminary storage of waste;
- Treatment:** recovery or disposal operations, including preparation prior to recovery or disposal;
- Reuse:** any operation by which products or components that are not waste are used again for the same purpose for which they were conceived;
- Recycling:** any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations;
- Recovery:** any operation for which the principal result is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function. For tyres, recovery is incineration as an alternative fuel for energy from waste plants or incineration as an alternative fuel for industry such as cement kilns;
- Disposal** any operation which is not recovery even where the operation has as a secondary consequence as the reclamation of substances or energy.

Tyre classification<sup>2</sup>:

C1 = Tyres that are intended for vehicles of category M1 (vehicles used for the carriage of passengers) plus O1 (Trailers with a maximum mass not exceeding 0.75 tonnes) and O2 (Trailers with a maximum mass exceeding 0.75 tonnes, but not exceeding 3.5 tonnes);

C2 = Tyres intended for vehicles above 3.5t of category M2 (vehicles comprising of more than eight seats in addition to the driver's seat used for the carriage of passengers, and having a maximum mass not exceeding 5 tonnes) plus category M3 (vehicles comprising of more than eight seats in addition to the driver's seat used for the carriage of passengers, and having a maximum mass exceeding 5 tonnes) plus category N (power-driven vehicles having at least four wheels and used for the carriage of goods) plus category O3 (trailers with a maximum mass over 3.5 tonnes, but not exceeding 10 tonnes) and category O4 (trailers with a maximum mass over 10 tonnes); and

C3 = Tyres intended for vehicles above 3.5t of category M1 (vehicles used for the carriage of passengers) plus category M2 (vehicles comprising of more than eight seats in addition to the driver's seat used for the carriage of passengers, and having a maximum mass not exceeding 5 tonnes) plus category M3 (vehicles comprising of more than eight seats in addition to the driver's seat used for the carriage of passengers, and having a maximum mass exceeding 5 tonnes) plus category N2 (vehicles used for the carriage of goods and having a maximum mass in excess of 3.5 tonnes but not exceeding 12 tonnes) plus category N3 (vehicles used for the carriage of goods & having a maximum mass exceeding 12 tonnes) plus category O3 (trailers with a maximum mass over 3.5 tonnes, but not exceeding 10 tonnes) and category O4 (trailers with a maximum mass over 10 tonnes).

<sup>1</sup> European Commission (2016) Directive 2008/98/EC on waste (Waste Framework Directive), accessed 25 June 2019, <http://ec.europa.eu/environment/waste/framework/>

<sup>2</sup> PROTYRE: Tyre label values explained, <https://www.protyre.co.uk/tyre-label-information>

Tyre naming convention – there are instances where the terminology used for different types of tyres changes. For example, original equipment manufacturer (OEM) data uses the term “HGV” (heavy goods vehicle) whilst for replacement sales, the data from Used Tyre Working Group (UTWG) uses the term “truck & bus” tyres. In both instances, we are referring to C3 tyres but are using terminology used by the source data for accuracy.

## Abbreviations

ATF	Authorised treatment facility
BEIS	Department for Business, Energy & Industrial Strategy
BTMA	British Tyre Manufacturing Association
CIM	Construction, Industrial and Mining
DEFRA	Department for Environment, Food & Rural Affairs
EA	Environment Agency
EPR	Extended producer responsibility
ETRMA	European Tyre & Rubber Manufacturers' Association
HGV	Heavy goods vehicle
HMRC	HM Revenue and Customs
LCV	Light commercial vehicle
NTDA	National Tyre Distributors Association
OEM	Original equipment manufacturer
ONS	Office for National Statistics
PoM	Placed on the market
PCWSU	The Producer Compliance and Waste Shipment Unit
RMA	Retread Manufacturers Association
SEPA	Scottish Environment Protection Agency
SMMT	Society of Motor Manufacturers and Traders
SMTA	Scottish Motor Trade Association
TIF	Tyre Industry Federation
TRA	Tyre Recovery Association
UTWG	Used Tyre Working Group

# 1 Executive Summary

Eunomia was commissioned by Zero Waste Scotland to assess the current state of the vehicle tyre market and propose policy mechanisms which could be used to create a circular economy for tyres in Scotland. This project comprises two stages. The first stage, which this report is the product of, has involved producing an overview of the Scottish market for vehicle tyres throughout their life cycle. The second stage, which has yet to commence, focuses upon what policies could be implemented to create a circular economy for tyres.

This report presents an appraisal of the Scottish market for vehicle tyres throughout their life cycle, taking into account the number and type of tyres placed on the market (PoM) and as waste arisings, the disposal or treatment routes, end-markets and destinations. This will be used to understand the scale of the associated environmental impacts of waste tyres, and to inform the creation of a circular economy for tyres in Scotland, including measures such as: extended producer responsibility (EPR) and mandatory labelling and product standards.

## 1.1 Methodology

In line with the scope of this project, Eunomia conducted an extensive literature review, which was subsequently supplemented with a stakeholder engagement process to a) ground-truth data collected from the literature review and any subsequent calculations made, and b) address and minimise any data gaps and to collect data not in the public domain. A range of Scottish Environment Protection Agency (SEPA) departments were liaised with to gather information to inform the market analysis. Information collected through the literature review and via consultation with SEPA provided a strong basis to build a profile of sales, end of life arisings in Scotland and a reprocessing profile covering the flows of material from Scotland to England, the main operators involved, and the methods being used to manage end of life tyres. Following this, information was sought from industry stakeholders, to provide further detail to the reprocessing profile, and to gather sufficient data to produce a retread, part-worn tyre, and new replacement tyre sales profile including routes to market. Industry related stakeholders included retailers, distributors, wholesalers, collection companies, and reprocessors. Despite the number of organisations contacted, the calls were met with limited success. Nonetheless, useful insights were gathered, allowing a far more detailed and insightful reprocessing profile to be developed than would have been possible from Licensed Waste Site data alone. Due to the lack of engagement from stakeholders involved in sales, there was a greater reliance on gathering information from industry and trade bodies. In particular, the British Tyre Manufacturing Association (BTMA) who also encompass the Retread Manufacturers Association (RMA), provided UK level data on sales for replacement new tyres, retreads, and methods to derive part-worn sales for Scotland based on UK data.

Following this data gathering exercise, modelling of the collected data was undertaken to produce estimates of:

- PoM figures for tyres in Scotland, split by vehicle type;
- The split of supply chain sourcing and market routes for new car, truck & van & light truck, and motorcycles, as well as part-worn tyres and retreaded truck & bus tyres including a split of tyre PoM by different retailer types. Market route splits were not available for construction, industrial, mining and agricultural and “other” vehicle tyres, other than original equipment manufacturer (OEM) sales;
- The split by manufacturing location (UK, EU, worldwide);
- Waste tyre arisings by tyre type including estimates of the end destination for waste tyres arising in Scotland;
- The split of tyres across different points of collection derived on the basis of an assumption that end of life tyres will arise at any point where a sale is made; as well as qualitative information on how tyres are transported to processors. A profile of collection for agricultural and “other” vehicle tyres could not be produced based on the information available;

- A split of tyres across reproprocessors, including the methods they employ in managing end of life tyres and their geographic location, though with some gaps including where operators are not required to submit quarterly waste site returns and where export data provided by SEPA was anonymised, and
- A capture rate of all tyres arising in Scotland based on the identified arisings compared to anticipated arisings, though with significant uncertainty due to a number of factors which might limit the comprehensiveness of the mass flow. These are explained in section 6.

A few original goals could not be met due to insufficient data being acquired through stakeholder consultation or due to features of the publicly available data. These included:

- A split of tyres sold by manufactures in Scotland for which only global-level data was available; and
- A financial cost flow, as stakeholders in general saw this information as confidential, and therefore declined to share the information.

## 1.2 Manufacturing and Sales

According to data found, a total just over four million tyres (new, retreaded and part-worn) are estimated to have been placed on the Scottish market in 2018. Two Sankey diagrams were produced for this report to visually summarise the quantities of tyres PoM and their route to market. Figure 1-1 details this for new tyres, with Figure 1-2 showing the same for part-worn and retreaded tyres.

It was found that most tyres sold in the UK are manufactured abroad, and just over half are manufactured outside the EU. The key exception to this is for retreaded tyres, which come largely from the local market. On the global scale, manufacture is skewed towards eight firms, accounting for over 58% of total production. This data is from a global level, and no conclusive statement on the breakdown of manufacturers for Scotland can be drawn.

As shown in the two diagrams, new tyres form the largest portion of the tyre market in Scotland, with retreaded tyres currently mainly offered in the commercial sectors, and part-worn tyres being subject to quality and safety checks. The largest quantities PoM by vehicle type are passenger car and 4x4 tyres. Part-worn tyre sales were found to be skewed towards cars. This is likely a result of the high reclamation rate from end of life cars at dismantlers and retailers, but is somewhat uncertain as, due to a lack of data for 2018, 2017 data was uplifted based on historic growth rates in dismantled vehicle tyre arisings. Of the total quantities of new tyres, new replacement tyres are the largest constituent part, accounting for over two thirds of new tyres PoM. Figure 1-1 shows that local tyre retailers and national tyre chains sell the largest volumes of new replacement tyres in Scotland, making around 60% of the market combined. New replacement tyres were found to be largely sourced through UK wholesalers (75%), with 20% of tyres sourced directly from manufactures, and a small quantity (5%) bought from non-UK wholesalers. The exact route to market for OEM tyres is largely unknown, other than that they are sourced directly from manufacturers and in accordance to the specified requirements of the vehicle.

Four UK based organisations that take casings for retreaded tyres from Scotland were identified through research. Due to the lack of comprehensive up-to-date sales figures for these operators, the route to market reflects the split at a UK level. Relevant trade bodies confirmed that a similar distribution of retreaded tyres across manufacture types for Scotland is likely. As shown in Figure 1-2, retreaded tyres using the mould cure process form the vast majority of the total retreaded tyres PoM. Retreads are carried out largely by manufacturers and independent retread organisations at 36% and 47% respectively. Pre-cure treatment by independent organisations make up approximately 16% of retreaded tyres. A small fraction is imported, with the manufacturing method unknown, but there was contradictory information reported as to the level of imported retreaded tyres sold. It is understood that this is because a quantity of tyres will be imported and retreaded in the UK but then exported for sale as part of an industrial optimisation operation, whereby manufacturers will have specific factories equipped to retread certain tyre types or sizes located around Europe and so some cross border



movements do not represent flows for sale in that country but for remanufacture. Part-worn tyres are believed to be derived from three key points: just under two thirds are PoM by vehicle dismantlers; approximately 14% are imported; and approximately 21% are retained for resale by retailers replacing used tyres. In conclusion, the two diagrams clearly show varying routes to market depending on the tyre type and use.

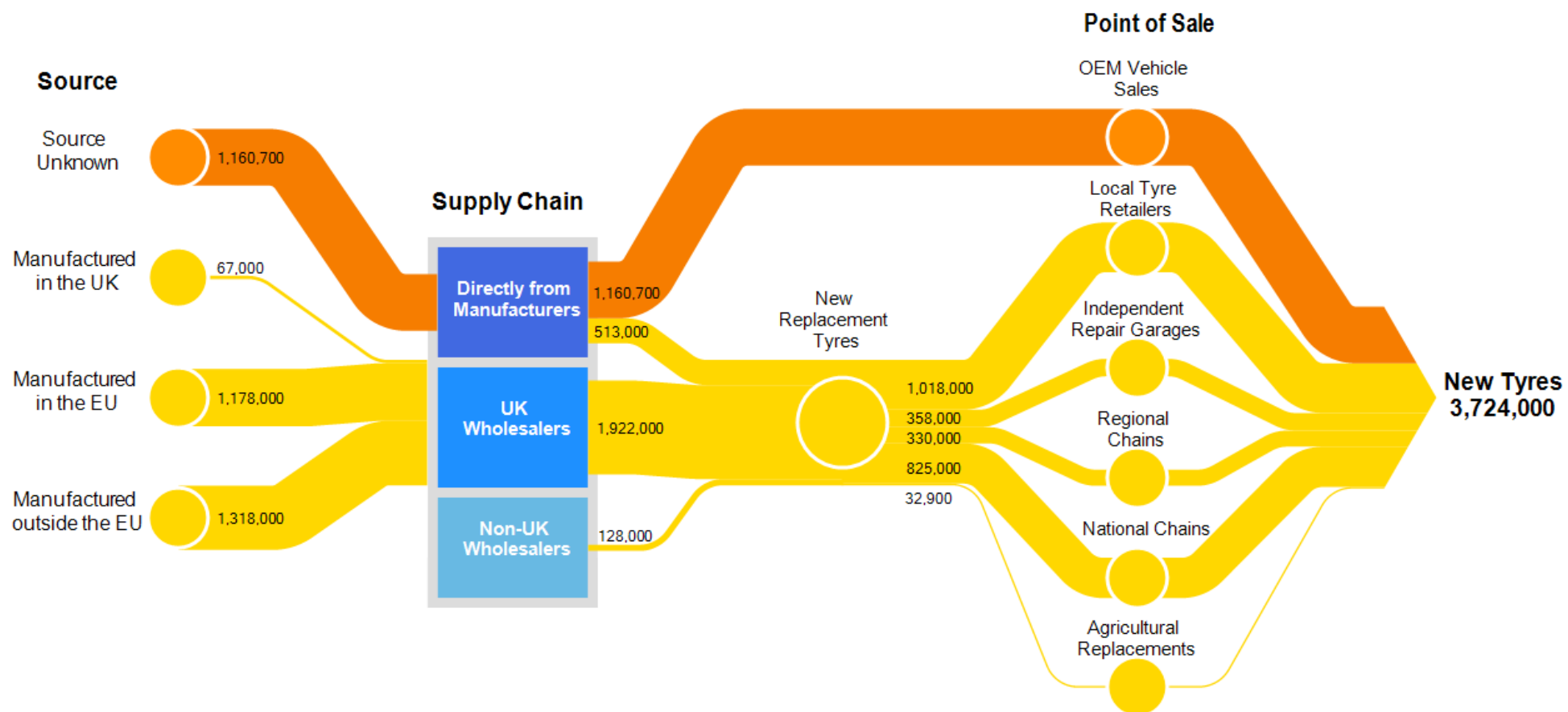


Figure 1-1. PoM figures and route to market flows for new tyres, Number of Tyres

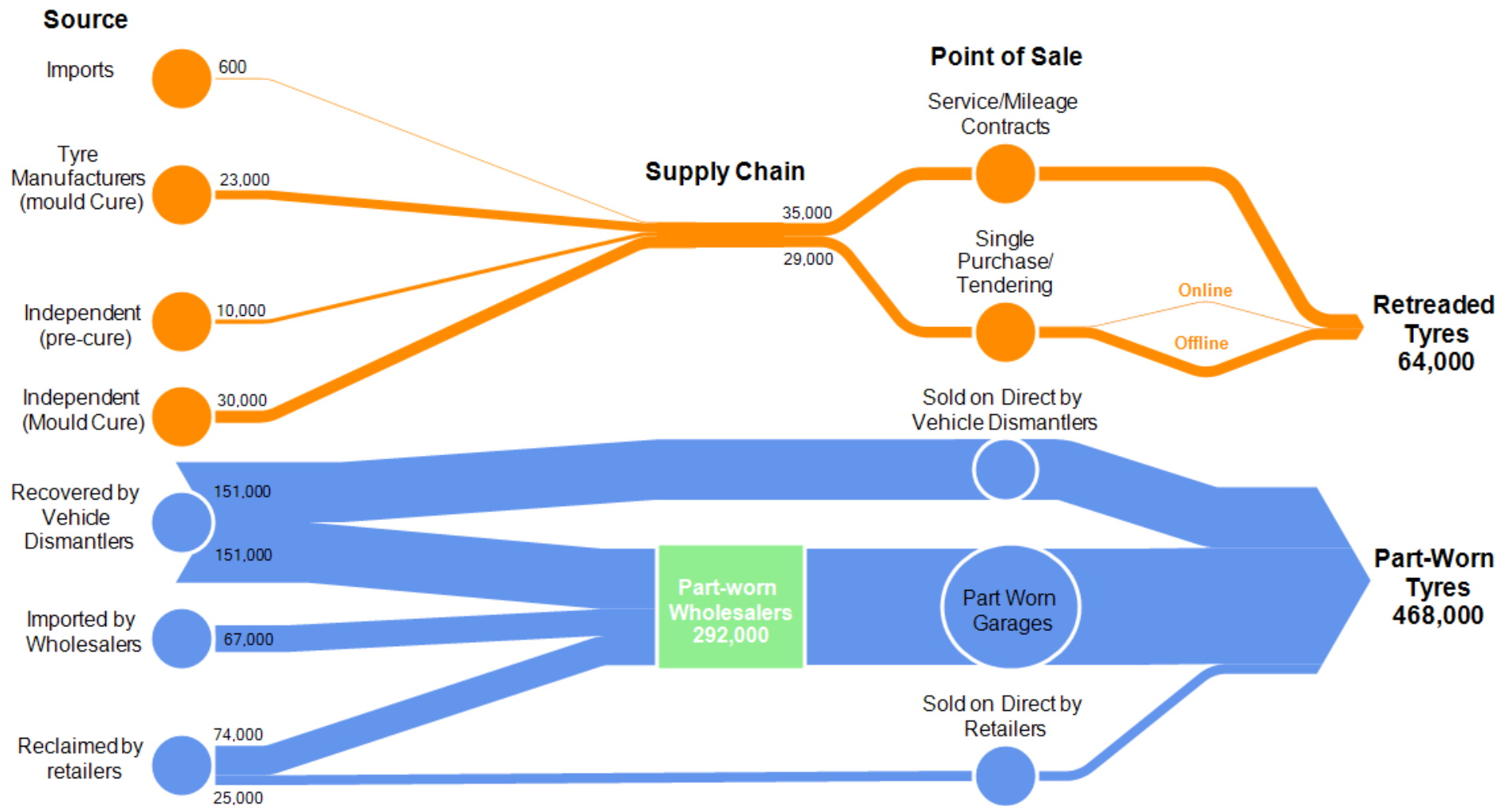


Figure 1-2. PoM figures and route to market flows for retreaded tyres and part-worn tyres, Number of Tyres

### 1.3 End of Life Tyre Arisings, Collection and Reprocessing

A total volume of ~54,300 tonnes of waste tyre arisings in 2018 have been identified. When compared with the total anticipated arisings, there is a shortfall of around 1,400 tonnes or ~2.5% of total anticipated arisings. It is not known how this tonnage is being managed. Figure 1-3 presents a Sankey Diagram to visually summarise the vehicle type breakdown of arisings, collection profile, location of reprocessing and type of reprocessing for Scottish waste tyre arisings in 2018.

Regarding the collection of waste tyres, it was assumed that at the point at which a tyre is sold, an end of life tyre would arise. On this basis, as can be seen in Figure 1-3, for car, truck & bus, and van & light truck tyres, the majority of end of life tyres by tonnage are collected by retailers selling new tyres, followed by vehicle dismantlers. For car, van & light truck tyres, the next largest point of collection is expected to be retailers of part-worn tyres. For truck & bus tyres, after vehicle dismantlers, retailers of retreaded tyres are expected to the next largest share of end of life tyres. The higher fraction of tyres collected by part-worn tyre retailers for cars, is due to a higher rate of recovery of tyres for part-worn, both from new tyre retailers and from vehicle dismantlers.

Regarding the management of tyres at end of life, a systematic analysis across all arisings of the reprocessing of tyres by tyre type was not possible as figures reported in licensed waste site data are not distinguished by tyre type. The summarised reprocessing profile, Figure 1-3, reveals that the most common fate for waste tyres arisings in Scotland is co-incineration in cement kilns, with recycling to produce new products trailing some way behind. Recycling, of which ~61% is carried out in England can be in form of shredding and granulation for new products including rubber mulch and crumb for playground surfaces, formulated sports surfaces and polymeric infill materials for artificial pitches, but also as PAS108 bales for use in engineering purposes on landfill sites. It is anticipated demand will for PAS108 bales will reduce significantly as a result of the forthcoming Scottish Landfill ban. Other exported products for recycling are rubber powder, shredded tyres and rubber crumb. Concerns have been raised to Indian Authorities about the fate that material supposedly exported for recycling is actually meeting, and the environmental credentials of operators of pyrolysis plants in India to which much of India's imports of waste tyres are sent.<sup>3,4</sup>

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<sup>3</sup> Personal communication with Defra, (April 2020)

<sup>4</sup> <https://www.tyreandrubberrecycling.com/latest-news/posts/2019/september/indian-ban-imminent>. Accessed April 2020

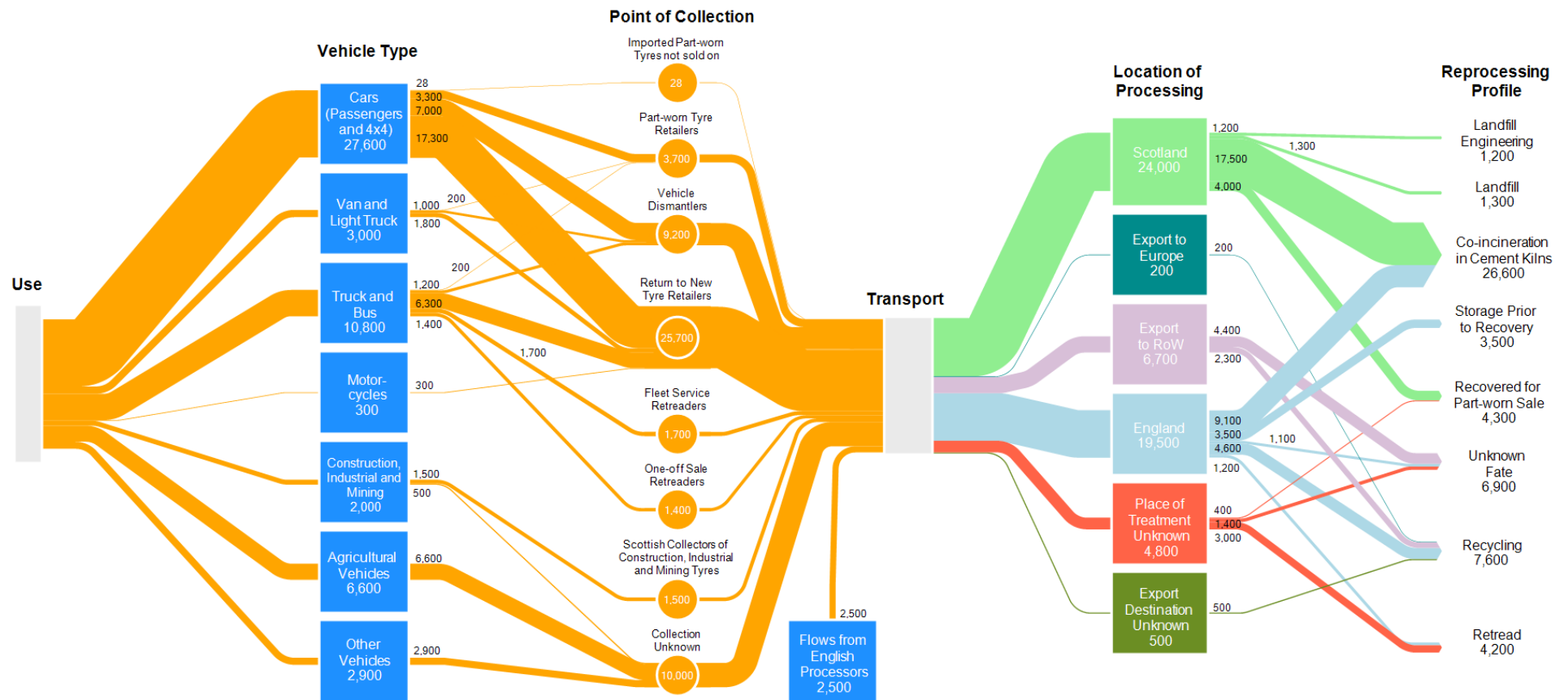


Figure 1-3. Total reprocessing profile for Scottish waste tyre arisings in tonnes, 2018

Tyres that have been removed by vehicle dismantlers or when fitting a replacement-new tyre are classed as waste. Those that are assessed as suitable for sale as part-worn tyres by conforming to the necessary requirements, meet end of waste criteria and can be reused. It is estimated that in 2018 approximately 8% of total arisings were recovered as part-worn. Sales of part-worn passenger car tyres vastly outnumber those for vans & light trucks or trucks and buses. This is due to a higher rate of recovery of tyres for part-worn from vehicle dismantlers for cars but is somewhat uncertain as, due to a lack of data for 2018, 2017 data was uplifted based on historic growth rates in dismantled vehicle tyre arisings. In addition, it is estimated that around 375 tonnes of construction, industrial and mining (CIM) tyres are recovered as part-worn in Scotland a year, however, it was not disclosed where these are treated or ultimately sold.

Approximately 6% of total arisings were reported as “stored prior to recovery” in 2018. The vast majority of these are managed by two organisations, TRS Tyres Ltd and Vellco Tyre Management Ltd. Both organisations were approached to seek information on the split of the fate of material they store, but at the time of writing, no response had been received.

Around 2% of tyres arising in Scotland were recorded as being sent to landfill within Scotland. The only tyres that are still permitted to be landfilled are those over 1.4m in diameter – these are usually from CIM vehicles. Based on SEPA licensed waste site data<sup>5</sup> of the 1,300 tonnes reported as landfilled; 920 were reported as being tyres larger than 1.4m in diameter; and the remaining 380 tonnes were simply recorded as “Tyres”, and so not absolute conclusion can be drawn as to whether all tyres being landfilled are being sent there legally.

Finally, in total there are around 12% of total arisings for which a fate could not be assigned.

## 1.4 Opportunities for increasing the circularity of the Scottish Tyre Market

While there are clearly benefits to using tyres as substitute fuel in cement kilns from the fossil fuels and iron displaced, from the perspective of the waste hierarchy it would be desirable to direct more material towards recycling, reuse and indeed to pursue means of reducing the generation of waste tyres.

It appears that retread is only being used meaningfully for truck & bus tyres, and represents a relatively small portion of total arisings, though with some uncertainty around the quantity of larger sizes including agricultural vehicle tyres that are being retread. The existence of some demand for retreaded passenger car tyres in the UK could indicate potential for a new market for retreading of passenger cars and thus extending their life through recycling, as is currently done for truck & bus tyres. One key driver is the cost of retreading in comparison to the price of a new replacement tyre, which are highly dependent on raw material prices.

Greater priority might also be given to reuse and as such seeking to increase the legitimate resale of part-worn tyres. The large role that dismantlers as Authorised Treatment Facilities (ATF) play in sourcing part-worn tyres, and the status as a regulated sector, could present an opportunity for part-worn tyres to be collected through regulated avenues, tested to ensure compliance with tyre regulations, before then entering the consumer market. This would help increase confidence in the part-worn tyre market and address safety concerns.

Finally, sales data suggests that there has been a decline in consumption of new replacement tyres and in OEM sales. It would be interesting to understand what is driving this trend, and whether it can be further promoted through interventions that reduce the overall demand for tyres, to reduce the generation of waste.

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<sup>5</sup> Personal correspondence with SEPA Data Unit (March 2020)

## 2 Introduction

Eunomia Research & Consulting Limited ('Eunomia') was engaged by Zero Waste Scotland to produce an assessment of the state of the market for vehicle tyres in Scotland. This report is the first deliverable in a wider project exploring the circular economy potential for tyres in Scotland. The project will inform further research regarding tyres within the context of the Scottish Government's strategy 'Making Things Last: A Circular Economy Strategy for Scotland'.

This report therefore presents an overview of the Scottish market for vehicle tyres throughout their life cycle, taking into account the number and type of tyres placed on the market (PoM) and as waste arisings, the disposal or treatment routes, end-markets and destinations. This will be used to understand the scale of the associated environmental impacts of waste tyres, and to inform the creation of a circular economy for tyres in Scotland, including measures such as: extended producer responsibility (EPR) and mandatory labelling and product standards. This will deliver a comparison of the effectiveness of the different methods in achieving circularity for the tyre industry and their effectiveness in capturing waste tyres.

In line with the scope of this project, Eunomia sought information relating to a range of aspects of the tyre market in Scotland. This included, but was not limited to:

- Tyres PoM in Scotland, split by type, namely: passenger/light commercial vehicle (LCV), heavy goods vehicles (HGVs)/truck/bus and other vehicles;
- Profile of tyres placed on the Scottish market by brand, manufacturing and market route;
- Waste tyre arisings by tyre type including estimates of the end destination for waste tyres (e.g. retreaded, recycled, illegal disposal);
- Estimated capture rate of waste tyres and likely destination of those lost from the system;
- Material flows in Scotland showing the distribution, collection, reprocessing method and end market; and
- Geographic destination of waste tyres and end products.

This was subsequently supplemented with a stakeholder engagement process to a) ground-truth data collected from the literature review and any subsequent calculations made, and b) address and minimise any data gaps and to collect data not in the public domain.

A material flow showing the sales, distribution, collection, processing methods and end market of tyres in Scotland was then produced. This material flow is detailed in section 7 to serve as a summary.

The data used to create the mass flow and charts in this report is from 2018. This year was used due to availability of the most complete data set. This is therefore a "snap shot" of the tyres sector at that time. It is acknowledged that there have been a number of market changes in the years since 2018, including changes related to the input of waste tyres to cement kilns, and the role of exports to India as a destination for tyres arisings in Scotland. These are discussed qualitatively where information was available to assess their impact.

The report structure is broken down as follows:

- Section 3 details the methodology used;
- Section 4 details the quantities of tyres entering, and their route to, the market;
- Section 5 details the end of life tyre arisings and a profile of how they are estimated to have been reprocessed in 2018;
- Section 6 details the range of factors which influence the comprehensiveness of model;
- Section 7 provides a summary and conclusions; and
- Section 8 provides the technical appendices.

### 3 Methodology

As part of this project, a two-stage process was undertaken to build an understanding of the market for vehicle tyres in Scotland. A detailed breakdown is available in the Technical Appendix in section 8. The first stage focused on data collection. In order to collect data for this project, Eunomia first undertook a literature review to identify existing reports and information which would provide insight into the key research requirements. Data was gathered from a range of sources, including, but not limited to:

- Industry and trade bodies;
- Government bodies;
- National and European-level data sources; and
- Manufacturer, retailer, collector and reprocessor profiles via websites and annual reports.

Following this, stakeholder engagement was undertaken to help ground-truth data collected during the literature review and any subsequent calculations made. This engagement also served to address data gaps and limitations found whilst undertaking the literature review. This engagement first started with SEPA, then trade associations, and subsequently the trade association members.

A range of SEPA departments were liaised with to gather information to inform the market analysis including:

- The Data Unit – who provided a bespoke database of licensed waste site quarterly returns;
- The Producer Compliance and Waste Shipment Unit (PCWSU) – who provided waste export data for Scotland;<sup>6</sup> and
- The National Waste Unit – who provided data on illegal dumping and fly tipping.<sup>7</sup>

Information collected through literature review and via consultation with SEPA provided a strong basis to build a profile of:

- Sales of tyres via manufacturers of new vehicles (original equipment manufacturers or “OEM”);
- The end of life tonnage arisings in Scotland; and
- A reprocessing profile covering the flows of material from Scotland to England, the main operators involved, and the methods being used to manage end of life tyres.

Following this, information was sought from industry stakeholders, to provide further detail to the reprocessing profile, and to gather sufficient data to produce a retreaded, part-worn tyre, and new replacement tyre sales profile including routes to market. Industry stakeholder engagement took a range of forms, including a simple online survey, which was sent out to National Tyre Distributors Association (NTDA) members as an initial way to gather quantitative data on volumes and material flows, market share and financial flows within their businesses. The intention was to also initiate opportunities for more detailed phone discussions. Despite following up by telephone and email, no responses were received through this survey.

Direct calls were also made to key companies to gain sector specific insights. In total 42 organisations across the key sectors were contacted. This included:

- 22 retailer, distributor and wholesale organisations. This was made up of eight national organisations (e.g. Kwikfit, Stapletons, National, Group Tyre, Halfords), three earthmover tyre retailers, five local tyre fitters, and nine online tyre retailers;
- 12 collection, reprocessor and recycling organisations;
- Four retread organisations; and
- Five part-worn tyre organisations.

Despite the number of organisations contacted; the calls were met with limited success. In all instances, a minimum of two calls, and/or emails, were made where no response was received. Third

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<sup>6</sup> Personal correspondence with SEPA Producer Compliance and Waste Shipment Unit (March 2020)

<sup>7</sup> Personal correspondence with SEPA National Waste Unit (March 2020)



calls, and/or emails, were also made in some cases. Eight organisations responded and agreed to an interview, with these interviews being of varied use as some organisations were often reticent to share information due to confidentiality concerns. Despite this, useful insights were gathered that allowed for a far more detailed and insightful reprocessing profile to be compiled than would have been possible from Licensed Waste Site data alone, especially in regard to the fates to which tyres are being sent. Additionally, a Scottish collector of CIM tyres was able to provide insights on the sales and recovery of CIM vehicle tyres in Scotland.<sup>8</sup>

Given the lack of engagement from stakeholders involved in sales, there was a greater reliance on gathering information from trade associations with a good overview of the state of the market. In particular, the BTMA who also encompass the Retread Manufacturers Association (RMA), provided UK level data on sales for replacement new tyres, retreaded tyres, and methods to derive part-worn sales for Scotland based on UK data.<sup>9</sup>

Following this data gathering exercise, modelling of the collected data was undertaken. On the basis of the data collection exercise outlined above, it was possible to produce estimates of;

- PoM figures for tyres in Scotland, split by vehicle type;
- The split of supply chain sourcing and market routes for new car, van, light truck, trucks and, and motorcycles, as well as part-worn tyres and retreaded truck & bus tyres including a split of tyres PoM by different retailer types. Market route splits were not available for agricultural, CIM, and other vehicle tyres, other than OEM sales;
- The split by manufacturing location (UK, EU, worldwide);
- Waste tyre arisings by tyre type including estimates of the end destination for waste tyres arising in Scotland;
- The split of tyres across different points of collection derived on the basis of an assumption that end of life tyres will arise at any point where a sale is made; as well as qualitative information on how tyres are transported to processors. A profile of collection for agricultural tyres and other tyres could not be produced based on the information available;
- A split of tyres across reprocessors, including the methods they employ in managing end of life tyres and their geographic location, though with some gaps including, where operators are not required to submit quarterly waste site returns and where export data provided by SEPA was anonymised; and
- A capture rate of all tyres arising in Scotland based on the identified arisings compared to anticipated arisings, though with significant uncertainty due to a number of factors which might limit the comprehensiveness of the mass flow. These are explained in section 6.

A few original goals could not be met due to insufficient data being acquired through stakeholder consultation or due to features of the publicly available data. These included:

- A split of tyres sold by manufactures in Scotland for which only global level data was available; and
- A financial cost flow, as stakeholders in general saw this information as confidential, and therefore declined to share the information.

It is important to acknowledge that although the data gathering exercise was extensive, there were limitations on what data could be collected. For example, certain data was not available at the Scottish level, and was only available at either the UK, European, or global level. Where this was the case and it was possible to do so, the available data was scaled to represent the Scottish market.

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<sup>8</sup> Personal correspondence with confidential company (March 2020)

<sup>9</sup> Personal correspondence with BTMA (March 2020)

## 4 Tyres PoM and Route to Market

### 4.1 Manufacturer Profile

There are 700 to 800 tyre manufacturers (with over 160 major companies) globally. The market is dominated by eight of the largest firms, accounting for over 58% of total global production, as shown in Figure 4-1. Approximately 650 of these companies are based in Asia, and it is expected that production will be consolidated into fewer, larger companies through acquisitions and mergers.<sup>10</sup>

**Table 4-1. Global tyre market share (by turnover), 2020<sup>11</sup>**

Manufacturer	Global Tyre Market Share (by turnover)
Bridgestone	14.8%
Michelin	13.8%
Goodyear	8.5%
Continental	7%
Sumitomo	4.1%
Pirelli	3.6%
Hankook	3.4%
Yokohama	2.8%
Others	42%

Table 4-1 shows the top 8 manufacturers' market share according to global turnover data for 2020. Bridgestone and Michelin dominate the market, followed by Goodyear and Continental. The top 5 manufacturers account for nearly half of the global sales turnover.

Whilst detailed European and UK market data was not available at the time of writing, it is understood that the European vehicle tyre market is led by Michelin. This is likely to be due to the presence of a large number of dealer networks across Europe and a strong customer base in France. The other major players operating in the market are Continental, Goodyear, Cooper Tire, Pirelli, Bridgestone, Yokohama, Hankook, Nokian, Apollo, and Sumitomo.<sup>12</sup> It is not confirmed if the UK or Scottish market shows a similar profile to the European market.

<sup>10</sup> From Rubber to Road, Unite Strategy for The Tyres Industry, <https://retreaders.org.uk/wp-content/uploads/2014/11/From-Rubber-To-Road-Unite-PDF.pdf>

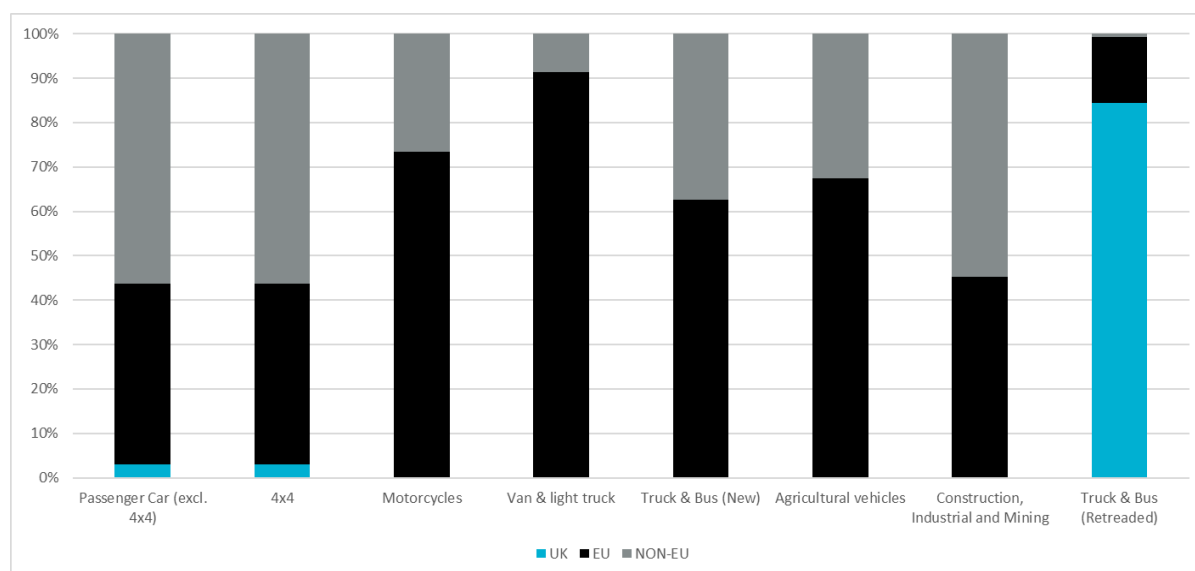
<sup>11</sup> Bridgestone Data 2020, [https://www.bridgestone.com/corporate/library/data\\_book/pdf/BSDATA2020.pdf](https://www.bridgestone.com/corporate/library/data_book/pdf/BSDATA2020.pdf)

<sup>12</sup> Europe Automotive Tire Market Overview, PS Market Research, 2019 <https://www.psmarketresearch.com/market-analysis/europe-automotive-tire-market>

### 4.1.1 Location of Manufacture

For new replacement tyres, manufacturing data specifically for those sold in Scotland was not available as all market data for manufacturing is gathered at the UK level only.<sup>13</sup> However, given that replacement tyres are freely traded within the UK, it is likely that a location of manufacture split for the UK will be broadly representative for tyres sold in Scotland.<sup>14</sup>

Figure 4-1 displays an estimated split of the location of manufacture of tyres by tyre type for the UK. The fraction manufactured in the UK is estimated on the basis of UK Manufacturers' Sales by Product Survey (Prodcom) data for 2018.<sup>15</sup> For the split of tyres manufactured abroad and then imported, HM Revenue and Customs (HMRC) data on the import of new and retreaded tyres was relied upon.<sup>16</sup> The BTMA advised caution in interpreting a split based on HMRC data as misdeclaration of imported part-worn tyres as new is common, and as such, imports from some countries in Europe in particular might be slightly overstated.<sup>17</sup>



**Figure 4-1. Location of Manufacture split for tyres sold in the UK by Tyre Type**

What can be drawn from the Prodcom data is that replacement tyres manufactured in the UK make only a small contribution to total replacement sales. There has been a decrease in new tyre manufacture in the UK, with the number of UK factories having shrunk from twenty to three in the last twenty years.<sup>18</sup> The exception to this is retreaded truck & bus tyres which are largely produced within the UK. There is a discrepancy between the number of retreaded truck & bus tyres imported based on the split outlined above (around 16%), and the number estimated as imported by the Tyre Industry Federation (placed at around 1%).<sup>19</sup> It is understood that this is because a quantity of tyres will be imported and retreaded in the UK but then exported for sale as part of an industrial optimisation operation, whereby manufacturers will have specific factories equipped to retread certain tyre types or sizes located around Europe, and so some cross border movements do not represent flows for sale in that country, but for remanufacture.<sup>20</sup>

<sup>13</sup> Personal correspondence with BTMA (March 2020)

<sup>14</sup> Personal correspondence with BTMA (March 2020)

<sup>15</sup> Office for National Statistics (2019) UK Manufacturers' Sales by Product Survey (Prodcom)

<sup>16</sup> HM Revenue and Customs *HM Revenue & Customs - UK Trade Info - Data by Commodity Code*, accessed 22 April 2020, <https://www.uktradeinfo.com/Statistics/BuildYourOwnTables/Pages/Home.aspx>

<sup>17</sup> Office for National Statistics (2019) UK Manufacturers' Sales by Product Survey (Prodcom)

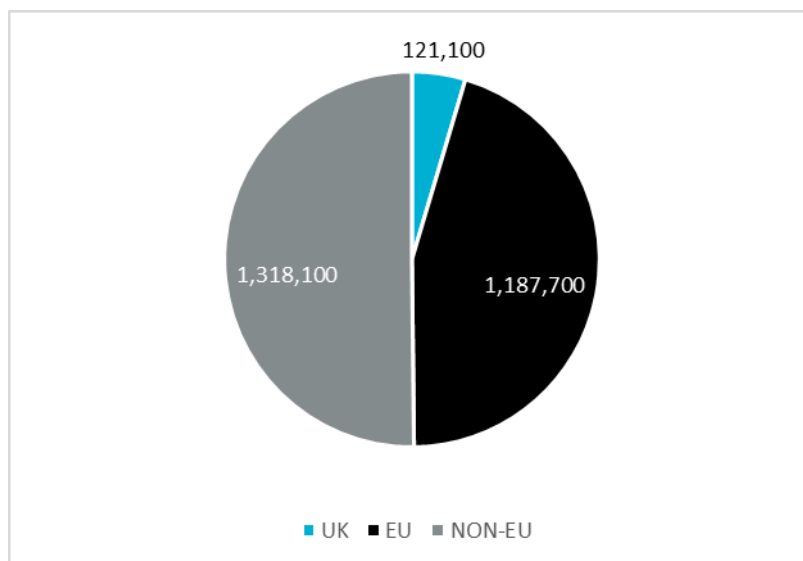
<sup>18</sup> Personal correspondence with BTMA (April 2020)

<sup>19</sup> Tyre Industry Federation (2014) Factbook - A guide to the UK tyre industry from manufacture to end of life reprocessing

<sup>20</sup> Personal correspondence with BTMA (March 2020)

It should however be noted that manufacturing figures for motorcycle and van and LCVs were suppressed due to there being potential disclosure of commercially sensitive information. However, the BTMA believe that manufacturing volumes in the UK of these tyre types is minimal.<sup>21</sup>

In order to estimate the split of location of manufacturer by the number of tyres, across all tyre types, the above splits in Figure 4-1 were applied to the total sales of new and retreaded tyres in Scotland, estimated as per the method outlined in Section 3. The resulting split is displayed in Figure 4-2. It should be noted that this does not include unit sales figures of CIM tyres or other vehicles tyres as it was not possible to assign indicative weights to these tyre types due to the wide range in tyres that fall within this category, from forklift trucks to straddle-carries for transporting shipping containers and thus there was great uncertainty as to the indicative weight.



**Figure 4-2. Split of manufacturing location for tyres PoM in Scotland, based on UK manufacturing location split (total number of tyres)**

Application of the HMRC and Prodcom data to total sales suggests that around half of new replacement tyres sold in Scotland are manufactured in the EU and UK, with the remainder being manufactured outside the EU, principally in Asia.<sup>22</sup> In consultation, the BTMA reported that on the basis of data they gather from members, and in collaboration with other trade associations, they expect a similar distribution between UK, EU and Non-EU manufacture as is presented based on the above analysis.<sup>23</sup>

## 4.2 Original Equipment Manufacturers PoM

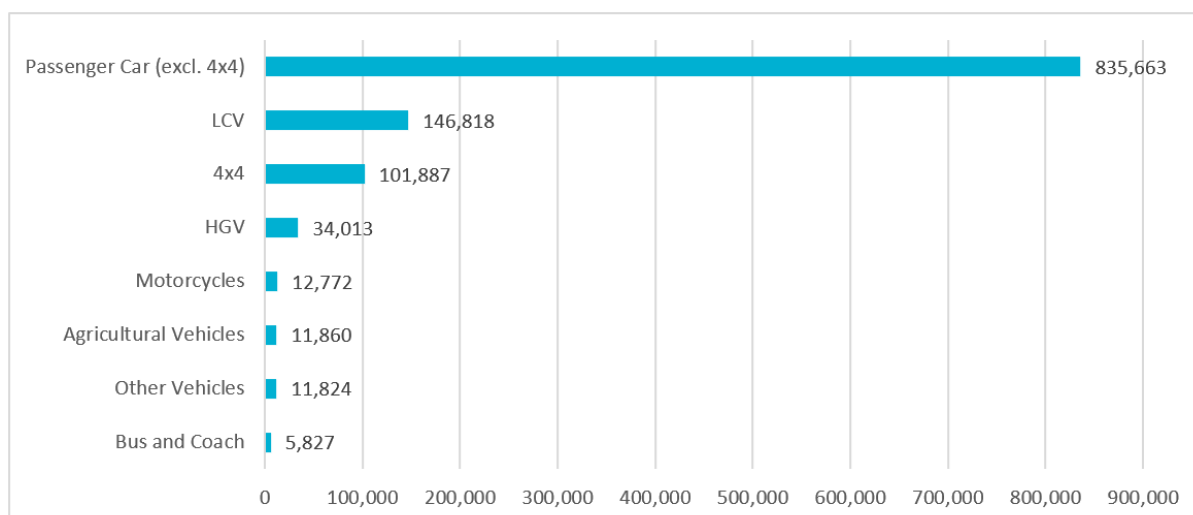
Original equipment refers to any vehicle component that is fitted to a newly manufactured vehicle as standard. OEM tyres are therefore brand-new tyres that have been selected and fitted by the vehicle manufacturer.

Figure 4-3. shows the number of OEM tyres PoM in Scotland, disaggregated by vehicle type, in 2018. A total of around 1,160,700 OEM tyres were PoM in Scotland in 2018.

<sup>21</sup> Personal correspondence with BTMA (March 2020)

<sup>22</sup> Personal correspondence with BTMA (April 2020)

<sup>23</sup> Personal correspondence with BTMA (April 2020)

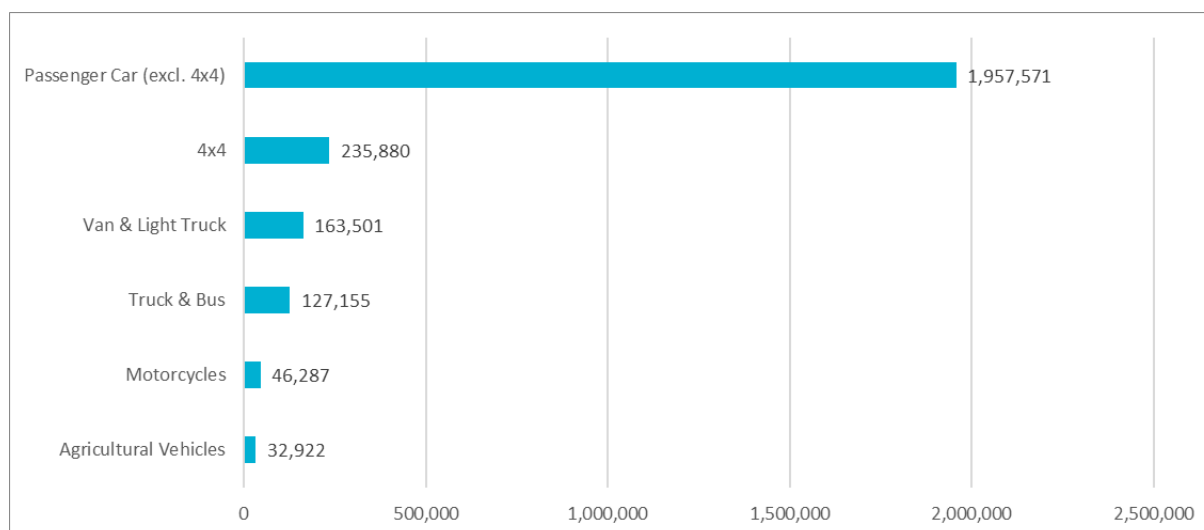


**Figure 4-3. Number of Tyres PoM via OEMs – By Vehicle Type (2018)**

OEM tyres sales in Scotland are estimated to have decreased by 16% between 2016 and 2018. This is due to the total number of new vehicle registrations in Scotland decreasing by 8.2% from 2016 to 2017, and by 7.2% from 2017 to 2018.<sup>24</sup>

### 4.3 New Replacement Tyres PoM

Replacement tyres are new tyres that have been purchased to replace the used tyres on a vehicle. Figure 4-4. displays the estimated number of replacement-new car, van & light truck, Truck & bus, motorcycle and agricultural vehicle tyres PoM in Scotland. The figure is derived from UK data from 2018 disaggregated by vehicle type, and is scaled to Scotland on the basis of vehicle registrations by vehicle type. Approximately 2.59 million replacement-new tyres were PoM in Scotland in 2018.



**Figure 4-4. Number of tyres PoM via replacement new tyres – by vehicle type (2018)**

The UK data used to derive the estimate of new replacement tyres PoM in Scotland in 2018 displays a trend of decreasing replacement sales of 5% between 2016 and 2018. This may be a reflection of the trend previously described (in section 4.1), where decreasing new vehicle registrations may translate to decreasing tyre sales of all types. It should be noted this trend does not include the rate of change

<sup>24</sup> Scottish Transport Statistics No. 38 2019 Edition: A National Statistics Publication for Scotland. Accessed 07/04/20  
<https://www.transport.gov.scot/publication/scottish-transport-statistics-no-38-2019-edition/>

in replacement sales of motorcycle, agricultural or CIM tyres for which reliable multiyear data was not available.

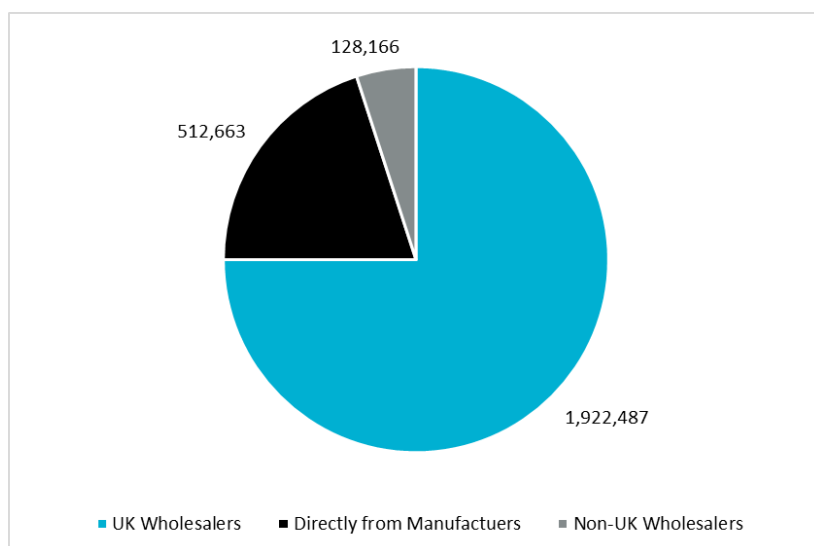
Regarding the sale of winter tyres, it has been reported that in 2016/2017, the most recent year for which data could be gathered, winter tyres made up 1.5% of total passenger car, 4x4 and LCV tyre sales.<sup>25</sup> Publicly available figures for C3 tyres were not found in the literature review, however in consultation, the BTMA suggested that an even smaller proportion of C3 tyres are winter-specific as standard C3 tyres generally already have quite an ‘aggressive’ tread and the loading of tyres is so high that standard C3 tyres tend to grip better in snow than a standard C1 or C2 tyre.<sup>26</sup>

The trade associations consulted were not able to provide sales data for CIM or “Other” vehicle tyres. As was outlined in Section 4.1.1, no CIM tyres are produced in the UK, and as a result the balance of imports and exports of CIM tyres was used to provide an estimate of total sales in the UK. Tonnage exports were subtracted from imports to arrive at net imports and then scaled to Scotland using the ratio of registrations for “Other Vehicles”.<sup>27</sup>

This led to an estimate that around 2,000 tonnes of CIM tyres and 2,900 tonnes of “Other” vehicle tyres are sold in Scotland in each year. In consultation, the BTMA advised that assigning an average weight to CIM and “Other” vehicle Tyres in order to convert the net tonnage imported to a number of tyres would be extremely difficult due to the wide range in tyres that fall within these two categories, ranging from forklift trucks to straddle-carries for transporting shipping containers.<sup>28</sup> As such no figure for unit sales of CIM and “Other” vehicle tyre sales is presented in this report. For reference, the combined mass of tyres represents around 9% of total estimated tonnage sales of tyres in Scotland, however, for CMI tyres at least, the impact on total sales in unit figures is anticipated to be small as these tyres are likely to weigh far more than other tyre types.

## 4.4 Replacement-New Tyres Route to Market

The 2018 supply chain route to the Scottish market for replacement-new tyres is shown in Figure 4-5. The vast majority of replacement-new tyres access the Scottish market via UK Wholesalers.



**Figure 4-5. Number of replacement-new tyre sales – supply chain route to market, 2018**

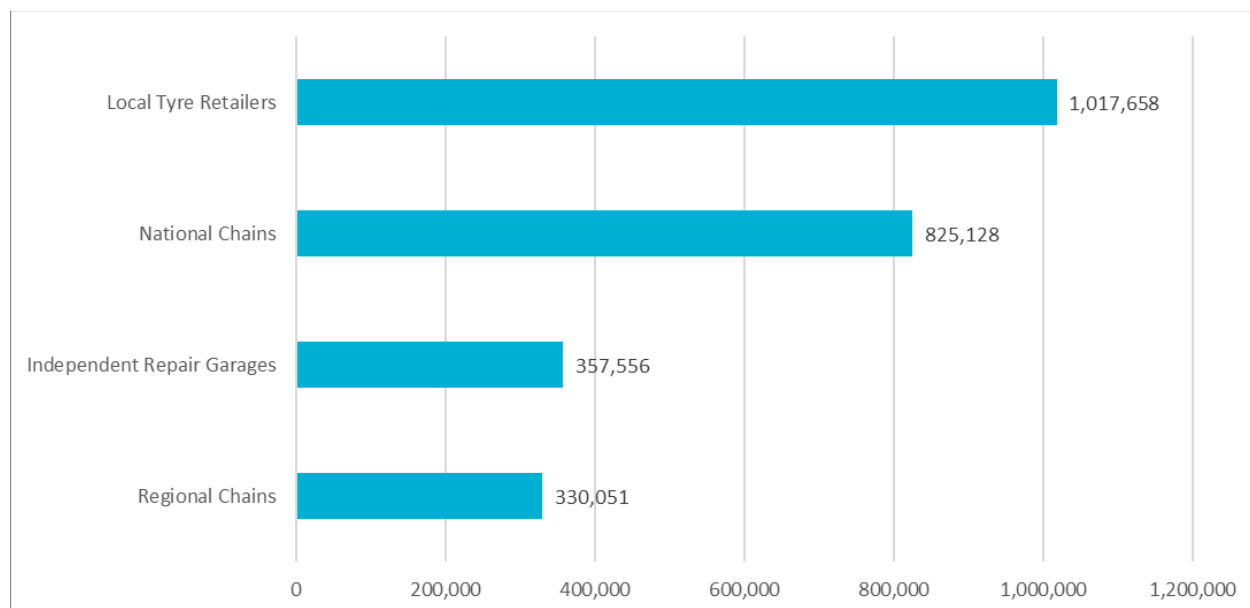
<sup>25</sup> GfK via Tyre Press (2017) *Long-term trend shows winter tyres receding, all-season rising in UK*, accessed 12 May 2020, <https://www.tyrepress.com/2017/08/long-term-trend-shows-winter-tyres-receding-all-season-rising-in-uk/>

<sup>26</sup> Personal correspondence with BTMA (April 2020)

<sup>27</sup> HM Revenue and Customs *HM Revenue & Customs - UK Trade Info - Data by Commodity Code*, accessed 22 April 2020, <https://www.uktradeinfo.com/Statistics/BuildYourOwnTables/Pages/Home.aspx>

<sup>28</sup> Consultation with the BTMA (May 2020)

Once procured by retailers via the supply-chain routes listed above, new replacement tyres will be sold to consumers via four key groups of outlet as outlined in Figure 4-6.



**Figure 4-6. Number of replacement-new tyre sales – market route, 2018**

This shows that the majority of replacement-new tyres' route to the consumer market is via local tyre retailers and national chains. The distinction between independent repair garages and local tyre retailers is the business focus. Whereas the core business focus of local tyre retailers is selling tyres, and they will sell in the order of hundreds of tyres a month, the core business of an independent repair garage is vehicle repair and MOT testing, and sales will be as an adjunct to MOT testing. These organisations will likely sell in the order of less than a hundred tyres a month.<sup>29</sup>

It is estimated that on average, a tyre can be handled by up to three different market actors before it is sold to a consumer, which shows the complexity of mapping out the route to market for tyres in Scotland.<sup>30</sup> In the course of being manufactured, sourced and distributed, tyres can also move across borders within the UK and internationally.

It is estimated that of all the replacement-new tyres sold into Scotland, online sales have increased from 10% in 2014 to 15% in 2018.<sup>31</sup> Approximately 70% of motorists do research online pre-purchase, however only 15% then proceed to make the purchase online.<sup>32</sup> It is not known how these sales interlink with the sales made by the organisations outlined above, though it is assumed that they are via national and regional chains rather than local retailers or independent garages. Due to the complex task of fitting tyres and the equipment needed, tyres bought online will still usually be fitted by a retailer who has the equipment to do so.

It is estimated that only 2-3% of truck & bus tyre sales will be made online as these tyre types are mainly sourced through mileage contracts or via a tendering exercise.<sup>33</sup>

The route to market of CIM and agricultural vehicle tyres was sought from relevant stakeholders. However, no response was received which would allow a profile to be constructed. From the websites of those retailers of CIM tyres who were contacted, it appears that the majority specialise in such tyres

<sup>29</sup> Personal correspondence with BTMA (April 2020)

<sup>30</sup> Personal correspondence with BTMA (March 2020)

<sup>31</sup> Personal correspondence with TIF (March 2020)

<sup>32</sup> Personal correspondence with BTMA (March 2020)

<sup>33</sup> Personal correspondence with BTMA (March 2020)

and offer a national fitting service whereby they will travel to sites (e.g. mining and quarrying site) and fit the new tyres themselves.<sup>34,35,36</sup>

## 4.5 Retreaded Tyres PoM

Retreading is the process whereby selected and inspected worn tyre casings receive a new tread. Only sound, carefully inspected tyre casings are used for retreading. The worn tread is buffed away, and a new tread bonded to the tyre body in a process very similar to the manufacture of a new tyre. There are different processing techniques – mould cure and pre-cure. While both produce a similar quality of retreaded tyres, the processes are different. The mould cure technique applies an unvulcanised layer of tread rubber to the buffed tyre casing which is then placed into a rigid mould with the chosen tyre tread for the curing process. In the pre-cure technique, a tread is precured with the chosen tread design and then applied using a cushion gum for bonding. The tyre is then placed into a curing chamber to complete the adhering process.<sup>37</sup> The ultimate objective is always the same – affixing a new tread through the application of heat and pressure.

Table 4-2 shows the estimated number of retreaded tyres PoM in Scotland from 2016-2018 by vehicle type. This is derived by scaling UK sales data to Scotland on the basis of vehicle registrations.

**Table 4-2. Number of retreaded tyres PoM in Scotland from 2016-2018 by vehicle type.**

Vehicle tyre type	2016	2017	2018
Car & Van	0	0	0
Light Truck	0	0	0
Truck & Bus	63,446	63,894	63,771
<b>TOTAL</b>	<b>63,446</b>	<b>63,894</b>	<b>63,771</b>

The number of retreaded tyres PoM in Scotland has remained largely static for the years 2016 to 2018. Retreaded tyres sales are provided for trucks and buses only. It is reported that the higher inherent value of truck tyres makes it more financially worthwhile retreading truck tyres than C1 or C2 tyres.<sup>38</sup> This is however not the case for car & van tyres, as these have seen an influx of cheap imported tyres from Asia since the 1990s that has undermined the economic basis for retreaded car tyres.

However, UK Manufacturers' Sales by Product Survey (Prodcom) data for 2018 suggests in the UK, 44,000 retreaded passenger car tyres were manufactured in 2018.<sup>39</sup> The Retread Manufacturers Association (part of the BTMA)<sup>40</sup> were able to confirm that this service is currently offered for passenger and taxi cars by two small firms as and when demand arises. Given the very small number of passenger car tyres being retreaded at the level of the UK, it was decided that scaling to Scotland

<sup>34</sup> Earthmover Tyre Solutions Ltd *Services | Earth Mover Tyre Solutions*, accessed 28 April 2020, <https://www.earthmovertyresolutions.co.uk/services/>

<sup>35</sup> Earthmover Tyres (Wakefield) Ltd *About Us | Earthmover Tyres*, accessed 28 April 2020, <https://www.earthmovertyres.com/about>

<sup>36</sup> T&C Site Services Ltd (2012) *Services*, accessed 28 April 2020, <https://www.tcsiteservices.co.uk/services/>

<sup>37</sup> <https://www.tirerrecappers.com/tire-recappers-news/two-sides-of-the-same-coin-mold-cure-vs-pre-cure/>

<sup>38</sup> Centre for Remanufacturing and Reuse (2015) *Circular Economy Evidence Building Programme - Remanufacturing Study, Report for Zero Waste Scotland*, 2015, [http://www.zerowastescotland.org.uk/sites/default/files/Remanufacturing%20Study%20-%20Full%20Report%20-%20March%202015\\_0.pdf](http://www.zerowastescotland.org.uk/sites/default/files/Remanufacturing%20Study%20-%20Full%20Report%20-%20March%202015_0.pdf)

<sup>39</sup> Office for National Statistics (2019) *UK Manufacturers' Sales by Product Survey (Prodcom)*

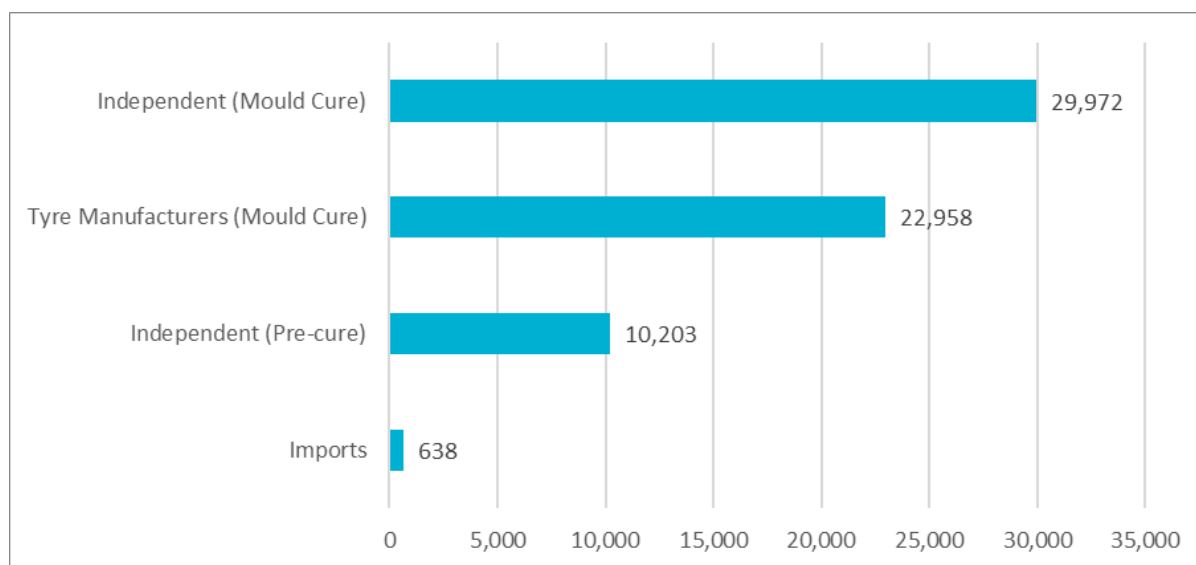
<sup>40</sup> Personal correspondence with BTMA (April 2020)



based on registration data would be inappropriate. However, the existence of some demand for retreaded passenger car tyres could indicate potential for a new market for retreading of passenger cars and thus extending their life through recycling, as is currently done for truck & bus tyres.

## 4.6 Retreaded Tyres Route to Market

Figure 4-7. shows the market route for retreaded truck & bus tyres in Scotland in 2018. This shows that the majority of truck & bus retreaded tyres are carried out by independent retreaders and tyre manufacturers using the mould cure process.



**Figure 4-7. Retreaded tyres market route, Number of tyres, 2018**

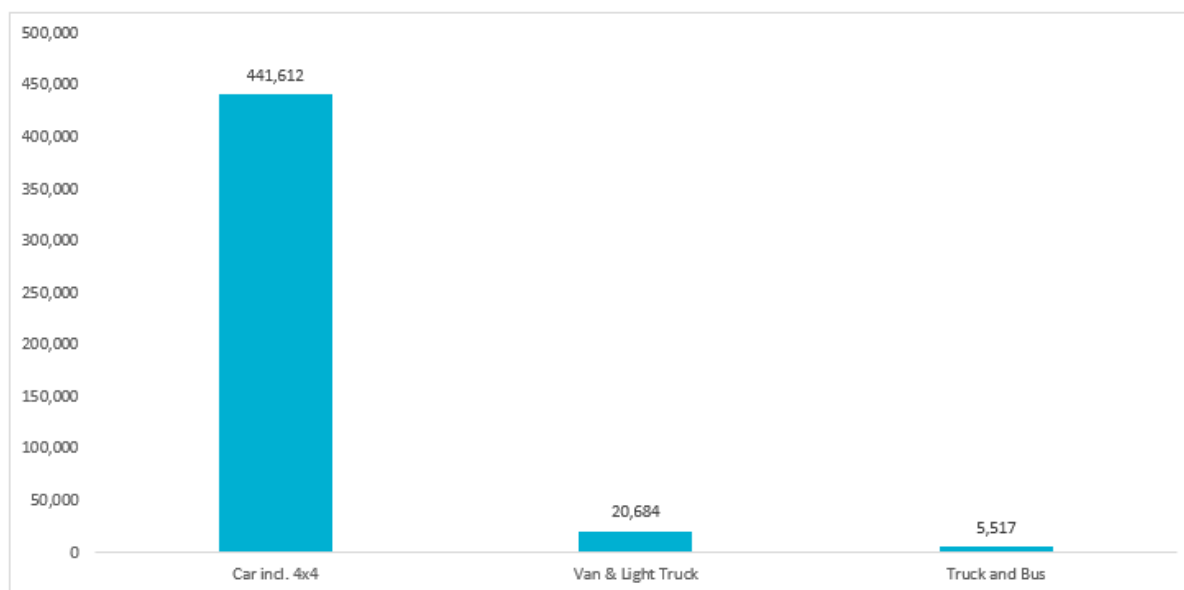
Regarding how retreaded tyres are ultimately placed on the market, around 55% are sold on service contracts – whereby a management company will be used to service vehicles, including replacing tyres. For large fleet operators, it is better value to have a tyre lease arrangement whereby they are charged per mile rather than per tyre. The remaining 45% are sold on a one-off purchase basis with fleet owners often running a tendering exercise in order to gain the best market rate.<sup>41</sup>

## 4.7 Part-worn Tyres PoM

Figure 4-8 displays the estimated number of part-worn tyres PoM in Scotland by vehicle type, at around 468,000, which was derived on the basis of the method applied by the UTWG in the UK Used Tyre Mass Balance (see Section 8 for further detail on the method).

It should be noted that the value for car incl. 4x4 displayed in Figure 4-8 will include some van & light truck tyres imported from abroad, due to it not being possible to disaggregate van & light truck tyre imports from the imports of car tyres. As it is believed however that the majority of the total import of car and van & light truck tyres, will be car tyres, they are included with the car tyre total. See section 8.5.4 of the technical appendix for further details. Additionally, at the time that modelling was carried out, it was understood that no van & light truck tyres were imported for part-worn use, and the average weight used to convert tonnage imports to number of tyres used was a car tyre average weight, and as such total imports of car and van & light truck tyres will be marginally underestimated.

<sup>41</sup> Personal correspondence with BTMA (March 2020)



**Figure 4-8. Total number of part-worn tyre sales by vehicle type in Scotland (2018)**

Part-worn tyres are second-hand, used tyres, and are legal in the UK. They must adhere to a number of regulations regarding their condition and tread depth. They must also be marked as being part-worn tyres. However, many part-worn tyre suppliers have previously been found to flout these regulations.<sup>42</sup> A 2018 survey by Trading Standards and TyreSafe found that, during 18 investigations involving 68 UK part-worn tyre firms, 99% were selling illegal and/or dangerous part-worn tyres. Tyres were classed as 'Dangerous' when deemed unsafe as a result of not meeting the principal requirements under The Motor Vehicle Tyres (Safety) Regulations 1994 (reg.7.) part of the Consumer Protection Act, regarding: structural integrity; inflation capability; and visible original grooves.<sup>43</sup> Tyre were classed as illegal where they had not been labelled in accordance to the regulation, which states that tyres need to permanently and legibly display the word "PART-WORN" in uppercase letters with a height of at least 4mm. The label may not be applied using hot branding or cutting into the tyre. As part of the same investigation, of 129 tyres inspected, 75% were deemed unsafe.

Part-worn tyres are sourced by garages replacing used tyres and deeming those that they remove as being fit for re-sale as part-worn, and also by vehicle dismantlers. Part-worn tyres also enter the UK market via imports from markets such as the Scandinavian and central European markets, where consumers must replace their tyres seasonally to adhere to winter tyre policies.<sup>44</sup> In these same countries, the minimum tread depth regulations can be greater than the UK tread regulations (for example, many tyres are imported from Germany, where the legal tread depth is 3mm, compared to the UK's 1.6mm)<sup>45</sup> and so these can be sold in the UK. These tyres should be classed as a waste product, and so importers of such part-worn tyres should declare that they are shipping waste products which require waste transfer notes and waste carriers' licenses to transport, and permits for sites to store them. However, anecdotal evidence suggests that a significant proportion of part-worn tyre importers avoid declaring these tyres as waste, instead classing them as new tyres, 'automotive components', or other non-waste classifications.<sup>46</sup> Therefore, the official number of imported part-worn tyres is believed to be an underestimate, and an additional ~1 million part-worn tyres are estimated to be being imported to the UK by the UTWG (See Section 8 for further details). This equates to around 780,000 tyres being imported for sale in Scotland when the figure is scaled based on the ratio of Scottish to UK vehicle registrations.

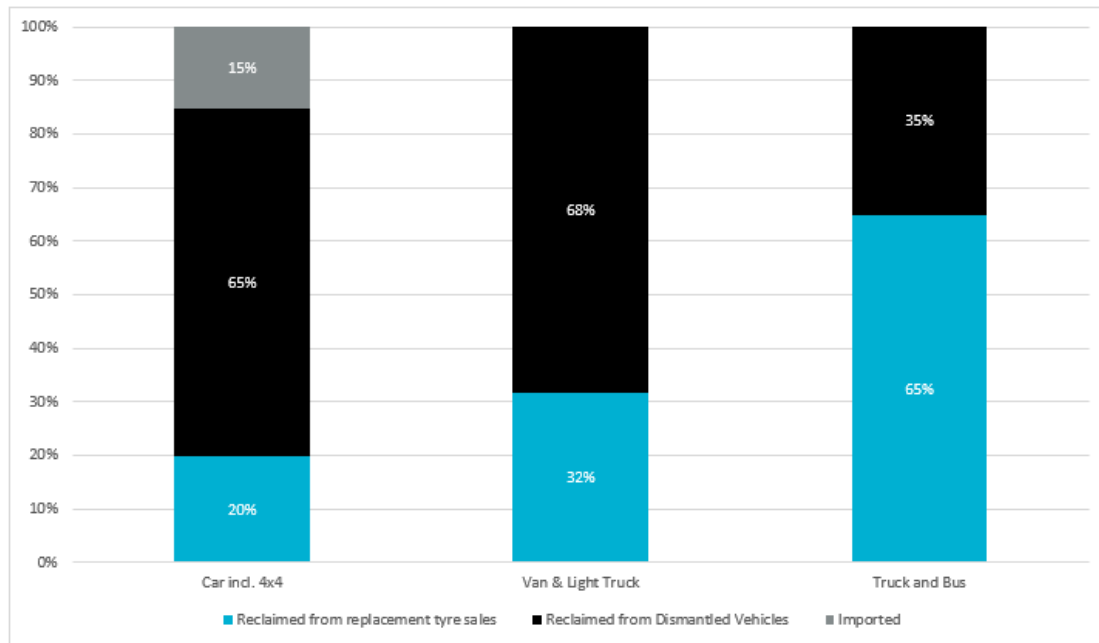
<sup>42</sup> <https://www.tyresafe.org/media-centre/latest-news/latest-round-of-investigations-reveals-99-of-part-worn-retailers-selling-illegal-and-unsafe-tyres/>

<sup>43</sup> <https://www.tyresafe.org/tyre-safety/part-worn-tyres/part-worn-tyres-law/>

<sup>44</sup> <https://www.uniroyal-tyres.com/car/tyre-guide/winter-care/winter-tyres-mandatory>

<sup>45</sup> [https://consultation.sepa.org.uk/communications/tyres/user\\_uploads/tyres-sector-plan\\_lr-1.pdf](https://consultation.sepa.org.uk/communications/tyres/user_uploads/tyres-sector-plan_lr-1.pdf)

<sup>46</sup> Personal correspondence with BTMA (April 2020)



**Figure 4-9. Split of sources of part-worn tyres by vehicle type**

Figure 4-9 shows the sources of these part-worn tyres by vehicle type, and the percentages of part-worn tyres that come through these routes. This shows that a significant proportion of both passenger car and van & light truck part-worn tyres PoM are recovered from dismantled vehicles, whereas the most significant route for part-worn truck & bus tyres PoM are those reclaimed from replacement tyre sales. It should be noted that the value for imports for car incl. 4x4 displayed in Figure 4-9 will include some van & light truck tyres imported from abroad, due to it not being possible to disaggregate van & light truck tyre imports from the imports of car tyres. As it is believed however that the majority of the total import of car and van & light truck tyres will be car tyres, they are included within the car tyre total. See section 8.5.4 of the technical appendix for further details.

The data in Figure 4-8 is based on assumptions applied by the UTWG in its Mass Balance for used tyres.<sup>47</sup> This includes assumptions about the fraction of tyres reclaimed from end of life vehicles that are suitable for sale as part-worn tyres, outlined in Table 4-3, and an assumption that 5% of tyres imported are subsequently deemed as unsuitable for sale, and that of those tyres that are recovered by retailers for potential sale as part-worn, 4% of car, van & light truck tyres and 2% of truck & bus tyres are subsequently sorted out in inspection as being unsuitable for part-worn use.

**Table 4-3. Percentage of tyres reclaimed at vehicle dismantlers that are suitable for sale as part-worn**

Vehicle type	Assumed percentage value	Corresponding number of tyres
Car	32%	87,738
Van & Light Truck	16%	6,540
Truck & Bus	8%	3,577

<sup>47</sup> UK Used Tyre Working Group (2018) UK Used Tyre Mass Balance 2017

## 4.8 Part-worn Tyres Route to Market

There are a range of routes to the consumer market for part-worn tyres:

- Retrieved when fitting replacement-new tyres:
  - and sold on direct to consumers by the retailers,
  - and sold on to part-worn wholesalers.
- Retrieved by vehicle dismantlers:
  - and sold on direct to consumers by the dismantlers,
  - and sold on to part-worn wholesalers; and
- Imported by wholesalers.

The split of the sale of part-worn tyres via these routes is displayed in Figure 4-10, with dismantlers being the significant route to the consumer market. Dismantlers are Authorised Treatment Facilities (ATFs) and are a regulated sector. There is therefore an opportunity for part-worn tyres to be collected through regulated avenues such as dismantlers, tested to ensure compliance with tyre regulations, before then entering the consumer market. This would help increase confidence in the part-worn tyre market and address safety concerns.

Of those retrieved during fitting of replacement-new tyres, 25% are estimated to be sold by the retailer themselves and 75% passed on to a part-worn tyre wholesaler.<sup>48</sup> Of those retrieved by dismantlers, 50% are estimated to be sold on direct to consumers by the dismantlers, with many of the larger dismantlers having their own tyre fitting bay, and with the remaining 50% ultimately being passed to a used tyre wholesaler who will distribute their stock to part-worn tyre garages.<sup>49</sup>

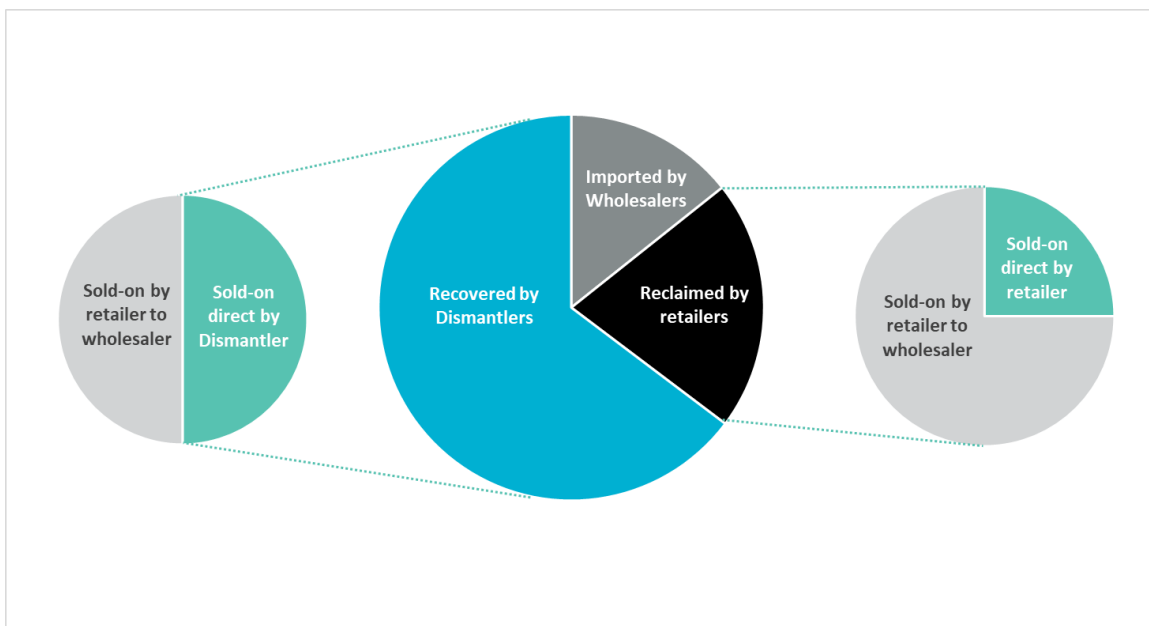


Figure 4-10. Route to market of part-worn tyres (2018)

<sup>48</sup> Personal correspondence with BTMA (March 2020)

<sup>49</sup> Personal correspondence with BTMA (March 2020)

## 5 End of Life Tyre Arisings, Collection and Reprocessing

### 5.1 Waste Arisings

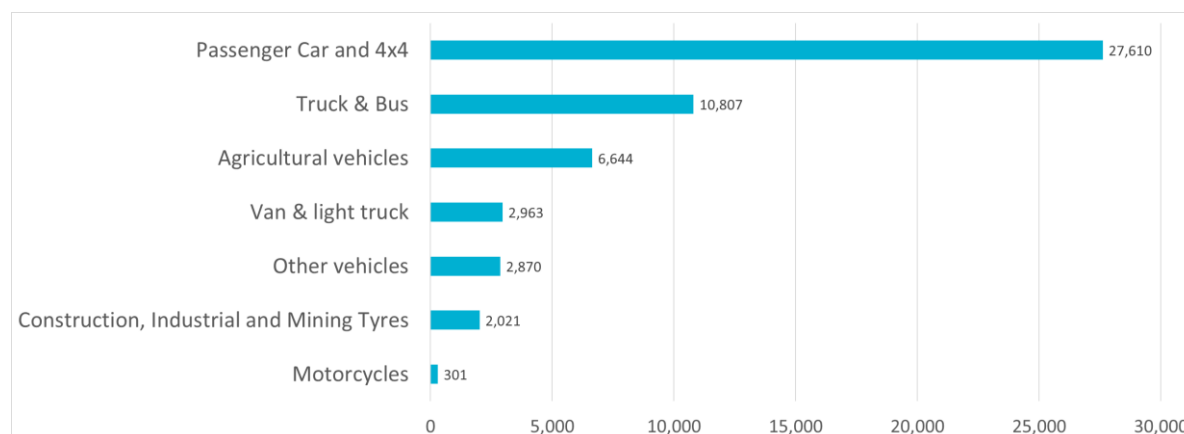
#### 5.1.1 Anticipated Waste Tyre Arisings

Anticipated waste arisings of tyres are estimated based on total tonnage of sales of new replacement, retreaded and part-worn tyres, on the basis that for every tyre sold through these routes, one will be removed that will arise as waste. An exception to this is where consumers purchase winter tyres for the first time, and as such there is no related disposal of an end-of-life tyre. As noted in section 4.3, winter tyres were estimated to make up less than 2% of tyre sales for passenger car, 4x4 and LCV tyre and even less for truck & bus tyres in 2016/17, the most recent year for which data was collected. Additionally, some sales of winter tyres will represent the replacement of winter tyres that have reached the end of life; however, we were not able to gather any information on what proportion of total winter sales this would represent. As such, no adjustment is made to the expected arisings to account for sales of winter tyres. This may therefore represent a very slight overestimate, though likely less than 1% of total arisings.

One uncertainty should be borne in mind when reviewing the anticipated waste tyre arisings. Agricultural tyre weights were derived from the midpoint of a range of agricultural tyre weights of 3kg to 398kg taken from stakeholder consultation previously undertaken by ZWS. In consultation, the BTMA advised that assigning an indicative weight is extremely challenging and so, in the absence of better data, the midpoint was used.<sup>50</sup> This should be borne in mind when reviewing the total tonnage anticipated arisings of agricultural tyres.

Added to total sales are arisings at vehicle dismantlers, as well as those tyres imported for potential part-worn sale, but which are deemed unsuitable for sale and so need disposing of.

The combination of arisings estimated based on sales, arisings at dismantlers, and those tyres rejected by importers leads to anticipated arisings of around 53,200 tonnes in 2018. Figure 5-1 presents total anticipated arisings by vehicle type.



**Figure 5-1. Arisings by vehicle type (Tonnes)**

In addition to this, cross border flows from England to Scotland based on Environment Agency (EA) data for Licensed Waste Sites in England have the effect of inflating the tonnage arising at licensed Waste Sites in Scotland beyond the volume expected to arise from vehicles registered in Scotland. These tyres could be excluded from the analysis; however, it is not known to which facilities they have been sent in Scotland and so cannot reasonably be removed from arisings identified through Scottish Licensed Waste Site data. Additionally, they may have originally arisen as waste in Scotland, crossed the border and then have been sent back to Scotland. Due to these uncertainties, they are included in

<sup>50</sup> Personal correspondence with the BTMA (May, 2020)

the estimate of anticipated arisings. The total tonnage of tyres recorded as flowing from Licenced Waste Sites in England to Scotland in 2018 was 2,400 tonnes.<sup>51</sup>

As such, total anticipated arisings used for comparison against the modelled waste arisings in this study are 55,685 tonnes.

### 5.1.2 Identified Waste Tyre Arisings

Tonnage arisings of tyres in 2018 have been identified equal to around 54,300 tonnes based on;

- Licensed Waste Site and incinerator quarterly returns for sites in Scotland, and those in England receiving tyres from Scotland;<sup>52,53</sup>
- Data provided by the BTMA on the sale of retreaded tyres, and thus expected level of capture of end of life tyres for retreading, and the recovery of part-worn tyres;<sup>54</sup>
- Waste export data for Scotland provided by the SEPA Producer Compliance and Waste Shipment Unit (PCWSU) – who provided;<sup>55</sup> and
- Stakeholder engagement with a collector of CIM tyres in Scotland.

It should be noted that when compared with the total anticipated arisings, there is a shortfall of around 1,400 tonnes or ~2.5% of total anticipated arisings. Reasons for the identified arisings not covering 100% of the anticipated arisings include:

- Some sites in England being exempt from the need to report the tonnage of tyres they are storing and processing;
- Stockpiling by sites of tyres across multiple years, and
- Reverse logistics operations which obscure the fact that tyres might originally be arising in Scotland.

These reasons are covered in more detail in section 5.3.9. A profile of the known collection routes and subsequent reprocessing of these arisings follows in Sections 5.2 and 5.3 respectively.

## 5.2 Collection Profile

### 5.2.1 Initial Collection

It is expected that the points at which tyres are collected closely follow the routes to market of new tyres, following the rationale that where a new tyre is sold, a waste tyre is likely to arise. On this basis, the collection profile displayed in Figure 5-2 has been derived for car, truck & bus and van & light truck tyres.

An exception to the rule that where a tyre is sold an end of life tyre will arise, is when consumers purchase winter tyres for the first time, and as such there is no related disposal of an end-of-life tyre. As noted in section 4.3, winter tyres were estimated to make up less than 2% of tyre sales for passenger car, 4x4 and LCV tyre and even less for truck & bus tyres in 2016/17, the most recent year for which data was collected. Additionally, some sales of winter tyres will represent the replacement of winter tyres that have reached the end of life, however we were not able to gather any information on what proportion of total winter sales this would represent. As such, no adjustment is made to the expected arisings to account for sales of winter tyres. Therefore the figures presented below for return to new tyre retailers may be slightly overstated, though only marginally.

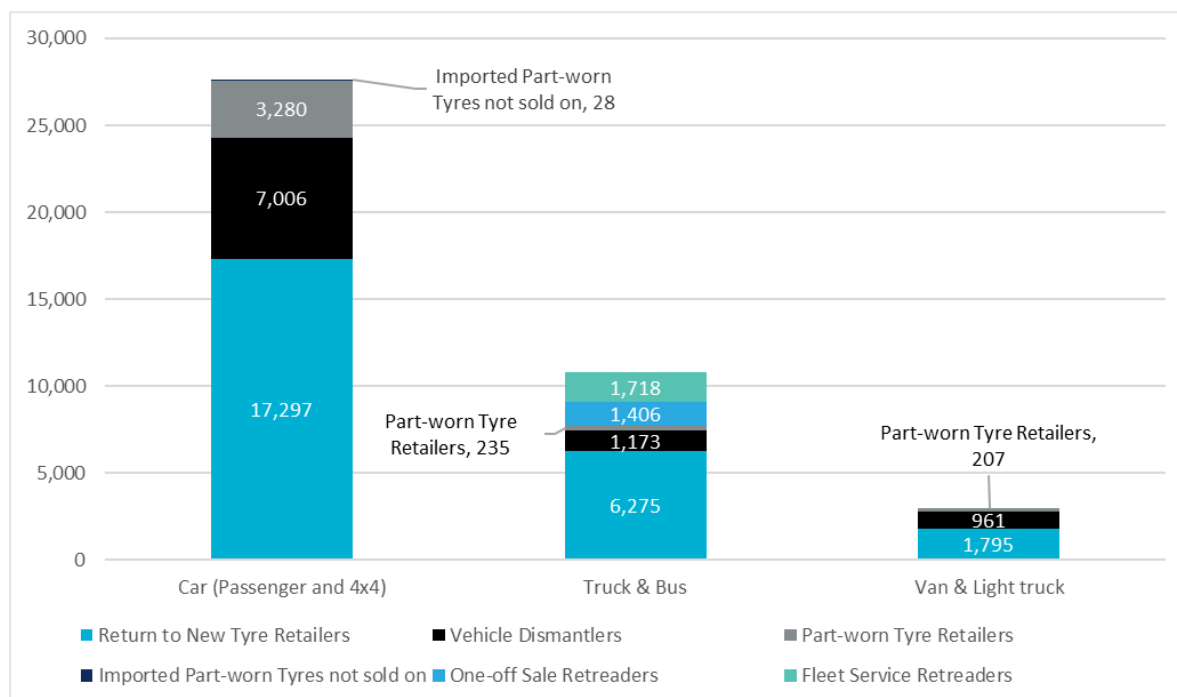
<sup>51</sup> Environment Agency, E. (2020) Waste Data Interrogator 2018, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

<sup>52</sup> Personal correspondence with SEPA Data Unit (March 2020)

<sup>53</sup> Environment Agency, E. (2020) Waste Data Interrogator 2018, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

<sup>54</sup> Personal correspondence with BTMA (March 2020)

<sup>55</sup> Personal correspondence with SEPA Producer Compliance and Waste Shipment Unit (March 2020)



**Figure 5-2. Tonnage collection of tyres via different capture routes for Car, Truck & Bus and Van & Light Truck Tyres**

This profile has been produced using:

- Sales figures for tyres by vehicle type combined with route-to-market splits; and
- End of life vehicle dismantler figures supplied by the UTWG.

As can be seen in Figure 5-2, the majority of end of life tyres by tonnage are collected by retailers selling new tyres, followed by vehicle dismantlers for all vehicle types included. For car and van & light truck tyres, the next largest point of collection is expected to be retailers of part-worn tyres. For truck & bus tyres, retailers of retreaded tyres are expected to receive around 3,100 tonnes of end of life C3 tyres each year. This is split evenly between those offering service contracts, where a management company will be used to service vehicles, including replacing tyres, and those selling retreaded tyres as a one-off sale.

The higher fraction of tyres collected by part-worn tyre retailers for cars, is due to a higher rate of recovery of tyres for part-worn both from new tyre retailers and from vehicle dismantlers, as outlined earlier in section 4.7.

No responses were received from stakeholders contacted regarding agricultural tyres, and so it has not been possible to build a profile of routes of collection for these tyres, equating to roughly 6,600 tonnes, or 12% of total anticipated arisings.

A collector of CIM tyres was able to provide insights on the recovery of CIM tyres in Scotland.<sup>56</sup> The operator collects around 1,500 tonnes of CIM tyres each year, equal to 75% of the total estimated arisings for CIM tyres. They offer a service whereby they visit and inspect tyres before agreeing to purchase and then will transport the tyres themselves. They report that they are the only collector of CIM tyres in the UK to audit tyres before making a decision to take them, and all other operators request that those with end of life CIM tyres have them collected by reproprocessors, with payment, and the potential for a disposal fee having to be paid, withheld until it can be established that the tyres received are of value.<sup>57</sup>

<sup>56</sup> Personal correspondence with confidential company (March 2020)

<sup>57</sup> Personal correspondence with confidential company (March 2020)



The operator further estimated that roughly half of all arisings of end of life tyres used in the mining and quarrying industry are unsuitable for retreading or repair for use as part-worn. They explained that most collectors of CIM tyres will not take these tyres.<sup>58</sup> As such these tyres are largely stockpiled at mining and quarrying sites and are not collected at all. As was mentioned in section 4.3, an analysis of trade data suggests that arisings of CIM tyres in Scotland are close to 2,000 tonnes. This would suggest the collector consulted is collecting around 75% of arisings in Scotland. Given the uncertainty as to whether the remaining 25% of arisings of CIM tyres are being collected, and if so, then by whom, we have decided to list this remaining tonnage as “collection unknown”. It was not possible to verify this assessment of the state of collection of CIM tyres in Scotland with other retailers or collectors of CIM tyres.

It should also be noted that end of life tyres also arise at civic amenity sites. Based on Scottish Licensed Waste Site data,<sup>59</sup> roughly 600 tonnes of tyres, around 1% of total arisings, are taken to HWRCs each year. However, as the Licensed Waste Site data does not include any detail on the nature of these tyres, it is not possible to include them robustly within the collections profile presented above.

### 5.2.2 Transport

There is less information available regarding the onward transport of end of life tyres from the point of collection to their ultimate fate. Through stakeholder consultation, a number of transport routes have been identified, including:

- Reverse logistics operations run by both larger retailers and wholesalers, who will take end of life tyres back to a centralised depot having delivered new stock to their outlets;<sup>60</sup>
- Tyre collection companies and reprocessors who will collect from vehicle dismantlers, HWRCs and either direct from retail outlets, or from wholesaler and retailer depots (where reverse logistics operations are running);<sup>61</sup>
- Part-worn tyre wholesalers who will collect from vehicle dismantlers and retail outlets before distributing to their networks of part-worn tyre garages;<sup>62</sup>
- Reprocessors who will visit companies with end of life tyres to assess their quality before agreeing to take them and then arrange transport;<sup>63</sup> and
- Reprocessors receiving unsold end of line stock from manufacturers and wholesalers.

## 5.3 Reprocessing Profile

The reprocessing profile has been calculated for waste tyre arisings in Scotland and identifies the volumes of tyres being reprocessed via different routes. Figure 5-3 presents a summary of the end of life route for Scottish waste tyre arisings in aggregate, and Figure 5-4 presents this data in a sunburst chart, split by location (inner circle) and type of reprocessing (outer circle). Detail on each fate summarised in these diagrams and the operators involved is provided in sections 5.3.1 through 5.3.9.

It should be noted that a systematic analysis across all arisings of the reprocessing of tyres by tyre type was not possible as Licensed Waste Site and incinerator quarterly returns for sites in Scotland, and for those in England receiving tyres from Scotland (which form a major part of the identified arisings), do not distinguish tonnages by tyre type.

It should also be noted that, the fates reported in English Waste Site data are intended to refer to the activity that the waste has undergone at the site. However, it seems that site operators are not interpreting them correctly, as fates have been reported for materials which could not be met on site e.g. co-incineration in cement kilns were reported as the fate of material arriving at tyre collection

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<sup>58</sup> *ibid.*

<sup>59</sup> Personal correspondence with SEPA Data Unit (March 2020)

<sup>60</sup> Personal correspondence with TRA (March 2020)

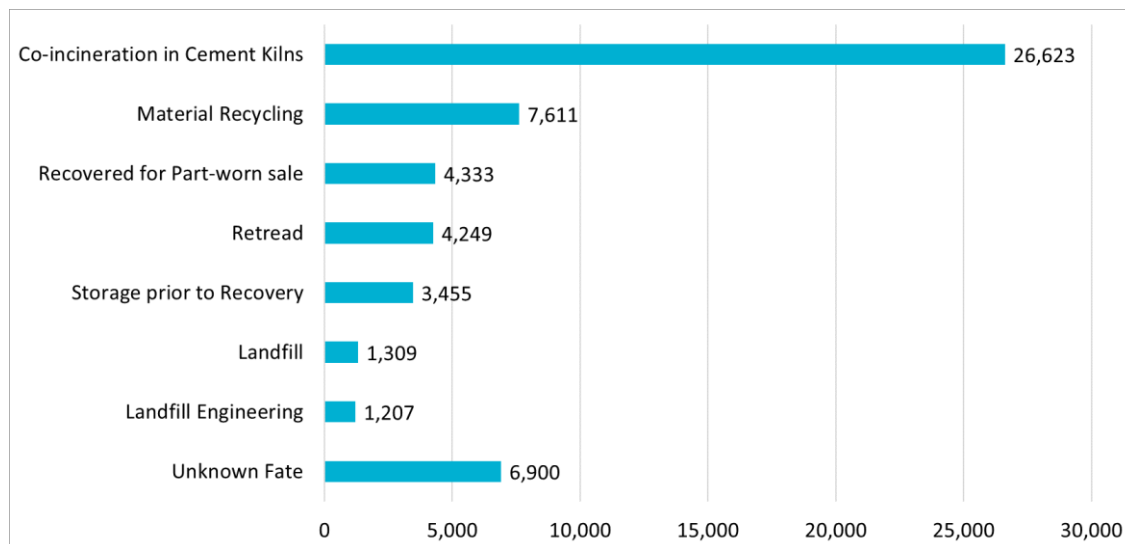
<sup>61</sup> Personal correspondence with BTMA (March 2020)

<sup>62</sup> Personal correspondence with BTMA (March 2020)

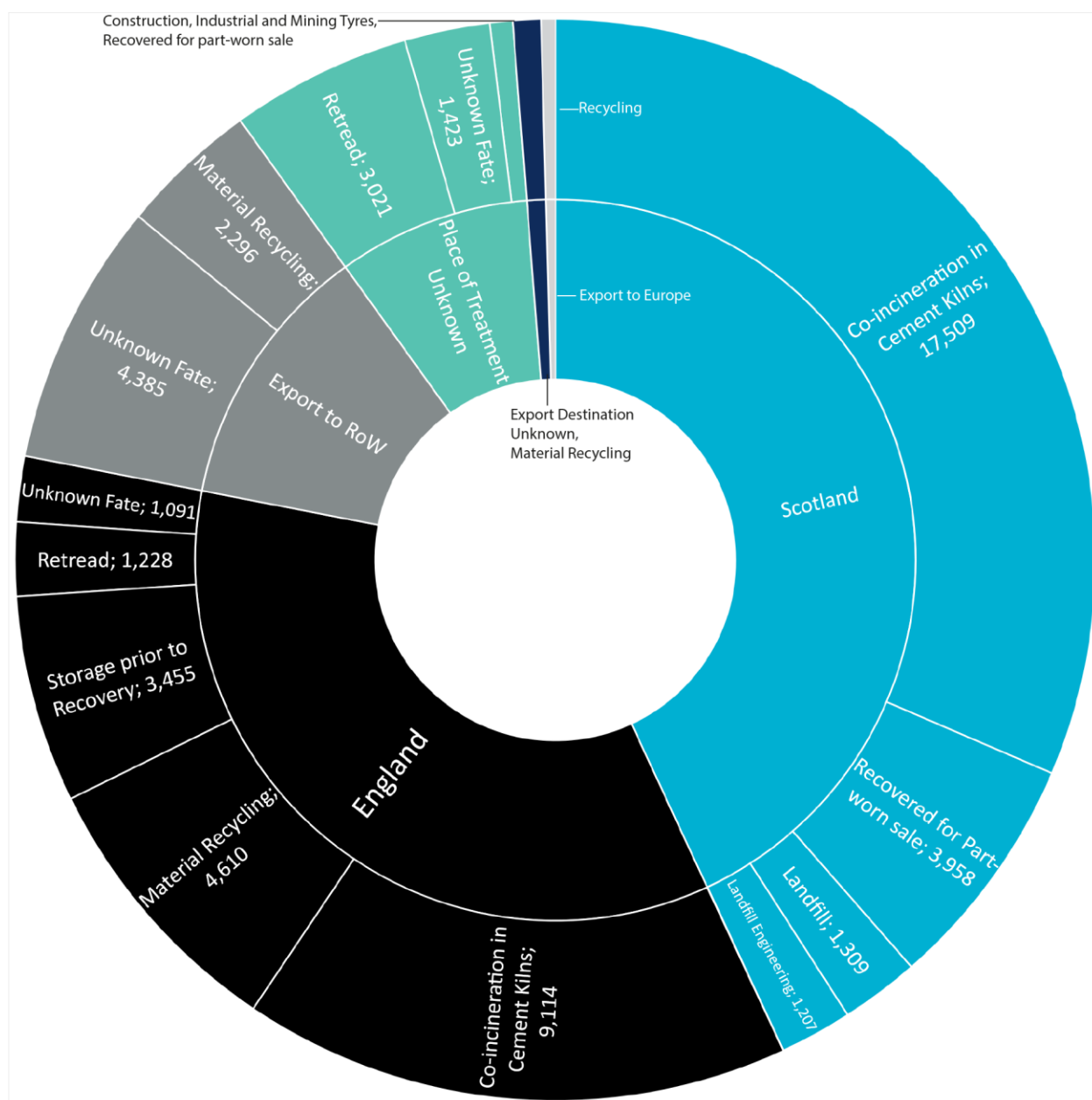
<sup>63</sup> Personal correspondence with confidential company (March 2020)



company premises. In most instances, however, it has been possible to determine whether material is likely to be meeting the fate recorded on the site identified based on analysis of the quantities and fates of waste tyres removed from sites, stakeholder consultation and review of site operator websites. Despite this, it is possible that there are some subsequent processing steps, and brokerage of material, beyond the organisations identified that means that the organisation ultimately processing material are not identified in the below profile. Further detail is provided in the Technical Appendix, Section 8.6.7.



**Figure 5-3. Total reprocessing profile for Scottish waste tyre arisings in tonnes, 2018**



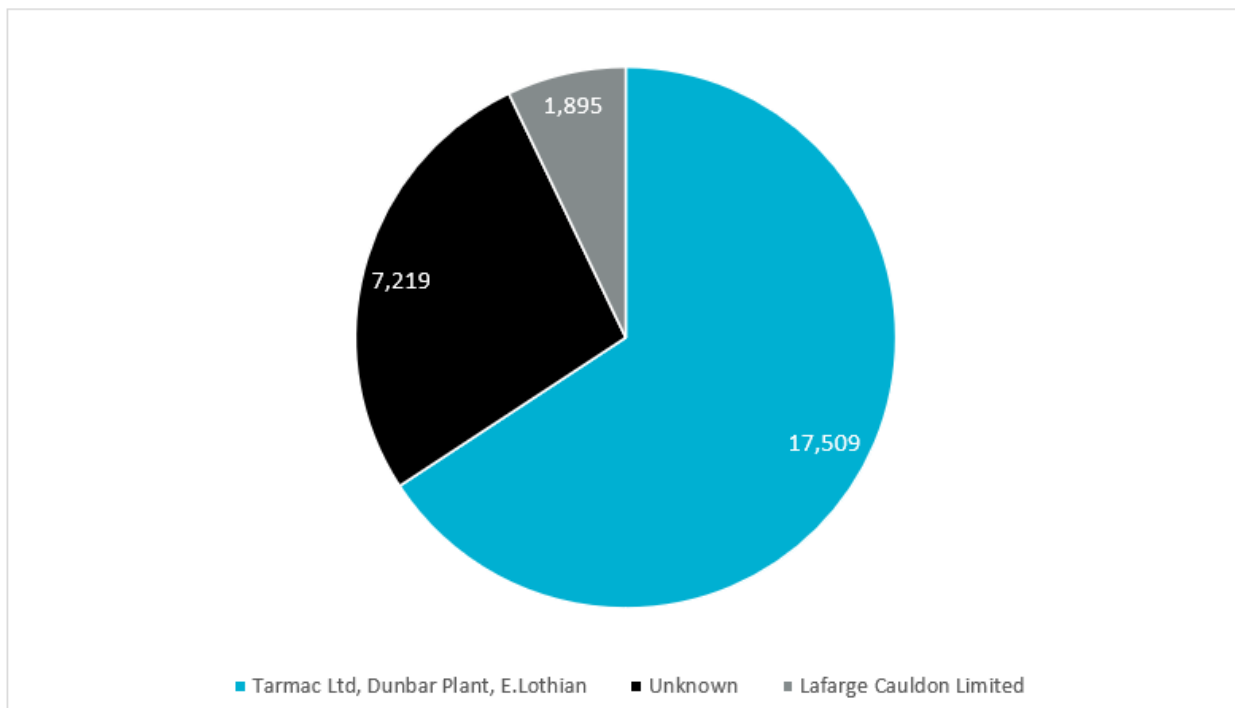
**Figure 5-4. Location of reprocessing for Scottish waste tyre arisings (inner circle) and type of reprocessing (outer circle) (Tonnes) 2018**

### 5.3.1 Co-incineration in Cement Kilns

26,600 tonnes, equal to ~48% of Scottish waste tyre arisings, were treated via co-incineration in cement kilns (in both Scottish and English kilns) in 2018. The use of tyres as a substitute fuel by the UK cement and lime industry delivers a number of benefits.<sup>64</sup> Tyres not only have the same high caloric value as coal (making them a direct replacement for fossil fuels) but the steel reinforcement within the tyres oxidises when burnt, reducing the amount of iron that has to be added to the raw material mix used to make cement.

There are two major cement companies that co-incinerate tyres: Tarmac Ltd in Dunbar, Scotland, and Lafarge Cauldron Ltd in Stoke-on-Trent, England. The remaining quantity is comprised of unknown actors. This breakdown is shown in Figure 5-5.

<sup>64</sup> Baird, D., Great Britain, and Environment Agency (2008) The use of substitute fuels in the UK cement and lime industries, Bristol: Environment Agency



**Figure 5-5. Reprocessor profile for the Scottish waste tyre treatment route 'co-incineration in cement kilns (Tonnes - 2018)**

### **Tarmac**

Tarmac reported accepting 17,509 tonnes of Scottish tyres into their Dunbar site in 2018.<sup>65</sup>

### **Lafarge**

In 2018, Lafarge declared they were accepting 1,895 tonnes of waste tyres from Scotland into their Caudon Cement Plant.<sup>66</sup> It should be noted however, that this is less than previous reported years (6,300 tonnes in 2017 and 13,200 tonnes in 2016). It is believed that the decline in tonnages through to 2018 is potentially in response to changes in the quantities that other cement kilns in the UK, including the Dunbar Site, were able to accept in previous years due to changes to infrastructure and management on the site.<sup>67</sup>

### **Unknown**

7,200 tonnes of waste tyres are identified as being sent to co-incineration by three operators. However, the location of the kilns are unknown as sites in England are not required to report the destination facility that waste is sent to and only have to report the fate.<sup>68</sup> Dundee Tyres in Carlisle (who trade as Tyrebin) sent 3,600 tonnes to an unknown site. Both Lafarge and Castle Cement report inputs from Carlisle so either site could potentially be receiving tyres from Dundee Tyres, or they may be being exported as Dundee Tyres has sent as much as 83% of its site outputs to incineration overseas in previous years.<sup>69</sup> 1,900 tonnes were processed by Sapphire England and is likely to have been sent to an English kiln, and the remaining 1,600 tonnes is reported to have been sent to English Kilns by a confidential waste management company.<sup>70</sup>

<sup>65</sup> Personal communication with Murfitts Industries Ltd (April 2020)

<sup>66</sup> Environment Agency, E. (2020) Waste Data Interrogator 2018, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

<sup>67</sup> Personal correspondence with TRA (March 2020)

<sup>68</sup> Environment Agency, E. (2020) Waste Data Interrogator 2018, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

<sup>69</sup> Environment Agency, E. (2020) Waste Data Interrogator 2018, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

<sup>70</sup> Personal correspondence with confidential waste management company (April 2020)

### 5.3.2 Landfill Engineering

Based on licensed waste site data returns and stakeholder consultation, one operator was identified as producing tyre bales for use in landfill engineering. In 2018, they recycled 1,200 tonnes, equal to around 2% of total arisings, to End-of-Waste (E.U) criteria, as defined in the Waste Framework Directive<sup>71</sup>. The operator is licensed to accept car tyres and light vehicle tyres only. The use of tyres for landfill engineering is predicted to be impacted by the Scottish landfill ban in 2025. The ban on sending biodegradable waste to landfill (such as food and garden waste, textiles, wood, paper, cardboard, packaging and residual 'black bin' waste), will mean that the demand for new or expanded landfill space, and so the use of tyre bales, is likely to decline.

The tyres the waste management company receives come from the following Scottish-only routes. A high-level split has been assigned to each route as shown here:

- Car Breakers/Scrap Metal Processors = 70%;
- Tyre Suppliers/ Tyre Collection Companies (i.e. retail) = 15%; and
- Local Authorities = 15%.

The operator receives the majority of its tyres through companies collecting tyres which it does not pay for, as this is a useful disposal route for collection companies. Previously, collection companies have been likely to export such tyres to India, Pakistan and elsewhere. However, these countries have implemented restrictions on tyre waste exports to their countries as a result of the associated air pollution and damage caused to human health from the burning of tyres at unregulated pyrolysis plants (Section 5.3.8 provides further details). As such, collection companies are seeking new disposal routes. The waste management company speculates that this accounts for the significant increase in TCCs that have approached it in order to dispose of their waste tyres.

### 5.3.3 Recycling

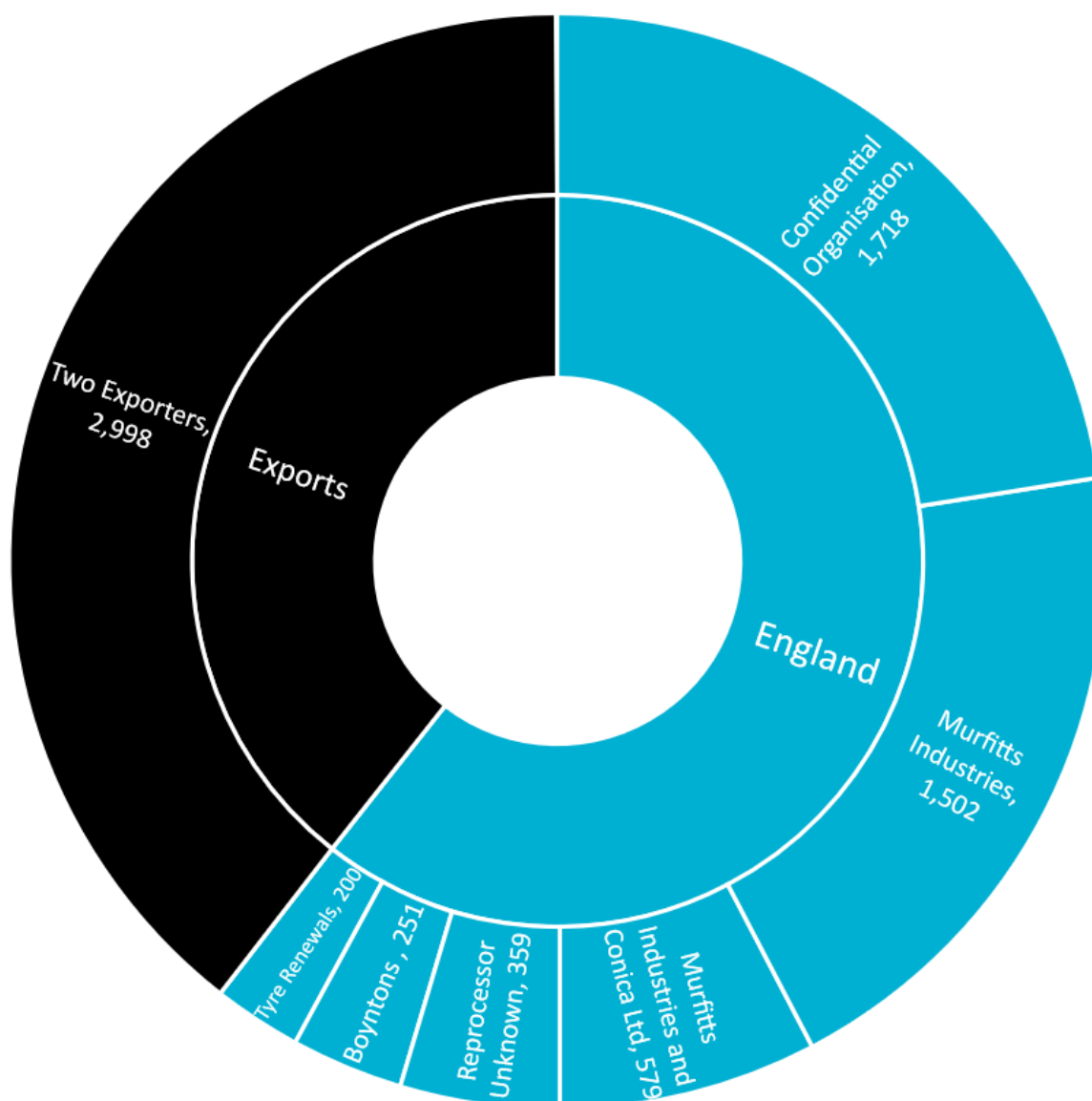
In 2018, around 7,600 tonnes of tyres arising in Scotland, equal to around 14% of total arisings are estimated to have been sent for recycling. Recycling can be defined in line with the Waste Framework Directive:<sup>72</sup>

*“Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It...does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations”.*

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<sup>71</sup> European Commission (2016) Directive 2008/98/EC on waste (Waste Framework Directive), accessed 25 June 2019, <http://ec.europa.eu/environment/waste/framework/>

<sup>72</sup> European Commission (2016) Directive 2008/98/EC on waste (Waste Framework Directive), accessed 25 June 2019, <http://ec.europa.eu/environment/waste/framework/>



**Figure 5-6. Location of recycling for Scottish waste tyre arisings (inner circle) and name of recycling companies (outer circle) (2018, Tonnes)**

Figure 5-6 presents a breakdown of the location of recycling and organisations involved. This clearly demonstrates that reported recycling activities for tyres are largely undertaken in England or outside of the UK. With no recycling activities being reported as happening in Scotland, beyond the production of bales for landfill engineering discussed separately in section 5.3.2, tyres are potentially being transported significant distances to be recycled.

Of the total tonnage reported as going to recycling, 4,600 tonnes are carried out in England, equal to around 8% of total arisings. Of the companies that report recycling of tyres in England, the main activity is to create rubber granulate for new products:

- Murfitts Industries processed ~1,500 - 2,000 tonnes,<sup>73</sup> equal to between 2.4 and 3.3% of total arisings, by shredding and creating rubber crumb for a variety of applications including rubber mulch and crumb for playground surfaces and formulated sports surfaces and polymeric infill materials for artificial pitches. They can also produce rubber granulate for applications

<sup>73</sup> The uncertainty in the tonnages processes is due to a retreader stating that they send their end of life casings to Murfitts and Conica Ltd but not providing a split between the two.

including carpet underlay, roads, non-slip decking and tiles. In late 2019, Murfitts Industries acquired the tyre collection business of Sapphire Energy Recovery, part of Tarmac which operates a cement kiln in Dunbar, Scotland that co-incinerates significant volumes of waste tyres;

- One confidential waste management organisation processed around 1,700 tonnes, equal to around 2.7% of total arisings, and are also granulate tyres to create rubber mulch, crumb or chips for use in playground and sports surfaces. They also sell the extracted reclaimed tyre wire for resmelting. They also create tyre bales for use in landfill engineering;
- Tyre Renewals Limited also shred and granulate tyres around 200 tonnes a year from Scotland for use in a variety of surfaces including equestrian surfaces. They also shred tyres to be blended with other combustible materials to create a blended fuel for incineration and create tyre bales; and
- Boynton Bros & Hallam (Ranskill) Limited shred and chip around 251 tonnes of tyres year from Scotland to create a patented rubber and fibre mix that can be used for equestrian surfaces, playground and sports surfaces and golfing greens. They also make a special sea defence product that uses tyres with holes in them in a cylindrical wire cage.

Retread companies will deem some of the casings they collect to be unsuitable for retreading and these tyres are likely to be sent for shredding/crumbing. One retread operator stated that this represents around 40% of their intake of tyres which they send to Murfitts and Conica for recycling. Conica also create an extensive range of sports and leisure surfaces as well as industrial flooring. Another retread company declared they send tyres for recycling, but it is unknown who processes their rejects.

It is possible that additional recycling is occurring but is reported as having been stockpiled, for example 413 tonnes were reported as being stockpiled on site following receipt in quarterly waste returns<sup>74</sup> by a confidential waste management organisation in 2018 but on the basis of the fates reported for material leaving the site it is believed that material is likely to have undergone a form of shredding (section 5.3.5 provides further examples).

A significant proportion of recycling is declared as being done via export. In 2018, the total tonnage exported out of Scotland to overseas markets with a fate reported as recycling was 3,000 tonnes or ~5% of total Scottish waste tyre arisings. Section 5.3.8 provides further details on the export of waste tyres from Scotland.

#### 5.3.4 Landfill

Around 1,300 tonnes of tyres arising in Scotland at three sites, equal to around 2% of total arisings were recorded in licensed waste site data returns as being sent to landfill. The European Union Landfill Directive banned the disposal of whole tyres to landfill from July 2003 and shredded tyres from July 2006. The ban applies to almost all tyres including car, commercial, motorcycle, aircraft, and industrial (including solid tyres). The only tyres that are still permitted are those over 1.4m in diameter – these are tyres such as CIM vehicle tyres. The SEPA licensed waste site data<sup>75</sup> used to derive the quantity being sent to landfill does not require site operators to systematically report the nature of the tyres being processed in detail. However, some site operators do still include waste descriptions.

Of the 1,300 tonnes reported as landfilled; 920 were reported as being tyres larger than 1.4m in diameter, and the remaining 380 tonnes were simply recorded as “Tyres”, and so no absolute conclusion can be drawn as to whether all tyres being landfilled are being sent there legally.

One collector estimated that they collect 1,500 tonnes of CIM vehicle tyres per year. Of these, they typically find premium brands (such as Michelin and Bridgestone) to be suitable for recycling or

<sup>74</sup> Environment Agency, E. (2020) Waste Data Interrogator 2018, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

<sup>75</sup> Personal correspondence with SEPA Data Unit (March 2020)

retreading due to the superior rubber blend used. The non-premium tyres (e.g. from Chinese manufacturers) they report are most commonly disposed of via landfill.<sup>76</sup>

### 5.3.5 Storage Prior to Recovery

Tyres may be collected but not reprocessed within the year received and thus are declared in Licensed Waste Site data returns as being “stored prior to recovery”. In total, around 3,500 tonnes, or roughly 6% of total arisings were reported as “stored prior to recovery” in 2018.

Naturally, these tyres will not be stored indefinitely, and on the basis of information gathered from their websites and the fates recorded for material they send off site in their licensed waste returns some commentary is included below regarding the likely fate of the tonnage of tyres they handle.<sup>77</sup>

TRS Tyres Ltd reported receiving around 1,500 tonnes onto their site for storage in 2018, equal to around 2.4% of total arisings. They repair and return, purchase and dispose truck tyre casings, as well as stocking new and part-worn tyres, including tyres larger than 1.4m in diameter.<sup>78</sup> Vellco Tyre Management Ltd reported receiving a similar quantity, and is an independent casing company involved in the procurement, grading, sales, and purchases of casings across any tyre product types including car, van, truck, agricultural and industrial tyres.<sup>79</sup> They supply part-worn casings worldwide. Both organisations were approached to seek information on the tyre type breakdown of their inputs from Scotland and the split of subsequent fates but at the time of writing, no response had been received. Whilst it is believed to be likely that both these companies, but in particular TRS Tyres Ltd due to their role, could be sending some end of life casings for recycling by shredding/crumbing or retreading, without detailed data from them, this cannot be confirmed.

In 2018, 413 tonnes of tyres were also declared as being stored at a confidential waste management organisation. Based on their declared waste outputs, it is believed these are likely to be going to co-incineration in cement kilns on the basis of the fates recorded for material they send off site in their licensed waste returns.<sup>80</sup>

### 5.3.6 Casings for Retread

The total tonnage of tyres arising in Scotland and being sent for retreading in 2018 is estimated at around ~4,200 tonnes, representing around 8% of total arisings. This includes both truck & bus tyres (C3 category) and an estimate from a collector of CIM vehicle tyres in Scotland of the fraction of the tyres they collect which they send for retread.<sup>81</sup> Of a used truck tyre, roughly 90% can be reused which leaves 10% waste,<sup>82</sup> and a used tyre can be retreaded up to approx. three times in their lifecycle, if quality and application are acceptable.

Three operators report receiving waste tyres from Scotland, equal to 2,400 tonnes.

The remaining tonnage for tyres that are retreaded is derived from retread sales for UK scaled to Scotland on the basis of the ratio of Scottish-English Vehicle registration by vehicle type. Of the remaining 1,800 tonnes of tyres that are retreaded, Caledonian Tyres and Alba Tyre Management are known Scottish retread companies who may account for most of this quantity based on 2014 data where Alba was cited as retreading 22,000 tyres a year and Caledonian Tyres retreading 20,000

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<sup>76</sup> Personal correspondence with confidential company (March 2020)

<sup>77</sup> Environment Agency, E. (2020) Waste Data Interrogator 2018, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

<sup>78</sup> TRD Tyres Ltd TRS TYRES LTD: Overview | LinkedIn, accessed 10 March 2020, <https://www.linkedin.com/company/trs-tyres-ltd/>

<sup>79</sup> site-admin Vellco Tyre Control, Used Casing Sales & Automotive Recycling, accessed 9 April 2020, <http://www.vellcotyrecontrol.co.uk/>

<sup>80</sup> Environment Agency, E. (2020) Waste Data Interrogator 2018, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

<sup>81</sup> Personal correspondence with confidential company (March 2020)

<sup>82</sup> Madu, C., 2001. Handbook of Environmentally Conscious Manufacturing. Boston: Kluwer Academic Publishers)



tonnes a year.<sup>83</sup> This equates to an estimated 2,000 tonnes through this does not allow for potential changes in market share in the last 4 years. Both companies were contacted for commentary but no response was received in time for inclusion in the report.

As previously mentioned in section 5.3.5, TRS Tyres and Vellco Ltd may also account as a source for some of the Scottish tyres that are retreaded, as they are both casings managers/dealers receiving tyres from Scotland according to licensed waste site data returns.<sup>84</sup> Similarly, Statham Tyres and Co report receiving around 850 tonnes of tyres from Scotland in 2018 but we were unable to ascertain the end fates of the casings they manage due to their reporting only “sorting” in their licensed waste returns. They engage in casing sales and purchasing, management including inspection and delivery, and scrap tyre clearance. As they partner with Goodyear, Dunlop and Bridgestone, it is expected that they will be supplying retread companies in the UK.<sup>85</sup>

It should be noted that one operator reported during stakeholder consultation that it collects around 1,500 tonnes of CIM tyres from Scotland each year.<sup>86</sup> Of the tyres, they report that around 75% are sent for retreading by one operator in England, two in Europe and two in America. As such, 1,125 tonnes are recorded as retreaded in the mass flow. We were not able to obtain licensed waste site data from SEPA for this operator, and so could not identify the geographic destination. The operator collecting CIM tyres was unable to provide a split of the export of the tyres collected by export operator, or export location. As such it is possible that including this material in the mass flow creates a double count as it may overlap with the tyres reported as received by other retread organisations.

### 5.3.7 Retrieved for Part-worn Sale

Tyres that have been removed by vehicle dismantlers or when fitting a replacement-new tyre are classed as waste. Those that are assessed as suitable for sale as part-worn tyres by conforming to the necessary requirements meet end of waste criteria and can be reused. It is estimated that in 2018, around 4,300 tonnes of tyres were recovered for part-worn sale, equal to around 8% of total arisings.

Figure 5-7 displays the estimated tonnage of part-worn tyres PoM in Scotland for cars, trucks and buses and vans & light trucks, and was derived on the basis of the method applied by the UTWG in the UK Used Tyre Mass Balance. It should be noted that the value for car incl. 4x4 displayed in Figure 5-7 will include some van & light truck tyres imported from abroad, due to it not being possible to disaggregate van & light truck tyres imports from the imports of car tyres. However, as it is believed that the majority of the total import of car and van & light truck tyres will be car tyres, they are included with the car tyre total. See section 8.5.4 of the technical appendix for further details.

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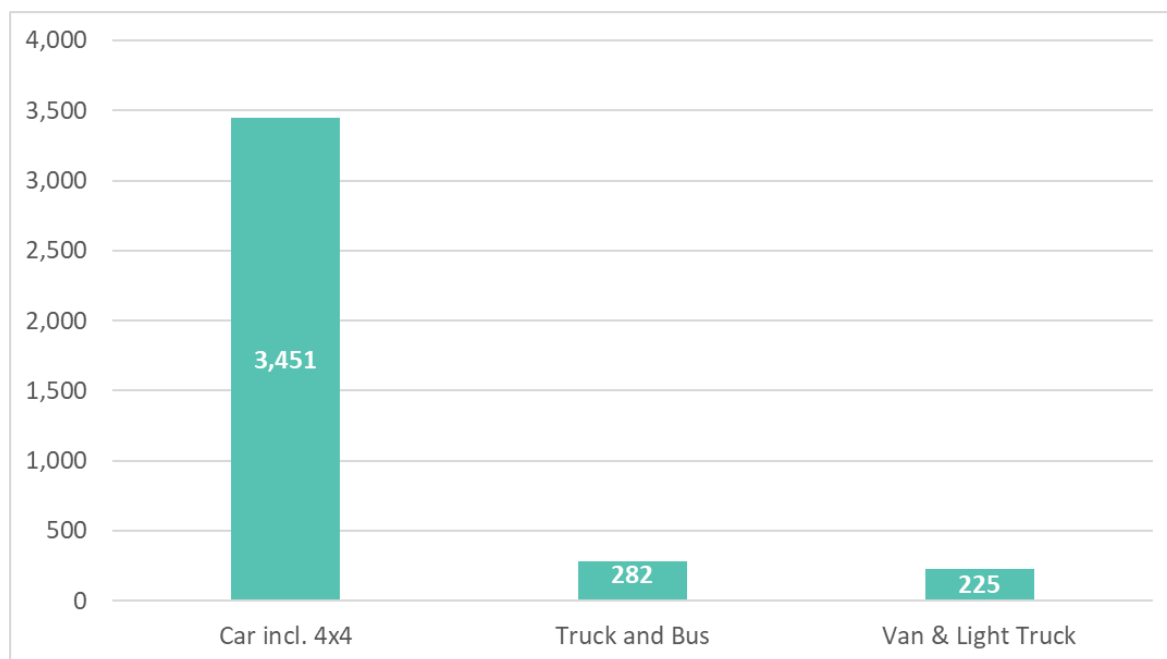
<sup>83</sup> Centre for Remanufacturing and Reuse (2015) *Circular Economy Evidence Building Programme - Remanufacturing Study*, Report for Zero Waste Scotland, 2015, [http://www.zerowastescotland.org.uk/sites/default/files/Remanufacturing%20Study%20-%20Full%20Report%20-%20March%202015\\_0.pdf](http://www.zerowastescotland.org.uk/sites/default/files/Remanufacturing%20Study%20-%20Full%20Report%20-%20March%202015_0.pdf)

<sup>84</sup> Environment Agency, E. (2020) Waste Data Interrogator 2018, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

<sup>85</sup> Statham Tyres Ltd *Statham Tyres Ltd*, accessed 29 April 2020, <http://www.stathamtyres.com/>

<sup>86</sup> Personal correspondence with confidential company (March 2020)





**Figure 5-7. Tonnage of part-worn tyre sales by vehicle type in Scotland 2018**

In addition to these tonnages, a collector of CIM vehicle tyres estimate that they collect around 1,500 tonnes of CIM vehicle tyres from Scotland a year, equal to around 2% of total arisings.<sup>87</sup> Of these they estimate that they send around a quarter, 375 tonnes, for repair for reuse as part-worn tyres.

Further detail on the nature of part-worn tyre sales, the quantities and routes back into the market is provided in section 4.7 and 4.8.

### 5.3.8 Export

In 2018, the total tonnage exported out of Scotland to overseas markets was 7,400 tonnes or around 13% of total Scottish waste tyre arisings. This data was calculated taking SEPA's Producer Compliance and Waste Shipment data for total exports in 2018 and cross-referencing data from Licensed Waste Sites in Scotland which recorded destination facility and region. SEPA's Producer Compliance and Waste Shipment Unit were unable to provide any information on the ultimate fate of the material sent for export.<sup>88</sup> However on the basis of reported arisings of end of life tyres at licensed/permitted waste management sites in Scotland, which includes destination facilities to which material has been sent<sup>89</sup> it was possible to identify that 3,000 tonnes of tyres were reported as being exported from Scotland via two exporters, with a reported fate of recycling. Around 4,400 tonnes of waste tyres were therefore exported by unknown companies. However, the data provided by SEPA suggest that that all exports in 2018 from Scotland were to India

Due to a lack of recycling and recovery routes in Scotland for waste tyres, in October 2010, SEPA issued a position paper detailing the circumstances under which shredded tyres can be exported out of the UK, giving Scotland-specific clarity to the existing EU Waste Shipment Regulation (WSR).<sup>90</sup> The position paper states that shredded tyres can only be exported if they are to be processed by the receiving country in a way that is not disposal. Co-incineration at a cement kiln or energy recovery using a combined heat and power plant is permissible as it is classed as recovery, not disposal. Shredded tyres must be classed as rubber waste if clean of wire and textiles or as waste pneumatic tyres if not. Tyres can be exported under 'green list' controls which is the lowest level of control due to being non-hazardous.

<sup>87</sup> Personal correspondence with confidential company (March 2020)

<sup>88</sup> Personal Correspondence with SEPA Producer Compliance and Waste Shipment Unit (March 2020)

<sup>89</sup> Personal correspondence with SEPA Data Unit (March 2020)

<sup>90</sup> SEPA Interim Enforcement Position - Export of Shredded Waste Tyres

Tyres have been exported out of the UK, often to India for processing in pyrolysis plants due to the Indian government authorities issuing licenses for the treatment of tyres in India. Such was the demand for waste tyres that, anecdotally, companies were being paid several hundred pounds for a container full of baled tyres versus facing the costs of a gate fee plus haulage by keeping tyres within the UK.<sup>91</sup> Concerns have also been raised by Indian NGOs that the pyrolysis plants that tyres are being sent to do not conform to regulations set by India or requirements for exports set by the UK Government, with a lack of due diligence being implemented to protect against illegal pyrolysis plants creating air pollution and damaging human health.<sup>92</sup> Anecdotally we have heard from the TRA that it is also believed that some operators have previously declared that tyres are going for recycling, but ultimately are sent to pyrolysis on arrival in India.<sup>93</sup>

Based on reports that of the 637 tyre pyrolysis units in India, 251 are complying to Standard Operating Procedures but 270 are not complying and 116 are closed; NGOs have also raised concerns about the environmental credentials of operators of pyrolysis plants in India to which much of India's imports of waste tyres are sent. Indian authorities have also been asked by Defra whether they are comfortable with the fate that material reportedly exported for recycling is meeting. However, they have yet to receive a formal response, with restrictions of the import of tyres into India having since been imposed.<sup>94,95</sup> This will in turn impact on the tyre reprocessing sector with a tonnage of tyres that were previously being exported now needing alternative end destinations in the UK or other countries.

It should be noted that a collector of CIM vehicle tyres reported during stakeholder consultation that they collect around 1,500 tonnes of CIM vehicle tyres from Scotland a year.<sup>96</sup> Of the tyres they collect, they report that around 75% are sent for retreading by one operator in England, two in Europe and two in America. We were not able to obtain licensed waste site data from SEPA for this operator, and so could not identify the geographic destination of their exports. Additionally, the operator collecting CIM tyres was unable to provide a split of the tyres they collect by export operator, or export location. As such it is possible that including this material in the mass flow creates a double count as it may overlap with the export data provided by The SEPA PCWSU. The extent of this double count should be 1,125 tonnes at most. However, the operator did not report in consultation that they export any material to India, which the PCWSU data reports was the only destination of exported end of life tyres in 2018.

### 5.3.9 Unknown Fate

In total there are around 6,900 tonnes of tyres for which a fate could not be assigned, equal to around 12% of total arisings. A fate could not be assigned to these tonnages for a number of reasons.

Firstly, around 1,400 tonnes are not accounted for in the mass flow, which would equate to 2.5% of anticipated arisings. Further details on the possible reasons for a quantity of tyres arisings in Scotland being obscured from the licensed waste site data which forms a large part of the inputs to the mass flow are detailed in section 6.

Also contributing to this tonnage to which a fate could not be assigned are organisations for whom we were unable to get more details via stakeholder engagement to confidently assign a fate for their waste tyres. This includes:

- 4,400 tonnes of material that is exported to India where the exporter is unknown as only anonymised data could be provided by SEPA's Producer Compliance and Waste Shipment Unit.<sup>97</sup> (see section 5.3.8 or further details);
- 850 tonnes reported by Statham Tyres and Co (UK) Ltd where fate is unknown (see section 5.3.6); and

<sup>91</sup> Personal correspondence with Murfitts Industries Ltd (March 2020)

<sup>92</sup> <https://www.theguardian.com/commentisfree/2019/jan/30/worse-than-plastic-burning-tyres-india-george-monbiot>. Accessed March 2020

<sup>93</sup> Personal correspondence with TRA (March 2020)

<sup>94</sup> <https://www.tyreandrubberrecycling.com/latest-news/posts/2019/september/indian-ban-imminent>. Accessed April 2020

<sup>95</sup> Personal correspondence with Defra (March 2020)

<sup>96</sup> Personal correspondence with confidential company (March 2020)

<sup>97</sup> Personal correspondence with SEPA Producer Compliance and Waste Shipment Unit (March 2020)

- 230 tonnes managed by a small number of operators who are believed to have misclassified the fates of their materials in licensed waste site returns given the unlikely nature of the described fate.

## 5.4 Illegal Dumping and Flytipping

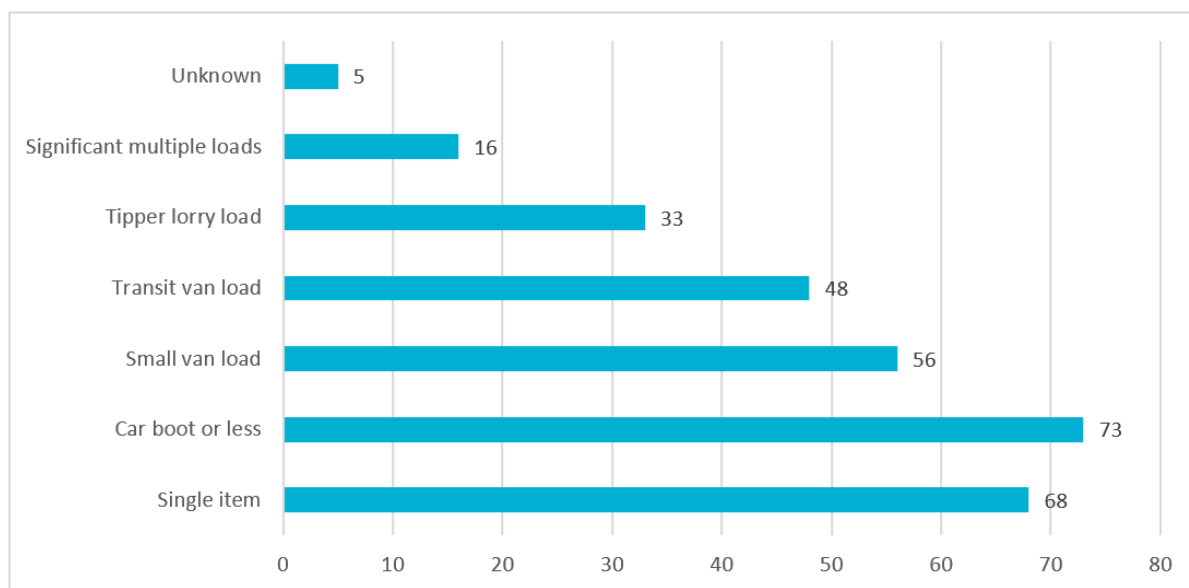
Two keys sources of data were collated with the intention to assess the role of flytipping and illegal dumping as a temporary fate of end of life tyres in Scotland. These are:

- A combined extract from the FlyMapper Database and Litter Monitoring System specially provided by Zero Waste Scotland for this project,<sup>98</sup> and
- An extract from SEPA's environmental events management system for events that pertain to illegally dumped tyres.<sup>99</sup>

The following caveats should be noted in interpreting this data;

- The FlyMapper and Litter Monitoring System dataset is only partial as there is no obligation on Local Authorities to use the system and as a result not all do;
- The data in these datasets is not necessarily verified by the entity which holds the data; and
- The volumes reported are reported by the public and as such are subject to significant subjectivity as regards how many tyres they represent.

A profile of total incidences by size category for 2018, the year for which mass flow analysis has been carried out throughout this report, is displayed in Figure 5-8 with the size categories of the incidence running from largest at the top of the graph, to smallest at the base of the graph.



**Figure 5-8. Number of incidences of fly-tipping and larger illegal dumping of Tyres in Scotland in 2018**

In total across the two datasets, 299 incidences were reported in 2018. As can be seen in Figure 5-8, incidences are skewed towards smaller volumes of tyres being dumped. As regards what number or tonnage of tyres this might represent, unfortunately there are a number of issues with the raw data which prevent making an estimate of total numbers or tonnage of tyres including:

- Misunderstanding by FlyMapper and Litter Monitoring Service users of the single-item category for which counts as high as 200 tyres are then provided in the notes section but which are not used consistently;

<sup>98</sup> Personal correspondence with Zero Waste Scotland (March 2020)

<sup>99</sup> Personal correspondence with SEPA National Waste Unit (March 2020)

- Significant variability in how users are interpreting the middle categories such that assigning a number to these categories would be highly subjective; and
- No distinction as to the type of tyre fly-tipped.

FlyMapper and the Litter Monitoring Service are not mandatory and are therefore used by a small proportion of local authorities, and often inconsistently. Additionally, as the FlyMapper database provided did not include a record of the local authorities that had reported using the platform, it was not possible to make any estimate as to what portion of total flytipping of tyres the above data represents. As such it is not possible to draw firm conclusions on the role of flytipping and illegal dumping as a temporary leakage of tyres from formal waste management.

It should be noted that in the last few years SEPA has made a concerted effort to tackle illegal activity following the removal of waste tyres from the exemption Paragraphs of the Waste Management Licensing regulations in 2016. For example, a large illegal dump at Cumnock was cleared in 2017 during which about 114,000 tyres weighing 700 tonnes were removed. This would have been a significant leakage relative to total arisings.<sup>100,101</sup> A SEPA representative expressed the view in consultation that large scale dumping of tyres is far less likely to occur in the future as a result of the changes to the licensing laws.<sup>102</sup>

## 6 Factors Influencing Comprehensiveness of Modelling

There are a number of known factors which will influence how comprehensive the treatment profile presented in this report. Each is briefly outlined below.<sup>103</sup>

### 6.1 T8 and S2 Exemptions for Storage and Processing of tyres in England

In England, the T8 Exemption allows for processors to mechanically treat smaller quantities of end of life tyres<sup>104</sup> without the requirement to have an environmental permit, and covers:

- Baling end of life tyres to use in construction;
- Granulating end of life tyres to use in horse manége;
- Re-treading end of life tyres so they can be reused as tyres; and
- Granulating end of life tyres again, where granulate is too big or needs further processing to comply with PAS 107.<sup>105</sup>

The exemption allows for operators to store or treat up to 60 tonnes of truck tyres or up to 40 tonnes of any other tyres over any 7-day period. There is additionally the S2 exemption which allowed for the storage of up to 40 tonnes of end of life tyres, tyre chip or crumb for up to 3 months.<sup>106</sup>

These sites will not be captured in quarterly licensed waste site data which the end of life arisings and reprocessing profile are reliant on. Where these sites are directly collecting material from retailers and vehicles dismantlers in Scotland and transporting it to England, this may go some way to explaining the shortfall in modelled arisings compared to anticipated arisings.

<sup>100</sup> Personal correspondence with SEPA (March 2020)

<sup>101</sup> Scottish Government Waste Management Licensing (Scotland) Amendment Regulations 2016 - PARTIAL/ FINAL BUSINESS AND REGULATORY IMPACT ASSESSMENT

<sup>102</sup> Personal correspondence with SEPA (March 2020)

<sup>103</sup> T8 waste exemption: mechanically treating end-of-life tyres, accessed 15 April 2020, <https://www.gov.uk/guidance/waste-exemption-t8-mechanically-treating-end-of-life-tyres>

<sup>104</sup> T8 waste exemption: mechanically treating end-of-life tyres, accessed 30 March 2020, <https://www.gov.uk/guidance/waste-exemption-t8-mechanically-treating-end-of-life-tyres>

<sup>105</sup> The Specification for the manufacture and storage of size reduced tyre materials, <https://www.gov.uk/guidance/s2-waste-exemption-storing-waste-in-a-secure-place>

<sup>106</sup> S2 waste exemption: storing waste in a secure place, accessed 30 March 2020

## 6.2 Storage of Tyres on Sites

Tyre collection and processing companies will stockpile tyres for onward sale or processing as demand requires. In some instances, consultation as part of this report has revealed that stockpiled quantities at a single site managing tyres arising in Scotland can be as much as 3,000 tonnes of tyres which could result in significant distortions in flows in the context of a total anticipated arisings of around 63,300 tonnes. The impact of licensed waste sites stockpiling a large number of tyres in any one year would be to reduce the quantities treated, below that which might be expected based on waste arisings.

## 6.3 Possible Reverse Logistics Operations of Wholesalers Based in England

As was noted in section 5.2.2, some wholesalers operate reverse logistics operations, whereby they take end of life tyres back to centralised depots having delivered new stock to their outlets. Where these depots are in England, this may lead to tyres that have arisen in Scotland being obscured within EA licensed data, as the first point at which the tyres are recorded may not record “Scotland” as the destination.

## 6.4 Scrappage of Unsold Stock by Manufactures and Wholesalers

As was mentioned in section 5.3.1, one waste management company reported that it received around 1,600 tonnes of tyres from Scotland in 2018.<sup>107</sup> It was reported that they received half of this from manufacturers and wholesalers scrapping unsold and unused end-of-line stock. The reasons for manufacturers and wholesalers scrapping relatively substantial tonnages of tyres are unclear. The impact on the mass flow of this source of waste tyres is to inflate arisings beyond what would be expected based on replacement sales and the dismantling of end of life vehicles, and thus to potentially overstate the capture rate of tyres arising through these routes. In consultation, the TRA expressed the opinion that this source of waste tyres will not be significant relative to total arisings, and so any distortion should be minor.<sup>108</sup>

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<sup>107</sup> Personal correspondence with confidential waste management company (April 2020)

<sup>108</sup> Personal correspondence with TRA (March 2020)

## 7 Summary

In the following section, key aspects of the preceding detailed sections of the sales profile, end of life tyres arisings and reprocessing are drawn.

### 7.1 Manufacturing and Sales

Sankey diagrams have been produced to visually summarise the PoM figures and their route to market for new, part-worn and retreaded tyres. It should be noted that in consultation, the BTMA advised that assigning an average weight to CIM and “Other vehicle” tyres in order to convert the net sales tonnages to a number of tyres would be extremely difficult due to the wide range in tyres that fall within these two categories, ranging from forklift trucks to straddle-carries for transporting shipping containers. As such no unit sales of these tyre types are presented in Figure 7-2 below, and references to percentages of total sales do not include these tyres. For reference, the combined mass of tyres represents around 9% of total estimated tonnage sales of tyres in Scotland. However, for CIM tyres at least, the impact on total sales in unit figures is anticipated to be small as these tyres are likely to weigh far more than other tyre types.

Figure 7-2 details the PoM figures and route to market for new tyres, with Figure 7-2 showing the same for part-worn and retreaded tyres. As explained earlier in this report and as can be seen in the diagrams, the vast majority of new replacement tyres sold in the UK are manufactured abroad, and just over half are manufactured outside the EU. This varies for retreaded tyres, which come largely from the local market. On the global scale, manufacture is skewed towards eight firms, accounting for over 58% of total production. This data is from a global level, so no conclusive statement on the breakdown of manufacturers for Scotland can be drawn.

As shown in the two diagrams, new tyres form the largest portion, at around 88% of the tyre market in Scotland, with retreaded tyres currently mainly offered in the commercial sectors and part-worn tyres being subject to quality and safety checks. The largest quantities PoM by vehicle type are passenger car and 4x4 tyres (at around 3.1 million unit sales). The next largest group, LCVs, only make up around 310,000 sales. Part-worn tyre sales were found to be skewed towards cars (~444,000 unit sales), whilst vans, light trucks, and trucks and buses only make up ~26,000 unit sales. In large part, this is as a result of the high reclamation rate from end of life cars at dismantlers and retailers.

Of the total quantities of new tyres, new replacement tyres are the largest constituent part, accounting for over two thirds of new tyres PoM. According to the Society of Motor Manufacturers and Traders (SMMT),<sup>109</sup> *“the average age of a car at scrappage in 2015 reached 13.9 years, which is on a par with the 2014 performance”*. Tyre industry advice is that regardless of the wear and thread depth, tyres need to be replaced at least every 7 to 10 years.<sup>110</sup> However, with regular usage resulting in greater wear, reduced thread depth or even other damages such as punctures and cracks, tyres tend to be replaced more frequently, resulting in a significantly higher number of new replacement tyres compared to tyres PoM by OEMs.

Figure 7-1 shows that local tyre retailers and national tyre chains sell the largest volumes of new replacement tyres in Scotland making up over two thirds of the replacement tyre market. New replacement tyres are largely sourced through UK wholesalers (75%), with 20% of tyres sourced directly from manufactures, and a small quantity (5%) bought from non-UK wholesalers.

Due to the lack of comprehensive up-to-date sales figures for these retread figures for these operators, the route to market reflects the split at a UK level. However, confirmation received by relevant trade bodies indicates that a similar distribution is likely. As shown in Figure 7-2, retreaded tyres using the mould cure process form the vast majority of the total retreaded tyres PoM, with manufacturers and independent retread organisations carrying out around 36% and 47% respectively.

<sup>109</sup> SMMT, Average Vehicle Age, <https://www.smmt.co.uk/industry-topics/sustainability/average-vehicle-age/>

<sup>110</sup> Blackcircles.com, Does the age of a tyre matter?, <https://www.blackcircles.com/helpcentre/tyres/age-of-a-tyre>

Approximately 16% of retreads are undertaken using a pre-cure method by independent organisations. Less than 1% of retreaded tyres are imported, with the manufacturing method unknown (according to data provided by TIF). There is a strong discrepancy in data for this route, however, with HMRC data showing 16% imports. It is understood that this is because a quantity of tyres will be imported and retreaded in the UK, but then exported for sale as part of an industrial optimisation operation, whereby manufacturers will have specific factories equipped to retread certain tyre types or sizes located around Europe. As such, some cross-border movements do not represent flows for sale in that country but for remanufacture, prior to export for sale.<sup>111</sup>

Part-worn tyres are believed to be derived from three key points: just under two thirds are PoM by vehicle dismantlers (the data is considered quite uncertain, see section 8); approximately 14% are imported, and approximately 21% are retained for resale by retailers replacing used tyres.

In conclusion, the two diagrams clearly show varying routes to market depending on the tyre type and use. This confirms that currently traceability of tyres within the supply chain is challenging and, thus, clear differentiation of segments and material flows are nearly impossible. Further work and research would be needed in order to have a clearer view of manufacturing and sales profiles, and this could be made possible with buy in from the industry and therefore a more positive engagement with stakeholders.

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<sup>111</sup> Personal correspondence with BTMA (March 2020)



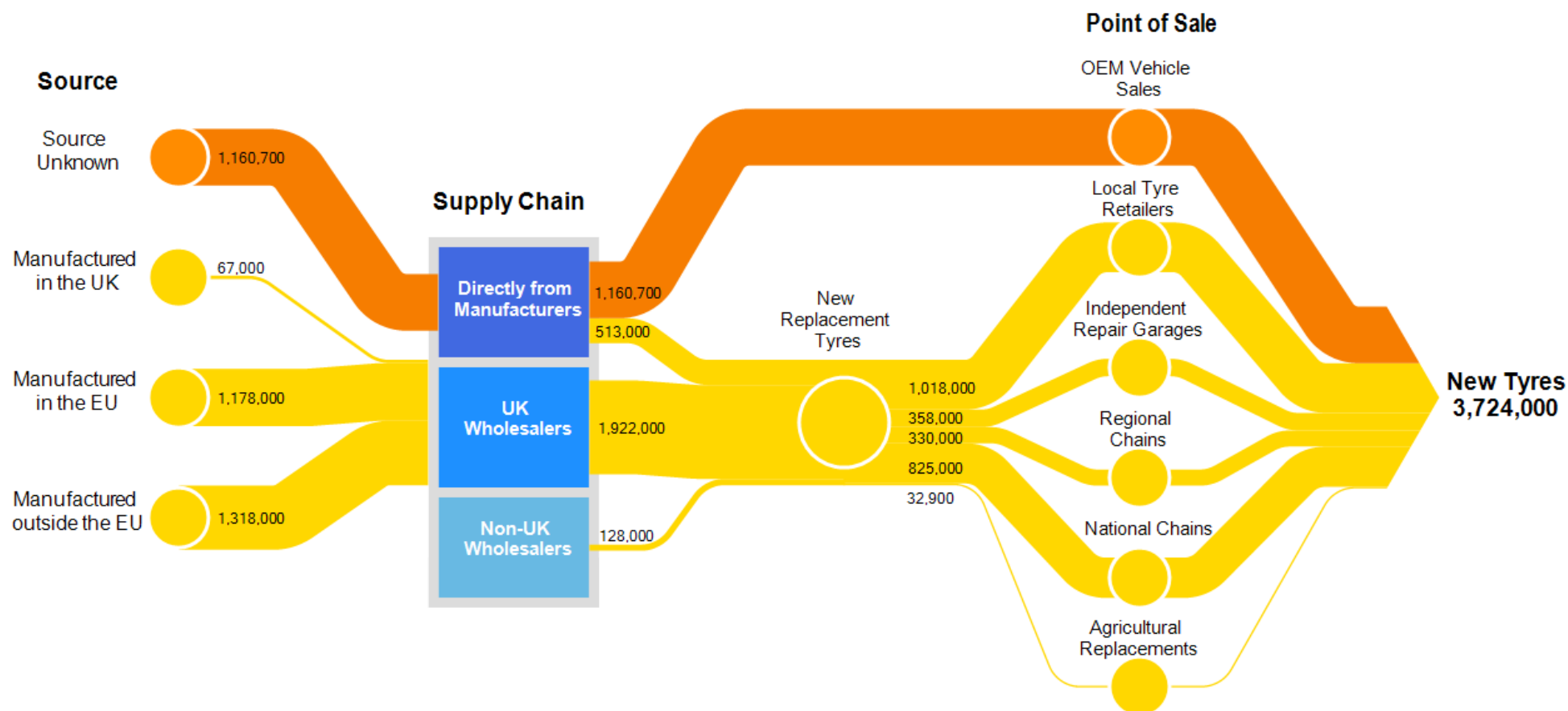


Figure 7-1. PoM figures and route to market flows for new tyres (Number of Tyres)



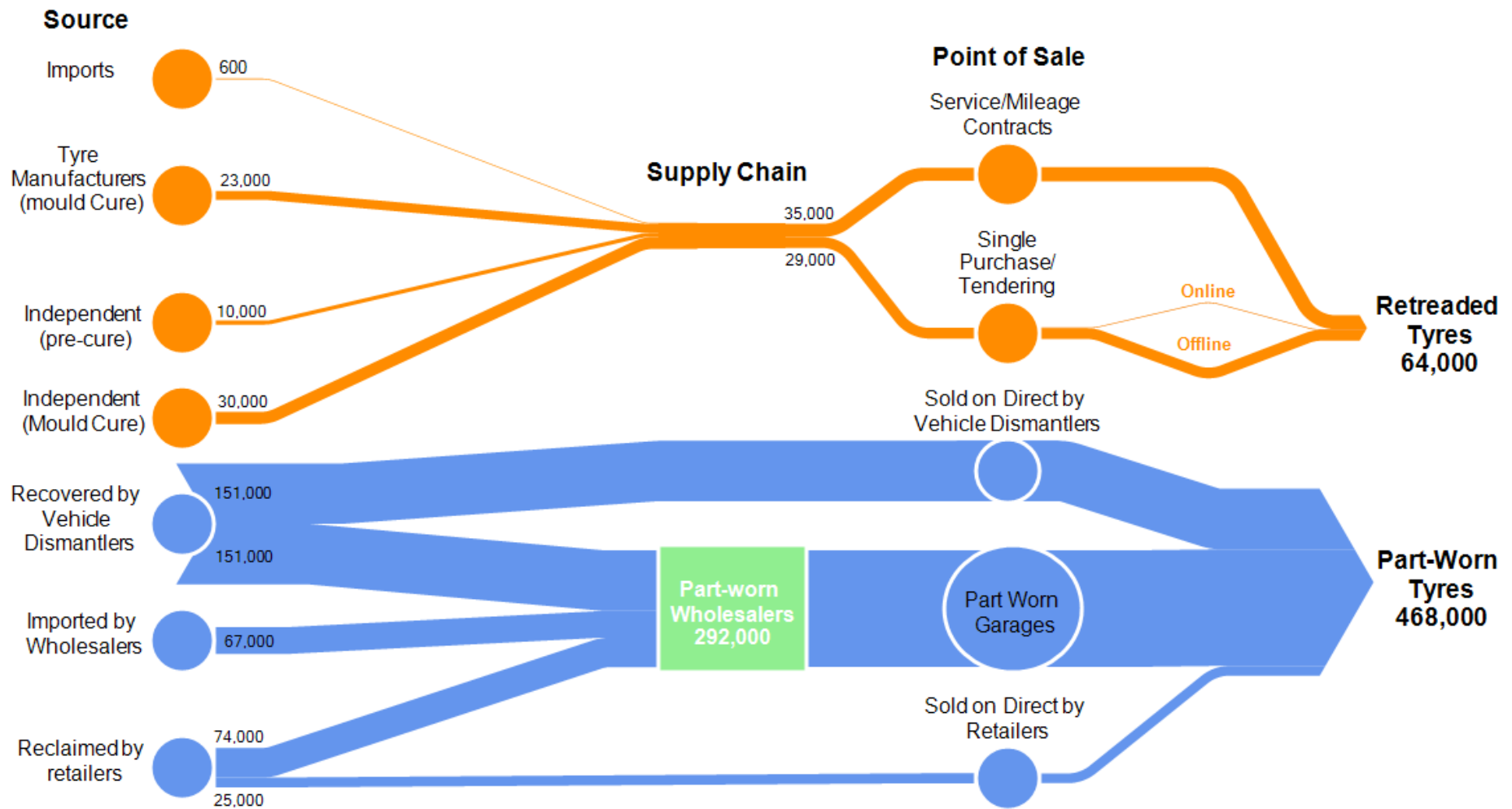


Figure 7-2. PoM figures and route to market flows for retreaded tyres and part-worn tyres (Number of Tyres)

## 7.2 End of Life Tyre Arisings, Collection and Reprocessing

As is explained in detail in section 5.1, the combination of arisings estimated based on sales, arisings at dismantlers, and those tyres rejected by importers leads to anticipated arisings of around 55,700 tonnes in 2018, and total arisings equal to around 54,300 in 2018 have been identified based on:

- Licensed Waste Site and incinerator quarterly returns for sites in Scotland, and those in England receiving tyres from Scotland;<sup>112,113</sup>
- Data provided by the BTMA on the sale of retreaded tyres, and thus expected level of capture of end of life tyres for retreading and the recovery of part-worn tyres;<sup>114</sup>
- Waste export data for Scotland provided by the SEPA Producer Compliance and Waste Shipment Unit (PCWSU) – who provided,<sup>115</sup> and
- Stakeholder engagement with a collector of CIM tyres in Scotland.<sup>116</sup>

It should be noted that when compared with the total anticipated arisings, there is a shortfall of around 1,400 tonnes or ~2.4% of total anticipated arisings. It is not known how this tonnage is being managed.

Figure 7-3 presents a Sankey diagram to visually summarise the vehicle type breakdown of arisings, collection profile, location of reprocessing and type of reprocessing for Scottish waste tyre arisings in 2018.

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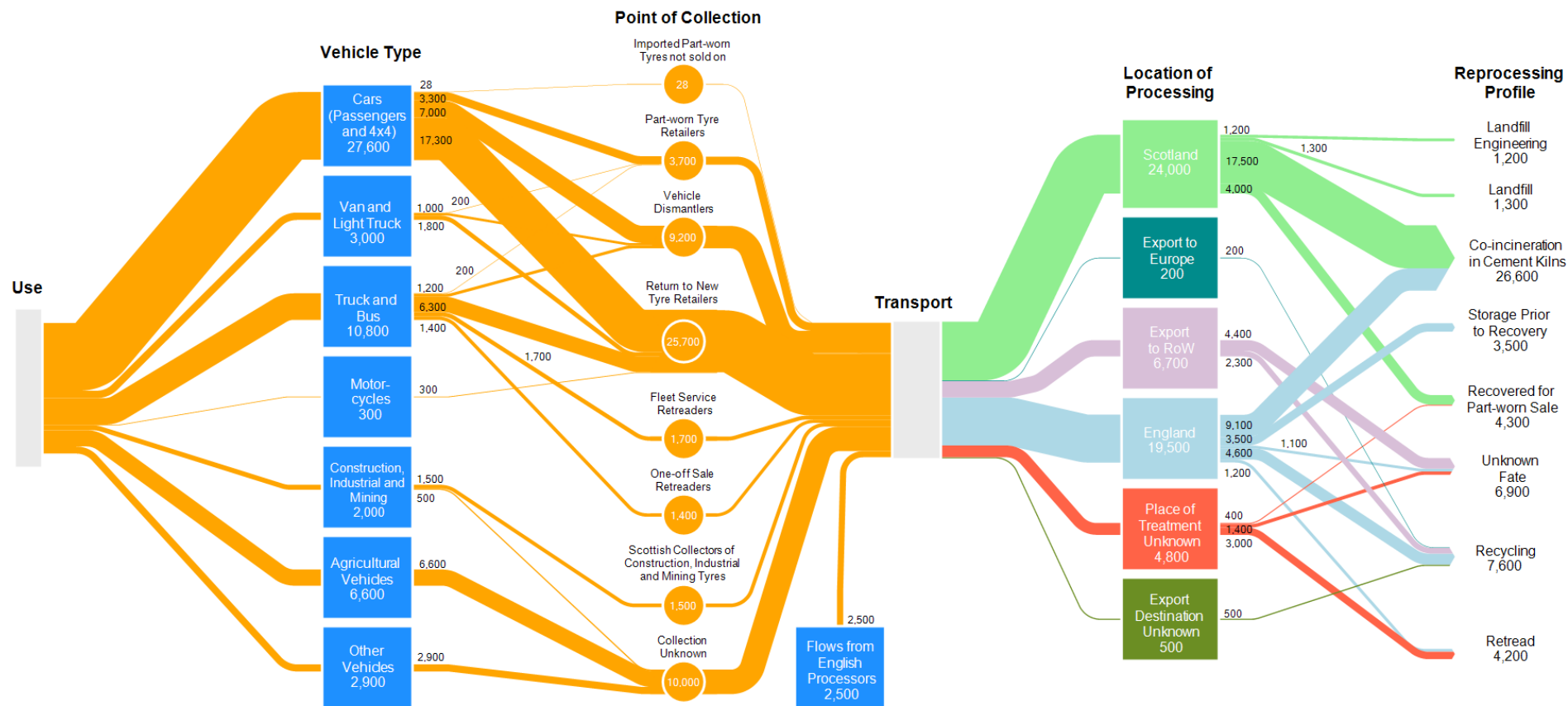
<sup>112</sup> Personal correspondence with SEPA Data Unit (March 2020)

<sup>113</sup> Agency, E. (2020) *Waste Data Interrogator 2018*, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

<sup>114</sup> Personal correspondence with BTMA (March 2020)

<sup>115</sup> Personal correspondence with SEPA Producer Compliance and Waste Shipment Unit (March 2020)

<sup>116</sup> Personal correspondence with confidential company (March 2020)



**Figure 7-3. Vehicle Type breakdown, collection profile, location of reprocessing and type of reprocessing for Scottish waste tyre arisings, 2018 (Tonnes)**

As can be seen in Figure 7-3, 27,600 tonnes of arisings, nearly half of all anticipated waste tyre arisings in Scotland by mass are those from passenger cars and 4x4s. Truck & bus tyres then make up around 18% of anticipated arisings at ~10,800 tonnes, followed by agricultural vehicle tyres at around 11% or 6,600 tonnes. However, there is a large range in the mass of agricultural tyres and uncertainty as to the indicative mass, and this should be borne in mind when comparing percentages of total arisings, as explained in greater detail in Section 5.1.1. CIM vehicle tyres contribute around 2,000 tonnes to the estimate arisings. Tyres in the “Other Vehicles” category and van & light truck tyres, and then make up around only 5% of estimated arisings each, roughly 3,000 tonnes. Motorcycle tyre arisings are estimated at around only 300 tonnes, less than 1% of arisings.

Regarding the collection of waste tyres, covered in more detail in Section 5.2, it was assumed that at the point at which a tyre is sold, an end of life tyre would arise. On this basis, as can be seen in Figure 7-3, for car, truck & bus, and van & light truck tyres the majority, around 25,700 tonnes, are collected by retailers selling new tyres, followed by vehicle dismantlers at around 9,100 tonnes. For car, van & light truck tyres, the next largest point of collection is expected to be retailers of part-worn tyres. For truck & bus tyres, after vehicle dismantlers, retailers of retreaded tyres are expected to receive around 3,100 tonnes of end of life C3 tyres each year. This is split nearly evenly between those offering service contracts, where a management company will be used to service vehicles, including replacing tyres, and those selling retreaded tyres as a one-off sale. The higher fraction of tyres collected by part-worn tyre retailers for cars, is due to a higher rate of recovery of tyres for part-worn both from new tyre retailers and from vehicle dismantlers, as outlined earlier in section 4.7.

Regarding the management of tyres at end of life, a systematic analysis across all arisings of the reprocessing of tyres by tyre type was not possible as Licensed Waste Site and incinerator quarterly returns do not distinguish tonnages processed by tyre type. Conclusions have been drawn about how particular tyre types are being managed where possible.

As is displayed in Figure 7-3 the largest fraction of end of life tyres arisings in Scotland is sent to co-incineration in cement kilns, equal to 26,600 tonnes and ~48% of waste tyre arisings. Co-incineration is largely taking place in Scotland at the Tarmac Dunbar site, with smaller volumes being incinerated by Lafarge Caudon Limited and at unknown sites in England. This data is derived from Licensed Waste Site data and incinerator returns for Scotland and England where the origin of incinerated wastes is reported and so there is a high level of certainty in these tonnages. Other operators reporting year-long stockpiling of tyres may also be sending their outputs ultimately to co-incineration in cement kilns on the basis of the fates recorded for material they send off site in their licensed waste returns.<sup>117</sup>

After co-incineration in cement kilns, recycling is the next most common fate to which 7,600 tonnes of tyres arising in Scotland is sent, equal to around 14% of total arisings. Around 4,500 tonnes of this is carried out in England and the remaining 3,000 tonnes are exported to India. Of the fraction being recycled in England, two operators process around 84% between them, with the main activity being shredding and granulation for new products including rubber mulch and crumb for playground surfaces, formulated sports surfaces and polymeric infill materials for artificial pitches. In addition, one Scottish operator recycled around 1,200 tonnes in 2018, equal to around 2% of total arisings, to create PAS108 bales for use in engineering purposes on landfill sites. This quantity fluctuates significantly year on year depending on own demand, and it is anticipated that demand for bales will reduce as a result of the forthcoming Scottish Landfill ban.

Regarding export for recycling, 3,000 tonnes of tyres were reported as being exported from Scotland via two exporters, with a reported fate of recycling in form of a range of products including tyre bales, rubber powder, shredded tyres and rubber crumb. This data is derived from Licensed Waste Site data for Scotland and England, with geographic origin and destination facility recorded for tonnages sent off site, and so there is a high level of certainty in these tonnages.

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<sup>117</sup> Environment Agency, E. (2020) Waste Data Interrogator 2018, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

An additional ~4,400 tonnes of tyres, equal to around 7% of total arisings, were exported to India in 2018 but their fate is unknown as only anonymised data could be provided. As is explained in greater detail in Section 5.3.8, Indian authorities have been asked by Defra whether they are comfortable with the fate that material reportedly exported for recycling is meeting. NGOs have raised concerns about the environmental credentials of operators of pyrolysis plants in India to which much of India's imports of waste tyres are sent when, we have heard anecdotally, that they may be reported as being sent for recycling.<sup>118,119</sup>

It is estimated that in 2018, around 4,300 tonnes of tyres were recovered for part-worn sale, equal to around 8% of total arisings. Tyres that have been removed by vehicle dismantlers or when fitting a replacement-new tyre are classed as waste. Those that are assessed as suitable for sale as part-worn tyres by conforming to the necessary requirements, meet end of waste criteria and can be reused. Sales of part-worn car tyres vastly outnumber those for vans & light trucks or trucks and buses. This is due to a higher rate of recovery of tyres for part-worn from vehicle dismantlers for cars, as outlined earlier in section 4.7. In addition, one operator estimates that they collect around 3,000 CIM tyres from Scotland a year, equal to around 1,500 tonnes (~2% of total arisings).<sup>120</sup> Of these they estimate that they send around a quarter, 375 tonnes, for repair for reuse as part-worn tyres. However, they could not provide details of whether the preparation for reuse occurs in the UK or abroad.

Around ~3,000 tonnes of waste truck & bus tyres, representing around 6% of total arisings are estimated to have been sent for retreading in 2018. This figure is derived from retread sales for the UK supplied by the BTMA and scaled to Scotland. Two retreaders report receiving tonnages direct from Scotland equal to around 56% of this total at 431 tonnes and 869 tonnes, respectively. It is not known where the remaining 1,600 tonnes of retreaded truck & bus tyre are being carried out. An additional ~1,100 tonnes of CIM tyres are estimated to be retreaded on the basis of an estimate from a collector of such tyres in Scotland and the fraction they send for retreading, however they could not provide details of where these retreads occur (either in the UK or abroad).<sup>121</sup>

Around 1,300 tonnes of tyres arising in Scotland, equal to around 2% of total arisings, were recorded in Licensed Waste Site data returns as being sent to landfill within Scotland. The only tyres that are still permitted to be landfilled are those over 1.4m in diameter – these are tyres such as earthmover tyres from mining and aggregates industry. Based on SEPA Licensed Waste Site data<sup>122</sup> of the 1,300 tonnes reported as landfilled; 920 were reported as being tyres larger than 1.4m in diameter; and the remaining 380 tonnes were simply recorded as “Tyres”, and so no absolute conclusion can be drawn as to whether all tyres being landfilled are being sent there legally.

As is explained in greater detail in Section 5.3.5, around 3,500 tonnes, or roughly 6% of total arisings were reported as “stored prior to recovery” in 2018. The vast majority of these are managed by two organisations, TRS Tyres Ltd and Velco Tyre Management Ltd. Both organisations were approached to seek information on the split of the fate of material they store but at the time of writing, no response had been received.

Finally, in total there are around 6,900 tonnes of tyres for which a fate could not be assigned, equal to around 12% of total arisings. The contribution of the 4,400 of tyres exported from Scotland within an unknown fate has already been discussed above.

## 7.3 Opportunities for increasing the circularity of the Scottish Tyre Market

Reflecting on the above summary of fates that have been met by tyres arisings in Scotland has revealed that the most common fate for waste tyres arisings in Scotland is co-incineration in cement kilns, with recycling to produce new products trailing some way behind. Additionally, it should be noted that the uncertainty as to whether the recycling fates reported are an accurate reflection of what is occurring

<sup>118</sup> Personal correspondence with Defra (April 2020)

<sup>119</sup> <https://www.tyreandrubberrecycling.com/latest-news/posts/2019/september/indian-ban-imminent>. Accessed April 2020

<sup>120</sup> Personal correspondence with confidential company (March 2020)

<sup>121</sup> *ibid.*

<sup>122</sup> Personal correspondence with SEPA Data Unit (March 2020)

once material is exported also casts doubt on total tonnage of recycling reported for Scottish waste tyre arisings. While there are clearly benefits to using tyres as substitute fuel in cement kilns from the fossil fuels and iron displaced, from the perspective of the waste hierarchy it would be desirable to direct more material towards recycling, reuse and indeed to pursue means of reducing the generation of waste tyres.

It appears that retreading is only being used meaningfully for truck & bus tyres, and represents a relatively small portion of total arisings at around 8%. However, there is some uncertainty around the quantity of larger sizes including agricultural, CIM vehicle tyres that are being retreaded, which may increase the fraction of arisings going to retread. As was noted in section 4.5, the existence of some demand for retreaded passenger car tyres in the UK could indicate potential for a new market for retreading of passenger cars and thus extending their life through recycling, as is currently done for truck & bus tyres. If further demand for such products could be stimulated, then this could represent a significant circular economy opportunity, given the number of new replacement car tyres sold each year.

Greater priority might also be given to reuse and as such seeking to increase the legitimate resale of part-worn tyres. The large role that dismantlers play in sourcing part-worn tyres, and the status as a regulated sector, could present an opportunity for part-worn tyres to be collected through regulated avenues, tested to ensure compliance with tyre regulations, before then entering the consumer market. This would help increase confidence in the part-worn tyre market and address safety concerns.

As was noted in Section 4.3, sales data suggests that there has been a decline in consumption of new replacement tyres and in OEM sales. It would be interesting to understand what is driving this trend, and whether it can be further promoted through interventions that reduce the overall demand for tyres, so as to reduce the generation of waste.

## 8 Technical Appendix

This appendix provides detail on the methodology used for the market assessment. It is structured as follows:

- Section 8.1 presents an assessment of the confidence in the accuracy of each modelled area of the Scottish tyre market and the data used in the analysis;
- Section 8.2 explains the timeframe used for the modelling;
- Section 8.3 presents the factors used to scale UK to Scottish figures where required;
- Section 8.4 presents average tyre weights used wherever unit conversions have been required;
- Section 8.5 presents the method used to estimate sales of tyres in Scotland by tyre type;
- Section 8.6 presents the method used to produce an estimated Collections Profile, End of Life Tyre Arisings and reprocessing profile for Scotland.

## 8.1 Model Area and Data Matrix

Table 8-1 presents an assessment of the confidence in the accuracy of each modelled area of the Scottish tyre market.

**Table 8-1. Assessment of the confidence in the accuracy of each modelled area of the Scottish tyre market.**

Modelled Area of the Scottish Tyre Market	Confidence Rating	Rationale
<b>New Replacement Sales</b>	Medium / High	<p>Data is largely modelled on the basis of;</p> <ul style="list-style-type: none"> <li>• official published statistics,</li> <li>• data provided by industry representatives who it is believed have a good overview of the relevant area of the market, or</li> <li>• industry published trade association data on their own members sales, and estimated market shares.</li> </ul> <p>For replacement sales, scaling from to UK to Scotland has been required, but this is the best available approach and data. A notable uncertainty is the size of the market for construction, industrial and Mining (CIM) and Other vehicle tyres, for which average weights could not be assigned to estimates of tonnages placed on the market due to the wide range in tyres that fall within this category, from forklift trucks to straddle-carries for transporting shipping containers, and thus there was great uncertainty as to the indicative weight. Collectively, the tonnage of tyres for which an average weight per tyre could not be assigned amounts to around 9% of total sales by mass. However, for CIM tyres at least, the impact on total sales in unit figures is anticipated to be small as these tyres are likely to weigh far more than other tyre types.</p>
<b>OEM Sales</b>	Medium / High	<p>Modelling is based on data that is entirely suitable for the required purpose and is official published statistics. This is combined with data on average number of tyres per vehicle, provided by a relevant trade association for the majority of vehicle types. Informed assumptions were made for agricultural vehicles and other vehicles.</p>
<b>Retread Sales</b>	High	<p>Retread sales relied on scaled UK data, though the data is provided by an industry representative who is believed to have a good overview of the relevant area of the market.</p>

<b>Part-worn Tyre Sales</b>	Medium	While the assumptions regarding the fraction of end of life tyres meeting legal requirement for part-worn sale at importers, dismantlers and retailers were provided by an industry representative who is believed to have a good overview of the relevant area of the market, there are uncertainties regarding the import and dismantler data used.
<b>Supply Chain/Sourcing and Route to Market information</b>	High	Data is entirely suitable for the required purpose and was provided by an industry representative who is in a position to have a good overview of the relevant area of the market.
<b>Manufacturing Location Profile</b>	Medium/Low	Though data used is derived from official published statistics, industry experts have cautioned that misdeclaration of imports undermines confidence in a split based on HM Revenue & Customs data. Industry experts provided insights to inform refinement of a manufacturing location profile, which involved an overriding assumption that a manufacturing split for the UK would be representative for Scotland.
<b>Anticipated End of Life Tyre Arisings</b>	Medium/High	The majority of the estimate of anticipated arisings draws on sales data in which there is a High level of confidence. However, the uncertainty regarding the indicative weight of agricultural tyres and dismantler data lead to a medium confidence level.
<b>Reprocessing Profile</b>	Medium / High	<p>The majority of the data used to construct the reprocessing profile is entirely suitable for the required purpose, and is based on official statistics collected by the industry regulator, operators providing data on their own operations or industry representatives who are believed to have a good overview of the relevant area of the market. Stakeholder consultation has been used to close gaps or clarify uncertainties in the fate of the majority of the material believed to be arising in Scotland.</p> <p>However, the uncertainty regarding the comprehensiveness of English cement kiln waste arisings and how exports are being treated leads to a Medium / High score.</p>



Table 8-4 presents information about the data relied upon in this market assessment, and a RAG colour-coding indicating a judgement on both the quality of the data used and the suitability of the data for the purpose it is used for. Table 8-2 and Table 8-3 provide a key for the RAG colour-coding.

**Table 8-2. Data Quality Indicator key**

<b>Data Quality Indicator</b>	<b>GREEN</b>	Data is officially published statistics, or provided by a industry representative who is believed to have a good overview of the relevant area of the market. E.g. providing data on their own operations, or at the level of the industries they represent.
	<b>AMBER</b>	There are known quality issues (e.g. missing values, step changes, or a large number of outliers) with understood gaps that has been an effort made to fill, or that is believed will have minor impact and not alter the conclusions drawn.
	<b>RED</b>	Data is uncertain. E.g. estimates or insights provided by stakeholders who it is believed have limited basis to draw judgements on the topic. The uncertainty could influence conclusions drawn.

**Table 8-3. Data Suitability Indicator Key**

<b>Data Suitability Indicator</b>	<b>GREEN</b>	Data is entirely suitable for the required purpose. i.e. statistics cover the required geography and temporal scope
	<b>AMBER</b>	Not the ideal data set for the analysis, but the best available at the time. Results will reflect the fact that it is not the ideal data set i.e. data manipulated to achieve the required geographical, temporal or market scope, or assumed to apply equally to UK and Scotland
	<b>RED</b>	There are concerns about the suitability of the data set for this application, which could negatively affect the quality and accuracy of the analysis.

**Table 8-4. Data Matrix**

Model Area	Data Item	Source / Business	Temporal Granularity	Geography	Data Suitability RAG	Data Quality RAG
<b>OEM Sales</b>	Number of New Vehicle Registrations by vehicle type	Transport Scotland <sup>123</sup>	2016-2019	Scotland	Data is entirely suitable for the required purpose i.e. statistics cover the required geography and granularity	Data is official published statistics
<b>OEM Sales</b>	Average number of tyres per vehicle, by type	Used Tyre Working Group Mass Balance <sup>124</sup>	NA	NA	Data is entirely suitable for the required purpose	Industry data provided by relevant trade association for the majority of vehicle type. Informed assumptions made for agricultural vehicles and vehicles fitted with other vehicle tyres
<b>Replacement Sales</b>	Replacement tyre sales (car, 4x4; van & light truck; and truck & bus)	Used Tyre Working Group Mass Balance <sup>125</sup>	2016-2018	UK	Scaled to Scotland using ratio of registrations	Provided by an industry representative who is believed to have a good overview of the relevant area of the market
<b>Replacement Sales</b>	Replacement Tyre Sales; Motorcycle and Agricultural vehicles	Used Tyre Working Group Mass Balance <sup>126</sup>	2018	UK	Scaled from ETRMA Member Sales to total market based on market share data for Europe. Agricultural vehicles scaled to Scotland using ratio of registrations for "other vehicles"	Industry published trade association data on their own members sales, and estimated market shares
<b>Replacement Sales</b>	Replacement Tyre Sales; Construction, Industrial and Mining	HM Revenue & Customs <sup>127</sup>	2018	UK	Scaled to Scotland using ratio of registrations	Data is official published statistics, however BTMA advise caution when reviewing trade as misdeclaration of used tyres as new is common

<sup>123</sup> Transport Scotland (2020) Scottish Transport Statistics No. 38 2019 Edition

<sup>124</sup> UK Used Tyre Working Group (2018) Draft UK Used Tyre Mass Balance 2018 (Unpublished)

<sup>125</sup> UK Used Tyre Working Group (2018) Draft UK Used Tyre Mass Balance 2018 (Unpublished)

<sup>126</sup> UK Used Tyre Working Group (2018) Draft UK Used Tyre Mass Balance 2018 (Unpublished)

<sup>127</sup> HM Revenue and Customs *HM Revenue & Customs - UK Trade Info - Data by Commodity Code*, accessed 22 April 2020, <https://www.uktradeinfo.com/Statistics/BuildYourOwnTables/Pages/Home.aspx>

Model Area	Data Item	Source / Business	Temporal Granularity	Geography	Data Suitability RAG	Data Quality RAG
<b>Retreaded Tyre Sales</b>	Sale of retreaded tyres for buses and trucks	Used Tyre Working Group Mass Balance	2018	UK	Scaled to Scotland using ratio of registrations	Provided by industry representative who is believed to have a good overview of the relevant area of the market
<b>Part-worn Tyre Sales</b>	Number of tyres reclaimed by Vehicle Dismantlers, by vehicle type	Used Tyre Working Group Mass Balance	2016-2017	UK	Scaled to 2018 on the basis of 2016-2017 growth, and to Scotland using ratio of registrations	Defra noted that the dismantler data they receive is incomplete requiring them to undertake some gap-filling but have confidence that it is a good order of magnitude estimate of arisings
<b>Part-worn Tyre Sales</b>	Number of Tyres imported by used tyre wholesalers (Used pneumatic tyres of rubber imported)	HM Revenue & Customs <sup>128</sup>	2016-2019	UK	Scaled to Scotland using ratio of registrations. 2017 additional tonnage import figure resulting from misdeclaration used as 2018 estimate was not available	UTWG believe that HMRC figures for the import of used tyres are likely be an underestimate due to intentional misreporting. As such an additional industry-estimated tonnage is added to imports
<b>Part-worn Tyres Sales</b>	Fraction of end of life tyres meeting legal requirement for part-worn sale at importers, dismantlers and retailers	UTWG Mass Balance	NA	UK	Data is entirely suitable for the required purpose	Provided by an industry representative who is believed to have a good overview of the relevant area of the market
<b>Route to Market</b>	Profile of new replacement tyres sold across route to market	Tyre Industry Federation Factbook, checked and updated with BTMA <sup>129</sup>	2014	UK/Scotland	Data is entirely suitable for the required purpose	Provided by an industry representative who is believed to have a good overview of the relevant area of the market
<b>Route to Market</b>	Part-worn tyres and retreaded tyres	Consultation with BTMA	2018	UK/Scotland	Data is entirely suitable for the required purpose	Provided by an industry representative who is believed to have a good overview of the relevant area of the market

<sup>128</sup> HM Revenue and Customs *HM Revenue & Customs - UK Trade Info - Data by Commodity Code*, accessed 22 April 2020, <https://www.uktradeinfo.com/Statistics/BuildYourOwnTables/Pages/Home.aspx>

<sup>129</sup> Tyre Industry Federation (2014) Factbook - A guide to the UK tyre industry from manufacture to end of life reprocessing

Model Area	Data Item	Source / Business	Temporal Granularity	Geography	Data Suitability RAG	Data Quality RAG
<b>Location of Manufacturing Profile</b>	UK Manufacturers' Sales by Product Survey data. UK tyre manufacturing figures by tyre type	Office for National Statistics <sup>130</sup>	2018	UK	Assumed also applicable for Scotland based on guidance from BTMA	Data is official published statistics, though with sales for multiple tyre types suppressed. However, industry advised that these production volumes are low
<b>Location of Manufacturing Profile</b>	UK Trade Info - Data by Commodity Code – Imports by tyre type	HM Revenue & Customs <sup>131</sup>	2018	UK	Assumed also applicable for Scotland based on guidance from BTMA	Data is official published statistics, however BTMA advised caution in interpreting a split based on HMRC data as misdeclaration of imported part-worn tyres as new is common
<b>Unit Conversions</b>	Average weights of tyres used for unit conversions - car, 4X4, motorcycle, van & light truck, truck & bus	Used Tyre Working Group Mass Balance <sup>132</sup>	NA	NA	Data is entirely suitable for the required purpose	Provided by an industry representative who is believed to have a good overview of the relevant area of the market
<b>Unit Conversions</b>	Average weights of tyres used for unit conversions - Motorcycle	BTMA <sup>133</sup>	NA	NA	Data is entirely suitable for the required purpose	Provided by an industry representative who is believed to have a good overview of the relevant area of the market
<b>Unit Conversions</b>	Average weights of tyres used for unit conversions - Agricultural Tyres	Stakeholder engagement previously undertaken by ZWS	NA	NA	Data is entirely suitable for the required purpose. Though a midpoint in a range has been used	Derived from relevant literature
<b>Collection Profile</b>	Tyre Arisings at HWRCs/Civic Amenity Sites	SEPA Data Unit Licensed/permitted waste quarterly returns <sup>134</sup>	2018	Scotland	Data is entirely suitable for the required purpose	Data is official published statistics

<sup>130</sup> Office for National Statistics (2019) UK Manufacturers' Sales by Product Survey (Prodcum)

<sup>131</sup> HM Revenue and Customs *HM Revenue & Customs - UK Trade Info - Data by Commodity Code*, accessed 22 April 2020, <https://www.uktradeinfo.com/Statistics/BuildYourOwnTables/Pages/Home.aspx>

<sup>132</sup> UK Used Tyre Working Group (2018) Draft UK Used Tyre Mass Balance 2018 (Unpublished)

<sup>133</sup> Personal correspondence with BTMA (March 2020)

<sup>134</sup> Personal correspondence with SEPA Data Unit (March 2020)

Model Area	Data Item	Source / Business	Temporal Granularity	Geography	Data Suitability RAG	Data Quality RAG
<b>Collection Profile</b>	Split of collection routes for construction, industrial and mining tyres	Confidential tyre collection operator <sup>135</sup>	2018	Scotland	Not the ideal data set for the analysis, but the best available at the time	Overview of market provided by only one collection company, which could not be verified with other retailers or collectors
<b>End of Life Tyre Arisings and Reprocessing Profile</b>	Tonnage of tyres received at English licensed waste management and their fate	Environment Agency Waste Data Interrogator 2018 <sup>136</sup>	2018	England	Data is entirely suitable for the required purpose. i.e. statistics cover the required geography and temporal scope	Data is official published statistics. However, it seems that site operators are not interpreting them correctly, as fates have been reported for materials which could not be met on site
<b>End of Life Tyre Arisings and Reprocessing Profile</b>	Tyres received at and removed from Scottish Licensed Waste Management Sites and their fate, and destination facility, including exporters	Bespoke database of permitted/ Licensed Waste Site returns <sup>137</sup>	2016-2019	Scotland	Data is entirely suitable for the required purpose. i.e. statistics cover the required geography and temporal scope	Data is official statistics collected by the industry regulator
<b>End of Life Tyre Arisings and Reprocessing Profile</b>	Tyres received at English Waste Incinerators	Environment Agency Waste Incinerator Returns <sup>138</sup>	2018	England	Data is entirely suitable for the required purpose. i.e. statistics cover the required geography and temporal scope	Data is statistics collected by the industry regulator. However, incineration facilities were previously permitted under the requirements of the Integrated Pollution Prevention and Control Directive and were not required to submit waste returns. Not all facilities have had their permits updated requiring reporting. The Environment Agency does not provide any estimate of the level of underestimate this might present in the

<sup>135</sup> Personal correspondence with confidential company (March 2020)

<sup>136</sup> Environment Agency, E. (2020) Waste Data Interrogator 2018, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

<sup>137</sup> Personal correspondence with SEPA Data Unit (March 2020)

<sup>138</sup> Environment Agency, E. (2020) Waste Data Interrogator 2018, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

Model Area	Data Item	Source / Business	Temporal Granularity	Geography	Data Suitability RAG	Data Quality RAG
						metadata accompanying the incinerator waste returns
<b>End of Life Tyre Arisings and Reprocessing Profile</b>	Number/Tonnage of construction, industrial and mining tyres treated by confidential tyre collection operator and fate (retreading and repair for part-worn use)	Confidential tyre collection operator <sup>139</sup>	2018	Scotland	Not the ideal data set for the analysis, but the best available at the time. Potential double-count of export data and retreaded figures	Operator providing data on their own operations
<b>Exports - End of Life Tyre Arisings and Reprocessing Profile</b>	Tonnages of end of life tyres exported from Scotland by year and country of destination	SEPA Producer Compliance and Waste Shipment Unit (PCWSU) <sup>140</sup>	2018	Scotland	Data is entirely suitable for the required purpose. i.e. statistics cover the required geography and temporal scope	Data is official statistics collected by the industry regulator

<sup>139</sup> Personal correspondence with confidential company (March 2020)

<sup>140</sup> Personal correspondence with SEPA Producer Compliance and Waste Shipment Unit (March 2020)

## 8.2 A note on the timeframe of modelling

In an effort to capture potential inter-annual variation in the nature of tyre sales and end-of-life management in Scotland, data covering 2016-2019 was sought for:

- Tyres sales in Scotland by type including vehicle type, and retreaded / part-worn and new;
- Route to market information including the split of total sales placed on the market by organisation type and tyre type, and the sourcing routes/supply chains for these tyres;
- The split of manufactures and their location for tyres placed on the market in Scotland;
- Records of the tyres collected and managed by waste management sites by operator, management method, tonnage of tyres processed, end products produced, tyre type, and location of any further processing;
- The quantity of tyres exported from Scotland, including fate and identities of exporters; and
- Financial costs incurred by operators across distribution, retail, collection, processing and disposing of waste tyres.

While Original Equipment Manufacturers (OEM) sales could be derived for 2016-2019, replacement sales data was only available for 2016-2018, and then not for all vehicle types as UK tyre industry representatives have yet to compile statistics beyond this timeframe.

Regarding the end of life management of tyres arising in Scotland, Licensed Waste Site data including for those receiving tyres in England, including from Scotland, is published by the Environment Agency for 2016-2018. However, until September 2016, the Waste Management Licensing (Scotland) Regulations included an exemption for tyres such that there was no requirement for those processing tyres in Scotland to report on the tonnages of waste they stored and processed on site, or sent off site. As such, data on tyres processed in Scotland is only available for 2017-2019.<sup>141</sup>

One impact of this is that sufficient data to build a comprehensive profile of the tyre market in Scotland is only available for 2017 and 2018. However, SEPA's Data Unit who manage the licensed site returns data believe it is likely that there will have been a lag between the time that sites, which operated under exemptions, ceased operations (on 30 September 2016) and those waste tyres which they held actually being removed from these sites.<sup>142</sup> As a result, 2017 arisings may have been distorted such that arisings would initially have been lower – through non-reporting, and in the following year possibly inflated, as those tyres were moved to legitimate sites.<sup>143</sup>

In light of the availability and reliability of data across sales and end of life management, a complete mass flow has been produced for 2018 only. This analysis therefore represents a “snap shot” of the tyres sector at that time. It is acknowledged that there have been a number of market changes in the years since 2018, including changes related to the input of waste tyres to cement kilns, and the role of exports to India as a destination for tyres arising in Scotland. These are discussed qualitatively where information was available to assess their impact.

## 8.3 Scaling of UK to Scottish Figures

Wherever figures have needed to be scaled from UK to Scotland, a ratio of Scottish total vehicle registrations by vehicle type to UK registration has been used, as detailed in Table 8-5 on the basis of UK vehicle registrations by vehicle type was derived from the ONS Vehicle Licensing Statistics<sup>144</sup> and those used in Scotland are published by Transport Scotland.<sup>145</sup>

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<sup>141</sup> Personal correspondence with SEPA Data Unit (March 2020)

<sup>142</sup> Personal communication with the SEPA Data Unit, March 2020

<sup>143</sup> Personal communication with the SEPA Data Unit, March 2020

<sup>144</sup> *Vehicle licensing statistics: 2018*, accessed 22 April 2020, <https://www.gov.uk/government/statistics/vehicle-licensing-statistics-2018>

<sup>145</sup> Transport Scotland (2020) Scottish Transport Statistics No. 38 2019 Edition

**Table 8-5. Total vehicle registration in the UK and Scotland (Thousands) by vehicle type and resulting factor used for scaling**

	2016	2017	2018
<b>Total UK Registrations</b>			
<b>Cars</b>	31,792	32,160	32,493
<b>Motorcycles</b>	1,270	1,256	1,265
<b>LCV</b>	3,890	4,011	4,128
<b>HGV</b>	517	523	525
<b>Buses and Coaches</b>	167	164	161
<b>Other vehicles</b>	752	779	794
<b>Total Scottish Registrations</b>			
<b>Cars</b>	2,437	2,466	2,489
<b>Motorcycles</b>	70	70	71
<b>LCV</b>	283	294	298
<b>HGV</b>	38	38	37
<b>Buses and Coaches</b>	15	15	14
<b>Other vehicles</b>	76	78	81
<b>Ratio for scaling</b>			
<b>Cars</b>	7.66%	7.67%	7.66%
<b>Motorcycles</b>	5.49%	5.55%	5.58%
<b>LCV</b>	7.27%	7.32%	7.21%
<b>HGV</b>	7.36%	7.30%	7.01%
<b>Buses and Coaches</b>	8.93%	8.94%	9.03%
<b>Other vehicles</b>	10.09%	10.07%	10.21%

In some instances, it has been necessary to scale aggregated data for HGVs and buses and coaches reported for example as “truck & bus”. For this purpose, a weighted average scaling factor for these two vehicles classes was calculated on the basis of their respective representation in the vehicle fleet. The resulting scaling factor is presented in Table 8-6.



**Table 8-6. Weighted average scaling for HGVs, Buses and Coaches/Trucks and Buses**

	2016	2017	2018
<b>Weighted Average Scaling Factor</b>	7.74%	7.69%	7.48%

Wherever reference is made to scaling of figures from UK to Scotland, the scaling factors included in the tables above have been applied.

## 8.4 Average tyre weights used for unit conversions

Where conversions between the number and mass of tyres has been required, the average weights outlined in Table 8-7 have been relied upon.

Average weights for car, van & light truck, and truck & bus were derived from the Used Tyre Working Group Mass Balance which was provided by the BTMA to inform this project.<sup>146</sup> See Box 8-1 for background information on the Used Tyre Working Group and its annual mass balance.

### **Box 8-1. Used Tyre Working Group Mass Balance**

The Used Tyre Working Group is a joint Government – Industry collaborative body formed in 1995 which includes, alongside representatives from Defra;

The British Metals Recycling Association (BMRA);  
Tyre Recovery Association (TRA);  
Motor Vehicle Dismantlers Association (MVDA);  
British Tyre Manufacturers Association (BTMA); and  
National Tyre Distributors Association (NTDA).

Originally conceived as a means of demonstrating industry level compliance with the ban on the landfilling of tyres, the group publishes a Used Tyre Mass Balance each year which draws on the expertise and knowledge of the group's members and the compilation of which is managed by Defra. The BTMA was able to provide copies of the mass balance for 2016 and 2017, as well as draft elements of the 2018 balance which is not yet published which are key sources used in this assessment.

As this data is compiled by a government-industry collaboration seeking to present as accurate a picture as possible of the state of tyre sales and used tyre management in the UK, the UTWG mass balance is believed to be a best available source of relevant tyre industry information. However, where the BTMA have made us aware of particular elements of the data that they know to be uncertain this is highlighted in the relevant sections below where UTWG Mass Balance data has been relied upon

An average motorcycle weight was provided by the BTMA.<sup>147</sup>

A weighted average weight for car tyres including both passenger car tyres and 4x4s was calculated on the basis of their respective representation in the vehicle fleet, using registration data detailed in section Table 8-6.

Agricultural Tyre weights were derived from the midpoint of a range of agricultural tyre weights reported by an unpublished study for ZWS into the Scottish Tyre market of 3kg to 398kg. Although the report applied an average weight for "Other Tyres" of 70kg, of which agricultural tyres would have

<sup>146</sup> UK Used Tyre Working Group (2018) UK Used Tyre Mass Balance 2017

<sup>147</sup> Personal Correspondence with the BTMA (April, 2020)

made up a part, the derivation of this figure was not described. We have limited confidence in this indicative weight as we were not able to sense check it with a relevant industry representative. This should be borne in mind when reviewing the total tonnage anticipated arisings of agricultural tyres, outlined in Section 8.6.

**Table 8-7. Average Tyres weights applied in this assessment**

Vehicle/Tyre Type	Mass per Tyre (kg)	Source
Car (Passenger and 4x4)	7.8	Calculation of weighted average based on vehicle fleet
Passenger Car (excl. 4x4)	7.1	UTWG
4x4	13.7	UTWG
Motorcycles	7.1	BTMA
Van & Light Truck	10.9	UTWG
Truck & Bus	49.0	UTWG
Agricultural Vehicles	201.8	Past stakeholder engagement by ZWS

## 8.5 Sales Profile

### 8.5.1 Sales of new tyres on new vehicles by Original Equipment Manufacturers (OEMs)

To estimate the sale of new tyres onto new vehicles via OEMs, data on new registrations published by Transport Scotland<sup>148</sup> was used (presented in Table 8-8).

**Table 8-8. New Vehicle Registration Data for Scotland by Vehicle Type**

	2016	2017	2018
<b>Passenger Car (excl. 4x4)</b>	199,887	181,852	167,133
<b>4x4</b>	22,222	22,172	20,377
<b>Motorcycles</b>	6,946	6,277	6,386
<b>LCV</b>	29,382	28,385	28,126
<b>HGV</b>	4,894	4,240	4,098

<sup>148</sup> Transport Scotland (2020) Scottish Transport Statistics No. 38 2019 Edition

<b>Bus and Coach</b>	877	703	702
<b>Agricultural Vehicles</b>	2,774	2,882	2,965
<b>Other vehicles</b>	2,690	2,942	2,956

These new vehicle registration data were multiplied by an assumption as to the average number of tyres per vehicle, presented in Table 8-9.

**Table 8-9. Number of Tyres per Vehicle by type**

Vehicle Type	Number of Tyres	Source
<b>Passenger Car (incl. 4x4)</b>	5.0	Used Tyre Working Group Mass Balance
<b>Motorcycles</b>	2.0	Eunomia Assumption
<b>LCV</b>	5.2	Used Tyre Working Group Mass Balance
<b>HGV</b>	8.3	Used Tyre Working Group Mass Balance
<b>Bus and Coach</b>	8.3	Used Tyre Working Group Mass Balance
<b>Agricultural Vehicles</b>	4.0	Eunomia Assumption
<b>Other vehicles</b>	4.0	Eunomia Assumption

As is noted in the table above, a number of the assumptions as to the average number of tyres per vehicle are derived from the UTWG Mass Balance. The UTWG assume that cars are sold with a spare tyre. Where the UTWG were unable to supply an average number of tyres per vehicle, an assumption has been made as to the likely number of tyres fitted. The “Other Vehicles” category likely includes a large number of vehicle types, some of which may be fitted with more or less than four tyres.

However, in the absence of a disaggregation of this vehicle class in the Scottish Registration data, a figure of four has been assumed.

### 8.5.2 Replacement Sales

Consultation with the NTDA revealed that Scottish-level data on replacement tyre sales would not be available as retailers would see this information as commercially sensitive,<sup>149</sup> and so an estimate of Scottish sales relied on scaling UK sales data. UK-level sales data used in the UTWG Mass Balance was provided by the BTMA<sup>150</sup> on behalf of UTWG and were scaled to Scotland on the basis of the scaling factors described in Section 8.3. The UK and scaled Scottish sales figures are presented in Table 8-10.

**Table 8-10. Summary of the derivation of replacement tyre sales**

Vehicle Type/Year	2016	2017	2018
<b>UK Sales</b>			

<sup>149</sup> Personal correspondence with the NTDA (March, 2020)

<sup>150</sup> UK Used Tyre Working Group (2018) Draft UK Used Tyre Mass Balance 2018 (Unpublished)

<b>Car</b>	27,451,074	26,430,290	25,551,292
<b>4x4</b>	2,746,519	2,872,275	3,078,839
<b>Van &amp; Light Truck</b>	2,363,666	2,334,448	2,268,010
<b>Truck &amp; Bus</b>	1,799,838	1,793,677	1,698,954
<b>Estimated Scottish Sales</b>			
<b>Car</b>	2,104,080	2,026,665	1,957,571
<b>4x4</b>	210,516	220,245	235,880
<b>Van &amp; Light Truck</b>	171,723	170,860	163,501
<b>Truck &amp; Bus</b>	139,336	138,017	127,155

UK replacement sales of Motorcycle and Agricultural Vehicle tyres published by the European Tyre and Rubber Manufacturers Association (ETRMA) for 2018 for ETRMA members<sup>151</sup> were scaled to an estimate of total UK market sales on the basis of the reported market share of ETRMA members in Europe the same year.<sup>152</sup> This introduces an element of uncertainty, as the market share of ETRMA members in Europe as a whole may not mirror their market share in the UK. However, as UK-level ETRMA market share data could not be found in the literature review, the European market share data is relied upon. These two sets of replacement sales were then scaled to Scotland based on the factors described in Section 8.3. As no specific scaling factor could be produced for agricultural tyres due to UK level registration data not disaggregating “Other Vehicles” into sub-categories. The intermediary steps in the derivation of these figures is summarised in Table 8-11.

**Table 8-11. Summary of steps in derivation of replacement motorcycle and agricultural tyre sales**

	<b>Reported UK Replacement Sales by ETRMA Members</b>	<b>ETMRA Members Market Share in Europe</b>	<b>Estimated Total UK Sales</b>	<b>Estimated Scottish Sales</b>
<b>Motorcycles</b>	655,085	79%	830,135	46,287
<b>Agricultural vehicles</b>	60,886	19%	322,521	322,521

#### 8.5.2.1 Construction, Industrial and Mining Vehicle Tyres (CIM Tyres)

Trade associations consulted were not able to provide sales data for CIM tyres. UK Manufacturers' Sales by Product Survey (Prodcom) data for 2018 data revealed that no CIM tyres are produced in the UK, and so the balance of imports and exports of CIM tyres was used to provide an estimate of total

<sup>151</sup> European Tyre and Rubber Manufacturers Association (2019) *ETRMA Members' Tyre Sales 2018: Overall stability in European tyre replacement sales*, January 2019

<sup>152</sup> European Tyre and Rubber Manufacturers Association (2019) *European Tyre and Rubber Industry Statistics No.10 2019 Edition*

sales in the UK. Import and export trade data published by HM Revenue and Customs was analysed as outlined in Table 8-12.<sup>153</sup> The tonnage exported was subtracted from imports to arrive at net imports and then scaled to Scotland using the ratio of registrations for “Other Vehicles”. It should be noted that not all CIM vehicles will be registered for road use, however we have no reason to believe that the ratio of those registered to not-registered should be different for the UK and Scotland and so in order to provide a rough estimate of the net tonnage sales in the UK, we have scaled by registrations.

**Table 8-12: Summary of steps in derivation of replacement CIM Vehicle Tyres**

Statistic	Value
UK - Imports and Arrivals (kg)	20,882,925
UK - Exports and Dispatches (kg)	1,083,601
UK - Trade Balance (kg)	19,799,324
Balance scaled to Scotland (kg)	2,021,057
Balance scaled to Scotland (Tonnes)	2,021

In consultation, the BTMA advised that assigning an average weight to CIM tyres in order to convert the net tonnage imported to a number of tyres would be extremely difficult due to the wide range in tyres that fall within this category, from forklift trucks to straddle-carries for transporting shipping containers and thus there was great uncertainty as to the indicative weight.<sup>154</sup> As such no figure for unit sales of CIM tyre sales is presented in this report.

#### 8.5.2.2 Other Vehicle Tyres

Manufacturers' Sales by Product Survey (Prodcum) data for 2018 data revealed that no tyres falling within the “Other Vehicle Tyres” commodity code categories are produced in the UK and so, as with CIM tyres, the balance of imports and exports of tyres was used to provide an estimate of total sales in the UK. Import and export trade data published by HM Revenue and Customs was analysed as outlined in Table 8-13.<sup>155</sup> The tonnage exported was subtracted from imports to arrive at net imports and then scaled to Scotland using the ratio of registrations for “Other Vehicles”. It should be noted that not all vehicles will be registered for road use, however we have no reason to believe that the ratio of those registered to not-registered should be different for the UK and Scotland and so in order to provide a rough estimate of the net tonnage sales in the UK, we have scaled by registrations.

**Table 8-13: Summary of steps in derivation of replacement Other Vehicle Tyres**

Statistic	Value
UK - Imports and Arrivals (kg)	28,988,997

<sup>153</sup> HM Revenue and Customs *HM Revenue & Customs - UK Trade Info - Data by Commodity Code*, accessed 22 April 2020, <https://www.uktradeinfo.com/Statistics/BuildYourOwnTables/Pages/Home.aspx>

<sup>154</sup> Consultation with the BTMA (May 2020)

<sup>155</sup> HM Revenue and Customs *HM Revenue & Customs - UK Trade Info - Data by Commodity Code*, accessed 22 April 2020, <https://www.uktradeinfo.com/Statistics/BuildYourOwnTables/Pages/Home.aspx>

<b>UK - Exports and Dispatches (kg)</b>	873,510
<b>UK - Trade Balance (kg)</b>	28,115,487
<b>Balance scaled to Scotland (kg)</b>	2,869,946
<b>Balance scaled to Scotland (Tonnes)</b>	2,870

Due to uncertainty as to the types of tyres that make up the “other” category, no average weight could be assigned to the net import tonnage calculated, and as such, no figure for unit sales of other vehicles tyre sales is presented in this report.

### 8.5.3 Retreaded Tyre Sales

Information on the quantity of retreaded tyres sold in Scotland was initially sought through stakeholder consultation via the TRA. However this consultation revealed that Scottish-level data on retreaded tyre sales would not be available as it would be seen as commercially sensitive by the manufacturers.<sup>156</sup> As a result, retread sales at a UK-level provided by the UTWG for 2018 for the vehicle type grouping “*Truck & Bus*,”<sup>157</sup> were scaled to Scotland on the basis of the scaling factor for trucks and buses of 7.48% as described in Section 8.3.

Although the UTWG Mass Balance only reports retread sales for trucks and buses, analysis of UK Prodcom data on manufacturers’ sales of part-worn tyres suggested that 44,000 retreaded car tyres were produced in the UK in 2018.<sup>158</sup> Consultation with the Retread Manufacturers Association (part of the BTMA)<sup>159</sup> revealed that tyre retreading is currently offered by two small firms as and when demand arises, for passenger and taxi cars. However, given the small number of retreaded car tyres produced relative to nearly 2 million replacement sales the and a lack of understanding as to whether those tyres will have been sold into Scotland, they have not been pro-rated to Scotland or included in the mass flow. The UK and scaled Scottish retread sales figures that result is presented in Table 8-14.

**Table 8-14. Steps in derivation of retread sales for Scotland**

	2016	2017	2018
<b>UK</b>			
<b>Car &amp; Van</b>	0	0	0
<b>Light Truck</b>	0	0	0
<b>Truck &amp; Bus</b>	819,544	830,373	852,062
<b>Scotland</b>			
<b>Car &amp; Van</b>	0	0	0

<sup>156</sup> Personal correspondence with the TRA (March, 2020)

<sup>157</sup> UK Used Tyre Working Group (2018) Draft UK Used Tyre Mass Balance 2018 (Unpublished)

<sup>158</sup> Office for National Statistics (2019) UK Manufacturers’ Sales by Product Survey (Prodcom)

<sup>159</sup> Personal correspondence between Eunomia and British Tyre Manufacturers Association, April 2020

<b>Light Truck</b>	0	0	0
<b>Truck &amp; Bus</b>	63,446	63,894	63,771

#### 8.5.4 Part-worn sales

Part-worn sales were derived on the basis of the method applied by the UTWG in the UK Used Tyre Mass Balance. This is based upon an understanding that part-worn tyres are sourced through three main routes:

- Tyres removed from end of life vehicle dismantlers at authorised treatment facilities;
- Imports of used tyres by used tyre wholesalers; and
- Tyres removed by retailers when selling replacement tyres.

The UTWG assume that of the end of life tyres arising or entering the country through these routes, only a certain fraction will ultimately be sold as part-worn tyres on the basis of assessment made by the relevant parties of used tyres against the requirements of the Motor Vehicle Tyres (Safety) Regulations. These assumptions are outlined in Table 8-15.

**Table 8-15. Details of assumptions for the sourcing of part-worn tyres**

	Fraction of tyres removed by vehicle dismantlers sold as part-worn	Accepted by importers for sale as part-worn	Fraction of tyres sold
<b>Car</b>	32%	95%	4%
<b>Van &amp; Light Truck</b>	16%	N/A	4%
<b>Truck &amp; Bus</b>	8%	N/A	2%

The steps in the process of estimating part-worn tyre sales by sources from Vehicle Dismantlers are outlined in Table 8-16. Vehicle Dismantler data for Scottish ATFs was requested from the DVLA but could not be provided in time for this report, as the DVLA would need to commission a scan of its records, which have to be scheduled by DVLA and prioritised alongside DVLA's own programme of work. It was unlikely that this would be possible within 9 months of the time of asking.<sup>160</sup> UK-level data for the number of vehicles dismantled compiled by Defra and included in the UTWG mass balance was only available for 2016 and 2017 as Defra has yet to fully compile the full 2018 mass balance.<sup>161</sup> More up-to-date data was sought from Defra but was not available as the time of writing as the UTWG have yet to compile their 2018 used tyre mass balance in full. In the absence of better data, the rate of growth in the number of vehicles dismantled by vehicle type between 2016 and 2017 was applied to 2018 figures. The resulting figure was then scaled to Scotland based factors detailed in section 8.3 for the following vehicle type groupings:

- Car & van;
- Light truck; and

<sup>160</sup> Personal Correspondence with UTWG/Defra (March 2020)

<sup>161</sup> UK Used Tyre Working Group (2018) UK Used Tyre Mass Balance 2017

- Truck & bus.

In consultation, Defra noted that there are some issues with the comprehensiveness of data they receive for vehicle dismantling, which requires them to undertake some gap filling. They nonetheless have confidence that it is a good order-of-magnitude estimate of dismantler arisings.

**Table 8-16. Summary of steps in derivation of Part-Worn tyre sales sources from Vehicle Dismantlers**

	2016	2017	2018
<b>UK Vehicle Dismantler Data</b>			
<b>Car</b>	7,259,795	9,212,680	Not available
<b>Van &amp; Light Truck</b>	1,212,674	1,210,247	Not available
<b>Truck &amp; Bus</b>	338,648	333,228	Not available
<b>Year-on-year rate of change</b>			
<b>Car</b>		27%	
<b>Van &amp; Light Truck</b>		0%	
<b>Truck &amp; Bus</b>		-2%	
<b>Estimated Scottish Dismantler tyre arisings</b>			
<b>Car</b>	556,451	706,425	896,453
<b>Van &amp; Light Truck</b>	88,102	88,579	88,401
<b>Truck &amp; Bus</b>	24,917	24,338	23,949
<b>Fraction of tyres removed by vehicle dismantlers sold as part-worn</b>			
<b>Car</b>		32%	
<b>Van &amp; Light Truck</b>		16%	
<b>Truck &amp; Bus</b>		8%	
<b>Estimated Scottish part-worn tyres sourced from Vehicle Dismantlers</b>			
<b>Car</b>	178,064	226,056	286,865
<b>Van &amp; Light Truck</b>	14,096	14,173	14,144
<b>Truck &amp; Bus</b>	2,018	1,971	1,940

The steps in the process of estimating part-worn tyre sales sourced from imports are outlined in Table 8-17. Imports of used tyres were not available from the UTWG for 2018. As a result, import data



published by HM Revenue and Customs (HMRC) for commodity code 40122000 (used pneumatic tyres of rubber)<sup>162</sup> was used. This total was divided into car & van and truck & bus on the basis of a split of car & van and truck & bus provided by the UTWG for 2017. The UTWG believe that HMRC figures for the import of used tyres are likely be an underestimate due to intentional misreporting of used tyres as new tyres so as to avoid the burden of additional licensing and reporting requirements and associated costs that result from cross-border movements of waste.<sup>163</sup> As a result, they estimated that an additional ~8,000 tonnes of part-worn tyres were imported to the UK in 2017.<sup>164</sup> 2018 data was unavailable, and in the absence of a better estimate, the 2017 figure is used for 2018 to arrive at a figure of ~780,000 tyres for cars & vans and ~51,000 for trucks & buses which was added to the import figures derived from HMRC data. This total was then scaled to Scotland on the basis the factors outlined in section 8.3 and converted to number of tyres on the basis of the average tyre weights. Finally, the level of recovery of part-worn tyres from imports of 95% was applied. A 0% recovery rate of part-worn tyres for truck & bus tyres is applied, as the UTWG believe that nearly all imported used truck & bus casings are retreaded in the UK but then exported for sale as part of an industrial optimisation operation, whereby manufacturers will have specific factories equipped to retread certain tyre types or sizes located around Europe. The implication of this is that some cross-border movements do not represent flows for sale in that country but for remanufacture.<sup>165</sup>

Another point to be noted is that at the time that modelling was carried out, it was understood that no van & light truck tyres were imported for part-worn use, and thus the average weight used to convert tonnage imports to number of tyres and scaling factor for converting UK imports figures to figures for Scotland related to cars. As a result, the total imports of car and van & light truck tyres will be marginally underestimated.

**Table 8-17. Summary of steps in derivation of Part-Worn tyre sales sourced from imports**

	Car and Van & Light Truck	Truck & Bus	Total
<b>UK</b>			
<b>2018 UK Used Tyre Imports according to HMRC data (Kilograms)</b>			<b>7,009,578</b>
<b>2017 UTWG Used Tyre Imports (Kilograms)</b>	1,560,000	5,066,000	<b>6,626,000</b>
<b>Estimated 2018 Used Tyre Imports (Kilograms)</b>	1,650,308	5,359,270	<b>7,009,578</b>
<b>UTWG estimate of imported of additional mis-declared Used Tyres for 2017 (Kilograms)</b>	5,540,002	2,500,000	<b>8,040,002</b>
<b>Total estimated UK imports of Used Tyres (Kilograms)</b>	<b>7,190,310</b>	<b>7,859,270</b>	<b>15,049,580</b>
<b>Scotland</b>			
<b>Weight of Average Tyre</b>	7.8	49.0	
<b>Estimated Used Tyre Imports (Number of Tyres)</b>	70,536	12,117	
<b>Recovery rate of Used Tyres from Imports</b>	95%	0%	

<sup>162</sup> HM Revenue and Customs *HM Revenue & Customs - UK Trade Info - Data by Commodity Code*, accessed 22 April 2020, <https://www.uktradeinfo.com/Statistics/BuildYourOwnTables/Pages/Home.aspx>

<sup>163</sup> Personal Correspondence with the BTMA (March 2020)

<sup>164</sup> UK Used Tyre Working Group (2018) UK Used Tyre Mass Balance 2017

<sup>165</sup> Personal correspondence with BTMA (March 2020)

Estimated Scottish Dismantler Tyre Arisings (Number of Tyres)	67,009	0	67,009
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The steps in the derivation of part-worn tyre sales sourced from reclaim by retailers is outlined in Table 8-18. Regarding the sourcing of part-worn tyres from the end of life tyres returned when retreaded and new replacement tyres sales take place, sales of these two tyre types were summed, before a factor for the rate of reclaim of part-worn tyres from replacement sales was applied. Consultation with the NTDA revealed that Scottish-level data on replacement tyre sales would not be available as retailers would see this information as commercially sensitive,<sup>166</sup> and so an estimate of Scottish sales relied on scaling UK sales data. UK-level sales data used in the UTWG Mass Balance was provided by the BTMA<sup>167</sup> on behalf of UTWG and were scaled to Scotland on the basis of the scaling factors described in Section 8.3. These were then multiplied by an assumption provided by the UTWG as to the rate of recovery of part-worn tyres by retailers.<sup>168</sup> Information on the quantity of retreaded tyres sold in Scotland was initially sought through stakeholder consultation via the TRA, however consultation revealed that Scottish-level data on retreaded tyre sales would not be available as it would be seen commercially sensitive as the manufacturers.<sup>169</sup> As a result, retread sales at a UK-level provided by the UTWG for 2018 for the vehicle type grouping “*Truck & Bus*,”<sup>170</sup> were scaled to Scotland on the basis of the scaling factor for trucks and buses of 7.48% as described in Section 8.3

**Table 8-18. Summary of steps in derivation of Part-Worn tyre sales sourced from reclaim by retailers**

	2016	2017	2018
<b>Estimated Scottish Replacement and Retread Sales</b>			
<b>Car</b>	27,451,074	26,430,290	25,551,292
<b>4x4</b>	210,516	220,245	235,880
<b>Van &amp; Light Truck</b>	171,723	170,860	163,501
<b>Truck &amp; Bus</b>	202,782	201,911	190,926
<b>Recovery rate of Used Tyres from retailers</b>			
<b>Car</b>		4%	
<b>4x4</b>		4%	
<b>Van &amp; Light Truck</b>		4%	
<b>Truck &amp; Bus</b>		2%	
<b>Estimated Scottish sourcing of Part-worn tyres from retailers</b>			
<b>Car</b>	84,163	81,067	78,303
<b>4x4</b>	8,421	8,810	9,435

<sup>166</sup> Personal correspondence with the NTDA (March, 2020)

<sup>167</sup> UK Used Tyre Working Group (2018) Draft UK Used Tyre Mass Balance 2018 (Unpublished)

<sup>168</sup> UK Used Tyre Working Group (2018) UK Used Tyre Mass Balance 2017

<sup>169</sup> Personal correspondence with the TRA (March, 2020)

<sup>170</sup> UK Used Tyre Working Group (2018) Draft UK Used Tyre Mass Balance 2018 (Unpublished)

<b>Van &amp; Light Truck</b>	6,869	6,834	6,540
<b>Truck &amp; Bus</b>	4,056	4,038	3,819

### 8.5.5 Route to Market and Sourcing/Supply Chain Splits

Information on supply chains/sourcing and routes to market for new replacement and retreaded tyres were derived initially from the Tyre Industry Federation's 2014 Industry Factbook, and then discussed with representatives from the tyre industry. The BTMA and NTDA were asked whether any changes were likely to have occurred since 2014 and whether they would expect any differences for the Scottish Market. Their belief was that no changes were likely other than online sales having risen from 10% to 15% of total sales for cars, LCVs, and motorcycles, but that online truck tyre sales would be only around 2-3%. The relevant supply chain splits for new replacement and retreaded tyres are summarised in Table 8-19 and route-to-market splits are summarised in

Table 8-20.

**Table 8-19. Summary of supply chain/sourcing splits for New Replacement and retread sales**

<b>New Replacement Sales</b>	
<b>UK Wholesalers</b>	75%
<b>Non-UK Wholesalers</b>	5%
<b>Directly from Manufacturers</b>	20%
<b>Retread Sales</b>	
<b>Tyre Manufacturers (Mould Cure)</b>	36%
<b>Independent (Mould Cure)</b>	47%
<b>Independent (Pre-cure)</b>	16%
<b>Imports</b>	1%

**Table 8-20. Summary of route to market splits for New Replacement and retread sales**

<b>New Replacement Sales</b>	
<b>Independent Repair Garages</b>	14%
<b>Local Tyre Retailers</b>	40%
<b>Regional Chains</b>	13%
<b>National Chains</b>	33%
<b>Retread Sales</b>	
<b>Service/Mileage contracts</b>	55%
<b>Single purchase/Tendering</b>	45%

Online	3%
Offline	43%

To estimate the sale of new tyres onto new vehicles via OEMs, data on new registrations published by Transport Scotland<sup>171</sup> was used (presented in Table 8-8). These new vehicle registration data were multiplied by an assumption as to the average number of tyres per vehicle, presented in Table 8-9.

The split of part-worn tyres across routes to market are presented in Table 8-21, and were provided by the BTMA who are involved in the UTWG which developed the method for estimating total part-worn sales from the various routes they are sourced, and based on this understanding provided an estimate of how these tyres find their way to their point of sale.<sup>172</sup>

**Table 8-21. Routes to Market of Part-worn Tyres**

Route to Market	Percentage of total sales
<b>Recovered by Dismantlers</b>	<b>65%</b>
Sold by Dismantlers to Part-worn wholesalers and distributed to part-worn garages	32%
Sold-on Direct by Dismantlers	32%
<b>Imported by Wholesalers and sold through part-worn garages</b>	<b>14%</b>
<b>Reclaimed by retailers</b>	<b>21%</b>
Sold-on direct by retailer	5%
Sold-on by retailer to wholesaler and distributed to part-worn garages	16%

The route to market of CIM vehicle, agricultural and “Other” vehicle tyres was sought from relevant stakeholders including Earthmover Tyre Solutions Ltd, Earthmover Tyres (Wakefield) Ltd, and T&C Site Services Ltd, and Redpath Tyres Ltd. However, no response was received which would allow a profile to be constructed. From the websites of those retailers of CIM tyres who were contacted, it appears that the majority specialise in CIM tyres and offer a national fitting service whereby they will travel to sites (e.g. mining and quarrying site) and fit the new tyres themselves.<sup>173,174,175</sup>

### 8.5.6 Manufacturing Location Profile

For new replacement tyres, manufacturing data specifically for those sold in Scotland was not available as all market data for manufacturing is gathered at the UK level only.<sup>176</sup> However, given that

<sup>171</sup> Transport Scotland (2020) Scottish Transport Statistics No. 38 2019 Edition

<sup>172</sup> Personal Correspondence with the BTMA (March 2020)

<sup>173</sup> Earthmover Tyre Solutions Ltd Services | Earth Mover Tyre Solutions, accessed 28 April 2020, <https://www.earthmovertyresolutions.co.uk/services/>

<sup>174</sup> Earthmover Tyres (Wakefield) Ltd About Us | Earthmover Tyres, accessed 28 April 2020, <https://www.earthmovertyres.com/about>

<sup>175</sup> T&C Site Services Ltd (2012) Services, accessed 28 April 2020, <https://www.tcsiteservices.co.uk/services/>

<sup>176</sup> Personal correspondence with BTMA (March 2020)

replacement tyres are freely traded within the UK, it is likely that a location of manufacture split for the UK will be broadly representative for tyres sold in Scotland according to the BTMA.<sup>177</sup>

The fraction of total tyre sales manufactured in the UK is estimated on the basis of UK Manufacturers' Sales by Product Survey (Prodcom) data for 2018.<sup>178</sup> Although it might have been possible to establish the volume of tyres exported for cars based on HMRC import data, the BTMA cautioned that HMRC car tyre export data is unreliable due to misdeclaration of imported part-worn tyres.<sup>179</sup> They provided an indicative estimate that around 80% of the car tyres manufactured in the UK are exported. As such that figure for UK manufacturing of car tyres was adjusted to reflect exports. In consultation, the BTMA also noted that nearly all retreaded C3 tyres manufactured in the UK will be sold locally.<sup>180</sup> It should however be noted that manufacturing figures for motorcycle and van and LCVs were suppressed due to there being potential disclosure of commercially sensitive information. However, the BTMA believe that manufacturing volumes in the UK of these tyre types is minimal.<sup>181</sup> The figures used in deriving UK manufacturing are displayed in Table 8-22.

**Table 8-22. Summary of UK manufacturing data for new and retreaded tyres**

Vehicle Type	Number of Tyres Manufactured
<b>Raw Manufacturing Data</b>	
<b>New Car/4x4/Racing Car</b>	9,566,693
<b>Retreaded C3 Tyres</b>	663,956
<b>Adjusted based on BTMA Consultation</b>	
<b>New Car/4x4/Racing Car</b>	1,913,339

For the split of tyres manufactured abroad and then imported, HM Revenue and Customs (HMRC) data on the import of new and retreaded tyres was relied upon.<sup>182</sup> The BTMA advised caution in interpreting a split based on HMRC data as misdeclaration of imported part-worn tyres as new is common, and as such, imports from some countries in Europe in particular might be slightly overstated.<sup>183</sup> Kilograms of tyres imported were converted to numbers of tyres on the basis of the average weights presented in Section 8.4. The resulting figures for the import of tyres from abroad in summarised in Table 8-23.

**Table 8-23. Summary of HMRC data import for tyres to the UK by type**

	EU	Non-EU
<b>Mass of Tyres (Kilograms)</b>		
<b>Passenger Car (excl. 4x4)</b>	198,146,474	273,627,546

<sup>177</sup> Personal correspondence with BTMA (March 2020)

<sup>178</sup> Office for National Statistics (2019) UK Manufacturers' Sales by Product Survey (Prodcom)

<sup>179</sup> Office for National Statistics (2019) UK Manufacturers' Sales by Product Survey (Prodcom)

<sup>180</sup> Personal correspondence with BTMA (March 2020)

<sup>181</sup> Personal correspondence with BTMA (March 2020)

<sup>182</sup> HM Revenue and Customs *HM Revenue & Customs - UK Trade Info - Data by Commodity Code*, accessed 22 April 2020, <https://www.uktradeinfo.com/Statistics/BuildYourOwnTables/Pages/Home.aspx>

<sup>183</sup> Office for National Statistics (2019) UK Manufacturers' Sales by Product Survey (Prodcom)

4x4	15,781,797	6,692,965
Motorcycles	2,894,470	1,051,130
Van & Light Truck	15,781,797	6,692,965
Truck & Bus	58,521,952	34,889,120
Agricultural vehicles	21,841,648	10,574,999
Construction, Industrial and Mining	9,434,847	11,448,078
Retreads	5,768,498	252,984
	<b>EU</b>	<b>Non-EU</b>
	<b>Number of Tyres</b>	
Passenger Car (excl. 4x4)	25,354,400	35,012,798
4x4	25,354,400	35,012,798
Motorcycles	445,303	161,712
Van & Light Truck	1,451,867	136,647
Truck & Bus	1,194,813	712,314
Agricultural vehicles	108,234	52,403
Construction, Industrial and Mining	18,870	22,896
Retreads	117,773	5,165

The numbers of tyres manufactured in the UK and imported were then used to calculate a relative split as a rough estimate of the split of manufacturing location, as displayed in Table 8-24.

**Table 8-24. Estimated Location Manufacturing Split**

	UK	EU	Non-EU
Passenger Car (excl. 4x4)	3%	41%	56%
4x4	3%	41%	56%
Motorcycles	0%	73%	27%
Van & Light Truck	0%	91%	9%
Truck & Bus	0%	63%	37%
Agricultural vehicles	0%	67%	33%

<b>Construction, Industrial and Mining</b>	0%	45%	55%
<b>Retreads</b>	84%	15%	1%

There is a discrepancy between the number of retreaded truck & bus tyres imported based on the split outlined above (around 16%), and the number estimated as imported by the Tyre Industry Federation (placed at around 1%).<sup>184</sup> It is understood that this is because a quantity of tyres will be imported and retreaded in the UK but then exported for sale as part of an industrial optimisation operation, whereby manufacturers will have specific factories equipped to retread certain tyre types or sizes located around Europe and so some cross border movements do not represent flows for sale in that country, but for remanufacture.<sup>185</sup>

## 8.6 Collection, End of Life Tyre Arisings and Reprocessing Profile

### 8.6.1 Collection Profile

The collection profile was derived on the basis of an assumption that end of life tyres will arise at any point where a sale is made and is presented in Table 8-25. Summary of collection by vehicle type. An exception to the rule that where a tyre is sold an end of life tyre will arise, is when consumers purchase winter tyres for the first time, and as such there is no related disposal of an end-of-life tyre. Regarding the sale of winter tyres, it has been reported that in 2016/2017 the most recent year for which data could be gathered, winter tyres made up 1.5% of total passenger car, 4x4 and LCV tyre sales.<sup>186</sup> Publicly available figures for C3 tyres were not found in the literature review, however, in consultation, the BTMA suggested that an even smaller proportion of C3 tyres are winter-specific as standard C3 tyres generally already have quite an 'aggressive' tread and the loading of tyres is so high that standard C3 tyres tend to grip better in snow than a standard C1 or C2 tyre.<sup>187</sup> Additionally, some sales of winter tyres will represent the replacement of winter tyres that have reached the end of life, however we were not able to gather any information on what proportion of total winter sales this would represent. As such, no adjustment is made to the expected arisings to account for sales of winter tyres. This means that the return to new tyre retailers may be slightly overstated, though only marginally.

As such the quantities arising at the following locations were derived based on sales and route to market splits according to the methodologies described for:

- Retailers selling new replacement tyres in section 8.5.2;
- Retread sales offering fleet service/mileage-based contracts in section 8.5.5;
- Retailers of retreaded tyres selling tyres on a one-off basis in section 8.5.5, and
- Part-worn Tyre Retailers in 8.5.5;

The number of tyres sold through each of these routes, and thus assumed to result in an equivalent end of life tyre being collected, were converted to tonnes based on the average weights described in section 8.4.

In addition, end of life tyres will arise at vehicle dismantling sites. The steps in the process of estimating part-worn tyre sales sources from Vehicle Dismantlers are outlined in Table 8-16. As is covered in greater detail in section 8.5.4, Vehicle Dismantler data for Scottish ATFs was requested from the DVLA but could not be provided in time for this report. UK-level data for the number of vehicles dismantled compiled by Defra and included in the UTWG mass balance was only available

<sup>184</sup> Tyre Industry Federation (2014) Factbook - A guide to the UK tyre industry from manufacture to end of life reprocessing

<sup>185</sup> Personal correspondence with BTMA (March 2020)

<sup>186</sup> GfK via Tyre Press (2017) *Long-term trend shows winter tyres receding, all-season rising in UK*, accessed 12 May 2020, <https://www.tyrepress.com/2017/08/long-term-trend-shows-winter-tyres-receding-all-season-rising-in-uk/>

<sup>187</sup> Personal correspondence with BTMA (April 2020)



for 2016 and 2017, in the absence of better data, the rate of growth in the number of vehicles dismantled by vehicle type between 2016 and 2017 was applied to 2018 figures. The resulting figure was then scaled to Scotland based factors detailed in section 8.3 for the following vehicle groupings;

- Car & van;
- Light truck; and
- Truck & bus.

It should be noted that in consultation, Defra stated that there are some issues with the comprehensiveness of data they receive for vehicle dismantling, which requires them to undertake some gap filling, they none-the-less have confidence that it is a good order-of-magnitude estimate of dismantler arisings. Additionally, dismantler data for motorcycles are not included as the UTWG were unable to provide figures. However, given that new motorcycle tyre sales by OEMs represent around only 1% of tyre sales, this is thought to be an insignificant gap.

Another point of waste arisings is the tonnage of tyres that is imported by part-worn tyre wholesalers but which is rejected for sale for part-worn use on the basis of assessment made by the relevant parties of used tyres against the requirements of the Motor Vehicle Tyres (Safety) Regulations. The UTWG estimate this to 5% of total imports, equating to around only 28 tonnes of end of life tyres are rejected by importers.

The route to market of new replacement agricultural vehicle tyres, representing around 33,000 units sales of tyres and 6,644 tonnes of tyres,<sup>188</sup> was sought from relevant stakeholders including the BTMA and Redpath Tyres. However, no response was received which would allow a profile to be constructed.

Finally, a collector of CIM tyres was able to provide insights on the recovery of CIM tyres in Scotland.<sup>189</sup> The operator collects around 1,500 tonnes of CIM tyres each year, equal to 75% of the total estimated arisings for CIM tyres. They offer a service whereby they visit and inspect tyres before agreeing to purchase and then will transport the tyres themselves. They report that they are the only collector of CIM tyres in the UK to audit tyres before making a decision to take them, and all other operators request that those with end of life CIM tyres have them collected by reproprocessors, with payment, and the potential for a disposal fee having to be paid, withheld until it can be established that the tyres received are of value.<sup>190</sup>

The operator further estimated that roughly half of all arisings of end of life tyres used in the mining and quarrying industry are unsuitable for retreading or repair for use as part-worn. They explained that most collectors of CIM tyres will not take these tyres.<sup>191</sup> As such these tyres are largely stockpiled at mining and quarrying sites and are not collected at all. As was mentioned in section 8.5.2.1, an analysis of trade data suggests that arisings of CIM tyres in Scotland are close to 2,000 tonnes. This would suggest the collector consulted is collecting around 75% of arisings in Scotland. Given the uncertainty as to whether the remaining 25% of arisings of CIM tyres are being collected, and if so, then by whom, we have decided to list this remaining tonnage as “collection unknown”.

**Table 8-25. Summary of collection by vehicle type**

Vehicle Type	Point of collection	Tonnage
Car (Passenger and 4x4)	Return to New Tyre Retailers	17,297
	Part-worn Tyre Retailers	3,280
	Vehicle Dismantlers	7,006

<sup>188</sup> Though with significant uncertainty attached to the average weight used to calculate tonnage.

<sup>189</sup> Personal correspondence with confidential company (March 2020)

<sup>190</sup> Personal correspondence with confidential company (March 2020)

<sup>191</sup> *ibid.*



	<b>Imported Part-worn Tyres not sold on</b>	<b>28</b>
<b>Truck &amp; Bus</b>	<b>Return to New Tyre Retailers</b>	<b>6,275</b>
	<b>Part-worn Tyre Retailers</b>	<b>235</b>
	<b>Vehicle Dismantlers</b>	<b>1,173</b>
	<b>One-off Sale Retreaders</b>	<b>1,406</b>
	<b>Fleet Service Retreaders</b>	<b>1,718</b>
<b>Van &amp; Light Truck</b>	<b>Return to New Tyre Retailers</b>	<b>1,795</b>
	<b>Part-worn Tyre Retailers</b>	<b>207</b>
	<b>Vehicle Dismantlers</b>	<b>961</b>
<b>Motorcycles</b>	<b>Return to New Tyre Retailers</b>	<b>301</b>
<b>Construction, Industrial and Mining</b>	<b>Scottish Construction, industrial and mining Tyres Collectors/Processors</b>	<b>1,500</b>
	<b>Collection Unknown</b>	<b>521</b>
<b>Agricultural vehicles</b>	<b>Collection Unknown</b>	<b>6,644</b>
<b>Other Vehicles</b>	<b>Collection Unknown</b>	<b>2,870</b>
<b>Total</b>		<b>53,215</b>

In addition, the SEPA Data Unit shared a database of reported arisings of end of life tyres at licensed/permitted waste management sites in Scotland on the basis of quarterly returns submitted.<sup>192</sup> This dataset included a classification of sites based upon the waste management activities that each site is authorised to carry out. This allowed for the reported tonnage arisings at Civic Amenity Sites to be identified. Based on Scottish Licensed Waste Site data, roughly 600 tonnes of tyres are taken to HWRCs each year. However, as the Licensed Waste Site data does not include any detail on the nature of these tyres, it is not possible to include them robustly within the collections profile presented above.

### 8.6.2 Anticipated Waste Arisings

In addition to the 53,215 tonnes identified in the collection profile in Section 8.6.1, as being anticipated to arise in Scotland, cross border flows from England to Scotland based on Environment Agency (EA) data for Licensed Waste Sites in England have the effect of inflating the tonnage arising at Licensed Waste Sites in Scotland beyond the volume expected to arise from vehicles registered in Scotland. These tyres could be excluded from the analysis; however, it is not known to which facilities they have been sent in Scotland and so cannot reasonably be removed from arisings identified through Scottish Licensed Waste Site data. Additionally, they may have originally arisen as waste in Scotland, crossed the border and then have been sent back to Scotland. Due to these uncertainties, they are included in

<sup>192</sup> Personal correspondence with SEPA Data Unit (March 2020)

the estimate of anticipated arisings. The total tonnage of tyres recorded as flowing from Licenced Waste Sites in England to Scotland in 2018 was 2,470 tonnes.<sup>193</sup>

As such total anticipated arisings used for comparison against the modelled waste arisings in this study are 55,685 tonnes.

### 8.6.3 Material Processed at Licensed Waste Sites in Scotland

The SEPA Data Unit provided a bespoke database of licensed waste site quarterly returns for this project which included the following key insights for individual sites:

- Waste tyre inputs to site;
- Waste tyres processed on site and the management method;
- Waste tyres disposed of on site after treatment; and
- Waste tyres sent off site, the management method understood to be taking place at the receiving site, and in most cases, the destination facility name.

In the first instance, tonnages were identified that represented final fates of waste tyres i.e. that reported a management method of 'landfilled', 'incinerated' or 'recycled to end of waste criteria', which would no longer be reported in a licensed site return form if transferred to another site. This was used to identify the tonnage of material being processed by fate. A summary of the reprocessing routes in provided in Table 8-26.

**Table 8-26. Summary of reprocessing routes in Scotland in 2018 according to Licensed Waste Site quarterly returns**

Reprocessing route	Total tonnage
Recycled to EoW Criteria	1,211
Co-incinerated in cement kilns <sup>194</sup>	17,509
Landfilled	1308

One operator was contacted to understand the nature of the recycling which it undertook. It reported that it is licensed to accept car tyres and light vehicle tyres only.<sup>195</sup> The tyres are then baled to PAS108 Standard on site for landfill engineering purposes.

### 8.6.4 Material Processed at Licensed Waste Sites in England

Licensed Waste Site data for English sites which report receiving end of life tyres from Scotland were extracted from the EA's Waste Data Interrogator.<sup>196</sup> Unlike SEPA's licensed waste site returns which includes detail of waste processed on site, the Environment Agency data contains two key variables: waste received on site, and waste removed from site, with fate of tonnage recorded both at a high level (e.g. "recovery," "recycling," "disposal") and on the basis of Recovery and Disposal (RAD) Codes as defined in the Waste Framework Directive.

Additionally, as waste outputs from site entries in Scottish Licensed Waste Site data in nearly all cases included a geographic regional destination and destination facility, it was possible to identify the English sites receiving material from Scotland that, for unknown reasons, do not report on receiving a

<sup>193</sup> Environment Agency, E. (2020) Waste Data Interrogator 2018, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

<sup>194</sup> Assumed that all tyres arising at Tarmac Dunbar are incinerated in cement kilns

<sup>195</sup> Personal correspondence with confidential waste company (March 2020)

<sup>196</sup> Environment Agency, E. (2020) *Waste Data Interrogator 2018*, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

tonnage of tyres from Scotland in English Licensed Waste Site data. It is believed that this will be due to some English sites misreporting the origin of their waste tyre inputs.

It should also be noted that the fates reported in English Waste Site data are intended to refer to the activity that the waste has undergone at the site. However, it seems that site operators are not interpreting them correctly, as fates have been reported for materials which could not be met on site e.g. co-incineration in cement kilns were reported as the fate of material arriving at tyre collection company premises. In most instances, however, it has been possible to determine whether material is likely to be meeting the fate recorded on the site identified based on analysis of the quantities and fates of waste tyres removed from sites, stakeholder consultation and review of site operator websites. Despite this, it is possible that there are some subsequent processing steps, and brokerage of material, beyond the organisations identify that means that the organisation ultimately processing material are not identified in the below profile.

A summary of Licensed Waste Sites in England reporting tonnages received from Scotland, as well as those which Scottish sites report sending waste to, the reported fate of tyre they process and the fate assigned in the mass flow with rationale is provided in Table 8-27.

**Table 8-27. Summary of licensed waste sites in England reporting tonnages received from Scotland, the reported fate and the fate assigned in the mass flow with rationale**

Operators	Tonnage received on site	Reported fate	Assigned fate	Manipulation of data and rationale
Dundee Tyres Limited	4,805	Co-incineration in Cement Kilns	Co-incineration in Cement Kilns	Licensed waste site returns for Dundee Tyres Limited for waste removed from site show that in 2018, they sent 76% of their waste tyres to English sites and 24% to Scottish sites for co-incineration in cement. Input tonnage was split on this basis with the location of cement kilns in England unknown. The fraction of material sent back to Scotland, ~1,200 was excluded from the mass flow as it is assumed to form part of the tonnage received by Tarmac at their Dunbar site as they were the only site reported co-incineration of tyres in Scotland in 2018.
Sapphire Energy Recovery Limited	1,894	Co-incineration in Cement Kilns	Co-incineration in Cement Kilns	Licensed waste site returns for Sapphire Energy Recovery Limited for waste removed from site show that in 2018, they sent 100% of their waste tyres to English sites.
Murfitts Industries Limited	1,502	Recycling	Recycling	Consultation with Murfitts Industries Ltd confirmed that they undertake recycling of their inputs. <sup>197</sup>
Confidential Waste Management Company	1,675	Recycling	Co-incineration in Cement Kilns	The operator reported in 2018 that they sent all their inputs for co-incineration in cement kilns in England of unknown name or location. <sup>198</sup>

<sup>197</sup> Personal correspondence with Murfitts Industries Ltd (March 2020)

<sup>198</sup> Personal correspondence with confidential waste management company (April 2020)

Operators	Tonnage received on site	Reported fate	Assigned fate	Manipulation of data and rationale
Tyre Renewals Limited	200	Recycling	Recycling	Review of company website suggested recycling onsite was likely, and no waste tyres were removed from their site in 2018 based on Licensed Waste Site returns
Confidential Vehicle Dismantler	90	Recycling	Unknown Fate	This site appears to be a vehicle dismantler. As it seems unlikely that they will be undertaking recycling of tyres themselves, this tonnage is listed as unknown fate.
Boynton Bros & Hallam (Ranskill) Limited	251	Recycling	Recycling	Review of company website suggested recycling onsite was likely, and no waste tyres were removed from their site in 2018 based on Licensed Waste Site returns
Confidential Tyre Collection and Disposal Company	1,718	Recycling	Recycling	Review of company website suggested recycling onsite was likely, and no waste tyres were removed from their site in 2018 based on Licensed Waste Site returns
Greenfield Properties (UK) Limited	64	Bulking and Sorting	Unknown Fate	Insufficient information online to determine likely fate and so unknown fate reported.
Statham Tyres & Co (UK) Limited	857	Bulking and Sorting	Unknown Fate	As a vague fate was reported, unknown fate was assigned. Review of company website suggests they are a truck tyre casings and casing management company. They engage in casing sales and purchasing, management including inspection and delivery, and scrap tyre clearance. As they partner with

Operators	Tonnage received on site	Reported fate	Assigned fate	Manipulation of data and rationale
				Goodyear, Dunlop and Bridgestone, it is expected that they will be supplying retread companies in the UK. <sup>199</sup>
T R S Tyres Limited	1,523	Storage Prior to Recovery	Storage Prior to Recovery	Though contacted for insight into the ultimate fate of the tyres they manage, no response was received. As such tyres are reported at stored prior to recovery. Review of company website suggests they repair and return and purchase and dispose of truck tyre casings. <sup>200</sup>
Vellco Limited	1,494	Storage Prior to Recovery	Storage Prior to Recovery	Though contacted for insight into the ultimate fate of the tyres they manage, no response was received. Review of the company website suggested revealed they are an independent casing company involved in the procurement, grading, sales, and purchases of casings. However, this was insufficient detail to provide a definite ultimate fate of material.
Confidential Waste Management Company	413	Storage Prior to Recovery	Storage Prior to Recovery	Though contacted for insight into the ultimate fate of the tyres they manage, no response was received.
Confidential Waste Management Company	23	Storage Prior to Recovery	Storage Prior to Recovery	No attempt was made to contact due to the very low tonnage handled.

<sup>199</sup> Statham Tyres Ltd *Statham Tyres Ltd*, accessed 29 April 2020, <http://www.stathamtyres.com/>

<sup>200</sup> TRS Tyres Ltd TRS TYRES LTD: Overview | LinkedIn, accessed 10 March 2020, <https://www.linkedin.com/company/trs-tyres-ltd/>

Operators	Tonnage received on site	Reported fate	Assigned fate	Manipulation of data and rationale
Confidential Tyre Recycling Company	79	Fate not stated	Unknown Fate	No attempt was made to contact due to the very low tonnage handled.

This analysis of Licensed Waste Site return data was supplemented by incinerator annual site inputs which reported receiving end of life tyres from Scotland.<sup>201</sup> It should be noted that incineration facilities were previously permitted under the requirements of the Integrated Pollution Prevention and Control Directive and were not required to submit waste returns.<sup>202</sup> Some facilities have had their permits updated and had the permit condition added. The data used is from those facilities who are required to provide waste returns, but does not include those who are not required and as such may represent an underestimate of the tyres arising in English kilns but ultimately burnt in Scotland. Unfortunately, the Environment Agency does not provide any estimate of the level of underestimate this might present in the metadata accompanying the incinerator waste returns.<sup>203</sup> The only site to report receiving tyre for co-incineration in 2018 was Lafarge Cauldron Limited who reported receiving 1,895 tonnes.

### 8.6.5 Tyres Exported

The SEPA PCWSU provided tonnages for end of life tyres exported from Scotland by year and country of destination for 2018. They were unable to provide any information on the sites sending the material for export, who was exporting the tyres nor its ultimate fate.<sup>204</sup>

The aforementioned Licensed Waste Site database provided by the SEPA Data Unit included geographic fate of material being sent from sites, disaggregated to “Europe”, “Outwith Europe” and “Outwith UK or Europe (Unknown)”<sup>205</sup> reported fate at a high level, and the destination facility to which material was being sent, including names of exporters. This represented around 3,000 tonnes of material. This tonnage was assumed to be included within the total tonnages reported by the PCWSU data, and so were subtracted to arrive at a tonnage of unknown origin, but which it is known are being exported.

It should be noted that one operator reports that it collects around 3,000 tyres from Scotland each year, equal to around 1,500 tonnes.<sup>206</sup> Of the tyres they collect, they report that around 75% are sent for retreading by one operator England, two in Europe and two in America. As such, 1,125 tonnes are recorded as retreaded in the mass flow. We not able to obtain Licensed Waste Site data from SEPA for the operator, and so could not identify the geographic destination of their exports. Additionally, the operator was unable to provide a split of the export of the tyres they collect by operator, or location. As such it is possible including this material in the mass flow creates a double count as it may overlap with the export data provided by The SEPA PCWSU. The extent of this double count should be 1,125 tonnes at most. However, the operator did not report in consultation that they export any material to India, which the PCWSU data reports was the only destination of exported end of life tyres in 2018.

### 8.6.6 Tyres Retreaded

Information on the quantity of retreaded tyres sold in Scotland was initially sought through stakeholder consultation via the TRA, however, this consultation revealed that Scottish-level data on retreaded tyre sales would not be available as it would be seen as commercially sensitive by the manufacturers.<sup>207</sup> As a result, retread sales at a UK-level provided by the UTWG for 2018 for the vehicle type grouping “truck & bus,”<sup>208</sup> were scaled to Scotland on the basis of the scaling factor for trucks and buses of 7.48% as described in Section 8.3. The UK and scaled Scottish retread sales figures that result is presented in Table 8-28.

<sup>201</sup> Environment Agency (2020) Incinerator Waste Returns 2018

<sup>202</sup> Agency, E. (2020) *Waste Data Interrogator 2018*, accessed 21 April 2020, <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

<sup>203</sup> Environment Agency (2020) Incinerator Waste Returns 2018

<sup>204</sup> Personal Correspondence with SEPA Producer Compliance and Waste Shipment Unit (March 2020)

<sup>205</sup> Destination completely unknown

<sup>206</sup> Personal correspondence with confidential company (March 2020)

<sup>207</sup> Personal correspondence with the TRA (March, 2020)

<sup>208</sup> UK Used Tyre Working Group (2018) Draft UK Used Tyre Mass Balance 2018 (Unpublished)



**Table 8-28. Steps in derivation of tyres arisings for retread in 2018**

	2016	2017	2018
<b>UK</b>			
<b>Car &amp; Van</b>	0	0	0
<b>Light Truck</b>	0	0	0
<b>Truck &amp; Bus</b>	819,544	830,373	852,062
<b>Scotland</b>			
<b>Car &amp; Van</b>	0	0	0
<b>Light Truck</b>	0	0	0
<b>Truck &amp; Bus</b>	63,446	63,894	63,771

Analysis of the EA Licensed Waste Site data for English Licensed Waste Site revealed that two retreading companies report receiving tyres from Scotland equal to around 2,200 tonnes.

One of the retread organisations we consulted reported, that of the end of life casings they receive, around 60% are suitable for retreading.<sup>209</sup> This was applied to its input tonnages of end of life casings to estimate the tonnage of end of life tyres being retreaded. The company confirmed their waste is sent to Murfiits and Conica for recycling.<sup>210</sup> Another retread company was contacted for similar insight into their rate of retreading of tyres received, but no response was received. As such an industry average provided by the BTMA of 50% was applied to estimate the tonnage of end of life tyres being retreaded. As such, it is estimated that the two organisations combined are retreading around 1,230 tonnes of tyres, and sending 939 tonnes of reject casings for recycling.

We are aware of two operators who in 2015 were retreading tyres in Scotland: Caledonian Tyres Ltd and Alba Tyre Management Ltd.<sup>211</sup> However, we were not able to obtain Licensed Waste Site data from SEPA for these operators to establish the tonnage they might be retreading and though an effort was made to contact them directly, no response was received.

### 8.6.7 Construction, Industrial and Mining (CIM) Tyres

A collector of CIM tyres was able to provide insights on the recovery of such tyres in Scotland.<sup>212</sup> This was the only source of information available regarding the management at end of life of CIM tyres.

The operator reports that it collects around 3,000 tyres from Scotland each year, equal to around 1,500 tonnes, and 75% of total estimated arisings for Scotland. Of the tyres they collect, they report that around 75% are sent for retreading and the remaining 25% are suitable for repair for reuse as part-worn. These tyres are sent for retreading and repair by one operator England, two in Europe and two in America.

As such, 1,125 tonnes are recorded as retreaded in the mass flow in an unknown location and 375 are recorded as Recovered for Part-worn sale in an unknown location.

<sup>209</sup> Personal correspondence with confidential retread operator (March, 2020)

<sup>210</sup> Personal correspondence with confidential retread operator (March 2020)

<sup>211</sup> Centre for Remanufacturing and Reuse (2015) *Circular Economy Evidence Building Programme - Remanufacturing Study*, Report for Zero Waste Scotland, 2015, [http://www.zerowastescotland.org.uk/sites/default/files/Remanufacturing%20Study%20-%20Full%20Report%20-%20March%202015\\_0.pdf](http://www.zerowastescotland.org.uk/sites/default/files/Remanufacturing%20Study%20-%20Full%20Report%20-%20March%202015_0.pdf)

<sup>212</sup> Personal correspondence with confidential company (March 2020)

It should be noted that we not able to obtain Licensed Waste Site data from SEPA for one operator that confirmed to be collecting CIM tyres, and so could not identify the geographic destination of their outputs. Additionally, this operator was unable to provide a split of the export of the tyres they collect by operator, or location. As such it is possible including this material in the mass flow creates a double count as it may overlap with the export data provided by The SEPA PCWSU or with the tyres reported as received by other retread organisations. The extent of this double count should be 1,125 tonnes at most. Regarding the possible overlap with export figures, the operator did not report in consultation that they export any material to India, which the PCWSU data reports was the only destination of exported end of life tyres in 2018.

The operator further reported that around half of CIM tyres are unsuitable for retreading or repair for use as part-worn and that most collectors of CIM tyres will not take these tyres.<sup>213</sup> As such these tyres are largely stockpiled at mining and quarrying sites, and are not collected at all. It was not possible to separate out the fraction of CIM tyres that are used for mining and quarrying, and so we could not assign a tonnage to this fate.

### 8.6.8 Part-worn Tyres

Part-worn sales were derived on the basis of the method applied by the UTWG in the UK Used Tyre Mass Balance. This is based upon an understanding that part-worn tyres are sourced through three main routes:

- Tyres removed from end of life vehicle dismantlers at authorised treatment facilities;
- Imports of used tyres by used tyre wholesalers; and
- Tyres removed by retailers when selling replacement tyres.

The UTWG assume that of the end of life tyres arising or entering the country through these routes, only a certain fraction will ultimately be sold as part-worn tyres on the basis of assessment made by the relevant parties of used tyres against the requirements of the Motor Vehicle Tyres (Safety) Regulations. These assumptions are outlined in Table 8-29

**Table 8-29. Details of assumptions for the sourcing of part-worn tyres**

	Fraction of tyres removed by vehicle dismantlers sold as part-worn	Accepted by importers for sale as part-worn	Fraction of tyres sold
<b>Car</b>	32%	95%	4%
<b>Van &amp; Light Truck</b>	16%	N/A	4%
<b>Truck &amp; bus</b>	8%	N/A	2%

The full detail of the method for estimating tyres being recovered for part-worn sale is presented in 8.5.4, and a summary of the total tonnage estimated is presented in Table 8-30.

**Table 8-30. Estimated part-worn tyre arisings in Scotland by source of arisings**

Source of Part-worn Tyre	Tonnage
<b>Car including 4x4</b>	

<sup>213</sup> Personal correspondence with confidential company (March 2020)

Reclaimed from replacement car tyre sales	612
Reclaimed from replacement 4x4 tyre sales	74
Recovered from Dismantled Vehicles	2,242
Recovered from Imports	524
<b>Car incl. 4x4 Total</b>	<b>3,451</b>
<b>Van &amp; Light truck</b>	
Reclaimed from replacement tyre sales	71
Recovered from Dismantled Vehicles	154
<b>Van &amp; Light Truck Total</b>	<b>225</b>
<b>Truck &amp; Bus</b>	
Reclaimed from replacement tyre sales	187
Recovered from Dismantled Vehicles	95
<b>Truck &amp; Bus Total</b>	<b>282</b>
<b>Total Estimated Part-worn Tyre Arisings</b>	<b>3,958</b>

Additionally, as was explained in Section 8.6.7, the only source of information available regarding the management at end of life of CIM was a collector of such tyres.<sup>214</sup> The operator reports that it collects around 1,500 tonnes from Scotland each year, equal to around 75% of total estimated arisings for Scotland. Of the tyres they collect, they report that around 25% are suitable for repair for reuse as part-worn. These tyres are sent for retreading and repair by one operator England, two in Europe and two in America. As such 375 are recorded as Recovered for Part-worn sale in an unknown location.

### 8.6.9 *Illegal Dumping and Flytipping*

Two keys sources of data were collated with the intention to assess the role of flytipping and illegal dumping as a temporary fate of end of life tyres in Scotland. These are:

- A combined extract from the FlyMapper Database and Litter Monitoring System specially provided by Zero Waste Scotland for this project;<sup>215</sup> and
- An extract from SEPA's environmental events management system for events that pertain to illegally dumped tyres.<sup>216</sup>

The following caveats should be noted in interpreting this data;

- The FlyMapper and Litter Monitoring System dataset is only partial as there is no obligation on Local Authorities to use the system and as a result not all do;
- The data in these datasets is not necessarily verified by the entity which holds the data, and
- The volumes reported are reported by the public and as such are subject to significant subjectivity as regards how many tyres they represent.

<sup>214</sup> Personal correspondence with confidential company (March 2020)

<sup>215</sup> Personal correspondence with Zero Waste Scotland (March 2020)

<sup>216</sup> Personal correspondence with SEPA National Waste Unit (March 2020)

The two datasets recorded the number of incidences by size using the same scale. The SEPA Environmental Events Management data is presented in Table 8-31, and Fly Mapper data is presented in Table 8-32.

**Table 8-31. SEPA Environmental Events Management Data - Total instances by size**

Size of Incidence	Number of Incidences
Significant multiple loads	5
Single Item	2
Small van load	6
Tipper lorry load	5
Transit van load	18
Unknown	5
<b>Total</b>	<b>41</b>

**Table 8-32. Flymapper data - Smaller Dumping activities - total incidences by size**

Size of Incidence	Number of Incidences
Car boot or less	53
Significant multiple loads	11
Single black bag	20
Single item	66
Small van load	50
Tipper lorry load	28
Transit van load	30
Unknown	0
<b>Total</b>	<b>258</b>

As regards what number or tonnage of tyres this might represent, unfortunately there are a number of issues with the raw data which prevent making an estimate of total numbers or tonnage of tyres including:

- Misunderstanding by FlyMapper and Litter Monitoring Service users of the single-item category for which counts as high as 200 tyres are then provided in the notes section but which are not used consistently;
- Significant variability in how users are interpreting the middle categories such that assigning a number to these categories would be highly subjective; and
- No distinction as to the type of tyre fly-tipped.

