

LIGHT RAIL

Safety and Standards Board



Annual Report

2021/2022



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Safety and Standards Board

Annual Report 2021/2022

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Section 1 – Chief Executive's Review

Forward

The Light Rail Safety and Standards Board (LRSSB) was formed by the UK light rail industry and UKTram in 2019 under the guidance of the Department for Transport (DfT) and the Office of Rail and Road (ORR). This was following the Rail Accident Investigation Branch (RAIB) report into the Croydon Tram Accident at Sandilands on the 9th of November 2016.

LRSSB is structured by the LRSSB Board, which consists of:

- Chief Executive Officer (CEO)
- Non-executive Chair
- Four Non-executive Directors (consisting of representation from both Operators and Owners),
- Managing Director of UKTram and
- An ORR Observer.



At Board level the year saw three new Directors identified and appointed to position. The appointments were one from within the Owners Group and two from the Operator Group.

The current management structure of LRSSB consists of a CEO, Administration Manager, Engineering Manager, Safety and Assurance Manager and Project Management function, and despite the team remaining small, it has delivered some highly significant milestones in terms of output. Our aspirations for the future and what we wish to achieve mean that growing the team will be a necessity. The intention is to recruit further posts, in safety, engineering, technical support and data analysis within the next financial year.

LRSSB also intends to offer opportunities to graduates to assist within our upcoming projects but also to hopefully learn about, and promote a career in, light rail. Supplementary internal support from UKTram colleagues has also been provided during the year. Additionally, LRSSB has been able to successfully “partner” with a number of external agencies to leverage our capacity to produce documentation and information.

The key purposes of LRSSB are to:

- Assist the light rail sector in providing a safer environment for all passengers, staff and the public;
- Share best practice and standards across the sector by maintaining a risk profile, both national and local, that alerts and informs all users;
- Invest in innovative technology through Research and Development that benefits the sector as a whole
- Produce, manage and maintain a codified standard approach to documentation, guidance and support to the sector
- Become a centre of excellence for knowledge retention and individual development
- To ensure sustainable relevance to all stakeholders
- Ensure that ORR/RAIB future recommendations are acted upon industry wide
- To collaborate with other industry safety bodies and through collaboration provide value for money to its users
- Continually drive the enhancement of safety and reduction of risk throughout the sector

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Overview

This report summarises the work undertaken by LRRSB from May 2021 until April 2022 in relation to the aspirations and objectives detailed in the LRSSB Business Plan of that year.

The continuing effects experienced throughout 2021 and into 2022 from the Covid-19 pandemic forced the introduction of a series of governmental restrictions ranging from further national lockdowns to restrictive working and travel arrangements. These restrictions remained either fully or partially in force for the entirety of the 2021/22 business planning year.

The light rail sector continues to respond to the challenges as they arise and has managed the demands of social distancing to continue to provide safe, reliable and dependable public transport.

Figure 1 below illustrates that even when considering factoring in the ongoing effects of the pandemic, light rail networks across the UK delivered an increase of 9.6% of the previous years' service, taking operated kilometres to close to 99% of pre-pandemic levels.

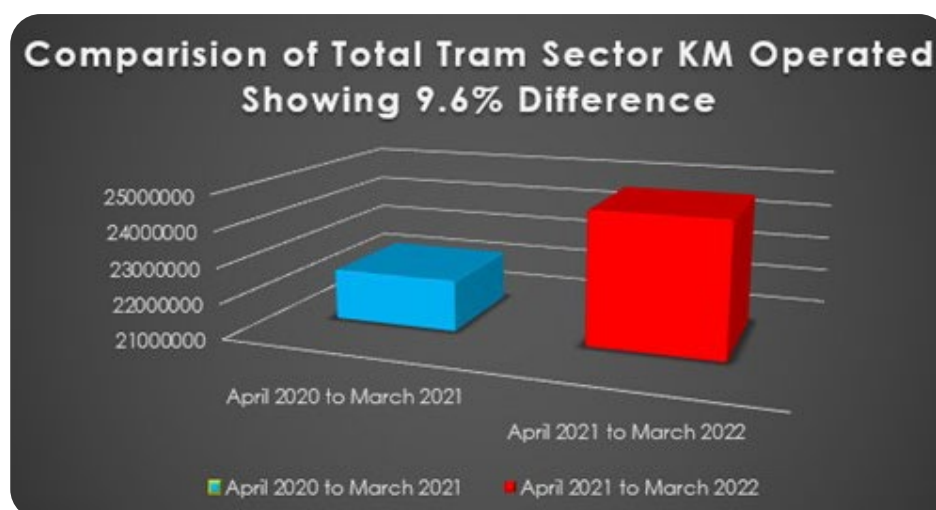


Figure 1 Comparison of Total Kms Operated

Whilst the LRSSB remained functional during this period, workload priorities and emphasis were adapted to answer the questions posed by the effects of the pandemic on the sector as well as the organisation.

An area where LRSSB had planned to focus heavily on was, the - "Digital Reference Library" - and the production of documentation to populate it. Achieving its planned targets, LRRSB has been prolific in the production of, guidance, standards, best practise, and information. The sector had identified a need for more and better documentation and LRSSB was able to respond. The full detail of documentation produced is contained within this report.

A major milestone in the year was the ORR's review of the LRSSB. It had been the intention of the original Shadow LRSSB to approach the ORR to conduct a review of the body within the third year of operation. The ORR were formally invited to conduct the review which took place between October 2021 and January 2022.

The full Findings Report can be accessed [here](#), but the main recommendations were as follows:

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Recommendation 1:

UK Tram operators, owners, and infrastructure managers should continue to support the role of a safety and standards body for the light rail sector. This body will need to have and continue to build specialism and understanding of the sector and be able to meet the specific requirements of and for the whole light rail sector

Recommendation 2:

LRSSB should review and update its terms of reference to clearly define its role and purpose. This should include how it ensures and demonstrates its independence from UKTram. LRSSB's review should consider if and how the current status of LRSSB impacts its ability to implement this report's recommendations fully.

Recommendation 3:

ORR recommends that LRSSB considers – in consultation with its members, DfT and ORR – the current model of voluntary membership and adoption of LRSSB outputs. In particular, LRSSB should consider how its successes to date, under that model, can be continued as LRSSB evolves. LRSSB should report back on its conclusions and any proposals for change.

Recommendation 4:

ORR recommends that LRSSB develops a stakeholder engagement strategy with a view to strengthening its collaboration with a broader range of stakeholders including relevant trades unions, RSSB, highway authorities and vehicle/tram manufacturers.

Recommendation 5:

ORR recommends that LRSSB – in consultation with DfT and ORR – develops a long-term strategy and plan of work. This should include the topic of health, be transparent to its members, and include the funding arrangements that will need to be secured in order to deliver that plan. It should clearly define the governance arrangements to enable delivery of the plan, including how progress against the plan is to be monitored and reported.

Recommendation 6:

ORR should take into account the findings of this review as it considers whether there is a continuing need for any MoUs or agreements in relation to light railways and tramways. This should be done in liaison with LRSSB.

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Additional to the recommendation's participants were asked to provide comment on the LRSSB. Below is a sample of some comments received:

“
LRSSB have been fundamental in support/advice and working with the industry members to establish safety standards and understand safety risk associated with light rail operations. An example being driver vigilance.

Duty Holder Respondent

“
LRSSB was shaped by industry for the industry with input from all the relevant stakeholders. It has to date achieved its objectives and continues to grow into a role that was envisaged.

Local Authority Respondent

LRSSB welcomes the report findings, recommendations and comments contained within it and LRSSB along with its partners and stakeholders, will develop a timebound response plan within the 2022/23 Business Plan.

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Throughout the year LRSSB continued to support the Sector with the production of relevant Covid 19 documentation and communicating best practice, whilst managing to remain “on track” and deliver against the timeframes set out in its Business Plan. LRSSB has also published and assisted in the production of documentation associated with the control and management of Covid-19 in liaison with UKTram and other organisations including the DfT and Public Health England.

In July of 2021 the Coroner’s Inquest into the Croydon - Sandilands accident was concluded.

In September 2021 the South London Coroner wrote to all Interested Persons involved. LRSSB were among those to whom the letter was addressed. The letter and supplementary Preventing Future Deaths Reports cited LRSSB to respond in certain areas that the Coroner had identified fell within LRSSB’s possible responsibility or influence. LRSSB responded to all the areas identified with an appropriate course of action and a time bound plan.

LRSSB continues to support research and development projects in a number of important areas in particular in technology providing obstacle detection and avoidance systems. The initial results are promising for the UK light rail sector as the technology is now being utilised in Europe. It is hoped this work will culminate in the publication of guidance documentation in 2022.

Additional initiatives invested in by LRSSB have been the TAIR – Risk Model - Bowtie – RM3 standardised platform concept and, in partnership with UK Tram, the Focus+ fatigue monitoring software.

A major cornerstone of the LRSSB business planning for 2021/22 was the “Digital Reference Library”. LRSSB has successfully continued to build on this core repository of knowledge, guidance notes and “good practice” documentation. The library is now hosted on the new LRSSB website.

During 2021/2022 the new LRSSB website has progressed its development by a dedicated working group to continue its enhancements and ongoing review. This work includes the alignment of website guidance indexes within Tramway Principles Guidance (TPG) to assist and ease of use and reference.

LRSSB has continued to significantly increase its social media presence via Twitter and LinkedIn. Support and take up of these channels are seen as essential alongside other communications activity. Newsletters are now regularly published with updates on published guidance, workstreams and upcoming issues.

LRSSB has agreed a 3-year funding allocation from the DfT, in line with expectations and has also received its annual industry subscriptions.

The monies received allow LRSSB to plan the areas and workstreams it wishes to undertake in 2022/23 and also alleviates the uncertainty surrounding funding for the short to midterm future.

Longer, more ambitious planning is now possible and better enables the ability to grow the team and the skill sets within it.

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In acknowledgement of the ORR's Review Report it remains a key objective for LRSSB to attain a guaranteed, sustainable funding mechanism so that the excellent progress made to date continues and momentum is not lost.

This is a promising sign of the commitments shown by government and is seen as an acknowledging of how relevant the LRSSB has become as the light rail sectors safety body.

LRSSB is currently producing a Business Plan for 2022/23, however, the need for funding certainty is crucial in building an industry body that is sufficiently robust in its resources, knowledge and technology to ensure that the light rail sector knows what its current and future safety risks are and is as informed and prepared as it can be.

This report details the activities, achievements, results and benefits that LRSSB has delivered for the light rail sector in the third year of operation. Furthermore, it summarises to date the work streams, areas of focus, standards and guidance developed, and how safety information collated from members, stakeholders and the industry is analysed, monitored and utilised to further improve the safety of the sector going forward.



Section 2 – Significant Achievements 2021/2022

LRSSB continued to make significant progress throughout 2021 and bring real benefits to the sector, these being recognised at the 2021 Global Light Rail Awards, where, LRSSB was awarded a “Significant Safety Initiative” award for its Risk Management Framework, also, “Technical Innovation of the Year” award for the LRSSB On-Line Reference Library.

The key areas of activities and achievements are summarised below, with more detailed information provided throughout this report.

LRSSB

LRSSB is now fully embedded within the light rail sector. The continued evolution from the embryonic LRSSB into the fabric of the industry is now a reality. LRSSB’s 2021 plans and activities in the main have been brought to fruition. Future plans are now being formulated for the 2022-2023 period.

Industry Risk Model

During the period a detailed review and gap analysis of all networks historical data was initiated in conjunction with Atkins in preparation for the forthcoming review of all individual and national risk models. In addition, LRSSB also commissioned the development of more intuitive risk model dashboards following feedback from the sector, in order to assist with the understanding and communication of the outputs from the models at all levels.

A schedule for the review of all risk models has now been produced that will be implemented during the 2022-2023 period.

Tram Accident and Incident Reporting Database Tool (TAIR)

Following ongoing consultation with the sector during the period, further updates, training, and modifications to the TAIR database have been introduced to improve the ease of data input in addition to tailoring the system to more bespoke individual organisation requirements where networks are opting to use TAIR as their primary database.

The re-review of existing individual networks historical data has been undertaken, enabling it to be accurately aligned in preparation of the forthcoming review of both individual network and national risk models during the 2022-2023 period. In addition, risk model analytics have also been integrated into the TAIR database to allow for a direct export of data into risk models, in turn enhancing the risk model review process.

Bowtie Risk Assessments

Initial global bowtie assessments associated to the national top ten hazardous events have now been developed and uploaded to the main bowtie server that has been brought online during the period. Transition of networks from their test databases to the main Bowtie server has also been undertaken.

Work continues to be progressed with Atkins and the Bowtie XP software providers to integrate the full sector risk model data into the bowtie server database.

Risk Management Maturity Model (RM3)

LRSSB has developed an RM3 audit tool, with Initial evaluation being undertaken by both the ORR and several networks from the light rail sector. Feedback is now being collated and the tool further developed. The tool will provide a standardised platform for the sector to apply RM3 in the evaluation of the maturity of their safety management systems.

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LRSSB Risk Management Framework

During the period LRSSB undertook a due diligence exercise associated to its Risk Management Framework in conjunction with representatives from Huddersfield University. Feedback received following review of the framework and its structure was overwhelmingly positive with representatives stating that that the framework is one of the best systems they had seen for providing safety information to decision-makers. This in turn provides both assurance to the LRSSB and its wider stakeholders that the organisations approach to the management of risk is optimally positioned to progressively manage the existing needs and emerging challenges of the sector.

New Standards and Guidance Published

Whilst recognising the benefits of TPG, LRSSB has been steadfast in its commitment to underpinning this with as many additional pieces of guidance and best practice documents as required. Using TPG as a “toolbox” a RAG index was produced to identify all topics which would benefit from industry specific documentation. Some 150 headings were identified and LRSSB set itself a lofty goal of producing 24 items of guidance and best practice in a 12-month period following on from that review. At the time of writing this report LRSSB is pleased to announce it is on target to achieve that objective. An index of documentation delivered in the year and a summary of the TPG working group and objectives is detailed in Section 3.

BSI

LRSSB has registered and supplied UK experts in liaison with BSI for CEN/CENELEC/ISO to attend committee meetings, standards and guidance development and to review and provide a voice on behalf of the UK light rail industry.

The table below details the committees and working groups LRSSB are engaged with:

| | | |
|---------------------------------|---|--------|
| EN17636 | Track-alignment design parameters for urban rail | WG15 |
| EN13232 | Track-Switches & crossings | DG15 |
| CEN/TC 256/SC 1 | Switches and crossings - Cast Crossings | WG19 |
| CEN 17530 | Interior Glazing | WG3&49 |
| ISO/TC 269/SC 2 | Interior passive safety | WG8 |
| CEN/TC/256/SC3 | Lighting & trackside signage | WG9 |
| CEN/TC 256/SC 2 | Coupling devices | WG33 |
| EN15152 | Windscreens for trains | |
| EN13103+13104 | Wheelsets & bogies-powered and non-powered axles | WG11 |
| EN13452 Part 1+2 | Braking-Performance requirement & methods of test | WG47 |
| prEN16186 | Driver's cab for urban rail vehicles | WG37 |
| EN 14750 | Air conditioning for urban rolling stock Comfoparameters and type tests | TBC |
| CEN TC 256 SC 1 & ISO TC269 SC1 | Rail Welding | WG4&3 |

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It is worth noting that there is a dramatic increase for experts from the Light Rail/Urban sector to attend a number of additional working Groups to the one above. The recent announcement that “All” standards will be inclusive and therefore applicable to “Urban Rail” will prompt a huge shift in the requirements to participate and help formulate these standards going forward. LRSSB are engaging with sector experts to continue support attendance of these working groups, also, LRSSB, are looking to ensure that there is sufficient document management / control ability within the organisation.

LRSSB has also become an official distributor for BSI which means it is in a position to purchase any and all relevant standards for itself and members.

Digital Reference Library

A digital reference library has been produced to house all current and future standards. The aim of this is to share information and best practice vital to continuous safety improvements across the light rail sector and our portal offers access to documents covering a broad range of relevant topics.

This library is based primarily on the Tramways Principal Guidance (TPG) and is currently split into the following categories:

- Control of Movement
- Design & Construction
- Electric Traction Systems
- Infrastructure
- Integrating the Tramway
- LRSSB Guidance Notes
- Tram stops
- Tramway Clearances
- Tramways Principals & Guidance



Section 3 – Activities in 2021/22

The LRSSB has continued to evolve and develop in 2021 even with the effects of the Covid-19 pandemic. The main focus of the LRSSB in 2021 has been

- **Safer Light Rail Sector** – By utilising the outputs from the Industry Risk Model, LRSSB has continued to manage and maintain the implemented model to better inform, both locally and nationally, where risks are emerging. By taking this information from the model and conducting Bowtie risk assessment exercises, LRSSB believe that the sector can significantly reduce the threat of real and perceived risk and in moving to a leading rather than a lagging system we have never been better placed to prevent accidents happening.
- **Sector Accident & Incident Reporting** – Development of a standardised safety reporting dashboard (driven by the Risk Model and TAIR database) to be applicable to all tramways to provide national oversight and understanding of current risk profiles and changes within the profile over time.
- **Research and Development** – The LRSSB has commissioned research relevant to its members and for the benefit of member organisations in the industry. LRSSB continued to horizon scan to better inform itself of relevant international research programmes to ensure the benefit of any lessons learned. LRSSB has also been able to partner with learning organisations such as Universities, Research facilities, Best Practice Centre etc
- **Standards and Guidance** – The LRSSB is the custodian for light rail standards and guidance for the UK. LRSSB has a three-year plan detailing the evolution of Tramways Principles and Guidance – LRG1.0, (TPG) and how it will become the reference document for the sector
- **People and Competency Management** - Oversight of Independent Competent Persons and accreditation. LRSSB has worked closely ORR to develop other sector-specific competencies, such as RM3.
- **Stakeholder Interfaces** – LRSSB now has an ongoing working relationship with government bodies/departments including DfT, ORR and RAIB as well as institutes of learning and aims to grow that stakeholder group in the year ahead.
- **Wider Global Industry** – LRSSB has actively engaged with networks and organisations from within the global industry to assist in the development, review and production of documentation that will benefit the UK sector.
- **Industry Accident & Incident report data collation and analysis** - re-review of existing individual networks historical data has been undertaken, enabling it to be accurately aligned in preparation of the forthcoming review of both individual network and national risk models.
- **Informing industry decisions and sharing best practice** - Reviewing requests from UKTram functional groups and disseminating requests for information to industry sector stakeholders.
- **Codification and development of Standards and Guidance** - Development and introduction of standardised document review process.
- **Relationship with other light rail counterparts and colleagues around the world, including benchmarking** - Through direct involvement with the likes of industry bodies such as UITP and VDV and presenting LRSSB work streams to international audiences.

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- **Light Rail Safety Innovation and Research** – LRSSB continues to fund and developed research into innovations such as the BOSCH obstacle detection system, Driver hazard perception and the SCADA simulator – a standardised reporting platform and
- **Collaboration with other industry safety bodies** - LRSSB has collaborated with CIRAS on compiling a light rail sector document based on the current CIRAS guidance aimed at raising awareness of the confidential reporting process for all employees with its members in the light rail sector. CIRAS has kindly reviewed the document and authorised LRSSB to publish it and are fully in support of this campaign to further promote CIRAS.
- **Oversight of Independent Competent Persons and accreditation** - LRSSB now has legal advice on the mechanism for appointing an ICP or ICP “Designate” that and how it could assist the sector in a clearer understanding of obligations under ROGS. LRSSB are looking to produce a roadmap to describe the, when, what, and who is required in the Safety Verification Process.

TAIR (Tram Accident and Incident Reporting Database Tool) Development

As previously stated within the report LRSSB has continued with ongoing consultation with the sector during the period, implementing further updates, remote training, and modifications to the TAIR database in order to improve the ease of data input in addition to tailoring the system to more bespoke individual organisation requirements.

LRSSB has re-reviewed individual networks existing historical data in conjunction with Atkins in preparation of the forthcoming review of both individual network and national risk models during the 2022-2023 period.

A substantial piece of work has been undertaken involving the integration of risk model analytics into the TAIR database to allow for a direct export of data into risk models, in turn enhancing the risk model review process by the provision of pre analysed data.

During the period LRSSB commissioned an independent survey report into TAIR by the tram networks. The report collated observations, comments and recommendations associated with the database. Fundamentally it is believed that an upgrade and “modernisation” of TAIR is required to guarantee a more efficient, long-term use of the platform.

An outline business case proposal has been produced and presented to LRSSB Board who have agreed the proposal. LRSSB are currently developing a scoping brief in conjunction with software providers.



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Industry Risk Model Development

During the period considerable effort has been applied to the core of LRSSB's activities focusing on the preparation for the forthcoming review of the risk model as follows:

- Commissioning and development of enhanced risk model dashboards, following feedback from the sector in order to assist with the benchmarking, understanding and communication of the outputs from the models at all levels;
- The integration of a single common language across all LRSSB's risk management platforms, Risk Model, TAIR, Bowtie associated to hazardous events and precursors;
- The re-evaluation of sector historical event data;
- The integration of newly developed guidance that has a direct positive impact on risk mitigation measures within the model;
- Provision of training on the risk model to new safety personnel within the sector;
- Evaluation of potential impact of other, non-UK sector, sources of data on the model if integrated.
- Establishment of schedule for the review of sector risk models during 2022-2023 period;
- Consultation with sector on modifications to model e.g., expansion of Hazardous Event and Precursor descriptors.

RM3 Development

To further embed RM3 within the sector LRSSB are establishing an RM3 working group where application of RM3 audits will be undertaken by peer review from members drawn from within the sector. This in turn will allow the sharing and cascading of best practice and benchmarking. This work will enable LRSSB and members to review the risk maturity of the industry and of individual systems collectively.

Equally as important, duty holders from the owner's group will be able to assess their relative strengths in terms of governance of their own systems and the industry overall and should they wish can be supported by LRSSB and other Operators to identify gaps and opportunities for improvement, indeed, one of the strengths of LRSSB, has been its ability to mobilise the knowledge and expertise of its own members for common benefit

Taking cognisance of feedback received from both the Heavy and Light Rail sectors regarding the provision of training associated with RM3, the ORR RM3 Board established a dedicated subgroup to lead on a project to develop an online RM3 e-learning module to assist in the familiarisation and application of the RM3 across the sectors.

LRSSB formed part of this subgroup spearheading the project and has assisted in the design and development of the e-learning framework as well as providing interactive commentary on the benefits that RM3 delivers to the Light Rail sector.

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Introduction of Bowtie XP

LRSSB completed all training to the sector on the new Bowtie XP software platform during the period by adapting its content to be delivered virtually. Further additional training sessions were also delivered during 2021 to incorporate new members of staff within the industry.

Edinburgh Trams produced the top ten industry global generic Bowtie risk assessments. LRSSB in conjunction with Atkins and the software providers integration of sector risk model data into the bowtie server database to enable a degree of automated bowtie risk assessment development in order to aid production.

To further assist the sector LRSSB are establishing a Bowtie Assessment working group through the Heads of Safety group, where application and development of global bowties for the sector will be undertaken. The aim of the working group is to produce global bowtie assessments capturing all best practice drawn from across the sector. Duty holders from the owner's group will be able to assess their areas of interface and responsibility associated with controls identified or which require additional review.

This in turn will allow the sharing and cascading of best practice and benchmarking for the control of risks across the sector.

Standards, Guidance & Best Practice documentation

The LRSSB is the custodian for light rail standards and guidance for the UK. This is to include, as a minimum, standards for operations, engineering, highways interface, management, environment quality and health and safety. Documentation is not limited to local guidance it is also fully inclusive of all urban standards relating to CEN Mandate 486 and all applicable CEN Heavy Rail standards. A table of current standards production and associated working groups is in the BSI section of this document. The magnitude of this body of work cannot be underestimated, as well as domestic requirements to standardise the industry there is a global push on Light Rail, Metro as well as the pending requirements to include Very Light Rail which will need its own set of standards or be made to fit current ones.

To date LRSSB has been utilising its own internal resource as well as UKTram employees to both attend working groups and review documentation as and when required. Attendance at working group meetings has been further supported by Network Rail and discussions have been had with a view to this continuing. LRSSB has the option of calling on individual consultants a number of which it is already working with to offer their expertise to relevant standards development. It has always been a challenge to get consistent support from the UK Light Rail Operators given their own daily commitments and up to date LRSSB has acted as a conduit to feed comments back to CEN on behalf of the UK industry. The best approach and therefore a desire of LRSSB is to set up mirror groups with members from owners, operators and maintainers to review and comment on documentation as it continues to be developed through to publication.

It is probably best summed up in one sentence - there is no doubt that despite some beliefs the Light Rail Industry does have its own standards, however it is not strictly standardised in its approach. Over the coming years LRSSB firmly believes that its work in this area will represent a huge shift toward standardisation and in doing so increase safety and optimise both operation and engineering practices for the greater good of the industry and its passengers and stakeholders alike.

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TPG Working Group

As mentioned previously one of the first tasks set was a full review of LRG 1.0 Tramways Principles and Guidance (TPG). In order to understand where the gaps existed in the guidance a newly formed working group was set up comprising of individuals from across the varied fields of expertise. The group formulated a full index of any and all requirements as it saw them and gave them each a priority status as they saw it. The selections were then cross reference to highlight common trends in areas using a Red, Amber & Green Status to identify them. This was then sent to a number of external bodies to offer a further objective view to understand if the TPG group were focusing on the correct aspects.

As part of this external review a number of new topics were added with comments on priorities. The group then took a decision to manage this project over a 3-year period and compile a business case for Board to allocate funding to achieve this. An agreement was made that the group would select and aim for the publication of 50 documents in total with a high target of 24 individual items to be initially produced over 2021/22 period. These were predominantly from the Red category of the index, there were also some legacy documents from 2019/20 which were included.

The TPG group meets every 4 weeks to review the ongoing guidance and discussed the following agenda items but not limited to:

- LRG Guidance update
- BSI/CEN Updates
- International Guidance – VDV, APTA etc.
- Resource Library update
- Risk model
- Research & Development
- Functional Groups/Stakeholder requirements
- RAIB Register

TPG RAG Index

As stated, the Tramways Principles and Guidance – LRG 1.0 was recently updated as part of its review. It will continue to be reviewed annually so that names, dates and existing content remain relevant and up to date and also ensuring that the document has taken into account the many new documents that LRSSB continues to publish in line with the following:

- the latest published Standards, Guidance Notes and Codes of Practice;
- current best practice;
- industry recommendations;
- innovation across the sector; and
- international experience and standards.

The current RAG status document which, as stated comprises some 150 categories and continues to grow, is a live process involving, adoption, review and updates. The index will also evolve as future research developments and / or recommendations from the sector come to the fore.

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Document Selection & Review

The following is a brief overview of LRSSB (GA) 01.3 Light Rail Guidance and Standards Documentation Development and Approval Process.

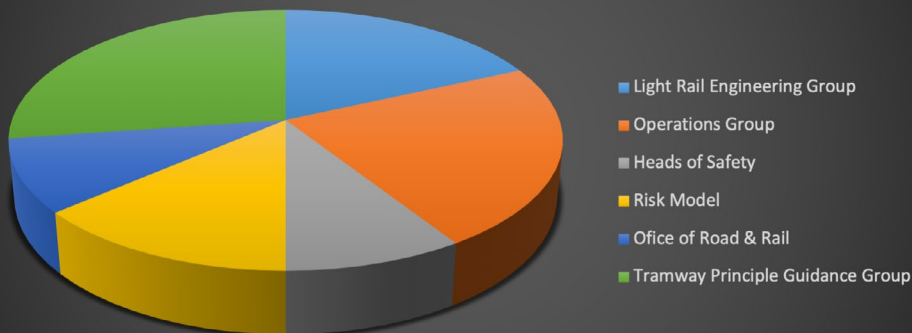
This defines the process by which Light Rail industry guidance and standards documents are initiated, developed, approved, and published. It also sets out the process for the maintenance and revision of documents as well as the process of the withdrawal of any document.

The selection of documentation had to represent an array of different criteria and is driven by a number of factors and sources. Three essential avenues for recommendations were UKTram Light Rail Operations Group, Light Rail Engineering Group and the LRSSB Heads of Safety Group, which through best practice sharing had highlighted a number of documents which they felt would be of great benefit. Additionally, the risk model was utilised to identify areas of focus which it was felt would benefit from new or updated guidance documents.

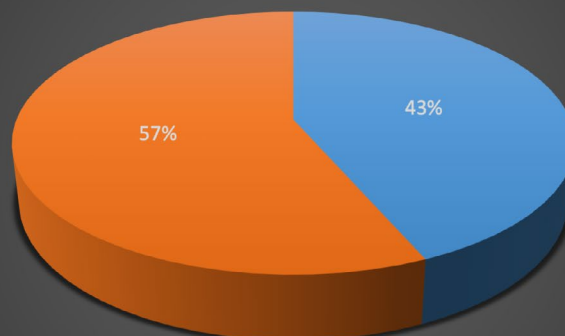
Other external sources that can affect the production of documentation are:

- RAIB Reports and Recommendations
- ORR actions / observations
- Changes in legislation
- Revised EN / ISO

Guidance Source



Resource



Internal External

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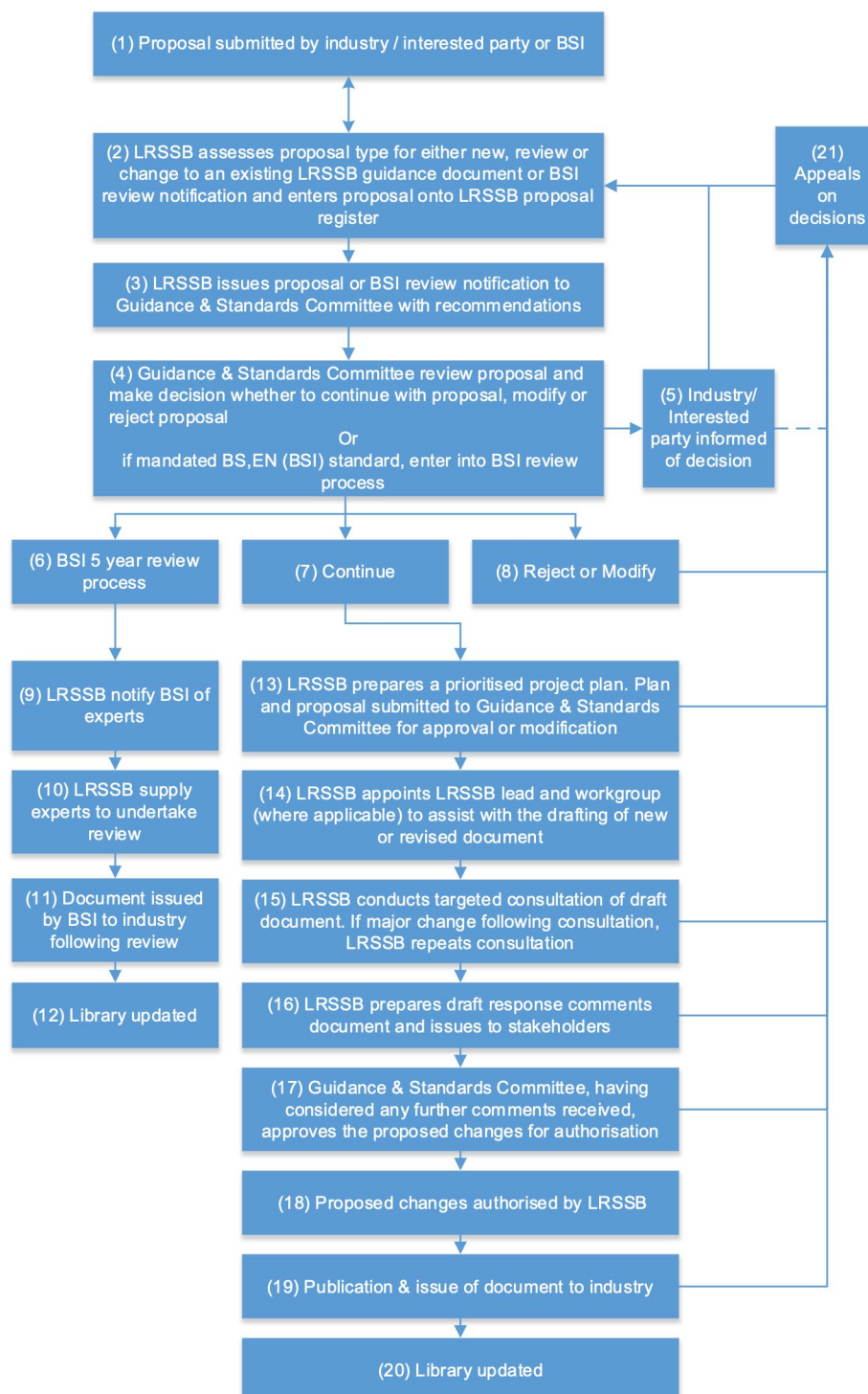
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Document Production

Given the limited internal resource it was not feasible to write all the documentation required so a number of external organisations were engaged to collaborate on the work. LRSSB has at its disposal a wealth of light rail expertise and experience which can be applied to any topic selected. All external organisations are under instruction to follow templates set out by LRSSB; however, it is very much a collaborative effort.

This collaborative approach has enabled LRSSB to make progress far beyond its size and get value for money as well as involving and engaging the industry and its expertise.

The illustration below depicts LRSSB's document development and review process.



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Stakeholder Engagement

While the TPG working group is the ultimate forum for decision making, LRSSB continues to engage with stakeholders to ascertain and understand the need for additional documentation whether in the form of guidance, best practice of technical reports etc. As highlighted in the previous section there is an official process whereby stakeholders must raise requests for documents to be considered LRSSB encourages feedback from all forums which might include but not limited to:

- UKTram functional Groups
- Office of Road & Rail
- DFT
- Network Rail
- Supply Trade members
- Consultants
- RSSB

By actively engaging with these bodies LRSSB believes it will continue to produce much needed relevant documentation for the sector by the sector.

By using this combination of internal and external resources, exploring the market in order to maximise value LRSSB has managed to bring in the documentation well under the original estimate. The number of documents and quality of the guidance produced has represented huge significance and added benefit to the sector.

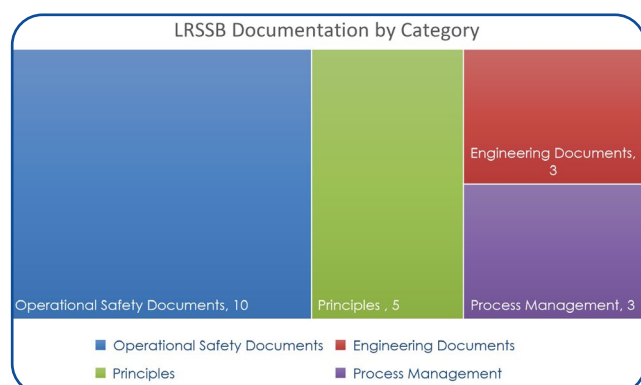


Table 1 - Guidance and documentation by type produced by LRSSB in 2021/2022

| DOC REF | DOCUMENT TITLE |
|----------------|--|
| LRSSB/LRG XXX | Depot Supervision |
| LRSSB/LRG XXX | The control of contracted works on or near a light rail system |
| LRSSB/LRG XXX | Safety Validation & Verification for Change Control Guidance |
| LRSSB/LRG 7.0 | Trap and Drag Interface Guidance |
| LRSSB/LRG 10.0 | Loading for Light Rail Bridges Guidance |
| LRSSB/LRG 13.0 | Underrun Protection |
| LRSSB/LRG 14.0 | On-Street/ Off-Street Principles |
| LRSSB/LRG 20.0 | Fire Rescue and Evacuation Best Practice Guidance |
| LRSSB/LRG 25.0 | Welding Guidance |
| LRSSB/LRG 26.0 | Track Manual |
| LRSSB/LRG XXX | Safety Validation & Verification for Change Control Guidance |
| LRSSB/LRG XXX | Trackworker Safety |

Table 2 – Guidance and documentation currently in production or under research

Some of this guidance is a legacy from the inception of LRSSB and through the establishment of the TPG working group a decision was taken to carry out further research before committing to commence work on them. In addition, other items have manifested through requests from Functional Groups and are currently in progress with a view to publishing in the next financial year.

Section 4 – Initiatives

Research and Development

In the year, LRSSB commissioned independent research in several major areas:

One of these projects was Obstacle Detection & Avoidance Systems (ODAS). This involved the trial of the BOSCH system in conjunction with Sheffield Supertram and Ian Rowe Associates Ltd (IRAL). Following the conclusion of this research a report has been finalised.

The report findings will be fed into guidance adoption and review process for application of ODAS within the sector.

The second area was that of the production of a universal SCADA simulator for use by the sector. Training and on-going competency assessments for control room staff has been a challenge for Operators for many years and with this new simulator networks are able to train and assess staff in an “off-line” environment, whilst also simulating day to day “real – time” issues that a control room may have to deal with whilst also undertaking this safety critical function.

LRSSB have engaged with an organisation to research and produce an initial Safety Verification Tool that will identify if there is a need for Safety Verification and potentially an ICP (Independent Competent Person) as part of a schemes planning process. The organisation has now developed their initial thinking for the “tool” further scope for possible development will take place during the 2022-2023 period.

Working Relationships – ORR, RSSB, RAIB, BSI and UITP

ORR – LRSSB hold regular meetings with representatives of the ORR to discuss any emerging issues, ongoing research developments and production of guidance. ORR also sit as an observer on the LRSSB Board. This occurs at all levels of LRSSB with quarterly updates given directly to the ORR team both on operational and engineering safety related work streams and issues.

RSSB – LRSSB and RSSB continue to discuss ways in which both organisations can learn from each other to better inform current and emerging projects and issues within the sectors.

LRSSB, also, actively engages with RSSB’s committees and standards working groups to ensure that the interests and comments of the light rail sector are heard.

BSi – LRSSB have been a distributor for BSi documents since the Summer of 2021, LRSSB has provided a number of documents to its member organisations on request.

CEN – LRSSB currently attends a number of Working Groups relevant to producing “Urban” rail standards. These meetings have been held online for the past two years but participants are being encouraged to attend in person which will involve travel across Europe.

IRR/UKRRIN – LRSSB has established a working relationship with the Institute of Rail Research (IRR) at Huddersfield University. IRR are an active member UK Rail Research Innovation Network (UKRRIN) which will allow LRSSB to strengthen ties with this group who have many relevant active work streams.

UKTram / LRSSB functional Groups – LRSSB is an active participant in the Heads of Safety Group, Light Rail Engineering Group, Light Rail Operations Group and Heritage group meetings and provides updates on all its activities, this has been very well received by members and strengthens ties with all aspects of the member organisations and supply trade.

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Establishment of Overseas Relationships

Establishing working relationships with overseas bodies will ensure LRSSB stay abreast of developments from other nationality networks as well as potentially becoming a source of income through commercialisation of LRSSB assets such as the Risk Model and TAIR systems.

As part of the period activities LRSSB delivered a presentation to Rail Live Madrid, attended by delegates from across the world. The presentation provided an overview of the systems and platforms LRSSB has developed to better understand and mitigate risk associated with light rail within the UK with particular emphasis placed upon the effectiveness of risk model profiling and LRSSBs' integrated risk management framework.

Having established core relationships, we continue to work closely with our counter parts and discuss emerging technologies, research and development.

Commercialisation

During the period LRSSB was invited by Transport for the West Midlands (TfWM) and Midland Metro Alliance (MMA) to conduct a ROGS compliance review and assessment. This was successfully delivered by the LRSSB through a series of collaborative Bowtie assessment workshops involving all relevant stakeholders.

The review was commissioned to ascertain the maturity and robustness of Transport for West Midlands, Midland Metro Alliances and Midland Metro Limited's processes in delivering the expansion projects on the West Midland Metro network. Feedback from the workshops has been overwhelmingly positive in respect of effectiveness of the application of the new bowtie assessment process employed by the LRSSB.

LRSSB have since been approached for further assistance by TWM and MMA that has resulted in the production of initial risk dashboards covering the following project areas:

- Responsibilities
- Design
- Construction
- Testing
- Acceptance
- Handover

The exercise has been mutually beneficial to all parties particularly in relation to the lessons learnt. LRSSB are currently considering the development of best practice reference framework based upon the initial data that has been collated.

LRSSB have held meetings with Transport for Wales to assist with "line of sight" element of the Valley Lines conversion project in Cardiff and surrounding areas.

The development of the Risk Model and TAIR continues to receive significant interest from systems and governments overseas. LRSSB will look to actively promote these excellent tools, particularly once the upgrade to TAIR is complete.

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Communications

The LRSSB website has now become the repository for LRSSB's documentation, standards, guidance, good practice codes and reports. The "Digital Reference Library" has been consistently populated throughout the year.

E-Shots, newsletters and updates are regularly published by LRSSB and distributed to members as well as being posted on the site. The use of platforms such as Twitter and LinkedIn are also actively utilised to inform the sector, stakeholders and the broader population as to what LRSSB are developing and delivering.

LRSSB also produced a safety video for the sector that utilises issues arising from the accident/incident database and the risk model as its script to highlight the potential hazards people are exposed to around an operating tramway.

Following a recommendation contained in the ORR Findings Report, LRSSB intends to deliver a concise and well-targeted Stakeholder Communications Management Plan which will identify the LRSSB's key stakeholders and establish effective channels through which important relationships can be appropriately managed and maintained.



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Section 5 – Industry Risk Profile

National Risk Profile

During 2020/21 LRSSB undertook an update of the National Safety Risk Profile. Changes included the introduction of Physical Prevention of Over-Speeding (PPOS), and revised precursor weightings of significant incidents, which have occurred, since the baseline. LRSSB will now conduct, a follow up, more comprehensive review, in the coming period.

During 2021/22 LRSSB have worked with a number of new safety teams within the sector to introduce and familiarise them to their current risk model and also the national profile.

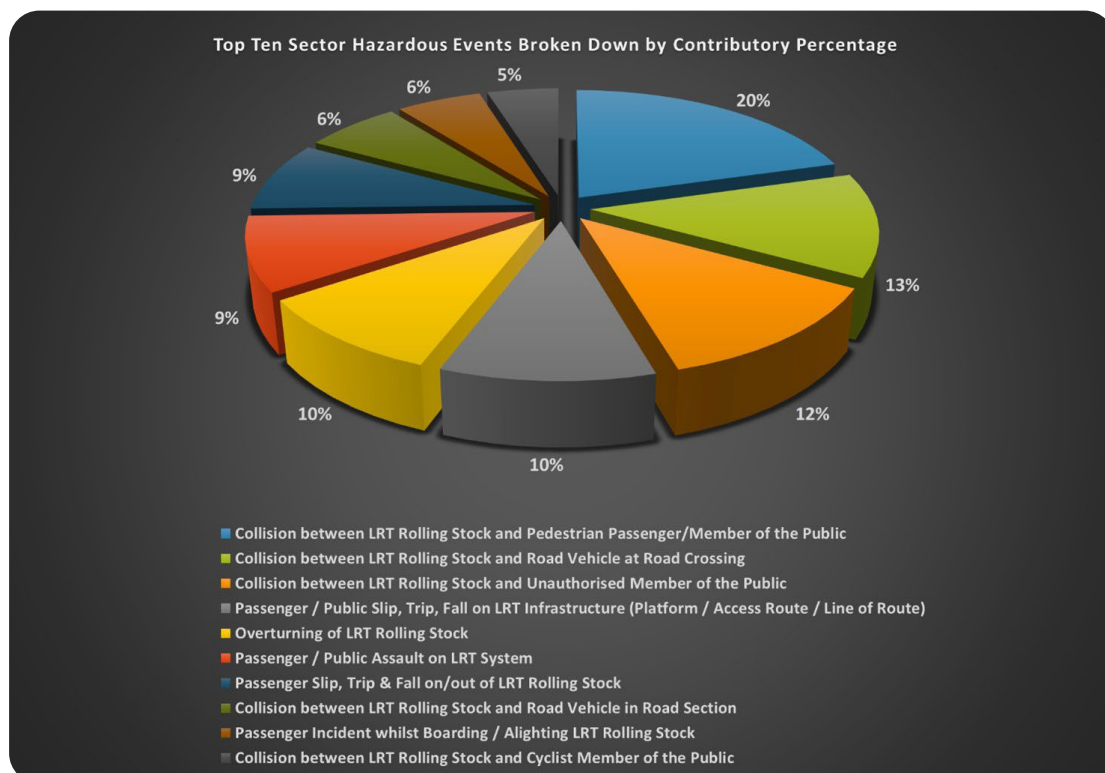
For 2022/23 LRSSB and Atkins have identified areas with the need for, a “honing” of the original models’ precursors and hazardous events. A programme for a full review of all network and national profiles has been agreed with Atkins and will be undertaken during the 2022/23 period.

Top Ten Sector Hazardous Events and Precursors

The charts below provide a breakdown of the hazardous events and precursors identified within the National Risk Model. At present the current individual and national risk model profiles remain static as per 2021-2022. The four charts illustrate:

- Top 10 Hazardous Events
- Top 10 Precursors
- Total Sector Hazards
- Fatal Risk

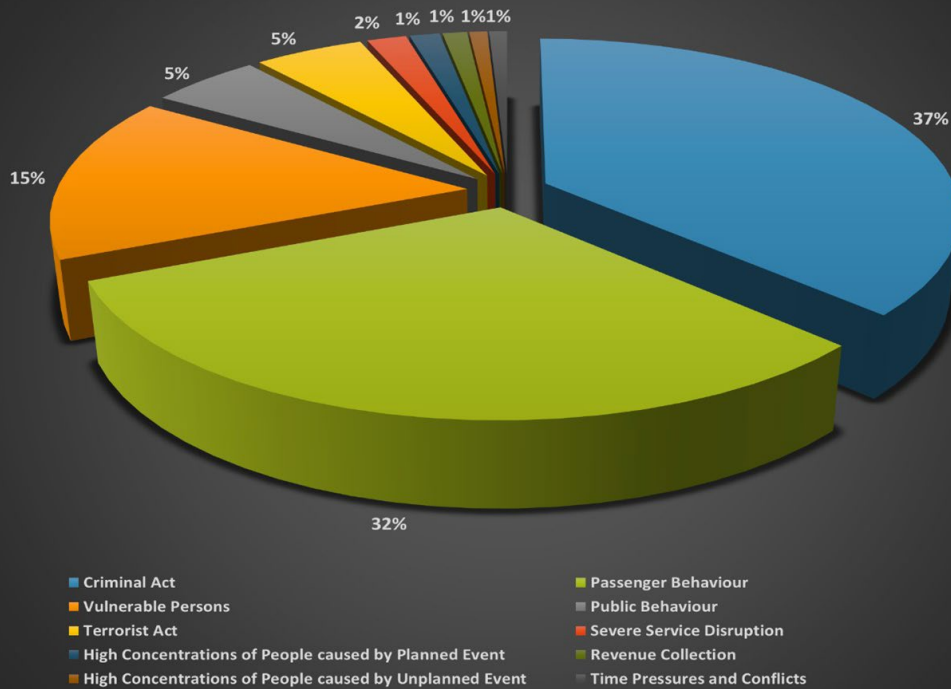
N.B - Any percentages indicated are a representation of each top ten and how they are apportioned.



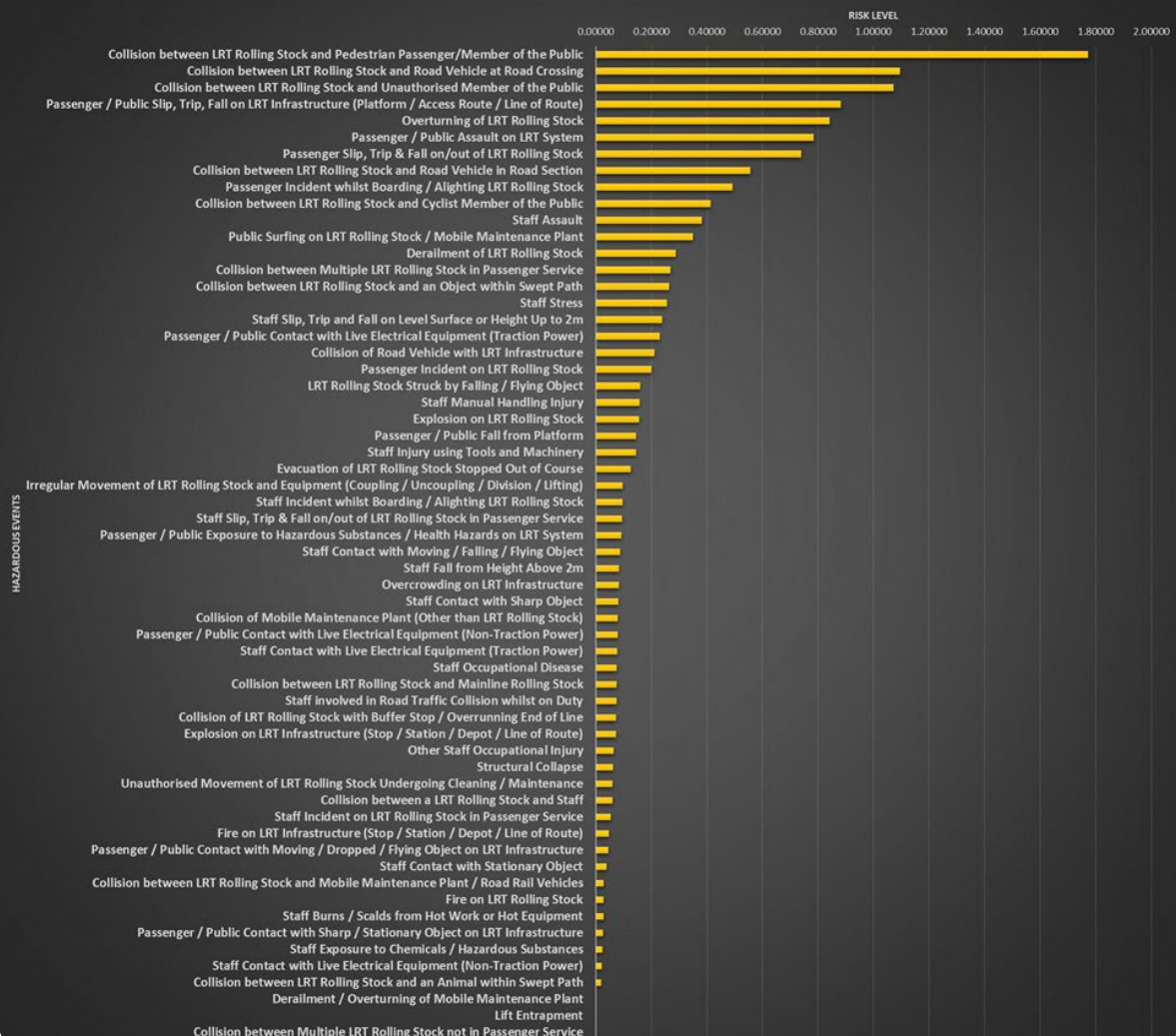
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Top Ten Sector Precusurs Broken Down by Contributory Percentage



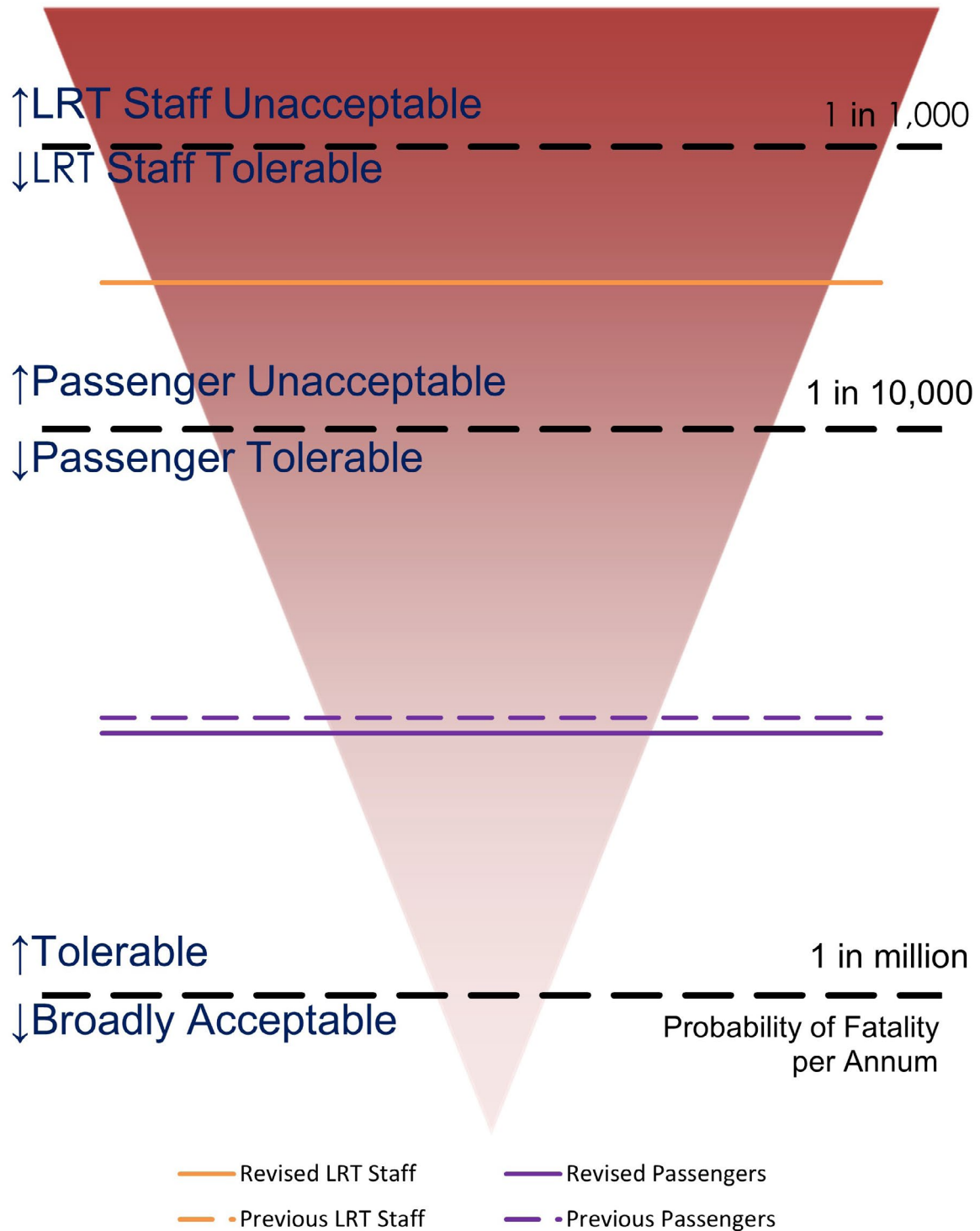
Ranking of Total Sector Hazardous Events



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Individual Risk of Fatality



Section 6 – Funding and Finance

Figure 2 below indicates how LRSSB has apportioned the allocated funding provided into the areas and disciplines identified as requiring the most urgent attention:

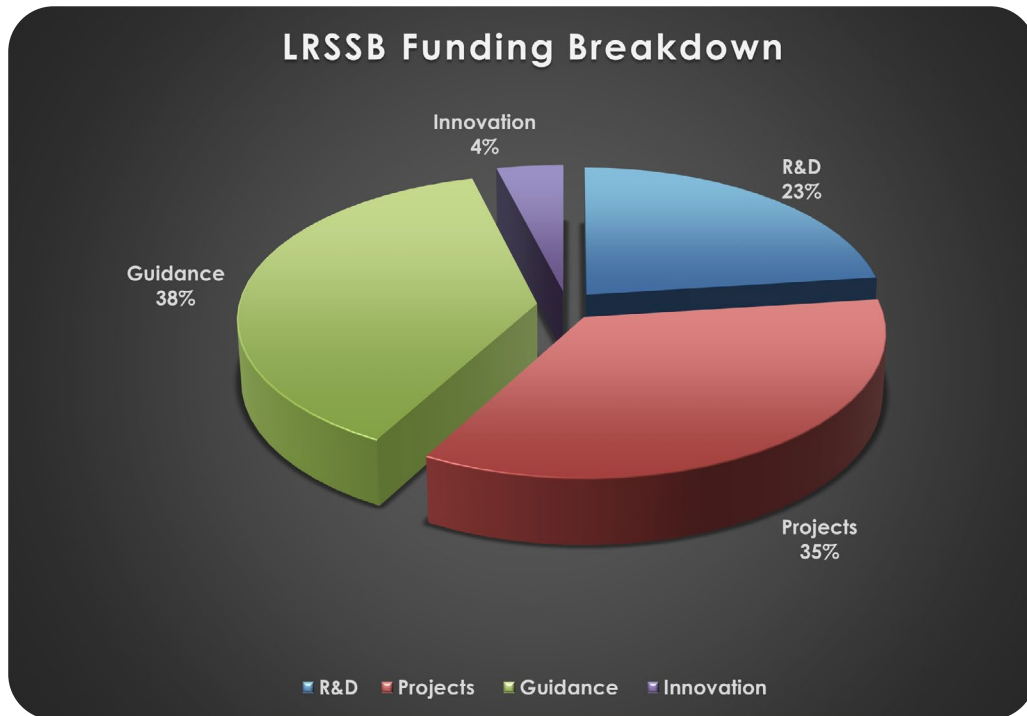


Figure 2 LRSSB Funding Breakdown

LRSSB has produced a budget forecast for 2022/23 in line with the Business Plan objectives for the period. It is believed that there is sufficient funding being provided to deliver the budgeted aspirations contained within the Business Plan.

In line with its agreement with the DfT and the sector, LRSSB is developing a three-year programme of work and in addition will also look to secure funding for investment in specific areas such as innovation and research and development that will help support and assist in the delivery of LRSSB's overall risk management strategy.

Section 7 – Programme Summary

Programme Summary for 2021/2022

| Objectives | | | | | | |
|------------|--|---------|---|--|-----------|--|
| Initiative | Description | Period | Initial Project Scope & Key Objectives | Additional Work | Status | Update |
| RM3 | Development of a revised version of the RM3 criteria framework (RM3 2019) has resulted in a revised edition of RM3 that has been designed to be more accessible to organisations who are just beginning to use RM3 criteria as well as more experienced users. LRSSB is supporting the light rail industry in adopting the RM3 model. | 2021/22 | Work with ORR to update RM3 criteria for use within the Light Rail Sector. | | 100% | Initial Project Complete Moved to next phase. |
| | | | Work with Light Rail Sector to integrate use of RM3 as minimum baseline measurement tool. | | Completed | |
| BOWTIE | LRSSB has identified that the Bowtie Risk Assessment model is a useful tool which can be adopted by the Light Rail industry. LRSSB has undertaken to deliver a process to the industry by which they can apply global industry Bowtie assessments. | 2021/22 | Identify and assess bowtie software platform for suitability. | | 100% | |
| | | | Picture software | | Completed | |
| | | | Undertake a collective analysis of all risk models to determine the top ten ranking industry risks. | | Completed | |
| | | | Develop Global top ten risk assessments and upload to server. | | Completed | |
| | | | Provide training to individual networks and other relevant parties on the Bowtie software | | Completed | |
| | | | Issue each network with their individual risk model (identifying their levels of risk). | Review and re-analysis of Operator models. | Completed | |

Objectives

| Initiative | Description | Period | Initial Project Scope & Key Objectives | Additional Work | Status | Update |
|------------|---|---------|---|-----------------|-----------|------------------------------------|
| RISK MODEL | To develop a risk model for the light rail industry to adopt; to obtain an understanding of individual system risk profiles and ensure greater control of emerging risks and precursors to incidents. | 2021/22 | Develop risk model framework. | | 100% | |
| | | | Collate data from individual networks. | | Completed | |
| | | | Undertake workshops with individual networks to compile their individual risk models. | | Completed | |
| | | | Provide training to individual networks on the operation and analytics of the risk model. | | Completed | |
| | | | Provide networks with access to Bowtie server. | | Completed | |
| | | | Develop database. | | Completed | |
| TAIR | To develop a common database for sector reporting for accidents, incidents and near misses. | 2021/22 | Standardisation of event classification. | | Completed | |
| | | | Standardisation of event classification. | | Completed | |
| | | | Introduce database to the sector and provide training. | | Completed | |
| | | | | 28/01/22 | | 11/02/2022 |
| TAIR 2 | Based upon industry feedback a modernisation upgrade to the TAIR database is required to ensure that it better meets the need of the end users. | 2021/22 | Phase 1: Project Team establishment - Steering Group | 28/01/22 | | On-going 2022/23 Business Planning |
| | | | | 11/02/22 | | |
| | | | | 14/02/22 | | |
| | | | | 28/02/22 | | |
| | | | | 28/02/22 | | |
| | | | | 25/07/22 | | |
| | | | | 16/09/22 | | |
| | | | | 25/07/22 | | |

| Research and Development | | | | | | |
|--|---|---------|---|--|--------|---|
| Initiative | Description | Period | Initial Project Scope & Key Objectives | Additional Work | Status | Update |
| Evacuation and Egress / Glazing / Passenger Safety | To research into potential initiatives, new technologies and industry advancements in relation to the RAIB Sandilands investigation report. | 2022/23 | LRSB now sitting on the CEN/BSI Urban Rail working group for interior vehicle crashworthiness including glazing. | | | Independent experts engaged by LRSB - Ongoing |
| | To research into potential initiatives, new technologies and industry advancements in relation to the RAIB Sandilands investigation report | 2022 | Initial work commissioned to investigate Obstacle Detection and Avoidance Systems ODAS being introduced both in Europe and the UK. | | 50% | Pilot scheme in Sheffield completed. Further investigatory analysis of introduction into the UK streetscape ongoing. |
| Focus+ | To investigate the use of a device that will be able to identify an employee's deteriorating health and possible fatigue. | 2022 | Agree timelines and costs with UK Tram to assist in the delivery of this device that identifies fatigue and illness within employees. | | | Six-month pilot scheme commenced. |
| | Production of new guidance document. | | | | | |
| Pedestrian Safety | To reduce risk of third-party pedestrian or public harm. | 2022 | Commission "Pilot" study | Review LRG 2:0 Tramways Crossings For Non-Motorised User Guidance. | 100% | Pilot Study complete, results analysis ongoing. |
| | Zero serious harm from unintentional acts | | | | | |

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Section 8 – Summation

As detailed within the report it can be seen that LRSSB has continued to make significant advancements throughout 2021/22, even with the continuing effects of the Covid-19 pandemic.

The recognition of the good work achieved to date is evident and welcomed within the ORR Findings Report. LRSSB accepts and will address the observations and recommendations within it.

LRSSB has now forged partnerships and agreements with a number of revered and established organisations, and, whilst benefiting LRSSB and our sector, this is also testimony to how those organisations see LRSSB.

With continued funding LRSSB will ensure that the light rail sector is well placed to foresee possible future hazards and safety risks. This in turn will benefit all stakeholders, duty holders, customers and the general public.

That LRSSB's open-minded and forward-thinking approach towards research initiatives, will ultimately drive standards within the industry, is self-evident. With the continued support of stakeholders and members, LRSSB can deliver real benefit for the light rail sector, today and in the future.



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