

Circular economy practice in rail infrastructure projects

Page 1: Participant information and informed consent

This questionnaire survey is part of a PhD research project supported by Loughborough University and High Speed Two Limited. Its aim is to investigate circular economy practice in rail infrastructure projects.

We will securely store any personal data until the end of this year (2021). Other data collected will be anonymised and held for a period of 10 years. All data will be securely erased once the defined storage periods have elapsed.

By completing this form you agree that we will process your data in line with the (linked) [participant information sheet](#) and [informed consent form](#) (copied below).

If you have any questions or change your mind about participating, please contact Matthew O'Leary at the following email address: m.oleary@lboro.ac.uk.

Taking part

The purpose and details of this study have been explained to me. I understand that this study is designed to further scientific knowledge and that all procedures have been approved by the Loughborough University Ethics Approvals (Human Participants) Sub-Committee.

I have read and understood the information sheet and this consent form.

I have had an opportunity to ask questions about my participation.

I understand that taking part in the project will involve completing an online questionnaire.

I understand that the personal information collected will be details of organisation worked for (type, number of employees and annual turnover), how many years' experience working on rail infrastructure projects, and involvement in circular economy practice.

I understand that I am under no obligation to take part in the study, have the right to withdraw from this study at any stage for any reason, and will not be required to explain my reasons for withdrawing.

Use of information

I understand that all the personal information I provide will be processed in accordance with data protection legislation on the public task basis and will be treated in strict confidence unless (under the statutory obligations of the agencies which the researchers are working with), it is judged that confidentiality will have to be breached for the safety of the participant or others or for audit by regulatory authorities.

I understand that information I provide will be used for journal articles or conference papers and as part of a PhD research dissertation.

I understand that personal information collected about me that can identify me, such as my name or where I live, will not be shared beyond the study team.

I agree that information I provide can be quoted anonymously in research outputs.

I give permission for the anonymised data I provide to be deposited in Loughborough's data repository so that it can be made publicly available for future research at the end of the project.

I agree that anonymous data from this study can be used for other, future research projects that may be unrelated to the aims of this study.

Consent to participate

I voluntarily agree to take part in this study.

☐ Yes

☐ No

Page 2: Background information

What type of organisation do you work for?

- ☐ Contractor
- ☐ Consultant
- ☐ Client
- ☐ Other

If you selected Other, please specify:

How many people does your organisation employ?

- ☐ Less than 1,000 employees
- ☐ Between 1,000 and 10,000 employees
- ☐ More than 10,000 employees

What is the annual turnover of your organisation?

- ☐ Less than £500m
- ☐ Between £500m and £1,000m
- ☐ More than £1,000m

How many years' experience of working on rail infrastructure projects do you have?

- ☐ Less than 10 years
- ☐ Between 10 and 20 years
- ☐ More than 20 years

At what level are you involved with circular economy practice?

- ☐ Strategic
- ☐ Implementation
- ☐ Other

If you selected Other, please specify:

At what stages are you involved with circular economy practice (answer all that are applicable)?

- ☐ Project brief
- ☐ Design
- ☐ Manufacture and supply
- ☐ Construction
- ☐ Operation and maintenance
- ☐ End of life

Page 3: Circular economy strategies

Please rate the following **stages** with respect to their importance for industry-wide circular economy implementation in rail infrastructure projects.

	No importance	Slight importance	Moderate importance	Major importance	Don't know
Project brief	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Manufacture and supply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Operation and maintenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
End of life	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please rate the following **strategies** with respect to their importance for industry-wide circular economy implementation in rail infrastructure projects at **project brief** stage.

	No importance	Slight importance	Moderate importance	Major importance	Don't know
Specifying closed or open-loop recycling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Building in layers*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Multi-functional infrastructure**	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Whole life costing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Specifying reuse of the existing asset	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*i.e. concept that layers different components of an asset (e.g. stuff, space, services, structure, skin) according to lifespan, thereby easing separation and reuse, remanufacturing or recycling (without affecting the wider entity).

**i.e. assets that deliver more than one purpose (e.g. services above and under bridges; multi-use transport corridors; noise barriers that double as solar collectors).

Other (please specify) *Optional*

Please rate the following **strategies** with respect to their importance for industry-wide circular economy implementation in rail infrastructure projects at **design** stage.

	No importance	Slight importance	Moderate importance	Major importance	Don't know
Design out waste*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Design for durability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Eco-design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Design for ease of maintenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Life cycle assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*i.e. design for recovery and reuse/recycling; offsite construction; materials optimisation; waste efficient procurement; deconstruction; flexibility/adaptability.

Other (please specify) *Optional*

Please rate the following **strategies** with respect to their importance for industry-wide circular economy implementation in rail infrastructure projects at **manufacture and supply** stage.

	No importance	Slight importance	Moderate importance	Major importance	Don't know
Product as a service*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Product take-back or reverse logistics**	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using secondary materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Material efficiency***	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Responsible sourcing of products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*product as a service is where the manufacturer or supplier provides additional services, which may include longer term responsibility for operation, maintenance and end of life.

**product take-back is an initiative by a manufacturer or supplier to collect and reuse products in the manufacturing cycle; reverse logistics is the means by which this process is facilitated, i.e. opposite to a normal supply chain.

***i.e. optimising material use (using less material for longer, while delivering the same function).

Other (please specify) *Optional*

Please rate the following **strategies** with respect to their importance for industry-wide circular economy implementation in rail infrastructure projects at **construction** stage.

	No importance	Slight importance	Moderate importance	Major importance	Don't know
Off-site, prefabrication and modularisation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other modern methods of construction (MMC)*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reducing on-site waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
On-site or off-site reuse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using locally available materials and suppliers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*e.g. thin-joint masonry, cross-laminated timber.

Other (please specify) *Optional*

Please rate the following **strategies** with respect to their importance for industry-wide circular economy implementation in rail infrastructure projects at **operation and maintenance** stage.

	No importance	Slight importance	Moderate importance	Major importance	Don't know
Lifetime extension*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Smart maintenance (e.g. condition monitoring)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sharing of underutilised assets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Self-generation (e.g. retrofit solar panels)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Upgrading to ensure latest technology is in use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*e.g. refurbish, repair, remanufacture, recondition.

Other (please specify) *Optional*

Please rate the following **strategies** with respect to their importance for industry-wide circular economy implementation in rail infrastructure projects at **end of life** stage.

	No importance	Slight importance	Moderate importance	Major importance	Don't know
Recovery strategy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Deconstruction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Diverting waste from landfill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Selective demolition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Linking end of life to new cycle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify) *Optional*

Page 4: Circular economy barriers

Please rate the following **sectoral barriers** to industry-wide circular economy implementation in rail infrastructure projects.

	Not a barrier	Slight barrier	Moderate barrier	Major barrier	Don't know
Lack of ownership between client and operator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Different component lifespans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Temporary and often bespoke nature of projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of commercially scalable case studies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify) *Optional*

Please rate the following **policy barriers** to industry-wide circular economy implementation in rail infrastructure projects.

	Not a barrier	Slight barrier	Moderate barrier	Major barrier	Don't know
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Lack of supportive code or legislation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regulatory obstructions to reuse*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ambiguous legal definition of waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of incentives for the circular economy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*e.g. overly prescriptive regulations, standards or specifications on waste, product performance, health and safety.

Other (please specify) *Optional*

Please rate the following **technical barriers** to industry-wide circular economy implementation in rail infrastructure projects.

	Not a barrier	Slight barrier	Moderate barrier	Major barrier	Don't know
Lack of product data a barrier to reuse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Difficult to separate components	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complexity and long life cycle of assets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Difficulty in measuring circularity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify) *Optional*

Please rate the following **supply chain barriers** to industry-wide circular economy implementation in rail infrastructure projects.

	Not a barrier	Slight barrier	Moderate barrier	Major barrier	Don't know
Fragmented nature of the industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of collaboration between organisations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of reuse markets and supply chains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of professionals with circular economy knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify) *Optional*

Please rate the following **economic barriers** to industry-wide circular economy implementation in rail infrastructure projects.

	Not a barrier	Slight barrier	Moderate barrier	Major barrier	Don't know
Downcycling and low value at end-of-life	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High upfront investment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Limited funding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of a clear economic business case	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify) *Optional*

Please rate the following **business barriers** to industry-wide circular economy implementation in rail infrastructure projects.

	Not a barrier	Slight barrier	Moderate barrier	Major barrier	Don't know
Lack of business model understanding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Limited viable business models	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supply and demand mismatch (e.g. storage)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Competing priorities and lack of focus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify) *Optional*

Please rate the following **cultural barriers** to industry-wide circular economy implementation in rail infrastructure projects.

	Not a barrier	Slight barrier	Moderate barrier	Major barrier	Don't know
Resistance to change (business as usual)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Short-term vision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of interest in the circular economy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of a role model	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify) *Optional*

Page 5: Circular economy enablers

Please rate the following **sectoral enablers** to industry-wide circular economy implementation in rail infrastructure projects.

	Not an enabler	Slight enabler	Moderate enabler	Major enabler	Don't know
Web-based exchange portals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Better evidence base, e.g. case studies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Specialist stockists for reuse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Material hubs for storage and sorting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify) *Optional*

Please rate the following **policy enablers** to industry-wide circular economy implementation in rail infrastructure projects.

	Not an enabler	Slight enabler	Moderate enabler	Major enabler	Don't know
Circular economy public procurement requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Specific circular economy legislation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Altering the legal definition of waste to facilitate reuse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extended producer responsibility requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify) *Optional*

Please rate the following **technical enablers** to industry-wide circular economy implementation in rail infrastructure projects.

	Not an enabler	Slight enabler	Moderate enabler	Major enabler	Don't know
Verifiable traceable product information*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Systems thinking**	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Targets (e.g. setting waste reduction targets in the project brief)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Framework to apply circular economy principles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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*e.g. environmental product declarations, cradle to cradle certification, material passports, building information modelling, radio-frequency identification tags.

**systems thinking means to consider how the wider system influences and is influenced by individual parts, rather than focusing on one part in isolation.

Other (please specify) *Optional*

<input type="text"/>

Please rate the following **supply chain enablers** to industry-wide circular economy implementation in rail infrastructure projects.

	Not an enabler	Slight enabler	Moderate enabler	Major enabler	Don't know
Collaboration, longer term relationships and partnerships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Early supply chain engagement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Development of higher value secondary materials markets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Top-down and bottom-up approach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify) *Optional*

Please rate the following **economic enablers** to industry-wide circular economy implementation in rail infrastructure projects.

	Not an enabler	Slight enabler	Moderate enabler	Major enabler	Don't know
Fiscal support, e.g. tax reduction for circular economy initiatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clear economic business case	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Funding for training, research and development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Making decisions based on total rather than capital expenditure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify) *Optional*

Please rate the following **business enablers** to industry-wide circular economy implementation in rail infrastructure projects.

	Not an enabler	Slight enabler	Moderate enabler	Major enabler	Don't know
Design-build-finance-operate-maintain contracts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coherent circular economy vision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circular business models	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assurance schemes for reused/secondary materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify) *Optional*

Please rate the following **cultural enablers** to industry-wide circular economy implementation in rail infrastructure projects.

	Not an enabler	Slight enabler	Moderate enabler	Major enabler	Don't know
Awareness raising (e.g. education)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Community of market parties, public authorities and academia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Client leadership	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Familiarisation with language of the circular economy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify) *Optional*

Page 6: Further thoughts

If you have any further thoughts or observations that may assist this research, please add your comments below.



We would like to discuss the findings from this questionnaire with participants. Please advise if you would be willing to undertake a short follow-up interview.

- ☐ Yes
- ☐ No

Would you like to be updated on the progress of this PhD project and its outcomes (including preliminary questionnaire results)?

- ☐ Yes
- ☐ No

Page 7: Final page

Thank you for taking the time to complete this questionnaire survey.
