

Fen Roads Record – Concept Papers

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Version	Approval required by	Date Sent	Comments
Draft v0.1	Anna Graham	7 August 2024	None
Draft v0.2	Tim Bellamy	8 August 2024	None
Draft V0.3	PMO	13 August 2024	Comments noted on the draft CP and sent to CCC 15/8/24
Final draft v0.4	Adrian Cannard/Judith Barker	15 August 2024	16 August 2024
Final Concept Paper sent to PMO v1.0	PMO	19 August 2024	



Fen Roads – Concept Paper

Submission Date	<i>19 August 2024</i>
Author	<i>Anna Graham</i>
Exec Director Signoff?	<i>Judith Barker 16 August 2024</i>

Key Project Information

Project/Programme Name	Fen Roads Trial		
Submitting organisation	Cambridgeshire County Council		
CPCA Directorate	Place and Connectivity		
CPCA Service	Transport		
Primary Strategic Objective	<p>This project is about enabling resilience in connectivity and therefore hits two of the 4 corporate Priorities.</p> <ul style="list-style-type: none"> • Enabling Resilient Communities (corporate deliverable – addressing how climate change is affecting our roads) • Improving connectivity 		
Accountable Owner	Tim Bellamy		
Delivery Responsibility	Cambridgeshire County Council		
Location of Project	<p>(Only one of following three routes identified to be chosen)</p> <ul style="list-style-type: none"> • B1104 Prickwillow Road Isleham, East Cambridgeshire. • B660 Holme Road, Ramsey St Mary, Huntingdonshire. • B1040 Herne Road, Ramsey St Mary, Huntingdonshire. 		
Funding type	CPCA funded, Gain share	Included in the MTFP?	<p>Yes. In the MTFP approved at CA Board 2024 for the Climate Programme funds are from the Capital Programme.</p> <p>(para 2.42 in 31 January 2024 MTFP paper)</p>

Brief Description Project/programme purpose: (single line only)

Trialling innovative solutions to address the continuing maintenance and safety problems related to roads constructed over fenland soil deposits which will inform future investment in C&P areas as well across the wider fens landscape region into Norfolk and Lincolnshire.

Detailed Description of the project/programme purpose: (be as full and descriptive as you can)

History

Over 1600km (c.40%) of Cambridgeshire's Road network lies on peat-based soils. These expand and contract significantly across seasons as they become saturated and then dry out. Recent years have seen the extent and frequency of this cycle, and the level of damage caused increase, presenting an increasing maintenance burden, largely due to climate change.

The traditional methods used to refurbish these roads previously are no longer providing the required outcomes in terms of extending the life of the road, halting further decline, and providing comfortable and safe surfaces. Longitudinal cracking on routes is posing a particular danger to vehicles and safety, including cycles and motorcycles as well as large lorries. Highly used routes now require traffic management; speed limits and safety signing to support safe use. This is all negatively impacting safe and active travel.

Cambridgeshire County Council (CCC) have maintained this asset over the years by patching and overlaying the affected areas. However, this method does not address the deeper-seated failures in the foundation layers and subgrade beneath.

To date, the county has had some success using one of the following three approaches, depending on the route:

- **Regen for lightly trafficked roads:** Shallow in-situ recycling 150mm deep with cement binder finished with double surface dressing.
- **Double Geogrid for higher levels of HGV traffic:** Deep plane-out and process ex-situ existing road; return 300mm of unbound recycled aggregate incorporating two confinement geogrid layers, finished with two layers of asphalt.
- **Roads containing failing concrete slabs:** Shallow plane-out and process ex-situ asphalt layers; rubblise existing concrete slabs then return 150mm of unbound recycled aggregate incorporating single confinement geogrid layer, finished with two layers of asphalt.
- Further background information can be found here: [Document.ashx \(cmis.uk.com\)](https://www.cmis.uk.com/Document.ashx)

The proposal is to create a case study that will trial all these solutions on the same stretch of road and compare their performance. This will inform future thinking with regards to treatment of this asset. The suggested options are as follows:

Trial options

- **Excavate and fill** using a lightweight recycled fill product.



- **Deep soil stabilisation** stabilises the underlying soil (peat in this case) up to 5m's below the existing road level to allow a more stable underlying foundation for the road to then be built on, [About Deep Soil Mixing - Soil Stabilisation, ground remediation contractor](#).
- **Ex-situ recycling** using a deeper performance enhancing three grid approach to create a flexible road. This approach uses the existing road as a linear quarry, recycling all the material into the new road layers without moving anything off site, (this ticks a lot of environmental boxes as well as proving effective to date).
- **Piping ditches** alongside the road on either side to reinforce the embankments and prevent edge failure / slippage.
- **Use of lighter weight aggregates** in the new construction layers to reduce the loading on the underlying soil - [Highways | Lightweight Expanded Clay Fill Aggregate \(leca.co.uk\)](#) and / or man-made construction aggregates which sequester CO2 - [Carbon Neutral Sustainable Construction Products | OCO Technology](#).
- **In-Situ Recycling with an 'ultra-low' carbon binder** using a H-EVA calcined clay product as an alternative to Portland Cement, this can save up to 55% CO2, and combined with a performance enhancing grid, installed under the new bound road layer.

- **New asphalt surface and binder courses** which use biogenic plant binders and alternative materials such as Graphene or Kevlar within the material mix to provide higher cracking and deformation resistance.
- **Monitoring** through sensors and probes inserted into pavement layers in the above sections to track movement, saturation, and temperatures.
- **A traditional inlay** control section for comparison.

Assuming a funding bid is successful Peterborough CC will be invited to sit on the project board, and all learning will be shared with them and more widely Cross authority, collaborative working on an issue which is front and centre locally and has cross party support. Engagement is taking place with other highway authorities, there is an initial meeting (8th October) has been arranged with Lincolnshire County Council and an initial contact with National Highway to gather their views and experiences. This issue impacts a large proportion of our road network in key business and income areas for the county, and wider region.

The project will be:

- A useful tool to demonstrate to central government the proactive approach being taken locally to identify potential repair solutions for fenland soils to inform future funding bids, including an opportunity to reach across to neighbouring authorities in Lincolnshire, Suffolk, and Norfolk to share best practise and innovation.
- Opportunity to engage with the construction industry with regards innovation, carbon reduction practices and mitigating the impacts of climate change on an issue which applies to 40% of the local road network.

The outcomes would include:

- Shared understanding of the most effective methods of tackling drought affected roads
- Understanding of the costs and benefits of the various trial methods
- Developing proposals to utilise the most effective methods to address climate adaptation on roads in the Fens

Timelines

<i>Proposed Start Date</i>	<i>Expected Duration of Project</i>	<i>Details of factors driving start and duration (why proposed start and end date have been chosen)</i>
<i>April 2025</i>	<i>April - Nov 2026</i>	<ul style="list-style-type: none"> • Assume approval to enter GFA in line with CCC governance procedures in place by Mar 2025 • 6 months for CCC programme management set up • 6 months design & investigation • 5 months procurement phase • 4 months delivery on site • Case Study production (assume 3 months) • Onwards monitoring timescales to be developed

Impact of not proceeding

Roads constructed on peat deposits are affected by climate change, warmer, wetter winters and hotter, drier summers cause significant changes in ground conditions. Not proceeding with the trial and identifying better more cost-effective methods would result in the continued use of traditional methods for road maintenance and increased frequency of maintenance interventions.

Climate change requires a response to mitigate or to adapt, the latter seeks to find ways to cope with the impacts of climate change and therefore, within scope of the climate budget.

These will not achieve the desired outcomes for safe travel around the county, will lead to increasing costs for maintenance plus require an increase in the use of traffic management, speed limit and safety signing due to road conditions – impacting growth, businesses and communities.

The Combined Authority is both the Strategic Transport and Passenger Authority. Whilst the Highways Authorities are responsible for the maintaining of the highway network, the Combined Authority has a responsibility to ensure that connectivity and passenger transport are maintained and improved – and not adversely impacted by climate change. The Directorate Business Plan for Place and Connectivity includes sub objective five - ‘Engage with partners to promote collaborative and strategic public sector asset management’ which the Fen Roads project would support.

At its meeting of 31 January 2024, the Combined Authority Board approved the Medium Term Financial Plan that included, ‘A further £9m of Capital and £2m of revenue is included in the MTFP proposals to help

deliver the Climate Action Plan and Local Nature Recovery Strategy, as well as developing innovative ways to support infrastructure being affected by climate change (e.g. the Fen roads) and to support the delivery of new requirements on biodiversity for constituent councils'. Therefore, there is already commitment to progress the Fen Roads Trial.

Financials (Estimates)					
Current Estimate for Total Cost of project/ programme		Funding structure and CPCA Contribution		Estimated cost for creation of business case	
£1.5M		100% contribution from CPCA.		What is the total estimated cost for design work and creation of business case? Up to £10,000 only.	
Cap ex?	£1.5M	Rev Ex		Combination of Rev & Cap Ex?	No
Assumptions or risks that could increase or decrease the total cost					
<ul style="list-style-type: none"> • Most if not all of the revenue could be capitalised as it relates to professional costs resulting in the creation of assets. • The test road needs to be at least 1.5km long for a successful trial • Road reconstruction could have unexpected additional costs due to soil conditions, construction inflation costs and the “experimental” nature of the trial. • Business case creation costs are included in the estimate 					
Benefits (Benefits must be measurable)					
Type	Description			Assumptions or risks that could increase or decrease the total benefits	
Financial benefits	<p>The project will allow CPCA and partners to learn the following:</p> <ul style="list-style-type: none"> • Quantitative data of the delivery cost, construction processes & methodologies, effectiveness of different repair solutions to enable the road network on peat soil deposits to adapt to climate change – reducing maintenance costs in the future. • It will also create better understanding of how we reduce the likelihood of disruption of road failures to businesses and communities which will have a positive economic impact for them, i.e. getting from a-b by the most efficient route possible instead of navigating alternative 			<p>The assumption is that the methodologies trialled at least one proves effective in the longer term.</p> <p>The cost of delivery of unique methodologies does not out way multiple future interventions in the future.</p> <p>Further investment, on a much larger scale than currently will be required, (once findings are known), from central government to change fen soil road network from a declining to an improving asset.</p>	

	routes, or the same route but at a reduced speed.	
Non-financial benefits	<p>The project will allow CPCA and partners to learn the following:</p> <ul style="list-style-type: none"> • Subsequent implementations are likely to have a higher chance of success. • Safety, journey time improvements, reduced maintenance time. • 40% of the road network is built over fen soil deposits which are being impacted by climate change, investment in this area demonstrates we are seeking to mitigate the impacts of this pro-actively to our communities. 	The new techniques could reduce future maintenance interventions and avoid disruption, caused by carriageway failures, to the public, communities and economic growth

Risk, Assumptions, Issues and Dependencies (RAID)

Known Risks	<ul style="list-style-type: none"> • Weather Conditions need to be dry and at an appropriate temperature to enable materials to meet testing standards. • Traffic Management maintenance will be 24hrs/7 days a week which could cause negative public and media interest • Innovative materials or methodologies may require technical approvals prior to installation which could require additional time or highlight mitigation measures • Monitoring regime will be required which depending on outcome of work may be more intensive than originally thought • Interface with utilities, avoid impacting or divert existing utilities, the extent will not yet be known until design is undertaken • Market engagement for suppliers could impact time and cost (if seen as too specialist) • Road Space availability/interaction with other works/third parties could cause delays. 					
Known Assumptions	<p>Initial materials and methodologies have been identified; however, the trial will seek to develop these further and, consider any other options. The trial will seek to undertake the development and delivery of these test methodologies.</p> <p>All revenue will be capitalised.</p> <p>Cambridgeshire County Council will lead the procurement.</p>					
Known Issues	<p>Risks have been identified above. The monitoring regime following the implementation of the scheme is not yet known, but will be considered during the development stage</p>					
Known External Dependencies	<p>Contractor availability and appropriate expertise. The trial road needs to have appropriate traffic diversion option during construction.</p>					
Known internal Dependencies (tick)	<i>Comms</i>	<i>Procurement</i>	<i>Legal</i>	<i>Finance</i>	<i>HR</i>	<i>Policy & Insight</i>
	X		X	X		X

which shared service is
required)

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