Assessment Procedure for ‘Innovative’ techniques and materials

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To reach the targets set as part of the Road Investment Strategy (RIS) and measured by Key Performance Indicators (KPIs), there is a need for Highways England to improve some of the current processes, techniques and procedures. One of the areas requiring attention is that of developing technical innovation.

At present a consistent approach to assess potentially innovative products and processes does not exist, possibly leading to ‘worthy’ techniques or new materials being missed. To help resolve this, an approach has been developed to give clarity to both the person/organisation promoting an innovation, and Highways England.

The approach described within this document is intended to avoid wasted time and funding through unrealistic expectations on the part of the innovator, and give a ‘rational’ approach to product assessment for Highways England.

The procedure summarised in Table 1 below is intended only for innovation in pavement materials, design and construction ‘solutions’ (as addressed, for example, in SHW series 700 to 1000, inclusive).

Innovation in other areas such as procurement will be dealt with in a different manner.

Highways England will assess and approve each stage of the process.

Formal recognition of these stages (with caveats where appropriate) will be provided by Highways England.

After the final stage of approval, and depending on the nature of the innovation, it will be considered and / or prepared for inclusion in the Design Manual for Roads and Bridges and/or the MCHW. The time interval involved for this process to be completed will vary, depending on the nature of the product or technique and how critical it is for the needs of Highways England.

It is appreciated that a situation could arise whereby a potentially innovative concept or material requires support before it is appropriate for use. It is therefore recommended that in this eventuality, possible solutions are discussed with Highways England. Innovative materials, processes and techniques from overseas will be considered. In these cases evidence will be required to show that the material process or technique under discussion is relevant to the UK conditions.

Note that to bring innovation to the fore it is intended that there will be interaction between Highways England and the promotor of innovative materials and techniques when required. In particular, if the steps outlined below are not appropriate to a new product or technique Highways England should be contacted and issues resolved.

Table 1 The Innovations Assessment Procedure

Technology Readiness Level (TRL)[a]	Highways England Technical Innovations Assessment	Note	Stage	Health, Safety and Environment (SHE) considerations	Commercial considerations
-	Provide a statement of the problem to be resolved/improved and contact details of the organisation promoting the innovation. Suggestions as to the terminology to be used in the submission, together with links to Highways England's Key Performance Indicators are given in Note 1.	1	1	The provider will identify any H&S issues associated with the product at any stage of development/ implementation/use. Any issues will need to be addressed and documented.	An overall business case will be presented to Highways England at the beginning of the process to illustrate potential commercial benefits. Thereafter commercial considerations may need to be addressed to relevant parts of the supply chain.
1, 2 & 3	State proposed 'solution'	2	2		
-	State benefit to Highways England	3	3		
4	Present state of solution	4	4		
5	Present state of solution				
6	Present state of solution				
7	Has it been used as a road trial on a road managed/owned by Highways England?	5	5		

Note 'a' The UK Government (the MOD, for example) makes use of 'Technology Readiness Levels' (TRLs) to assess the viability/maturity of products (See Table 2). It has been agreed that adapting the TRL approach to the innovations process is preferred to developing a new approach.

Notes

Note	Description
1	The **description of the problem to be resolved/improved** needs to be clearly defined on three main levels: (A) **in engineering terms**, with terminology commonly used by Highways England as found in the Design Manual for Roads and Bridges (https://www.gov.uk/guidance/standards-for-highways-online-resources#the-design-manual-for-roads-and-bridges) and in the Manual of Contract Documents for Highways Works (https://www.gov.uk/guidance/standards-for-highways-online-resources#the-manual-of-contract-documents-for-highway-works) to be used where possible. (B) **correlated with Highways England's aims and Key Performance Indicators (KPIs)** as given in the Road investment Strategy (RIS) . The publication for the 2015/16 – 2019/20 period is available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/408514/ris-for-2015-16-road-period-web-version.pdf • **Making the network safer**, contributing to a 40% reduction in deaths and serious injuries by the end of 2020 • **Improving user satisfaction**, with overall satisfaction scores rising to at least 90% • **Supporting the smooth flow of traffic** so that 85% of incidents are cleared in an hour, and 97% of the network remains open • **Encouraging economic growth**, supporting businesses, the construction sector, and the planning systems • **Delivering better environmental outcomes**, cutting noise exposure at 1,150 sites and reducing net biodiversity loss • **Helping cyclists, walkers, and other vulnerable users of the network** by increasing and improving crossings • **Achieving real efficiency** with work delivered on time and on budget, and generating savings of over £1.2 billion • **Keeping the network in good condition**, with at least 95% of the road surface not needing investigation for possible maintenance. and (C) An **outline** business case providing **financial justification** for the innovative material/technique, ideally showing long term (Whole Life Cost) benefits for Highways England. **Note:** At some point subsequent to publication of this document, electronic links to Highways England documents will alter. If there is any doubt that the links are out of date it is recommended that the latest documents are found on the Highways England website, and the issue brought to the attention of HE via email at PavementInnovationsDevelopment@highwaysengland.co.uk. HE documents can normally be found using an internet search tool.

Note	Description
	Details of the organisation providing the submission: Business name/owner name Business address and postcode, Business telephone number, Business email address: The contact email address/submission address is PavementInnovationsDevelopment@highwaysengland.co.uk
2	**Statement of the proposed 'solution'** Technical, operational, legal, market aspects for each product (or concept) need to be clearly articulated, against defined criteria determined by the HE 'gate team' for each stage. Considerations of financial matters are to be addressed under Note 3. <u>Technical</u> ●The providers **technical claims** for the new product shall be clearly explained and illustrated (by test data) to substantiate any end performance claims so HE can understand how it works in an engineering sense. The economic life cycle of the product is to be considered i.e. how many times can it be installed, and can it be recycled at end of 'life'? <u>Operational</u> ● The provider will outline the **production and installation** process, any special constituents involved, any material supply chain issues and/or production plant and distribution issues that may restrict product consistency and/or availability e.g. can any plant make it or does it require extra capital investment that may restrict supply coverage and capacity. ● The provider will identify any **SHE** issues associated with the product at any stage of its economic cycle e.g. plant emissions, potentially hazardous constituents, any special PPE required by the workforce etc

Note	Description
	Market ● The provider will address any potential **legal** barriers i.e. are there any patents in issue owned by competitors that could be enforced to restrict the providers activities? ● Are there any competing products/suppliers or is there only one supplier of the product? ● The provider will illustrate how the product can be **specified**, against what criteria and what testing and/or product certification scheme. ● Ideally this should address end performance.
3	**State benefit to Highways England** State how the solution addresses Highways England's needs in terms of KPIs: **RIS KPIs** (see links to documentation given in Note 1) ● Making the Network safer; ● Improving user satisfaction; ● Supporting the smooth flow of traffic; ● Encouraging economic growth; ● Delivering better environmental outcomes; ● Helping cyclists, walkers, and other vulnerable users of the Network; ● Achieving real efficiency; ● Keeping the Network in good condition. Indicate (net) projected / indicative level of improvement / impact on KPI and PI(s). Financial The provider shall illustrate how the new product provides financial benefit to a process or treatment. This might include a quicker process, a reduction in resources used, or a more durable product giving a lower whole life cost, for example.

Note	Description
4	**Description of Technical Approval** A full technical report should be submitted, as a minimum all test methods as required in the Normative Section of any relevant National Standards should be given. If applicable, CE certificates should also be provided. If a national standard does not exist then the legitimacy of any non-standard test data submitted must be demonstrated. Examples of technical evidence to be considered when not addressed by current HE Specifications or requirements: • Existing use on 'live' roads? • A road trial approved by a road authority? • Approved for use by a road authority? • Approved by an accredited third party approval body? • A proven track record through extensive use?
5	**Road Trial** Full details of the extent that the material has been used is to be submitted. This will include the condition of the road/asset before treatment, details of the treatment applied and the condition of the asset subsequent to treatment. Referees are required to confirm each notified use and that satisfactory performance was achieved. This could be dealt with through accreditation by a third-party approval body. **Maintenance Regime** How often maintenance/servicing will be required over the life of the material and what form that maintenance takes must be clearly stated. The expected safe life should be stated and the length of time the integrity of the material will be guaranteed for. Examples of sites meeting the promised life, or likely to meet the promised life, should be given where applicable.

Table 2 Technology Readiness Levels

Technology Readiness Levels	Description		TRL assessment implication & Further work recommendation	Responsibility
1	Basic principles observed and reported			
2	Technology concept and/or application formulated		(Further) Laboratory investigation and validation	Innovator
3	Analytical and experimental critical function and/or characteristic proof-of-concept			
4	Technology validation in a laboratory environment		Demonstration / validation of concept trial (off HE network)	Innovator
5	Technology basic validation in a relevant environment		Trafficked demonstration / validation of concept trial (off HE network)	Innovator (+ HE or other sponsor)
6	Technology model or prototype demonstration in a relevant environment		Demonstration / validation of concept trial (on HE network)	Innovator / HE sponsor
7	Technology prototype demonstration in an operational environment		If acceptable, authorise for DfS on project basis	HE
8	Actual technology completed and qualified through test and demonstration		Develop standard/specification	HE
9	Actual technology qualified through successful mission operations		Authorise duplicate / related technologies for Generic Network Approval. Publish new standard/specification in DMRB/MCHW	HE