



# Highways England's Supply Chain Capability

Prepared for ORR

February 2016

**FINAL REPORT FOR  
PUBLICATION**



OFFICE OF RAIL AND ROAD



# Notice

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# Agenda

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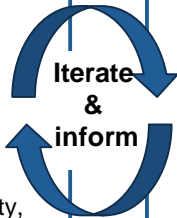
- **Executive summary**
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# Study overview & scope: Credo has assessed HE's supply chain to identify the key areas of potential capacity constraint over the RIS. To support this, we have led an extensive fieldwork campaign and built a high-level model of resources required

**Study objective:** Understand the capacity constraints within HE's supply chain that could influence deliverability of the first Road Investment Strategy (2015/16 – 2019/20)

### Fieldwork campaign

- Total of 40 – 45 interviews with the supply chain, including:
  - Tier 1 (e.g. CDF & MAC contractors)
  - Tier 2 (specialist suppliers)
  - Tier 3 (raw materials/ product suppliers)
  - Professional associations & experts
- Questions covered current and future capacity, and views on HE's approach to programme management
- Overall, the supply chain has shown a strong level of engagement with the study

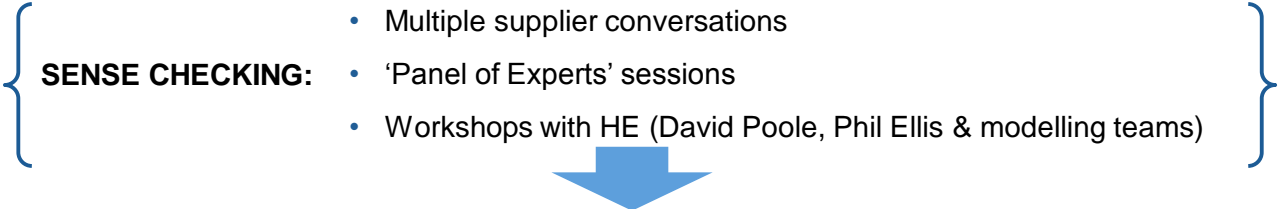


### Quantitative analysis

- We have built a high-level quantitative view of resource requirements and the profile of this demand:
  - Focuses on major projects, which will see significant growth in investment (c.23% pa.) between FY15<sup>1</sup> (pre-RIS 1) and FY20 (end RIS 1)
  - Uses case studies of past delivery to build a set of high-level metrics (e.g. *construction FTE per lane km*) for each of 5 project types. These metrics are then scaled up across the workbank of historic and future projects
- We have made a number of iterations and refinements: clarifying assumptions with suppliers, feedback from Panel of Experts, HE workshops

### Demand from adjacent industries

- We focus on key areas of adjacency where:
  - Skills and capability requirements overlap with those of HE
  - A material increase in spend is forecast during the RIS period (therefore representing material increase in demand vs. current levels)
- We assess infrastructure demand in detail, and in particular the impact of HS2 and planned new nuclear at Hinkley Point
  - These areas are consistent with suppliers' feedback in terms of key skills overlaps, especially at Tier 2, including earthwork, civils, drainage, and technology



### Recommendations for:

- 1 Supply chain capacity assessment**
- 2 HE's engagement with supply chain**
- 3 HE & ORR's monitoring of progress**

# Summary of findings [1/4]: This study assesses the capacity and capability of Highways England's supply chain to deliver the Road Investment Strategy

## Market situation and background

- HE manages the Strategic Road Network (SRN), comprising all motorways and most major 'A' roads in England
  - HE mainly delivers infrastructure works via outsourced contractors, though project scoping and programme management is delivered in-house
- Historic investment in the SRN (since c.1960) has fluctuated due to political and economic factors – often referred to as 'boom and bust'. In particular, there has been a period of relative underinvestment since c.2000
  - Suppliers suggest this variable profile of investment has inhibited planning and has resulted in periodic under- and over-capacity
- Looking ahead, the Road Investment Strategy (RIS) sets out the government's investment in the SRN across the first Road Period (2015/16-2019/20)
  - A total of £12.8bn of spend<sup>1</sup> has been committed over this period, covering major projects (capital enhancements), capital renewals and resource maintenance
- In particular, the RIS will more than double annual expenditure on 'major projects' (also referred to as enhancements) between 2015/16 and 2019/20. Such projects include road widening, junction works, construction of new roads and smart motorway schemes
  - By contrast, spend on maintenance and renewals is forecast to be flat over the period, and broadly in line with the historic average spend
- HE's supply chain is broadly split into three tiers: Tier 1 (design and project management), Tier 2 (specialist sub-contractors) and Tier 3 (materials and product suppliers)
  - HE generally contracts directly with Tier 1, though there have been recent moves towards a model of contracting directly with some Tier 2 suppliers
- HE engages a range of contracting models: the Collaborative Delivery Framework (CDFs) is common for capital works and Asset Support Contracts (ASCs) are replacing Managing Area Contracts (MACs) for maintenance works
- There are 24 Tier 1 suppliers on the CDF, which will be the primary delivery framework for contracting RIS major projects
  - Many of these Tier 1 suppliers also work outside of highways; for example in the rail or aviation industries

# Summary of findings [2/4]: The profile of resource requirements increases materially over the five years of the RIS. Suppliers indicate this will lead to capacity constraints, with ‘people’ representing a significant area of concern

Supply chain capacity assessment

### Core HE demand

- We assume that the most material capacity constraint will arise from the significant increase in spend on major projects. We assume the supply chain has adapted to deliver maintenance and renewal volumes at approximately FY15 / FY16 levels, and therefore we focus our quantitative analysis on major projects
  - Projected HE spend on renewals and maintenance over RIS is broadly in line with recent years and not predicted to increase materially – we have captured qualitative comments from suppliers on renewals and maintenance demand where relevant
- We examine the change in resource requirements for major project work between FY14-16 (historic period) and FY16-20 (RIS 1). Resource profiles have been estimated through case studies of past project delivery in five key project types (e.g. dualling, junctions). Our methodology is described in full on p.29.
- A number of new major projects have commenced over the last two years, leading to a steady increase in demand over FY14-16
- Our modelling shows that demand will continue to increase in the early years of the RIS in each of people, plant and materials. This profile dips in FY18 before continuing to increase – with FY20 and FY21 representing the strongest demand
  - The inflection in profile at FY18 is in part due to reduction in the number of active projects (from 40 in FY17 to 33 in FY18), but also a changing project mix; FY18 has a lower number (and proportion) of resource-intensive dualling, junction and new road projects – see profile on p.34

### Other infrastructure demand

- Highways represent only c.6% of total planned UK infrastructure spend to 2020. Conflicting demand for resources from adjacent markets is therefore a material risk to delivery of RIS (for example all of the CDF contractors (Tier 1) provide design and management across other sectors, with particularly strong overlap to rail)
- Key adjacencies where significant increases in spend are planned over the RIS period include:
  - High-speed rail: construction of this new line on green field will require many of the same specialisms as roads (including earthworks, road realignment, drainage, logistics and structural works). The project is currently planned to overlap with RIS from 2017/18 onwards
  - Nuclear: a new power plant at Hinkley Point is yet to be confirmed, but represents significant civils spend (c.£2bn/annum) from 2016

### Assessment of deliverability and identified risks

- **People** represent the largest challenge to the industry, with interviewees frequently mentioning shortages of experienced project managers and engineers
- The industry need to improve its attractiveness to new entrants (in both construction and management roles), particularly given suppliers’ comments on an increasing age profile
  - Existing mitigations, such as recruitment initiatives and improvements to utilisation, are likely to have a long lead-time before taking effect
- **Plant:** Interviewees reported an overcapacity in plant as a whole, despite long (6-18 month) lead times, although a strong overlap with other industries was noted, potentially making it harder to source plant as other adjacencies begin to demand more
  - Overall, suppliers should be able to mitigate for increased plant demand, but will require forward guidance
- **Materials:** were identified as the area of least concern, with a UK and international ability to meet increased demand
  - There is a capacity to scale in current production sites, and importation and quarry expansion can help to meet increased future demand (albeit with a requirement for capital investment)



The industry needs to address issues of attractiveness and ensure availability of skilled resource – in particular considering the major projects demand profile and competition from other industries

# Summary of findings [3/4]: While HE's project delivery has improved in recent years, suppliers are looking for more detailed, consistent demand visibility. Finally, we identify how Highways Monitor might gain early-warning of key risks to the programme

## HE approach to procurement and project management

- Over recent years, HE has made improvements to its delivery of major programmes as a result of a Transformation Programme (actioned between 2007-11); this has been described as successful in independent reports
- However, suppliers have raised concerns in three key areas:
  1. Across the whole supply chain, visibility of work is a critical factor, and needs to be issued at a sufficiently early stage, and in sufficient detail, to enable individual suppliers to build the business case for investment in scaling resources
    - Tier 2 suppliers in particular require more detail on skills/capability requirements (a level of detail beyond the outline scope and budget estimate currently provided in the HE Procurement Plan). The notice required to scale varies by resource – e.g. suppliers stated c. 6 months for skilled labour, 12 months to materially increase asphalt production, or between 18-24 months for bespoke equipment (e.g. extrusion trucks)
    - To date, suppliers report mixed signals from HE; in particular some reassignment of planned spend on maintenance has impacted confidence. When interviewed, some suppliers suggested their individual revenues have fallen an average of 40% in spite of calls to 'gear for growth'
  2. The procurement process for the largest contracts is viewed as appropriately rigorous, however Tier 2 suppliers consistently report little flexibility in procurement requirements for smaller lots (increasingly common should the new direct contracting model be extended). In some cases, smaller suppliers struggle to support investment required to bid for work
  3. Suppliers have mixed views over the new direct contracting model; larger Tier 2 suppliers welcome a principal contractor role, though some question whether sufficient management expertise can be built within HE under the timescales proposed
- The overall picture shows some signs of strain in the relationship between HE and the supply chain. Going forward, improved visibility of the workbank, particularly around the specific (specialist) requirements within projects would help to address many supplier concerns

## Key performance indicators and recommendations for ORR

- ORR is looking for HE to develop an appropriate approach to monitoring the delivery of RIS that will enable early-warning of the risks identified such that impact on deliverability and cost of the programme can be minimised
- This approach should account for the distinction between assurance of *project* delivery and that of the overall RIS *portfolio* (see p.71)
  - The portfolio impact is important when assessing interdependency – where slippage occurs on a given project, this can have broader impacts on the delivery of other projects and the overall portfolio, particularly when overall resources are constrained (as is likely to be the case for RIS)
- HE's current monthly report to ORR provides useful detail, but is a broad update covering both RIS projects and other areas of HE delivery
- To improve this, we suggest HE establishes a monitoring framework specific to RIS that provides a concise summary 'dashboard' of key risk areas, accounting for:
  - Project progress – a project-by-project view of progress against the agreed baseline, with reporting subject to regular external audit
  - Impact of adjacent infrastructure markets - analysis of infrastructure plans at regional level as indicators of overlapping demand
  - Indicators of future trends – for example construction price indices and raw materials/commodity prices – to identify external influences on cost
  - Portfolio health – an identification of how the above factors may impact delivery of the broader portfolio of work. This should be built up based on comparing an up to date latest view of the RIS programme vs. original baseline plan – particularly in terms of cost and delivery timeframe



**There is room for HE to engage further with suppliers on its forecast demand, and to develop (with ORR) an appropriate system of monitoring to give early warning of key risks**



# Summary of findings [4/4]: To bring the reporting dashboard to life, we have set out a framework for how this could work *(though this would need to be worked up in detail in terms of input data, analysis required, and format of output)*

- 1. Individual project risks**
- Identifies individual projects with material cost, timing or other risks
  - Should be a subset of a larger 'full project' dataset, that tracks the progress of every RIS project
  - Both the dataset and processes around measuring and recording data should be externally audited

- 3. Overall RIS portfolio risks**
- Gives a summary view of the overall impact of individual RIS project delays, and other infrastructure/ construction programmes
  - Based on a HE latest full view of the RIS plan (vs. baseline), incorporating both 1. individual project risks and 2. 'Competing industry' risks
  - Focus on top level cost and timings, both to date and projected over the full RIS programme

**[[Illustrative] RIS summary dashboard: Month, 201X**

**1. Individual project risks**

Project	Risk description	Risk impact					Current mitigation plan
		Cost	Delays	Network opps	H&S	Other	

**2. 'Competing industry' risks**

Infrastructure programme	Parts of RIS affected	Risk impact		Current mitigation plan
		Cost	Delays	

**3. Overall RIS portfolio risks**

RIS COSTS vs. baseline			
	Baseline	Actual	Variance
RIS to date	£Xbn	£Ybn	£(Y-X)bn
Projected full RIS	£Abn	£Bbn	£(B-A)bn

RIS timings & delays vs. baseline				
	No. of projects		£ cost of projects	
	Started	Total	Started	Total
Total				
On-time				
<6mnths delay				
>6mnths delay				

**4. Other macro risks**

Example indicators	Data	RISK
General	GDP	R/Y/G
	Construction Output	
People	Labour cost Indices	
	Other	
	HGV employment	
Plant	Other	
	Material Price Indices	
Materials	MPA data	

- 2. 'Competing industry' risks**
- Identifies other infrastructure (and broader construction) programmes that will impact the delivery of the RIS
  - Identifies which parts of the RIS will be affected (e.g. specific regions, types of construction activity)
  - Summary qualitative and quantitative information shown on dashboard e.g. 'HS2 plans currently likely to affect the following 4 projects; mitigation plan to start these projects 12 months earlier'

- 4. Other macro risks**
- Tracks key indicator data to give ORR some visibility of future trends, including:
    - Macro construction demand (e.g. GDP, CPI, Construction output)
    - Cost/ price indices around labour, plant and materials
  - Data gathered at a UK and regional level
  - Dashboard shows key trends and risks (e.g. Labour cost risen by 15% over last 12 months)
  - Should be factored into HE latest full view of the RIS plan (vs baseline)

# Conclusions: The study provides a number of key conclusions – notably for HE to improve suppliers’ visibility of requirements, and therefore their ability to plan for upcoming RIS demand



- **People** present the strongest capacity constraint (though there remain issues elsewhere)
- The industry needs to do more to address:
  - **Availability** of skilled resource (especially at a management level)
  - **Attractiveness** of a career in highways to new entrants

• HE to consider **optimising profile of work** and review this on an ongoing basis (we note modelling is in progress)

- HE should focus on:
  - Developing a more detailed forward **visibility** of demand that is specific and relevant to all contractors and communicating this effectively on an ongoing basis
  - Aligning **procurement** more closely with suppliers’ ability to bid
  - **Engaging with suppliers** (Tier 1 and 2) on any further roll-out of the ‘Area 7’ direct contracting model to understand concerns

- There is work to be done by HE to develop a clear and concise set of measures for ORR to monitor progress of RIS 1. These need to cover:
  - **Project progress:** scheme-by-scheme risks vs. an agreed baseline
  - **Adjacent infrastructure sectors:** Impact on RIS
  - **Indicators of future trends:** (e.g.) construction prices, unemployment rate
  - **Portfolio health:** to indicate the overall risk to cost and delivery time of the RIS programme

**Key**  
[Dashed box icon] Key areas to commence activity in the short-term

# Recommendations: We identify areas where there is opportunity for HE to develop clear action plans in order to minimise risk to delivery of the RIS

	Item	Opportunity	Page ref.	Responsible
1 Capacity ass'ment	Modelling of demand	<ul style="list-style-type: none"> <li>HE is building a detailed demand model at a very granular level (e.g. capturing c.43 distinct job roles in the 'people' category). This model may take some time to refine, and it will be challenging to achieve accuracy at such granularity</li> <li>There is an opportunity for HE to develop a high-level modelling approach first, to indicate the likely quantum and profile of resources, which can be compared and contrasted with the high-level quantitative analysis undertaken for this study. HE should consider sharing input assumptions with suppliers and refining its modelling on an iterative basis</li> </ul>	-	HE
	Provide suppliers with visibility	<ul style="list-style-type: none"> <li>There is an opportunity for HE to provide a more detailed view of demand/project requirements, sufficient to give Tier 2 suppliers knowledge of which specialisms are likely to be required for which projects, and at what scale. The current Procurement Plan provides only outline project and go-to-market information, applicable primarily to Tier 1s</li> <li>Better visibility of the detailed scope of works required for each RIS project (incl. specialisms required) would allow better planning throughout the supply chain</li> </ul>	pp.64, 68	HE
2 Supplier engagement	Supplier engagement	<ul style="list-style-type: none"> <li>Linked to the above actions, there is an opportunity for HE to engage more widely with the supply chain below Tier 1, to set out anticipated demand and to address concerns over its management approach. The current activity via Engagement Council / Collaboration Board had little recognition amongst suppliers interviewed</li> <li>Consideration of alternative approaches to procurement practice should form part of this – e.g. can early engagement, longer-term contracts or different frameworks improve suppliers' visibility and ability to plan?</li> </ul>	p.68	HE to lead, with industry participation
3 Monitoring progress	Baseline plan	<ul style="list-style-type: none"> <li>There would be benefit from HE setting clearer baseline delivery plans for the RIS portfolio, detailing project scope, timelines and budget</li> <li>This should be shared and agreed with ORR and subject to change control procedures going forward. All progress (and reporting) should be measured from this point</li> </ul>	p.72	HE to lead
	Portfolio management	<ul style="list-style-type: none"> <li>There would be benefit from HE ensuring and demonstrating sufficient portfolio management capability (actions listed on p69), and linking this into its reporting of progress</li> </ul>	p.71	HE to lead, reporting to ORR
	Reporting	<ul style="list-style-type: none"> <li>There would be benefit from HE ensuring it has a robust framework for reporting on progress of RIS 1 in place – including identifying a set of metrics to monitor, account for ORR's requirements, and ensure practicality (e.g. availability of data and its accuracy)</li> <li>This should result in a RIS-specific dashboard of measures, covering: individual project progress; impact of adjacent infrastructure markets; macro-economic indicators; and leading to an overall view of RIS portfolio health</li> </ul>	p.72	HE to lead, reporting to ORR
	HE capability assessment	<ul style="list-style-type: none"> <li>There is an opportunity for HE to assess, and share with ORR, its competency across key management disciplines to deliver against RIS requirements (including project management, sponsorship, commercial, procurement, etc.)</li> <li>There would be benefit from setting out a clear action plan to address any gaps identified</li> </ul>	p.71	HE to lead

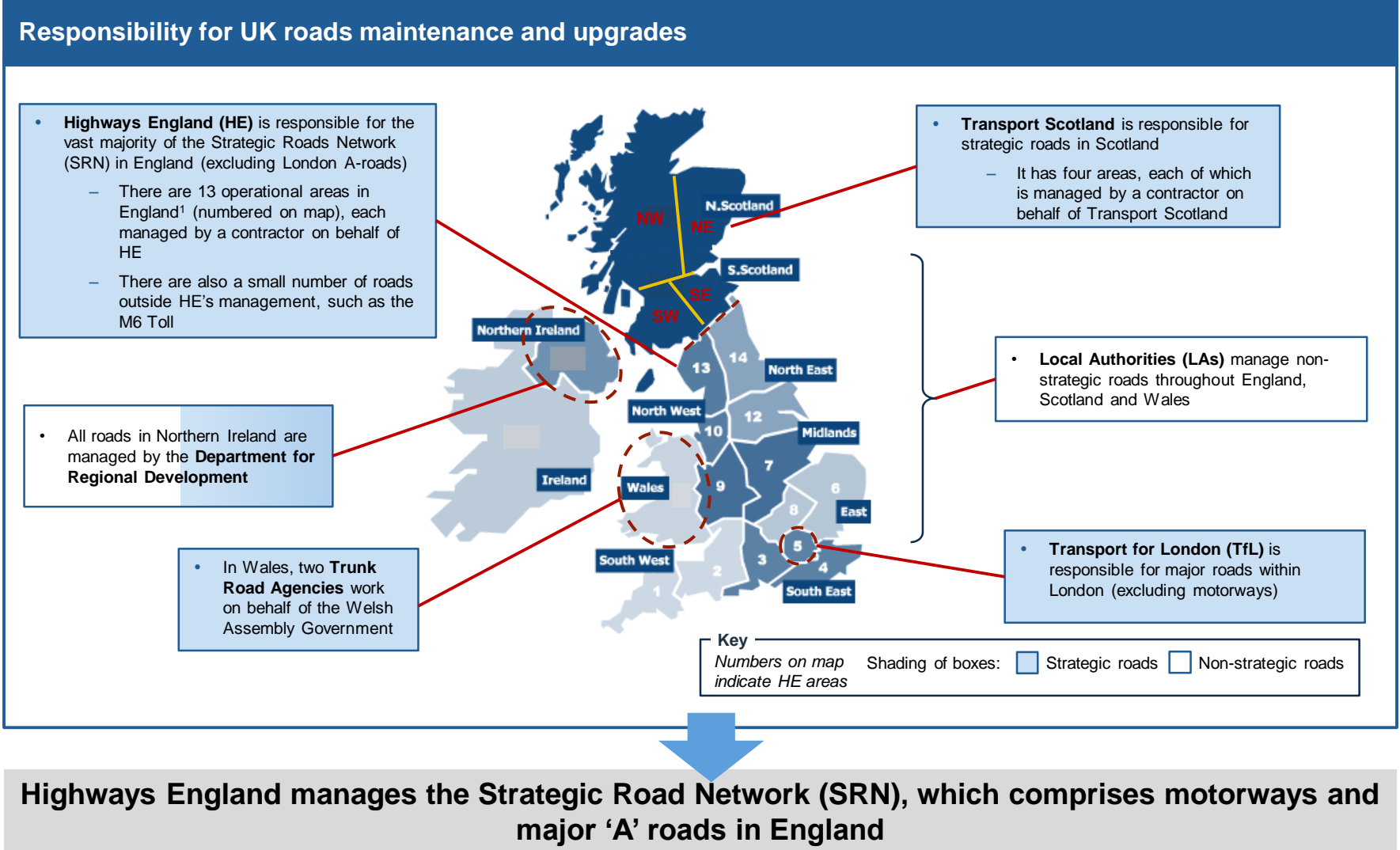
**Key opportunities are for HE to articulate its future demand, communicate this to the supply chain, and propose a process for ongoing monitoring for ORR's approval**

# Agenda

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- Executive summary
- **Market situation and background**
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  - Supply chain overview
  - Historic and future investment profile
- Supply chain capacity assessment
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# Responsibility for maintenance and capital works on UK roads is shared between Highways England, Local Authorities and TfL



**Notes:** <sup>1</sup>There is no longer an Area 11, hence 13 areas overall despite highest-numbered being Area 14  
**Source:** HE; TfL; Transport Scotland; DRND; Welsh SWTRA & NWTRA website; Credo fieldwork & analysis

# Highways England (HE) was formed in April 2015 to replace the Highways Agency; it manages the infrastructure of the SRN, including overseeing maintenance and capital works

## Highways England

- Highways England manages the SRN, overseeing maintenance and capital works on the infrastructure as well as providing traffic information and incident support for road users
  - HE primarily outsources its infrastructure works (beyond initial needs assessment and programme design) to private-sector contractors (see right)
- Highways England (HE) replaced the Highways Agency in April 2015, as part of its transition from a government agency to a government-owned company
  - The aim of transitioning HE to a government-owned company was to protect budgets for a longer period, limiting the cyclical nature of roads investment (see p.17)
- Alongside the creation of HE, the government announced a large investment programme, the Roads Investment Strategy (RIS), to be overseen by the company
  - The RIS will represent £12.8bn of spend between FY16 and FY20, with a large proportion of this (c.£7.6bn) designated to major capital projects
- For the purposes of this report, we consider HE's key responsibilities towards the RIS to include:
  - Delivery of investment plan
  - Carrying out scoping and overseeing high-level design of projects
  - Engaging the supply chain to give visibility of upcoming works
  - Running procurement processes to select private sector suppliers
  - Phasing works delivery by the supply chain, and allocating work packages to contractors

## HE delivery models for capital and maintenance works

Work type		Delivery model	Contracts/ frameworks in use
Capital	<b>Major projects</b> <i>New build or significant upgrade / enhancement</i>	<ul style="list-style-type: none"> <li>HE carries out initial design and project programming</li> <li>Detailed design is generally outsourced</li> <li>Delivery of works is always outsourced</li> </ul>	<ul style="list-style-type: none"> <li>Collaborative Delivery Framework (CDF)</li> <li>Specialist Technical Support Framework</li> <li>Open tender through OJEU<sup>1</sup></li> <li><i>(Note: some renewals work is understood to flow through maintenance frameworks)</i></li> </ul>
	<b>Renewal</b> <i>Reconstruction of life-expired components</i>	<ul style="list-style-type: none"> <li>Delivery of works is always outsourced</li> </ul>	<ul style="list-style-type: none"> <li><i>(Note: some renewals work is understood to flow through maintenance frameworks)</i></li> </ul>
<b>Maintenance</b> <i>Minor repairs; prevention of deterioration</i>		<ul style="list-style-type: none"> <li>Outsourced to contractors who hold performance contracts to maintain roads in a given HE area (see previous page)</li> </ul>	<ul style="list-style-type: none"> <li>Managing Agent Contractor (MAC)</li> <li>Asset Support Contract (ASC)</li> <li>'Area 7' pilot of direct contracting to Tier 2 (see p.23)</li> </ul>



**HE mainly works with outsourced contractors to deliver infrastructure works, though initial design and programme management are delivered in-house**

# The Office of Rail and Road (ORR) is responsible for monitoring HE’s performance and efficiency; this study forms part of its ongoing work to assess the deliverability of the RIS

## The role of ORR as Highways Monitor

<p><b>Formation of Highways Monitor</b></p>	<ul style="list-style-type: none"> <li>Following the passing of the Infrastructure Act 2015 the Office of Rail Regulation became the Office of Rail and Road</li> <li>ORR now functions as ‘Highways Monitor’ alongside its role as economic and safety regulator for UK rail</li> </ul>
<p><b>Responsibilities</b></p>	<ul style="list-style-type: none"> <li>The Highways Monitor’s responsibilities are:             <ul style="list-style-type: none"> <li>Holding Highways England to account</li> <li>Monitoring safety and performance on the SRN</li> <li>Ensuring value-for-money in highways spend for the taxpayer</li> <li>Monitoring road user satisfaction</li> <li>Providing guidance and assistance to the government on Highways England assessment and regulation</li> </ul> </li> <li>To achieve these objectives the ORR is empowered to initiate and run investigations as appropriate</li> </ul>
<p><b>Leadership</b></p>	<ul style="list-style-type: none"> <li>Peter Antolik has led the Highways Monitor function of the ORR since March 2015</li> <li>ORR’s Highways Committee oversees the work of the Highways Monitor, chaired by Stephen Glaister</li> </ul>
<p><b>Current activity</b></p>	<ul style="list-style-type: none"> <li>In the past 6 months             <ul style="list-style-type: none"> <li>HE has supplied ORR with monthly “dashboard” updates</li> <li>Highways Monitor has engaged with industry stakeholders, including through Panel of Expert sessions</li> <li>The first 6 month report on HE’s performance was published, covering the period from March - September 2015</li> </ul> </li> </ul>

## ORR/Credo RIS supply chain capability study

- Further to the objectives outlined on the left, the Highways Monitor has initiated this study to assess the risks to delivery of the RIS and the associated potential for cost escalation
- Specifically, this study assesses Highways England’s supply chain to identify:
  - Capacity, capability and readiness to deliver the RIS;
  - Risks and constraints to delivery of the RIS;
  - Risks from other competing clients; and
  - Risks to cost escalation during RIS period and beyond.
- To achieve this Credo has:
  - Undertaken an extensive fieldwork study with over 45 participants from across the industry, including:
    - Tier 1,2 and 3 suppliers
    - Industry body representatives
    - HE representatives
  - Created a high-level demand model using case studies and available RIS and SRN data to compare historic delivery to RIS requirements
  - Synthesised findings from both exercises to conclude the key areas of supply-chain related risk



**This study aims to inform Highways Monitor on the capacity and capability of HE’s supply chain and highlight potential areas of risk to the RIS**

# Agenda

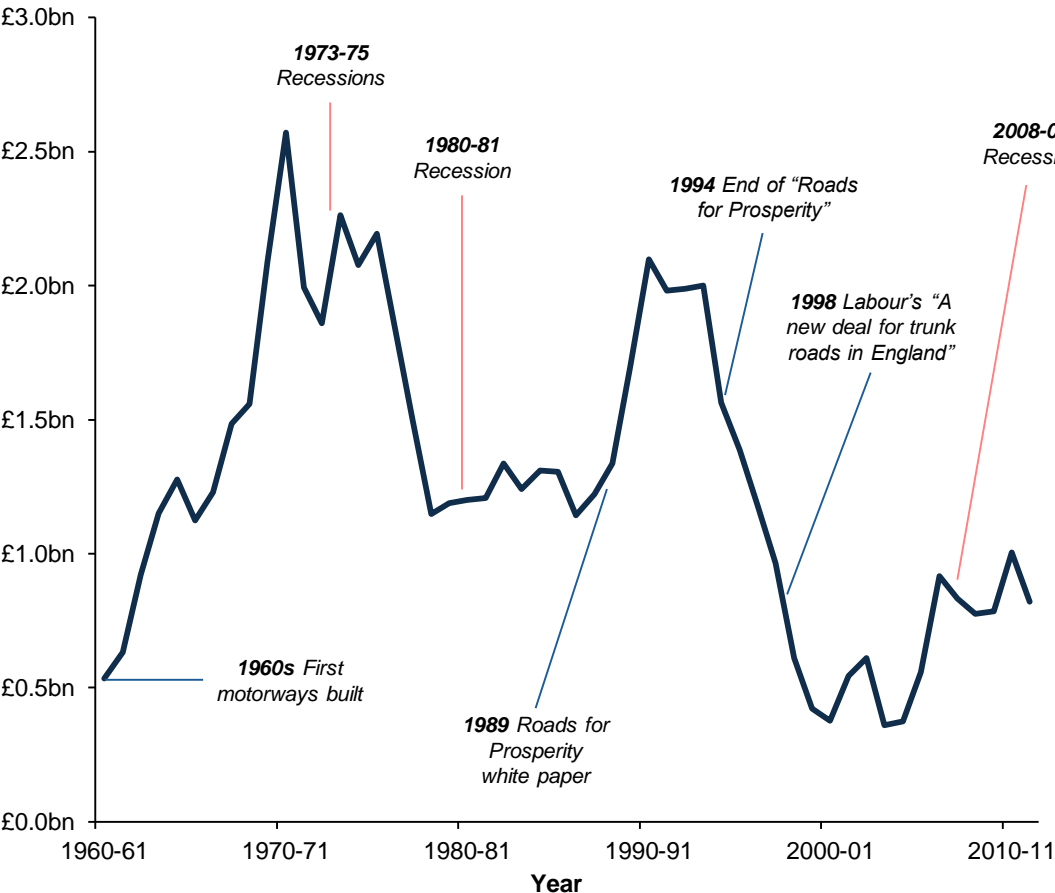
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  - **Historic and future investment profile**
  - Supply chain overview
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- Key Performance Indicators and recommendations for ORR



# Funding for the Strategic Roads Network is directed from DfT's budget. Major project investment has seen significant cyclicity over the last c.30 years

Highways major project investment (real terms) 1960-2011<sup>1,2</sup>



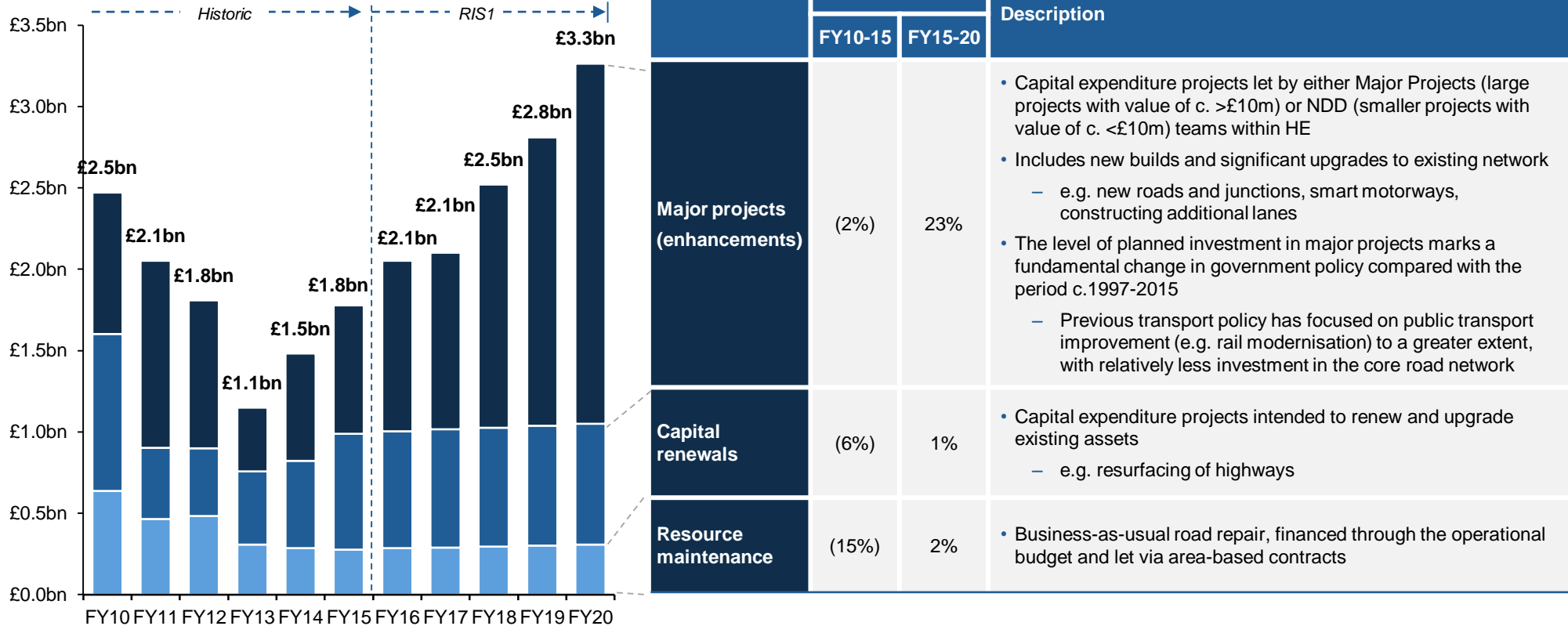
- The Strategic Roads Network has existed since 1958 when the first motorway was built as part of a major road investment programme
  - Funding for the SRN has been the responsibility of the DfT and its predecessors
- Since then, investment in major projects (shown left) shows cyclicity over a c.20 year period, as dictated by:
  - Political objectives and pressures (public transport initiatives, regional development policies, changes in ministry/department responsible for road building, pressure groups)
  - Macroeconomic cycles (recessions, economic uncertainty and periods of growth)
  - Environmental concerns (CO<sub>2</sub> emission concerns, prohibition of building on environmentally sensitive sites)
- Investment has followed a “boom and bust” pattern since 1960, with peak investment of £2,572m in 1970-71<sup>1</sup>, in real terms over seven times the £361m spent in 2003-04<sup>1</sup>
  - In particular, average annual investment since 2000 has been £690m/year, well below the (real terms) long-term average of £1,265m/year



**Investment in the SRN has fluctuated due to political and economic factors. Most recently, there has been a period of relative underinvestment since c.2000**

# Looking ahead, the RIS will bring a material step-change in major projects to extend, upgrade and improve infrastructure on the SRN. Investment in renewals and maintenance is forecast to be broadly flat

## HE/HA investment in Strategic Roads (FY10 – FY20)



### Key assumption:

We focus our modelling on the step-change in major projects investment (growing at c.23% pa.)  
We assume the supply chain can continue to deliver renewals and maintenance at broadly the level achieved in FY15 (though comment qualitatively on overlaps)

# For the supply chain, the RIS is intended to afford greater visibility of planned spend over the first Road Period (2015-2020)

The RIS intends to provide improved visibility of future projects...

- *“Through the Road Investment Strategy (RIS) we will be providing clear objectives for the SRN underpinned by more funding certainty. This will enable the more efficient, effective and innovative delivery of a safer and more reliable network.”*

Department for Transport

...though the level of detail will improve further over time.

- Highways England is committed to providing more transparency around activities and forward planning
- RIS 2 (2020-2025) will provide further long-term visibility and funding commitments, enabling strategic planning in the supply chain

Suppliers look for certainty of demand before making material investments...

- *“Our growth plan is based on forecasting, not speculation. We only aim to grow if we can do so sustainably, which requires a level of certainty of future work.”*

Tier 1 Supplier

- *“Purchasing a unit of [specialist] plant is a huge capital outlay for us – it takes over 5 years to recover our costs so we cannot invest if there is a possibility of work tailing off after three.”*

Tier 2 Supplier

- *“I am confident that we can scale to whatever capacity HE requires, but to do so we need to know there will still be work for those new employees tomorrow.”*

Tier 2 Supplier

...and the consequences of a lack of certainty can impact the supply chain's delivery capability.

- *“After 18 months of little work in highways we have started moving people into the rail sector. Under the current arrangement we tend to see long periods of low demand. Without continuous work our highways capability diminishes over time.”*

Tier 1 Supplier

- *“Some of our Tier 1 partners are very good, but others leave us in the dark until the last minute. We can usually still supply them sufficiently, but at a much greater cost. With more visibility of the pipeline we would be able to provide the same products at a much cheaper price.”*

Tier 3 Product Supplier



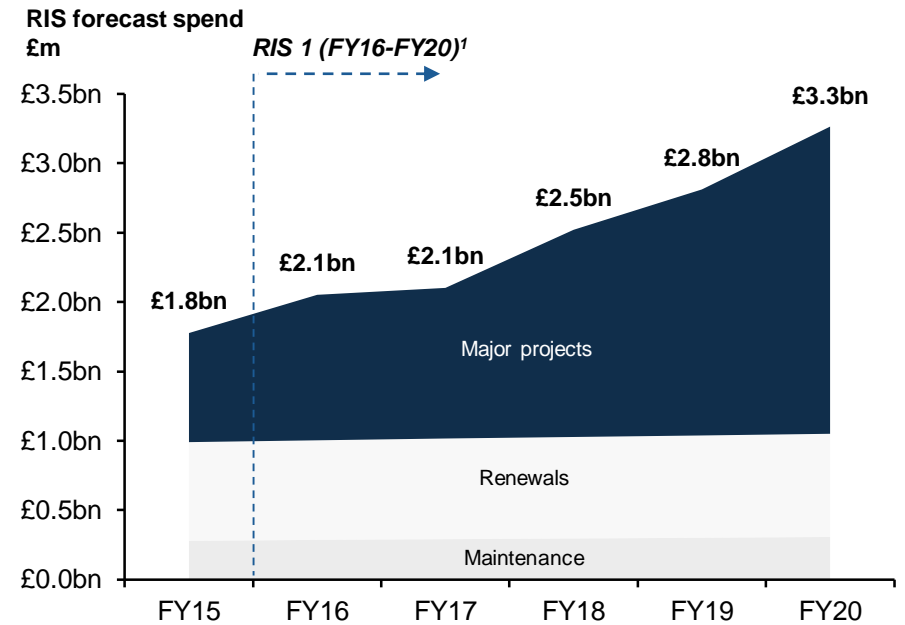
**The RIS should provide greater certainty and visibility of future highways projects, which may improve suppliers' willingness to invest to match their capacity to upcoming demand**

# The programme of 112 major projects is designed to deliver key outcomes for the SRN around traffic, safety and economic growth. Major project investment will reach £2.2bn per annum by FY20

- The DfT has set out a number of factors that motivate its programme of investment in the SRN
  - Increasing traffic volumes and congestion across the SRN require modernisation and expansion of the network
  - Areas of the network require modification to address safety and environmental concerns
  - Infrastructure renewal and modernisation is viewed as driver of economic growth
- The RIS includes a programme of 112 major capital projects or schemes
  - Some schemes are already under construction (through funding designated in the Spending Review 2010 and in the Autumn Statement of 2011 & 2012) and their ongoing works have been included in the RIS funding envelope
  - A significant number of existing (previously unfunded) schemes have been provided with resources to go ahead as part of the RIS (49 schemes announced in December 2014)
  - Six new feasibility studies have identified a range of projects to commence towards the end of the RIS, which have also been included
- This leads to a material major project workbank, which will be delivered through £7.6bn of funding over the RIS (FY16-20, blue shading in chart, right)
  - This expenditure is phased over five years, rising to annual spend of £2.2bn in FY20, around twice the average expenditure from FY10-FY15
- The RIS provides a guarantee of this expenditure, which is intended to allow the supply chain to increase capacity in response

**Government intends the RIS to address growing traffic volumes and provide much needed upgrades in key areas...**

## Forecast RIS major projects investment profile (FY15-20)



Fiscal Year	Major projects spend (£m)
FY15	£0.8bn
FY16	£1.0bn
FY17	£1.1bn
FY18	£1.5bn
FY19	£1.8bn
FY20	£2.2bn

**Average annual major projects spend: £0.8bn (FY11-15), £1.5bn (FY16-20)**

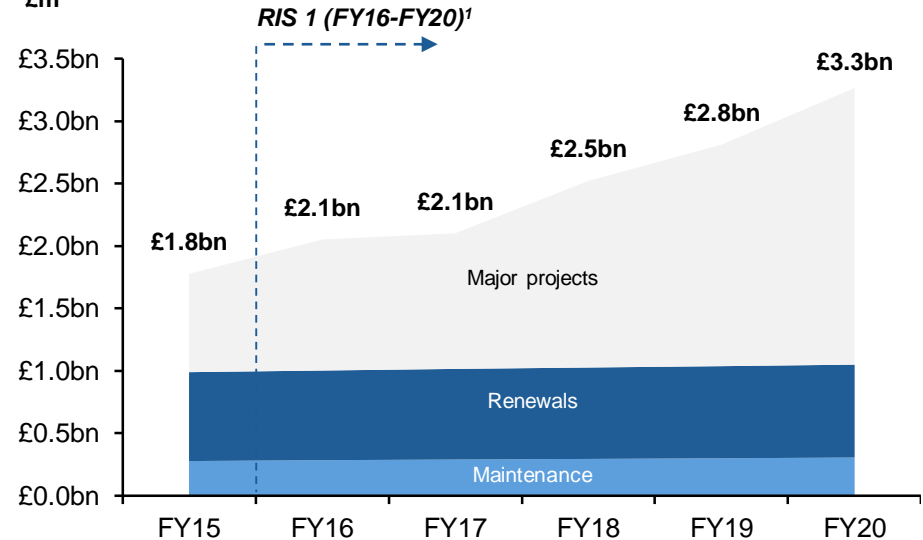
**...for capital works, this translates to an average annual expenditure over the RIS 1 period of c.2x that seen between 2010-15**

# Meanwhile, investment in maintenance and renewal works is expected to remain steady across the period of RIS1

- Alongside major project spend, the RIS also defines budgets for renewals (a form of capital expenditure) and maintenance (operating expenditure)
  - Renewals** include business-as-usual asset renewal programmes and is accounted for in capital budgets
    - This includes replacement and upgrading of road surfaces, as well as some technology and highways safety features
  - Maintenance** covers reactive and emergency highways repair and maintenance and is included in the operational budget
    - This category includes, for example, reactive road surface repair, bridge treatment and replacement of damaged barriers
- Compared to the period from FY10-15, the level of growth in renewals and maintenance expenditure is far less than the step-change seen in major projects (see p.20)
  - As a result we focus on delivery of major projects in our analysis
- However, it is important to recognise where people, plant and materials requirements for both renewals and maintenance show overlap with those of capital projects
  - We have accounted for this in qualitative commentary from suppliers, many of which (including Tier 1 contractors) have been able to comment on capacity constraints in both capital works and maintenance

## Forecast HE maintenance and renewals spend<sup>1</sup> (FY15-20)

RIS forecast spend  
£m



	FY15	FY16	FY17	FY18	FY19	FY20
<b>Renewals spend</b>	£0.7bn	£0.7bn	£0.7bn	£0.7bn	£0.7bn	£0.7bn
<b>Maint. spend</b>	£0.3bn	£0.3bn	£0.3bn	£0.3bn	£0.3bn	£0.3bn

Average annual renewals spend: £0.5bn (FY11-15); £0.7bn (FY16-20)

Average annual maintenance spend: £0.4bn (FY11-15); £0.3bn (FY16-20)

**Annual spend on renewals and maintenance is expected to be only c.3% higher (on average) than between FY10-15**

# Agenda

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- Executive summary
- **Market situation and background**
  - The Strategic Road Network and Highways England
  - Historic and future investment profile
  - **Supply chain overview**
- Supply chain capacity assessment
- HE approach to procurement and project management
- Key Performance Indicators and recommendations for ORR
- Appendix

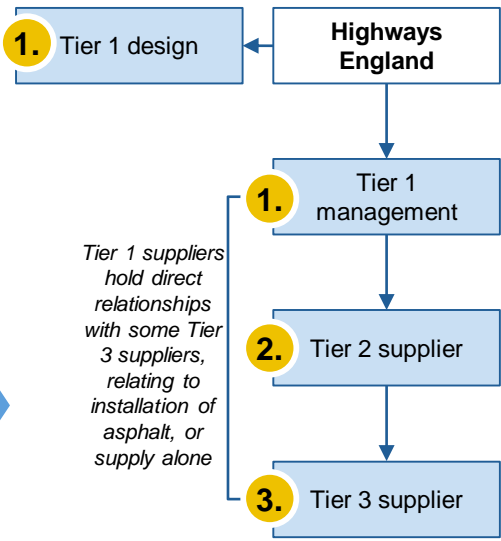
# Planned RIS investments are to be delivered through HE's established supply chain. This has three principal Tiers: design and management (Tier 1), specialist works contractors (Tier 2) and materials or product suppliers (Tier 3)

## Contractor roles by Tier within the supply chain

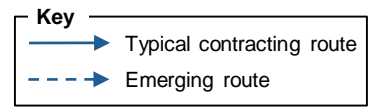
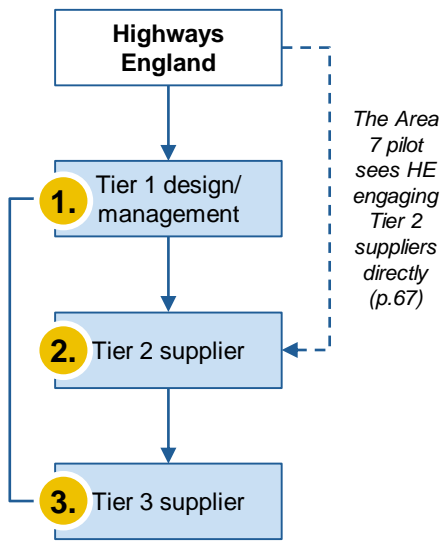
Tier	Role	Key services provided
1.	Design	<ul style="list-style-type: none"> <li>Pure design and engineering services<sup>1</sup></li> </ul> <ul style="list-style-type: none"> <li>Project design</li> </ul>
	Management	<ul style="list-style-type: none"> <li>Contract and project management</li> <li>In maintenance contracts (see overleaf), these contractors also offer design services</li> </ul> <ul style="list-style-type: none"> <li>Project management</li> <li>Contract management</li> </ul>
2.	Specialist suppliers	<ul style="list-style-type: none"> <li>Implementation of works: 'boots on the ground'</li> </ul> <ul style="list-style-type: none"> <li>10-15 specialisms, including (e.g.) Earthworks &amp; Landscaping; Bridges; Road Marking</li> <li>Most contractors offer multiple services</li> </ul>
3.	Materials	<ul style="list-style-type: none"> <li>Supply of raw materials (sometimes including installation)</li> </ul> <ul style="list-style-type: none"> <li>Provision of raw materials (e.g. aggregates; bitumen; asphalt)</li> </ul>
	Products	<ul style="list-style-type: none"> <li>Supplying finished products for use in highways work</li> </ul> <ul style="list-style-type: none"> <li>Provision of finished products (e.g. CCTV cameras; surface coatings)</li> </ul>

## Procurement structures<sup>2</sup>

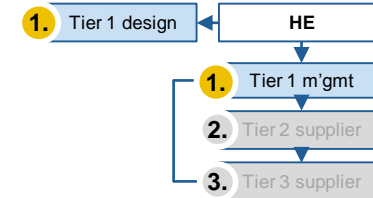
### Major projects



### Maintenance & renewals



**Capital works generally use separate Tier 1 contractors for design, whereas in maintenance design and management are handled by the same contractor**



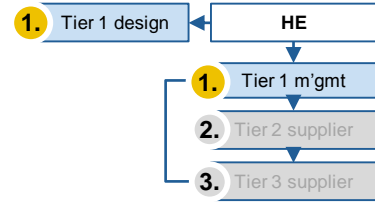
# HE operates a number of distinct procurement mechanisms. The Collaborative Delivery Framework (CDF) is currently the primary mechanism by which capital works are let to Tier 1 contractors

Form of contracting		Description	Design responsibility	Further tenders required?	Divisions/ lots	Example contract holders
Capital works	Collaborative Delivery Framework (CDF)	• For design and delivery of major RIS capital projects	• Design contractors engaged separately from framework Lot 1	✓	• Lot 1: design services • Lots 2, 3a, 3b: construction works in lots of increasing value	• Amey; Atkins; Mott MacDonald (total 10) • Kier; Galliford Try; Balfour Beatty; Costain (total 16)
	OJEU	• Used for limited number of projects in SR10 before CDF came into effect	• Design tendered separately from construction	✗	• Typically independent projects	• Balfour Beatty/Carillion JV, Costain/ Galliford Try JV
	Asset Support Framework	• Now replaced by the CDF for new tenders, though some delivery under this framework is ongoing	• Contractor	✓	• One lot; limited to four framework-holders	• Balfour Beatty; Morgan Est/ Bam Nuttall (JV); Costain/ Serco (JV)
Maintenance	Managing Area Contractor (MAC) and TechMAC	• A contractor is engaged to manage highways maintenance (or technology in the case of TechMACs) for a defined geographic region of the SRN	• Contractor submits designs to HE for agreement	✗	• Each contract allocated to one of 13 HE regions	• EM Highways (Areas 1, 3 & 13) • A One+ (Area 14)
	Asset Support Contract (ASC)	• Replacing MAC, with greater emphasis on outcome measures • Let through OJEU where requirements are complex or bespoke	• Contractor	✗		• Amey (Area 6 & 8) • A One+ (Area 12)
Supply of goods	Category Management Frameworks (CMF)	• HE-held framework contracts for supplying goods to Tier 1 contractors • Tier 1 contractor makes decision to call off frameworks	• n/a (supply of goods only)	✓	• 3 frameworks per 4 procurement regions; covering Gantries, Pavements and Temporary Traffic Management • Each framework contains further lots specifying the type of goods supplied	• Nusteel Structures (Gantries) • Aggregate Industries (Pavements) • Chevron (Traffic Management)



**Capital works over the RIS period will be let primarily through the Collaborative Delivery Framework. MACs and ASCs will continue to provide maintenance through ongoing contracts**





# On the CDF, contractors are organised into four lots covering design and construction. These Tier 1 players have national scale and are often multidisciplinary (working outside of highways)

## Structure of HE's Collaborative Delivery Framework

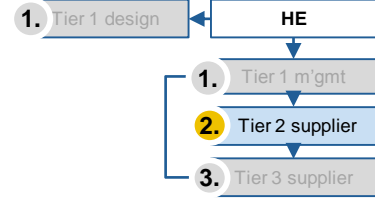
Function	Role	Description	Contractors	Adjacencies
Lot 1	Project design	• Design & engineering services	• <b>Amey</b> ; Atkins; CH2M Hill; Hyder; Jacobs; <b>Kier</b> <sup>1</sup> ; Mott MacDonald/Grontmij; Ove Arup & Partners; URS; WSP/Parsons Brinkerhoff	Contractors typically work across several adjacent industries, including rail, nuclear energy, airports and water and floods
Lot 2	Construction delivery	• Medium-value construction (up to £25m)	• <b>Kier</b> <sup>1</sup> ; Geoffrey Osborne; Interserve Construction; John Graham Construction; VolkerFitzpatrick;	
Lot 3a		• High-value construction (up to £100m)	• <b>Amey</b> ; Galliford Try; Hochtief; John Sisk; <b>Kier</b> ; Vinci	
Lot 3b		• Highest-value construction (up to £450m)	• Balfour Beatty; BAM Nuttall/ Morgan Sindall (JV); Carillion; Costain; Skanska	

Key: **contractors in bold** appear on >1 lot

## CDF contractors

- 24 companies across 4 lots were appointed to the CDF in late 2014, with framework to run for 5 years
  - The functions of these companies split between design & engineering services, and construction delivery
  - Only two companies (Kier and Amey) will offer both services
  - Framework contractors were selected following an OJEU tender and are subsequently required to bid for individual projects off the framework
- The majority of CDF contractors operate at international scale, and maintain a presence in a number of adjacent markets
  - *“We operate in strategic and local highways, with highways businesses in the UK and Australia. At group level we work across a wide variety of sectors relating to the built environment.”*  
Tier 1 supplier
- There is therefore likely to be some overlap in capacity between the highways supply chain and that of adjacent markets
  - We further demonstrate Tier 1 contractors' work in adjacent markets on p.44

**Contractors for major projects work will typically be drawn from the CDF; such players are scale businesses, many of which have material interests in adjacent sectors**

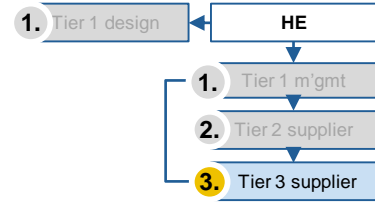


# Tier 2 contractors generally provide the workforce to deliver projects, and offer specialist skills such as earthworks, civil engineering, surfacing or technology

Disciplines		Heavy civils	Structures	Road marking and footways	Soft/ ancillary
Services provided		<ul style="list-style-type: none"> <li>Road construction (including surfacing)</li> <li>Earthworks</li> <li>Drainage</li> </ul>	<ul style="list-style-type: none"> <li>Bridges</li> <li>Tunnels</li> </ul>	<ul style="list-style-type: none"> <li>Footways</li> <li>Kerbs</li> </ul>	<ul style="list-style-type: none"> <li>Fencing</li> <li>Technology</li> <li>Environmental</li> <li>Lighting</li> <li>Signage</li> </ul>
Relative geographic coverage of UK		◐	◐	◑	◑
Specialist contractors	Local	<ul style="list-style-type: none"> <li>Marshall Surfacing</li> <li>Harlequin Civil Engineering</li> </ul>	<ul style="list-style-type: none"> <li>Taziker Industrial</li> <li>Alun Griffiths</li> </ul>	<ul style="list-style-type: none"> <li>TJ Road Markings</li> </ul>	<ul style="list-style-type: none"> <li>Cormac</li> <li>ATM</li> </ul>
	National	<ul style="list-style-type: none"> <li>Miles Macadam</li> <li>JCPS</li> </ul>	<ul style="list-style-type: none"> <li>Jack Tighe</li> <li>Wood Group Industrial</li> </ul>	<ul style="list-style-type: none"> <li>WJ Road Markings</li> <li>LMS Highways</li> <li>Universal Highways</li> </ul>	<ul style="list-style-type: none"> <li>Chevron Traffic Management</li> <li>Littlewood Fencing</li> <li>Gristwood &amp; Toms</li> <li>Nuneaton Signs</li> </ul>
Generalist contractors	Local	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">Henderson &amp; Taylor</div> <div style="width: 45%;">Walters</div> </div>			
	National <sup>1</sup>	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">Carnell</div> <div style="width: 45%;">Galliford Try</div> </div>			

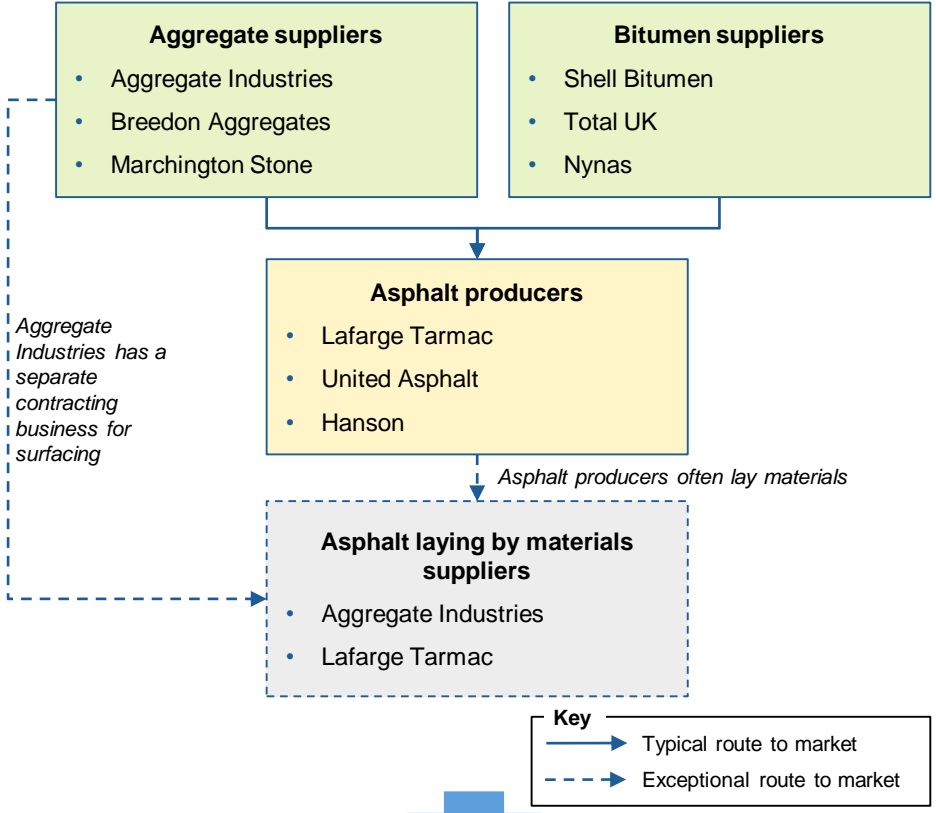
**Key**  
Scale runs from Regional coverage (◐) to National coverage (◑)

**There is some overlap between Tiers 2 and 1: generalist Tier 2 contractors who operate nationally tend also to offer services direct to HE at Tier 1**



# Beyond this, a third Tier of suppliers provides raw materials or finished product (such as CCTV or signage). Generally, these suppliers operate nationally or internationally

## Raw material suppliers



**Some scale materials suppliers also operate non-core contracting businesses relating to asphalt installation. This overlaps with Tier 2**

## Product suppliers

Products supplied	Description	Example contractor(s)
<b>Surfacing</b>	• Coatings and surface treatments for use in road building/ maintenance	• Stirling Lloyd • Ayton Products
<b>Signage</b>	• Informational signs conforming to DfT standards	• Morelock Signs • Tennants UK
<b>Barriers</b>	• Temporary and permanent roadside safety barriers	• Hill & Smith • Hales Sawmills
<b>Kerbs</b>	• Concrete or asphalt kerbstones	• Marshall Surfacing • Aggregate Industries
<b>Plant</b>	• Mechanical equipment for road works, for hire or purchase	• Highway Plant Hire Ltd • Highway Hire • Modern Plant Hire
<b>Technology</b>	• Solutions including CCTV; variable message signs; traffic detection loops	• RoadTech • Smart CCTV • Coeval

**We consider Tier 3 product suppliers as those whose core business is the supply of product, without offering installation**

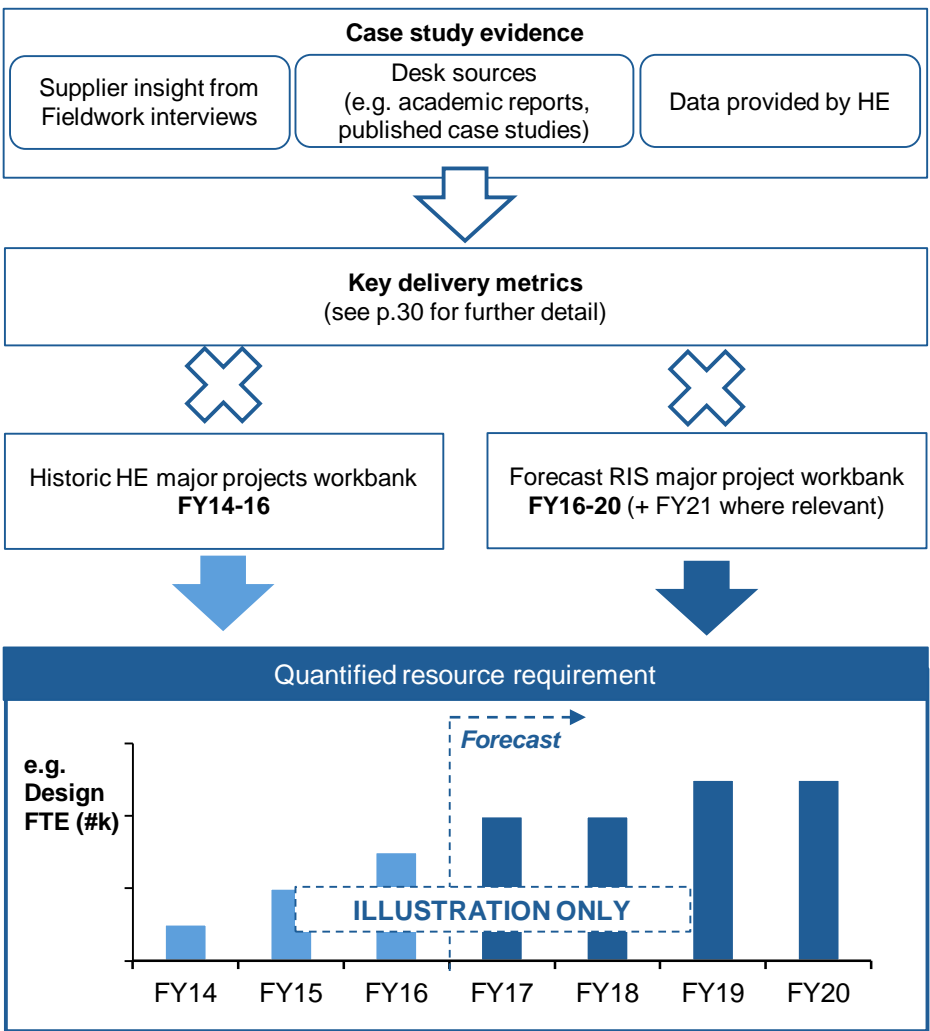
# Agenda

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- Executive summary
- Market situation and background
- **Supply chain capacity assessment**
  - **Core HE demand**
  - Other infrastructure demand
  - Assessment of deliverability and identified risks
- HE approach to procurement and project management
- Key Performance Indicators and recommendations for ORR
- Appendix

# Methodology: We have formed a quantitative view of historic and future demand on the highways supply chain to help highlight areas of capacity constraint for the RIS

## Overview of Credo quantification methodology



## Description of approach

- We consider HE major projects in terms of 5 core project types: Smart Motorways; Dualling; Junction works; New roads and Other (incl. safety, technology and cycle schemes)
  - For each project type, we compile a case study detailing the resource requirement for a typical past project of that type. Where appropriate we have used two or more projects to gain a more representative view

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  - We then derive a set of ten scalable metrics from these case studies (for example, *aggregate tonnage per lane km*) to approximate the delivery requirement on a unit basis
    - Equivalent metrics are derived for each of the 5 project types

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  - We have compiled a comparable list of HE major projects spanning the period FY14 – FY21, along with a view of project timeframes and phasing
    - Pre-RIS, projects are based on a list of completed projects provided by HE’s Major Projects team
    - For the RIS period, we align with HE’s major projects baseline plan (as at November 2015)
  - On a project-by-project basis, metrics are then scaled according to the appropriate factor (e.g. *lane kms constructed*) and aggregated to produce an estimated resource profile (example, left)
- While illustrative of potential capacity constraints, there are a number of limitations to this approach, including:**
- Absolute quantification (e.g. number of FTEs) is a high level estimate; we therefore focus on the delta from historic to future**
  - We have used the best-available view of RIS major project descriptions and profiling – however, a significant portion of work is currently lightly-scoped and therefore subject to change**
  - Demand does not consider future (RIS 2) projects that may have design or other requirements towards the end of the forecast period**

# Methodology: We consider how capacity constraints could be felt in terms of People, Plant and Materials through a series of 10 key metrics

## Metrics employed in quantitative analysis

- Our quantitative modelling takes into account the best-available view of the resources that will need to be employed in for RIS major projects<sup>1</sup>, which we compare against historic major project delivery
  - We use this ‘gap analysis’ to derive an indication of potential pinch points in three areas: People, Plant and Materials
- We quantify resource requirements through 10 metrics (shown right)
  - These metrics were selected on the basis of our fieldwork programme, and are consistent with market feedback as an appropriate means to quantify demand

	People (FTEs)	Plant (Truck days)	Materials (Tonnes)
<b>Tier 1 (design)</b>	<i>Designer FTEs</i>	<i>Not considered</i>	<i>Not considered</i>
<b>Tier 1 (management)</b>	<i>Management FTEs (within Tier 1)</i>	<i>Not considered</i>	<i>Not considered</i>
<b>Tier 2 (implementation)</b>	<i>Construction worker FTEs</i>	<i>Roller days Paver days Earthworks Truck days</i>	<i>Aggregate tonnage Bitumen tonnage</i>
<b>Tier 3 (materials)</b>	<i>Not considered</i>	<i>Aggregate Truck days Bitumen Truck days</i>	



**We use the above set of metrics as the structure for our demand analysis**

# Over the last 3 years, HE/ HA has completed 7 major capital projects (with 43 more in progress). This workbank forms our view of historic delivery

## Example HE Major Projects FY14-16

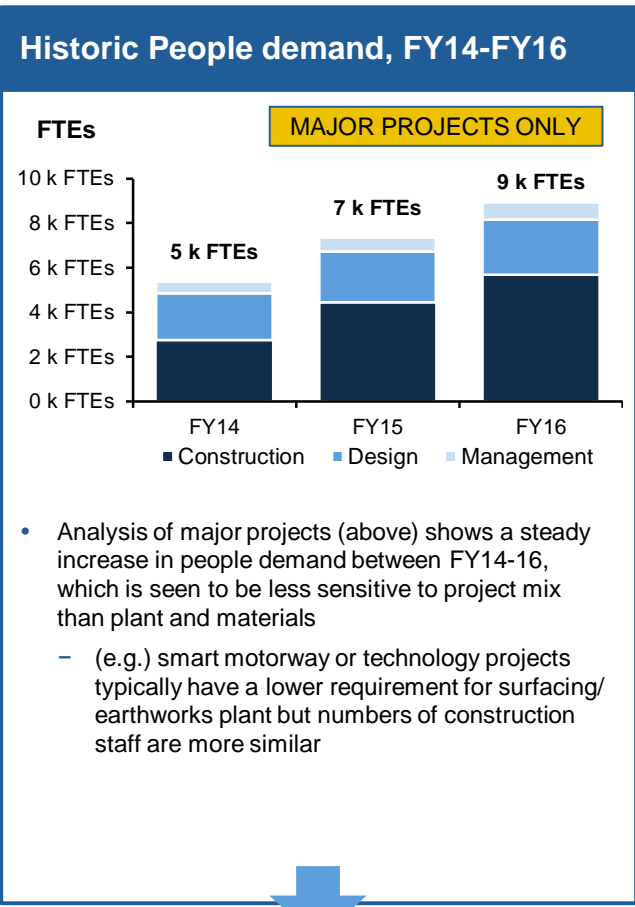
Major project	Description	Completed / Ongoing
<b>Projects completed (and Open for Traffic)</b>		
A23 Handcross to Warninglid	• Replacing 3.8km of dual two-lane carriageway with dual three-lane carriageway	Completed
M62 J25–J30	• Converted section to Smart Motorway by introducing variable speed limits and hard shoulder running	Completed
M4 J19-20 and M5 J15-17	• Converted sections to Smart Motorway	Completed
A11 Fiveways to Thetford	• Dualling the A11 between Fiveways and Thetford	Completed
M6 J5-J8 (BBox Phase 3)	• Converted sections to Smart Motorway	Completed
M25 J5 - J6/7 (Sect 2)	• Converted sections to Smart Motorway	Completed
M25 J23-J27 (Sect 5)	• Converted sections to Smart Motorway	Completed
<b>Projects ongoing (examples, total of 43 ongoing into RIS 1)</b>		
A45/A46 Tollbar End	• Replacement of the Tollbar End roundabout with a grade separated junction	Ongoing
A14 Kettering J7 - J9	• Widening to dual three lane	Ongoing
M3 J2-J4A	• Upgrading the M3 to Smart Motorway including hard shoulder running	Ongoing

- We have looked to quantify the resource requirement for capital works delivered between FY14 and FY16
  - Renewals and maintenance is not quantified; as previously stated this expenditure is not forecast to change significantly during RIS 1
- There are two key types of capital works delivered between FY14-FY16 that appear to be like-for-like comparable with capital projects in the RIS
  - The list, left, details projects overseen by HE’s Major Projects team
  - Further to this a set of Pinch Point schemes were undertaken, as reported in the HE road project listings<sup>1</sup>
    - These include, for example, A5 Major Highway Improvements, A5 Junction 5, A1 Black Cat Roundabout, A34 M40 Junction 9 Wendlebury Phase 2
    - The majority of Pinch Point schemes were delivered through NDD (Network Delivery Directorate) rather than Major Projects – therefore for the purpose of this analysis we include 10% of the resource requirements for these schemes
- A number of projects included in the RIS began during FY14-16 – we have represented these appropriately in the historic analysis and have avoided double-counting

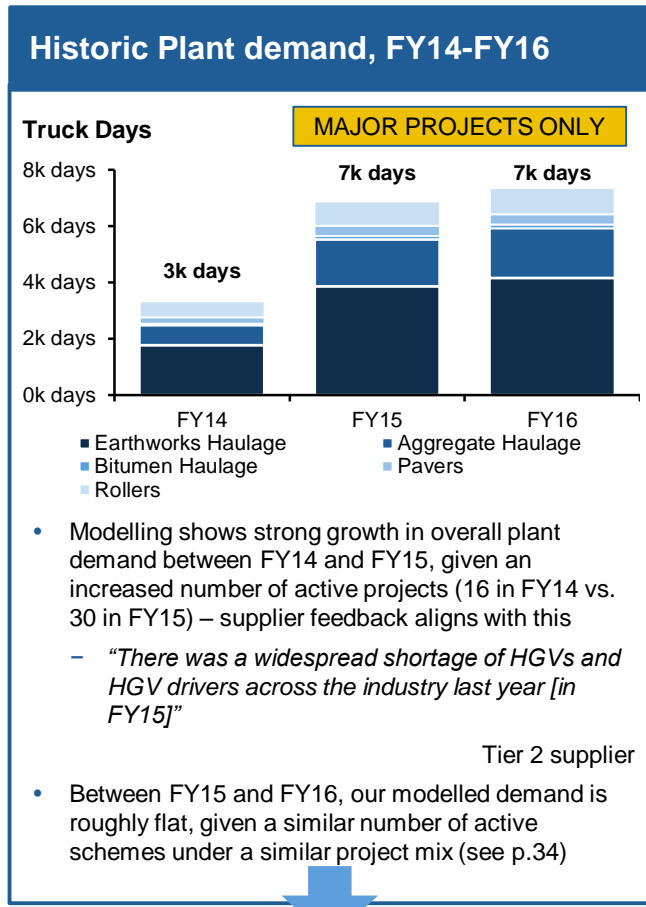


**As a basis for comparison, we estimate the resources employed in the delivery of major projects and improvement works over the last 3 years**

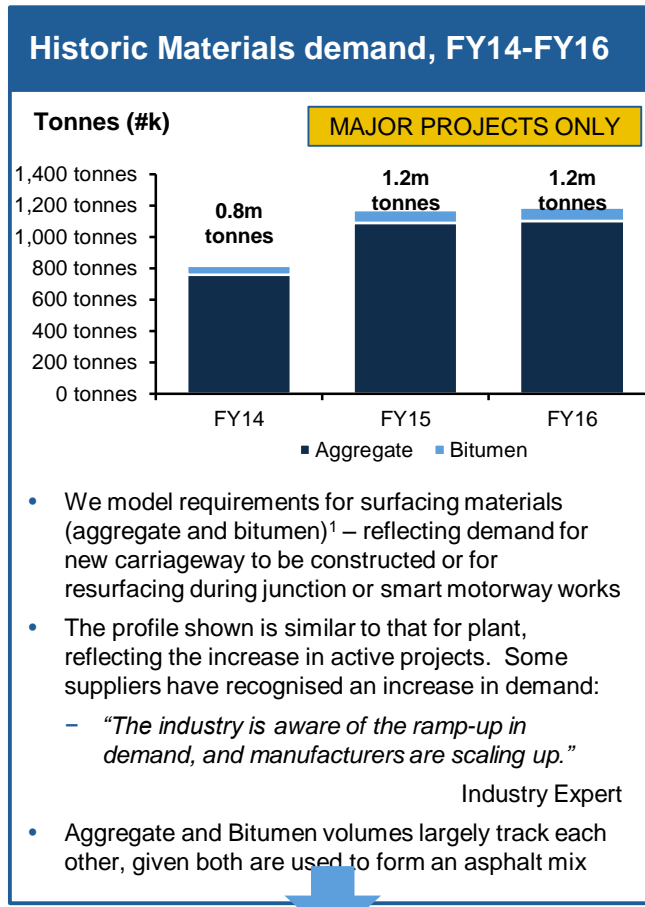
# Analysis of the resources required to deliver these works (over the period FY14-16) provides a view of the output of HE's supply chain. We assess this in terms of people, plant and materials



**Modelling suggests an increase in people demand for major projects over the last three years**



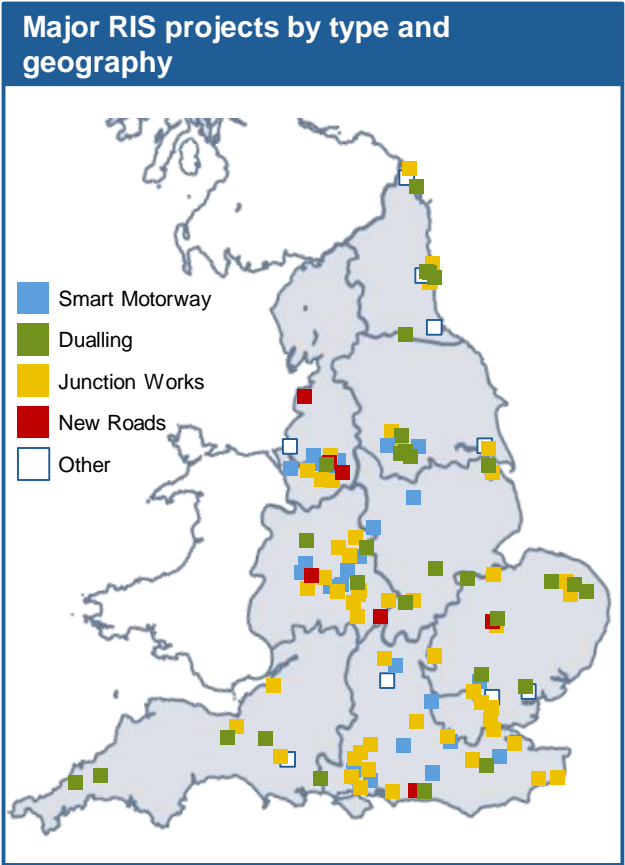
**Suppliers have witnessed an increase in demand for plant since FY14; haulage has been a pinch-point**



**Bitumen and aggregate demand for major projects has similarly increased to FY15 and FY16 as more projects have come online**



# Looking ahead, the RIS sets out 112 major projects<sup>1</sup> to be delivered across England between 2015/16 and 2019/20. For each project, Credo has assigned one of five project types to reflect the type of works required



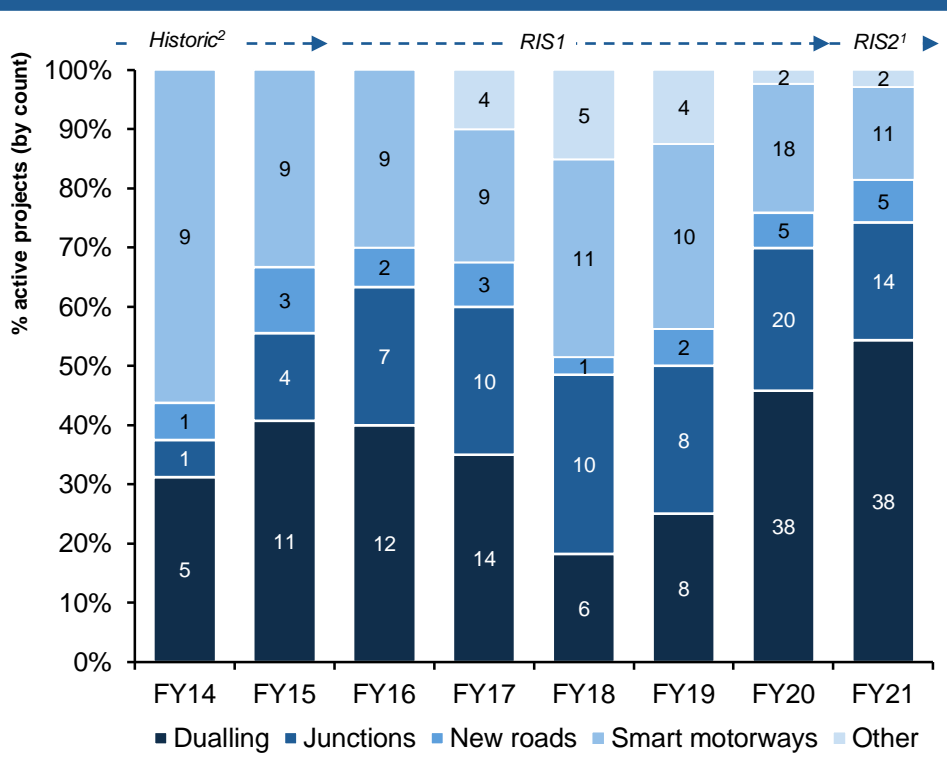
## RIS major projects to be delivered FY16-20

Project type	Description	Examples	133 projects <sup>3</sup>	
1 Smart Motorway	Upgrading motorways to meet Smart Motorways specifications	<ul style="list-style-type: none"> <li>M4 Junctions 9-14</li> <li>M25 Junctions 10-16</li> <li>M6 Junction 21A-26</li> </ul>		Smart Motorway (27 projects)
2 Dualling	Increasing the number of carriageways (from 1-2 or 2-3)	<ul style="list-style-type: none"> <li>A21 Tonbridge to Pembury dualling</li> </ul>		Dualling (31 projects)
3 Junction Works <sup>2</sup>	Works on junctions, including roundabouts, slip roads and T junctions	<ul style="list-style-type: none"> <li>M6 junction 10: providing additional capacity</li> </ul>		Junction Works (56 projects)
4 New Roads	Constructing a completely new road as part of the SRN	<ul style="list-style-type: none"> <li>Arundel dual carriageway bypass</li> </ul>		New Roads (8 projects)
5 Other	Safety, technology and cycle schemes	<ul style="list-style-type: none"> <li>A1 &amp; A19 Technology enhancements</li> </ul>	Other (11 projects)	
			<b>Total RIS Capital Projects (2015-20)</b>	

**RIS capital works contain a material volume of junction works, dualling and smart motorway schemes, with most located in the Midlands, East, South East and North West of England**

# Both the number of active projects and the mix of project types varies across the years of the RIS. This will lead to variation in the skills and resources required for delivery

Active SRN major projects by type, FY14 – FY21



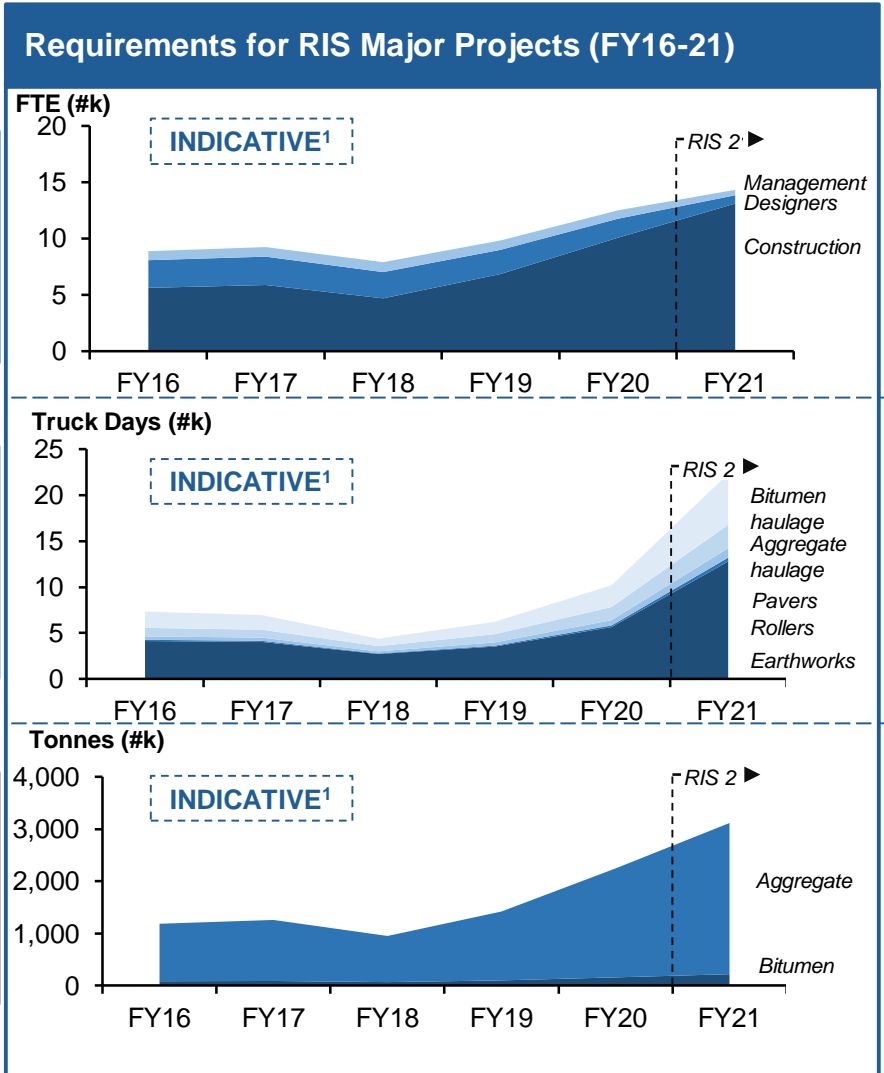
Total # active projects	16 <sup>2</sup>	27 <sup>2</sup>	30 <sup>2</sup>	40	33	32	83	70
Reported capital spend	£0.7bn	£0.8bn	£1.0bn	£1.1bn	£1.5bn	£1.8bn	£2.2bn	£3.1bn

- HE/HA's major project delivery in FY14 and FY15 spans a range of project types (dualling, junctions, new roads, smart motorways) though the number of active projects is lower than forecast in any year of the RIS
- The RIS therefore represents a step change both in terms of spend (as previously mentioned) and in the volume of projects delivered
  - Broadly, dualling, junctions and other major projects (including new carriageway) are the most resource intensive in terms of construction
  - The proportion of such 'complex' projects in progress varies across the years of the RIS
- By FY20, the number of active projects rises significantly to 83, and the mix of project types also suggests a high proportion of the most resource-intensive project types
  - FY20 will involve the construction and renewal of c. 3.5x the number of lane kms compared to FY14, due primarily to the large number of dualling and other major projects (e.g. new carriageway) active
- As project mix varies, so will the supply chain be required to adjust and scale capacity in appropriate capabilities
  - Demand for individual job specialisms, plant and materials will not necessarily scale linearly with the increase in project numbers



**The RIS represents a material increase in annual construction activity and a change in the mix of project types active over the five year period**

# Overall, the RIS will bring a material increase in demand from the highways supply chain. The current phasing of this work means the most significant demand will come towards the end of the RIS 1 period



## Key contributions to demand

- Most project types have a significant requirement for manpower to deliver the work – this profile therefore appears less reflective of project mix than those for plant and materials
- Within this, projects with higher complexity still typically require larger construction teams

- As project mix tends towards dualling and new roads in later years, Earthworks requirements peak
- Smart motorway and technology projects show less demand for plant on a per km basis; a high proportion of these projects in FY18 leads to reduced demand

- Key surfacing materials (aggregate & bitumen) are required to some extent across all project types and are especially crucial for lane widening and new roads projects
- Several large projects are due to start late in the RIS, leading to an increasing demand profile

## Overall scale and phasing

- Management requirement is most consistent over the RIS, while demand for designers is front-loaded (reflective of early involvement in projects)<sup>2</sup>
- Requirement for construction FTEs increases strongly in later years as new projects come online
- Overall, the period from FY18 onwards represents a strong requirement to scale

- The second half of RIS 1 will see a significant increase in demand for plant as a large number of new projects enter the construction phase

- Demand for materials increases broadly in line with the increase in projects of higher complexity towards the end of the RIS, especially in FY20-21
- The overall shape of the materials demand profile is roughly in line with plant over the 5 years of the RIS

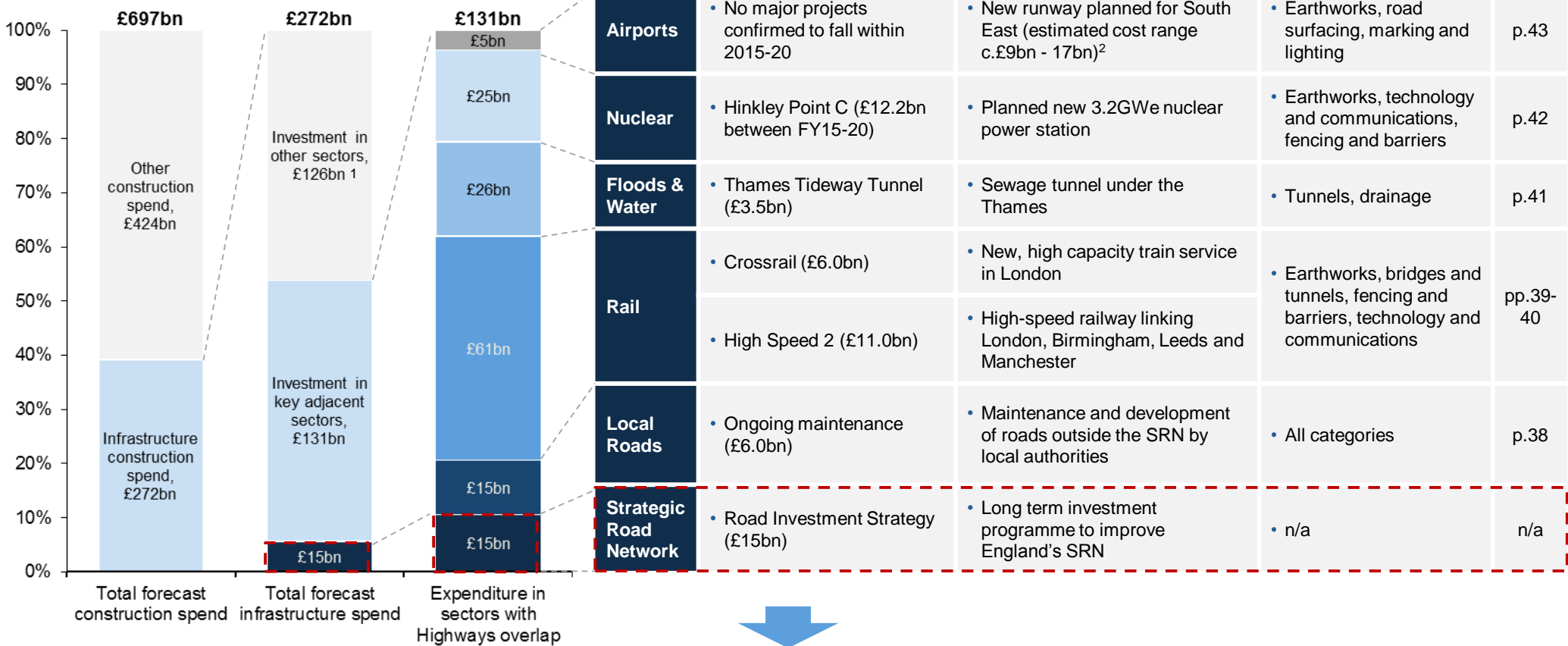
# Agenda

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- Executive summary
- Market situation and background
- **Supply chain capacity assessment**
  - Core HE demand
  - **Other UK infrastructure demand**
  - Assessment of deliverability and identified risks
- HE approach to procurement and project management
- Key Performance Indicators and recommendations for ORR
- Appendix

# Highways capital spend forms part of a far broader UK construction sector. We focus on major infrastructure projects as the area with greatest overlap of specialisms with the highways supply chain

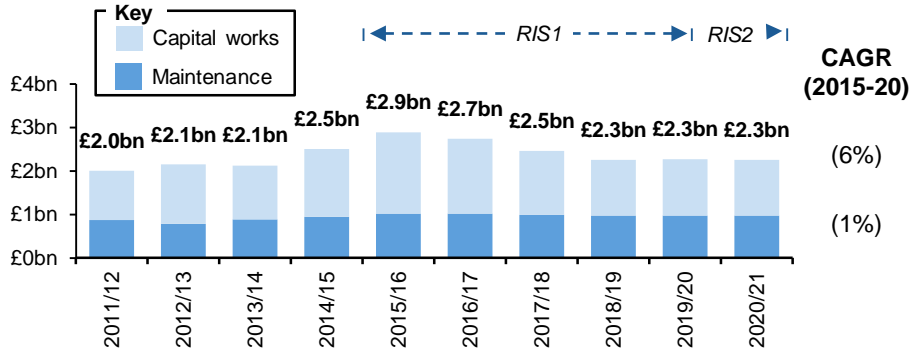
**National Infrastructure Plan - major projects spend (cumulative, 2015-20)**



**Investment in the SRN (c.£15bn) is forecast to comprise only c.6% of total infrastructure spend between 2015-20. Other industries present significant overlapping demand for specialist contractors (e.g. in earthworks, drainage) – we assess these in turn**

# Local roads have very similar capability requirements to the SRN, though investment is likely to fall between 2015-20 as a result of reduced capital funding from government

Local Roads expenditure 2011-21 (source: NIP)



- Local roads represent 97% of the road network and c. 67% of journeys made in England. They are managed by individual local authorities (of which there are 326 in England)
  - There is some overlap with the SRN around A-roads: trunk road projects are managed by HE with other A-roads under LA control
- Local authorities are allocated funding for roads from the Department for Transport
  - The majority of funding is allocated via a needs-based formula – this covers most maintenance and repair
  - For major projects, a bidding system (the ‘Challenge Fund’) has designated £275m to 31 one-off projects across the country
- Capital funding from the DfT is projected to decrease at c.4% p.a. between 2015-20, while expenditure on maintenance is expected to be broadly flat
  - Local authorities are expected to make cost savings through efficiencies and shared services with adjacent local authorities

## Impact on highways supply chain capacity

- Building and maintaining local roads clearly has strong overlaps with the highways supply chain
  - However, local roads projects are individually typically below £1m in value, requiring fewer resources and not involving Tier 1 contractors
- Going forwards, smaller maintenance projects will increasingly become the focus of work as an existing backlog is exacerbated by underfunding
  - “The lack of real investment in road maintenance during those decades is evident by today’s estimated £12bn cost to repair the backlog of existing potholes.”
- With no forecast increase in maintenance funding, the resources required will put no extra strain on highways specialisms such as resurfacing, filling in potholes with bituminous materials, fixing lighting and repainting lines
  - “Highways England are likely to outbid local authorities for resources when it comes to both maintenance and capital contracts, so I don’t see HE feeling too much effect from local projects”

LA industry expert

LA industry expert

**The forecast contraction in funding suggests that demand in local roads is unlikely to exceed historic levels. In particular, capital works volumes are likely to fall – potentially freeing up capacity**



# In rail, HS2 is a project of material scale with total budgeted spend of £42.5bn. This includes both rail infrastructure and a significant spend on highways works (c. £580m)

## HS2 project profile

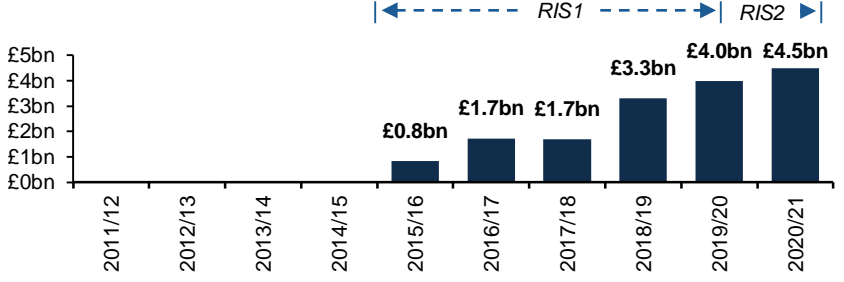


HS2 is a planned high-speed railway connecting London, Birmingham, Leeds and Manchester.



<b>Project Budget</b>	<ul style="list-style-type: none"> <li>Total budget of £42.5bn over the next 17 years, of which c.£11bn within RIS1 period. Of the total spend: <ul style="list-style-type: none"> <li>£584m spend on road works, e.g. realignments</li> <li>£1.5bn+ spend on earthworks, e.g. land clearance, levelling</li> <li>£6bn+ spend on bridges and tunnels for railway</li> </ul> </li> </ul>
<b>Commissioning authority</b>	<ul style="list-style-type: none"> <li>High Speed Two (HS2) Ltd is responsible for developing proposals and is wholly funded by grant-in-aid from the government</li> </ul>
<b>Contracting Structure</b>	<ul style="list-style-type: none"> <li>Both frameworks and individually let contracts</li> <li>Design and construction work is organised by geography and specialism</li> <li>Specialisms include enabling works, tunnels and bridge construction and project management</li> </ul>
<b>Highways contractors expressing interest</b>	<ul style="list-style-type: none"> <li>Initial expressions of interest from CH2M Hill, Jacobs, Mott MacDonald, Ove Arup, WSP, Kier, Amey, Hochtief, BAM Nuttall, Carillion, Costain</li> </ul>

## HS2 forecast expenditure 2015-21 (source: NIP)



CAGR (2015-20)  
33%

There are two major overlaps between HS2 and RIS:

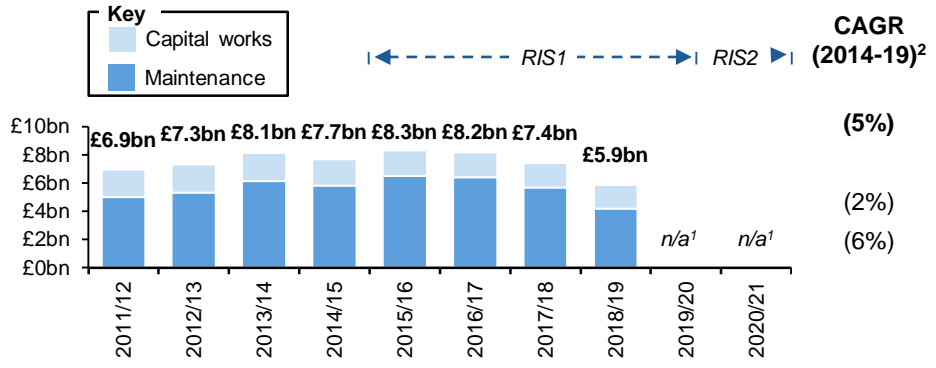
- Railway construction requires a significant amount of shared specialisms with highways construction
  - “Building a railway is like building a road. Both are linear constructions, requiring similar resources in terms of earthworks, drainage works, structures and materials.”  
Tier 1 supplier
  - In particular, 128 million tonnes of material is expected to be moved, which is estimated to cost over £1.5bn
- Highways projects precipitated by HS2 construction will require almost exactly the same skillset as RIS capital works (though the relative scale of these works is low)
  - Projects impact both local roads and the SRN, and mostly include realignment of roads and footpaths and construction of some new bridges and junctions
  - A number of the most material HS2 roads projects are included in the RIS itself, such as the redevelopment of M42 junction 6 near Birmingham
    - Beyond these, there is a further c.£584m of spend on road works within the HS2 (Phase 1) budget. These works are phased over a 9 year construction timeframe – equivalent to only c.2% of RIS spend per year

**HS2 construction will step up significantly during the RIS period and is likely to impact earthworks, drainage and other key specialisms**

2a

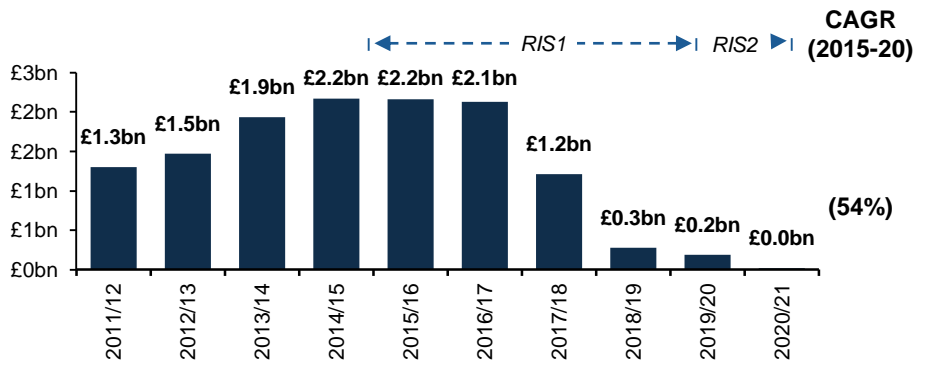
# Beyond HS2, demand for railway infrastructure work broadly falls between Network Rail’s enhancement programme and the Crossrail project

Network Rail CP4/5 expenditure 2011-19 (NIP)



- Outside of the construction of new high-speed infrastructure, almost all infrastructure enhancements on the UK heavy rail network are managed by Network Rail
  - The Crossrail project is a special case, as the line of route spans both existing NR infrastructure and newly-constructed tunnels (managed by Crossrail/TfL)
- Spending by Network Rail is set to peak in 2015/16 and decrease towards the end of the RIS as the CP5 programme comes to an end
  - This is mainly due to the completion of capital works such as electrifying lines. These involve specialist railway systems and do not have significant overlap with the highways supply chain
  - Expenditure on maintenance includes a £120m increase in civils work compared to CP4; this may have a small impact on the highways supply chain

Crossrail forecast expenditure 2011-21 (NIP)



- In terms of Crossrail, the majority of civils works (incl. tunnelling) are now complete, with remaining expenditure focused on fit-out and railway systems (with limited overlap with the highways supply chain)
  - Most of the relevant construction works for the first Crossrail project have therefore already been delivered prior to the RIS period
  - The Crossrail 2 project has not yet been given formal consent, and would not start until at least 2020, after the RIS period



**Extra expenditure on civils work as part of the CP5 strategy may impact HE’s supply chain, while construction phases for both Crossrail projects mainly fall either side the RIS period**

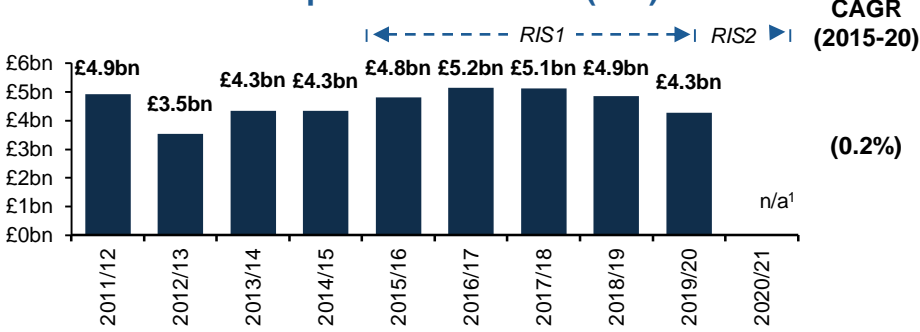
Impact

2b



# In water and floods, the Thames Tideway Tunnel is a major ongoing project during the RIS period

## Water & Floods expenditure 2011-20 (NIP)



- In the flood defences sector, there are many small-scale publicly funded projects in the pipeline to protect local areas
  - Average value of projects is under £1m
  - There are few material changes in the pipeline, with no major projects
- In water and sewerage, most projects form part of maintenance and improvement programmes, the funding for which is forecast to stay steady over the RIS period
  - These programmes are unlikely to affect the RIS supply chain
  - However, the Thames Tideway Tunnel is a major capital works project in the pipeline during the RIS period

## Thames Tideway Tunnel

- The Thames Tideway Tunnel is a £4.2bn sewage pipe being constructed under the River Thames to help tackle overflows from London’s Victorian sewers
  - The main works preliminary phase has begun, with tunnelling due to start in 2017 and finish in 2021
- Overlaps with highways construction specialisms include tunnelling and earthworks
  - The tunnel is 25km in length, requiring roughly 4.7 million tonnes of material to be excavated
    - 3.8 million tonnes of this is scheduled to be extracted in 2018 and 2019
  - Excavated materials will be transported to several receptor sites by barge and by truck
- This work coincides with the tail end of the Crossrail 1 and the scheduled beginning of Crossrail 2
  - Depending on the progress of Crossrail and the planning/design phase of the A303 Amesbury to Berwick (Stonehenge) this may result in the overlap of three significant tunnelling projects across road, rail and water



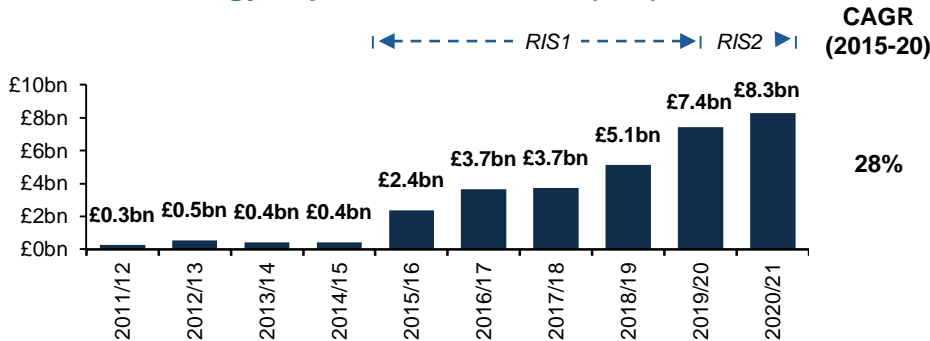
**Though the Tideway Tunnel construction overlaps with the RIS period, it is unlikely to have a material effect on the highways supply chain due to overlap with the end of the Crossrail project**

Impact

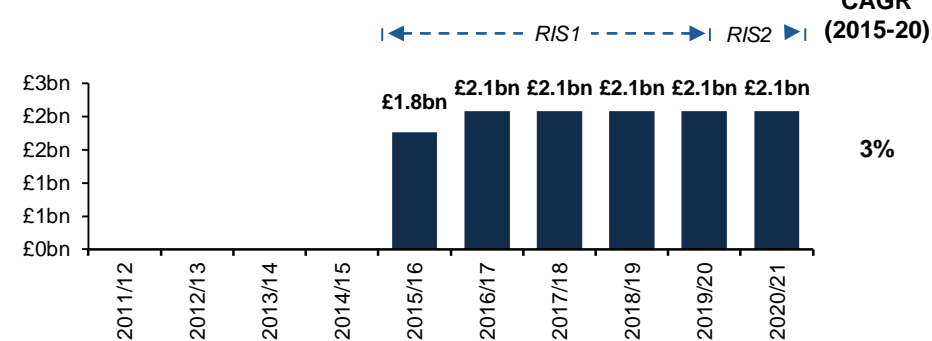
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# There are a number of major nuclear projects in the pipeline that will require significant civils work

**Nuclear energy expenditure 2011-21 (NIP)**



**Hinkley Point C forecast expenditure 2015-21 (NIP)**



- There are some major projects in the privately-funded nuclear energy industry pipeline, significantly increasing expenditure in this sector
- These include the decommissioning of old power stations and the construction of new stations, which form the majority of new spend
  - Three new power stations are planned at Hinkley Point C, Wylfa B and Moorside
  - While Hinkley Point C is at an advanced stage, construction at Wylfa B and Moorside currently has no fixed start date and will most likely begin after 2020
- The key overlaps with the highways industry are primarily in earthworks, cement, and project management and advanced civil engineering design capability

- The construction of Hinkley Point C is scheduled to be carried out from 2016-23, coinciding with the RIS period
- This will be a 3.2GWe nuclear power station in Somerset and has a total construction budget of £18bn
  - Civils work is estimated to make up 40% of spend; including building a sea wall and jetty to bring in aggregates for construction and drilling tunnels for cooling pipelines
  - 4.8 million tonnes of earth are required to be excavated from a 175-hectare site, a similar volume to the entire projected earthworks carried out in the RIS plan for FY17
- The plant is forecast to be operational in 2023, and earthworks have already commenced
  - However, in January 2016 there was a temporary halt of works as EDF appeared unsure of funding security, suggesting there may be some uncertainty surrounding the project timelines

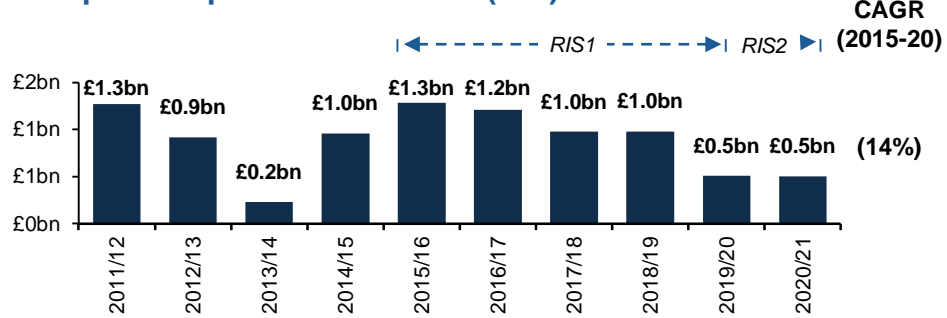


**Should construction at Hinkley C go ahead, the project timeframe is likely to coincide with RIS 1 and a material overlapping demand for earthworks has been identified**

Impact

# Spend on new infrastructure at airports is relatively small compared to other sectors. A new runway is proposed in the South East at either Heathrow or Gatwick in the medium term (likely beyond the RIS period)

Airports expenditure 2011-21 (NIP)



- Capital expenditure on the UK’s privately funded airports is fairly low compared to other adjacent sectors
  - Ongoing capital investment programs at Heathrow and Gatwick are the biggest projects described in the NIP
  - Most of the work includes upgrading existing terminal buildings or processes, which have little influence on the highways supply chain
  - However, existing runways require ongoing maintenance that overlap with highways works such as resurfacing, white-lining and ensuring good drainage
- However, there has been ongoing discussion about building a new runway in the South East, not detailed in the NIP due to its timeline and uncertainty

Supply chain impact of potential new South East runway

- A third 3.2km long runway has been proposed at Heathrow airport to reduce strain on its current runways, which are operating at 99% of capacity
  - The project is estimated to cost at least £17bn
  - If the project goes ahead, current plans are for the runway to become functional in 2025
  - Demolition and clearance of land would begin in May 2019, overlapping with the tail end of the RIS period
  - This would require an additional realignment of the M25
    - Although this would probably occur in the RIS2 period, it would represent a major tunnelling project and could increase demand for designers at the end of the RIS 1 period
  - The Airports Commission Final Report recommends that this project should be taken forward
- A second £9bn runway has been proposed at Gatwick, increasing the airport’s capacity from 34 to 67 million passengers per year
  - If the project goes ahead, demolition works could start by 2019, although no major earthworks are projected to start until 2021
- The government delayed its decision on which project will be taken forward by at least 6 months in December 2015, pushing the above timelines back even further



**Given the proposed timelines for development, airport projects are unlikely to materially impact the highways supply chain over RIS 1 (though construction of a new South East runway would coincide with RIS 2)**

Impact

5

- 1 Local Roads
- 2 Rail
- 3 Floods & Water
- 4 Nuclear
- 5 Airports

# In addition to the constraints identified for specialist services, most of HE's Tier 1 design and management contractors are also active across other industries

CDF Contractors	Highways design	Project mgmt.	LA roads	Rail	Water	Nuclear	Airport
Atkins	█	█	█	█	█	█	█
CH2M Hill	█	█	█	█	█	█	█
Jacobs	█	█	█	█	█	█	█
Mott MacDonald	█	█	█	█	█	█	█
Ove Arup	█	█	█	█	█	█	█
WSP/ Parsons Brinkerhoff	█	█	█	█	█	█	█
Kier/EM	█	█	█	█	█	█	█
Amey	█	█	█	█	█	█	█
Geoffrey Osborne	█	█	█	█	█	█	█
Interserve Construction	█	█	█	█	█	█	█
Volker Fitzpatrick	█	█	█	█	█	█	█
Galliford Try	█	█	█	█	█	█	█
Hochtief	█	█	█	█	█	█	█
John Sisk	█	█	█	█	█	█	█
Vinci	█	█	█	█	█	█	█
Balfour Beatty	█	█	█	█	█	█	█
BAM Nuttall/Morgan Sindall	█	█	█	█	█	█	█
Carillion	█	█	█	█	█	█	█
Costain	█	█	█	█	█	█	█
Skanska	█	█	█	█	█	█	█

- Tier 1 construction companies are usually multidisciplinary as skills requirements are often similar across industries
  - "We see lots of transfer across our rail, water and nuclear sectors."

Tier 1 supplier
- "Many suppliers now recognise the overlap in challenges between adjacent sectors and are merging teams accordingly"
 

Tier 1 supplier
- Resource constraints can be felt either in terms of business development (tendering for work) or delivery, which sometimes leads to a choice being made on which industry to invest in
  - "HE overestimates tier 2 suppliers' tendering capabilities, the result of which is a prohibitively complex and costly for smaller companies."

Tier 2 supplier
- There are a number of ways of making the highways industry attractive for suppliers
  - "If we had more certainty that we had work beyond next year we would add resources to our Highways practice."

Tier 1 supplier
- However, other industries have a number of advantages
  - "Nuclear power station projects tend to run procurement years in advance, making it very easy to plan for them."

Tier 2 supplier

█ Highways Specialism █ Evidence of projects carried out in sector<sup>1</sup> █ Some evidence of capability in sector<sup>2</sup> █ Key adjacencies

**Adjacent industries draw on a similar pool of design and management contractors to those supplying HE; Continuity of work, pipeline visibility and ease of tendering are key to the attractiveness of delivering work**

# In summary, HS2 and Hinkley C are likely to represent the most material impacts on HE's supply chain; both represent a step-change in requirements for overlapping capabilities over the period of the RIS

Impact summary	
1 Local Roads	<ul style="list-style-type: none"> <li>Although local roads require the same resources as highways, investment (and work volumes) for capital works are expected to fall</li> <li>With no major projects during the RIS period, it is unlikely that there will be significant supply-side changes that will affect the highways supply chain</li> </ul>
2 Rail	<ul style="list-style-type: none"> <li>While CP5 and Crossrail will not have a major effect on the highways supply chain, HS2 will have a significant impact during the RIS period</li> <li>HS2 will place extra strain on earthworks, drainage works, structures and material resources               <ul style="list-style-type: none"> <li>£1.5bn of spend is allocated for earthworks alone, relating to clearing the railway's line of route</li> </ul> </li> </ul>
3 Floods & Water	<ul style="list-style-type: none"> <li>In floods and defences, the Thames Tideway Tunnel is the only major project currently in the pipeline, requiring significant tunnelling works</li> <li>Overlap with the end of Crossrail 1 tunnelling works means that the overall effect on the highways supply chain will be small</li> </ul>
4 Nuclear	<ul style="list-style-type: none"> <li>The first phase of construction of Hinkley Point C, clearing a 175 hectare site, is planned to commence in 2016 and will put additional strain on earthworks during the RIS period</li> <li>However, there is some uncertainty around start date of the project (as at January 2015); should this be postponed, impact on RIS delivery may be reduced</li> </ul>
5 Airports	<ul style="list-style-type: none"> <li>In airports, there are no major capital works projects in the pipeline during the RIS period</li> </ul>

Material impact	Moderate impact	Small impact
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## Summary of impacts on HE's supply chain

- We have assessed demand in adjacent industries to identify where there is both an overlap of specialisms with HE's supply chain, and also a material step-change in the demand that is likely to be felt over the RIS period
- A degree of overlapping demand is already in place, which the supply chain has delivered against in recent years
  - We make an assumption that demand in line with historic levels will be deliverable in future; this allows us to focus on areas where a step-change in demand is forecast
- Spend is likely to materially increase in two industries where capability requirements overlap significantly with highways:
  - Rail** - construction of HS2 is due to commence in 2017
  - Nuclear power** – if investment is secured, construction of Hinkley Point C will represent a step-change in demand
- Of these, HS2 appears to represent the most material risk to supply chain capacity:
  - “HS2 works will have a material impact on the highways supply chain. Until rail systems are added, the construction of a new greenfield high-speed railway involves all the same disciplines: site clearance, ecological measures, utility and road diversions, boundary fencing, earthworks, drainage, materials logistics, site compounds, structures, etc.”*

Tier 1 supplier



**Major projects in rail and nuclear industries will increase demand for a number of specialisms common to highways. We will overlay these findings onto our quantitative analysis**

# More broadly, the UK highways industry also faces international competition – with the strongest influence being on people. However, international markets can also provide a beneficial route for procuring plant and materials

People	Plant	Materials
<ul style="list-style-type: none"> <li>Following the 2010 cut in highways funding, many designers and managers moved (or were moved) abroad                             <ul style="list-style-type: none"> <li>“As a company with a large international presence we moved a large number of our staff abroad in 2010” Tier 1 supplier</li> <li>“We lost a large number of talented managers to the Middle East in 2010/11 and I don’t think they will be back for at least another 3 or 4 years” Tier 1 supplier</li> </ul> </li> <li>However, the past five years has seen an influx of talent from the continent                             <ul style="list-style-type: none"> <li>“Where there has been a skills gap we have been able to hire staff from Europe, particularly Spain and Greece” Tier 1 supplier</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Most plant is imported from abroad but must be ordered in advance                             <ul style="list-style-type: none"> <li>“It is currently very easy to import any plant we need, albeit with a lead time of 6-18 months. We import plant from Japan, Germany and the USA and have never encountered any supply issues” Tier 2 supplier</li> </ul> </li> <li>Even heavy, specialised plant can be loaned from Europe if required                             <ul style="list-style-type: none"> <li>“Demand on the continent for heavy earthworks plant is currently low, so if need be we can move it over here. It would not be a simple job, but the industry are specialists in managing complex large-scale projects” Tier 2 supplier</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Although often seen as a backup option, importing cement, aggregate and bitumen is seen as a viable option when domestic capacity is stretched                             <ul style="list-style-type: none"> <li>“We are very proud of our ability to supply any level of demand our customers challenge us with: as our overseas sites are currently underutilised we can always import what we can’t produce here” Tier 3 supplier</li> </ul> </li> <li>Finished products, such as communications and technology products, can generally be purchased on the open market and imported                             <ul style="list-style-type: none"> <li>“The only real barrier to procuring communications components that I can see is if there is a global peak in demand for a particular product – HE buy relatively small volumes and would be passed over in favour of the bigger players” Tier 1 supplier</li> </ul> </li> </ul>



**Some skills still remain abroad after reductions in spend around 2010**

**There is evidence the UK highways supply chain could leverage spare plant capacity from Europe**

**International markets provide options for materials import to help address shortages**

# Agenda

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- Executive summary
- Market situation and background
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  - Core HE demand
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  - **Assessment of deliverability and identified risks**
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# As before, we consider deliverability in terms of People, Plant and Materials. In each case, we assess capacity constraints, the ability to scale current capacity, and any mitigating approaches in place

## Resource categories

**1 People**

- Demand for human resource across key project stages
- We quantify in terms of high-level categories of Tier 1 designers, Tier 1 management and construction workers
- Qualitatively, we consider how demands impact particular specialisms

**2 Plant**

- Demand for machinery, including both specialist plant for highways and more generic items (e.g. for earthworks)
- Quantified in three key categories: pavers, rollers and earthworks
- Qualitatively, we consider other specialist items (e.g. for white lining) and requirements for transport and haulage

**3 Materials**

- Demand for raw materials and finished products
- We quantify for aggregate and bitumen
- Qualitatively, we give a view on likely constraints for asphalt (a product of asphalt and bitumen), finished products for road technology, and signage

## Assessment criteria

**Capacity constraints**

- At a high level, how does forecast RIS demand compare to historic levels?
- What key issues have suppliers raised as cause for concern?

**Ability to scale**

- Where future demand exceeds current capacity, do suppliers feel able to scale resources to meet demand?

**Existing mitigations**

- What approaches are currently in place to deal with the capacity constraint, and what is the likely success of these?

- This section combines the qualitative and quantitative evidence from our study to assess the key risks to delivery of the RIS
- We address the resource categories of People, Plant and Materials in turn
- For each assessment criterion we assign a red, amber or green indicator to denote the severity of risk represented

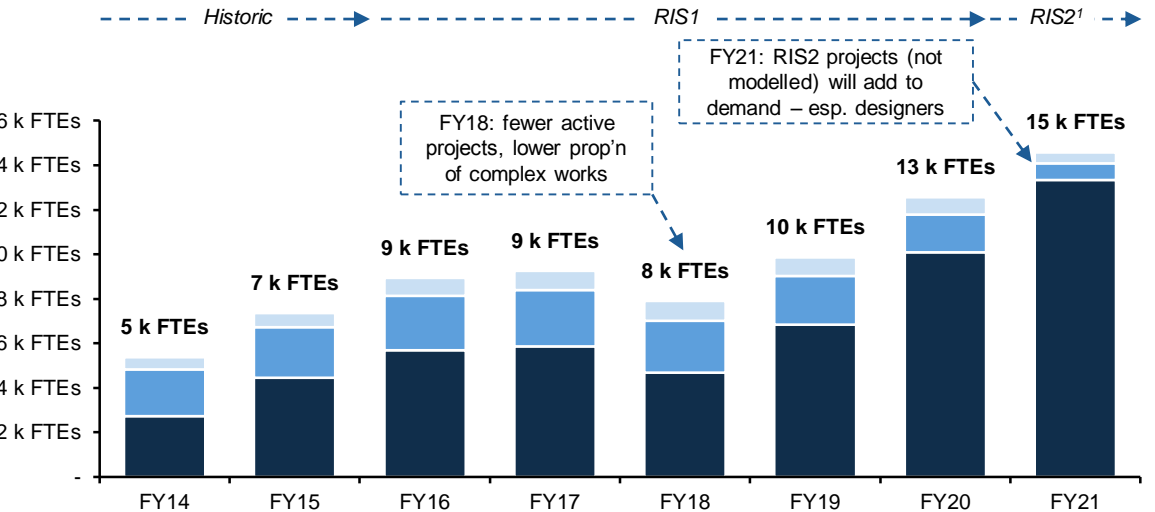
**We discuss the assessment criteria for each of the resource categories in turn...**



1	PEOPLE	Capacity Constraints
2	PLANT	Ability to scale
3	MATERIALS	Existing mitigations

# Labour requirements for RIS projects are expected to increase on average over the period. An uneven demand profile has proven challenging to suppliers in the past, and appears likely to continue

Modelled growth in People requirements (FY14-21) MAJOR PROJECTS ONLY



**Key**  
 ■ Construction ■ Design ■ Management

NB. quantum of FTEs illustrative only<sup>2</sup>

**Pinch points:** FY18 (contraction), FY21 (later expansion)  
**Volatility:** Maximum variance from average FY16-FY21 = +4.1k FTEs (40%) in FY21  
**Geographic constraints:** South East (FY19 & 20 – combination of significant A27 dualling, junction work on M3 & M25, and M25 smart motorway)

## Key issues highlighted by suppliers

- Inconsistency of demand makes 'right-sized' resourcing difficult
- Highways sector could do more to attract new entrants (cf. HS2 / high-speed rail)
- Experienced designers are difficult to find: many have left the industry

- The key issue around people for most interviewees is the difficulty in adapting to an inconsistent profile of demand. The supply chain reported difficulties in maintaining staff numbers in the face of reduced revenues between FY15 and FY16 (more detail on p.65)
  - “Having employed a large number of workers, we have not seen the revenue to back this up, and redundancies are expected as we cannot continue to bear the cost.”

Tier 1 supplier
- During the recession, interviewees reported that a large number of construction workers left the industry; these were not felt likely to return
  - “Given the contraction we’ve seen, a lot of skilled construction workers have gone to HS2, or moved abroad.”

Tier 1 supplier
- This touches on attractiveness issues experienced by the highways market, which has meant difficulties in recruitment in previous years
  - “There are attractiveness issues with highways – the whole industry is concerned about this. We are focussed on STEM engagement to address the education aspect of this.”

Tier 1 supplier
- As well as construction workers, there have been some resourcing issues with experienced designers
  - “There is an hourglass shape in the labour market: a lot of people at the mid-level, such as technicians and experienced engineers, have left the sector.”

Tier 1 supplier

**Supplier feedback suggests capacity gaps for skilled workers in construction and design are likely. This is exacerbated by a churn risk - in recent years, skilled resource leaving the industry has proven difficult to replace**

Focus area: **1 – People**  
 Overall capacity constraint: **HIGH**

1	PEOPLE	Capacity Constraints
2	PLANT	Ability to scale
3	MATERIALS	Existing mitigations

# Suppliers feel their ability to scale resources in senior management is limited; similarly, poor availability of labourers may prevent material growth in scale

Area	Comment	Evidence	Difficulty of scaling
Senior management	<ul style="list-style-type: none"> <li>Market feedback indicated this was a key area of concern, and that it is increasingly difficult to recruit <b>experienced managers</b> to replace those lost to natural churn</li> </ul>	<ul style="list-style-type: none"> <li>“The key problem is bringing new people at a management level into the industry, while the old knowledge and experience is leaving.”</li> </ul> <p style="text-align: right;">Tier 2 supplier</p>	
	<ul style="list-style-type: none"> <li>As HE moves towards a direct contractor engagement model, there will be a drive to move <b>managers</b> from Tier 1 contractors into HE. Salaries were not felt to be as attractive in the public sector</li> </ul>	<ul style="list-style-type: none"> <li>“At a senior level, the private sector has far better returns.”</li> </ul> <p style="text-align: right;">Tier 1 supplier</p>	
Technical	<ul style="list-style-type: none"> <li>The talent pipeline for <b>graduate engineers</b> was viewed as healthy, although interviewees reported the highways industry was beset by attractiveness issues</li> </ul>	<ul style="list-style-type: none"> <li>“The talent pipeline is there – it’s competitive, but we have been able to recruit graduates. There are some attractiveness issues with the highways sector.”</li> </ul> <p style="text-align: right;">Tier 1 supplier</p>	
	<ul style="list-style-type: none"> <li>However, the number of <b>experienced technical staff</b> was viewed as more difficult to scale</li> </ul>	<ul style="list-style-type: none"> <li>“It will be difficult to scale skilled technical people (e.g. estimators, quantity surveyors) – a lot of these individuals have moved into other industries.”</li> </ul> <p style="text-align: right;">Tier 3 supplier</p>	
Labourers	<ul style="list-style-type: none"> <li>Scaling <b>skilled labour</b> may be challenging, since skilled equipment operators are not being replaced by younger workers as they retire. This is due in part to attractiveness issues relating to increasing levels of night work</li> <li>However, this concern is partially offset by the large freelance market, and the potential to recruit from abroad</li> <li>No interviewee reported difficulties with <b>unskilled labour</b></li> </ul>	<ul style="list-style-type: none"> <li>“There is a shortage of skilled workers currently – nothing like the numbers we would need to scale capacity.”</li> </ul> <p style="text-align: right;">Tier 1 supplier</p>	
		<ul style="list-style-type: none"> <li>“Skilled equipment operators are ageing, and highways work has become less attractive to new recruits – there is much more night work.”</li> </ul> <p style="text-align: right;">Tier 2 supplier</p>	
		<ul style="list-style-type: none"> <li>“Scaling supply of construction workers can be done internationally: we will look to Spain and Greece, where there is currently oversupply. In my experience, these people have tended to be high quality.”</li> </ul> <p style="text-align: right;">Tier 1 supplier</p>	

The move towards direct contracting by HE may lead to challenges at management level; beneath this, there is a current lack of skilled labourers in the UK market, which is prompting suppliers to look internationally

Focus area: **1 – People**  
 Difficulty of scaling: **HIGH**

# Recent innovations in working practices have the potential to mitigate some of the capacity constraints identified. However, not all potential mitigations may be in place over RIS 1

Levers	Description	Evidence	Status	Implication for RIS
1. Reduce resource demand	<ul style="list-style-type: none"> <li>New techniques, such as microsurfacing, are being piloted in some HE areas</li> <li>These carry a reduction in manpower requirement per lane km</li> </ul>	<ul style="list-style-type: none"> <li>"Microsurfacing requires half the people and 3/5<sup>ths</sup> of the material, but is only in Area 7. It's in pilot at this stage."</li> </ul> <p>Industry Expert</p>	Pilot	<ul style="list-style-type: none"> <li>Unlikely to experience a scale roll-out over the RIS 1 period</li> <li>Promising if used to tackle localised capacity constraints during RIS</li> </ul>
2. Increase resource utilisation	<ul style="list-style-type: none"> <li>A movement towards larger workspaces, enabled by closing a section of road to traffic, increases the efficiency of construction workers</li> </ul>	<ul style="list-style-type: none"> <li>"Road closures (e.g. over a weekend), instead of night-time lane closures, are much more efficient. HE is bought into this: night-time working wastes time."</li> </ul> <p>Tier 2 supplier</p>	Early	<ul style="list-style-type: none"> <li>In order to impact resource demand over RIS, this will require a cultural change, driven by HE</li> <li>Change process potentially too slow</li> </ul>
3. Staff training	<ul style="list-style-type: none"> <li>Incorporating lean management techniques in project management programmes</li> </ul>	<ul style="list-style-type: none"> <li>"Some suppliers are training their staff to use lean management methodologies – this could allow them to do the same work with fewer people"</li> </ul> <p>Industry Expert</p>	Pilot	<ul style="list-style-type: none"> <li>Mitigates impact of the experienced worker pinch-point by using existing workforce more efficiently</li> <li>Currently low level of industry adoption</li> </ul>
4. Recruitment	<ul style="list-style-type: none"> <li>Graduate recruitment of contract managers from other academic backgrounds coupled with appropriate in-house training</li> </ul>	<ul style="list-style-type: none"> <li>"The industry currently focuses on recruiting from a narrow set of backgrounds [i.e. Civil Engineering] even though much of the job is learned in-house"</li> </ul> <p>Industry Expert</p>	Pilot	<ul style="list-style-type: none"> <li>Strengthens pipeline of graduate recruits</li> <li>Introduces diversity of backgrounds to industry</li> </ul>

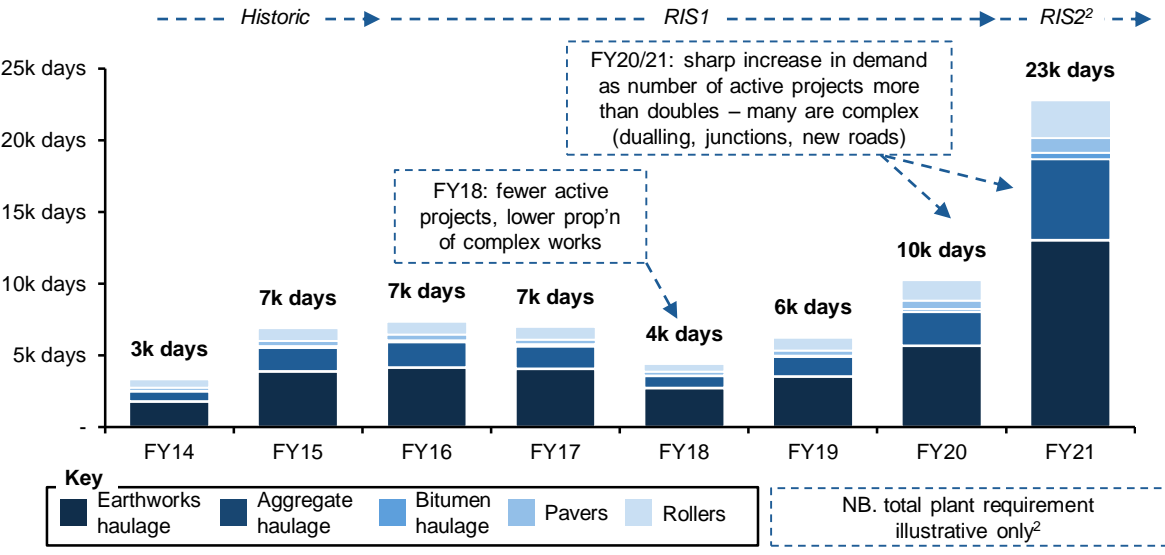
Mitigations could improve efficiency and approaches to recruitment and training, though the lead-times to achieving change in each case are likely to prove challenging

Focus area: **1 – People**  
 Impact of existing mitigations: **MEDIUM**

# Our analysis suggests plant requirements are likely to peak towards the end of RIS 1. Until then, average demand appears to be within FY15 levels of capacity<sup>1</sup>

## Modelled growth in Plant requirements (FY14-21)

MAJOR PROJECTS ONLY



**Pinch points: FY21** (Significant body of work due to start Mar 2020)  
**Volatility:** Maximum variance from average FY16-FY21: **+21k truck days<sup>3</sup>** (120%) in FY21  
**Geographic constraints:** South East (as p44); North East and South West peak in FY21; constraint in South East & Midlands due to material HS2 earthworks demand

### Key issues highlighted by suppliers

- Evidence of current overcapacity
- Bespoke plant is well-supplied, though more difficult to source
- Plant demands from adjacent sectors overlap with highways
  - Expected to drive increases in demand going forwards

- Demand for Plant is currently high...
  - "I have never seen such a high demand for Plant as there currently is in the market."

Tier 1 supplier
- ...although the supply chain reported few capacity issues, with most interviewees commenting that they were over-supplied relative to current demand
  - By comparison with people, oversupply of machinery is arguably easier to manage (though fleet ownership does incur costs)
  - "We've invested in new machines, but now have more than we need."

Tier 2 supplier
- Bespoke plant, such as white lining equipment, is more difficult to source – however, market participants were not currently experiencing supply difficulties
  - "We only use bespoke extrusion trucks for white-lining. We are currently running c.50% capacity."

Tier 2 supplier
- Large infrastructure projects in adjacent sectors carry a strong demand for similar Plant
  - "There is a demand for Plant from large infrastructure projects in other sectors. This Plant is often the same as is required for Highways works, and there is a knock-on effect."

Tier 1 supplier
- This is particularly the case for Earthworks, where there is understood to be an exceptionally strong demand from works for HS2 and Hinkley Point

**There are no reported capacity constraints in Plant, though upcoming Earthworks demand in adjacent sectors may create a pinch point**

Focus area: **2 – Plant**  
 Overall capacity constraint: **LOW**

1	PEOPLE	Capacity Constraints
2	PLANT	Ability to scale
3	MATERIALS	Existing mitigations

# Suppliers are generally confident in ability to scale plant, though there remains the potential for supply constraints in surfacing, haulage and white-lining

Area	Comment	Evidence	Difficulty of scaling
General comments	<ul style="list-style-type: none"> <li>Interviewees were generally optimistic about scaling plant, arguing that workarounds meant capacity constraints on plant were rarely critical</li> </ul>	<ul style="list-style-type: none"> <li>“There have never been any problems securing plant. If your supplier is out of stock, you can usually use a different piece of equipment, or ask the supplier to cross-hire from another agency or area.”</li> </ul> <p style="text-align: right;">Tier 2 supplier</p>	
Traffic management	<ul style="list-style-type: none"> <li>Traffic management plant was reported to be over-supplied</li> </ul>	<ul style="list-style-type: none"> <li>“Our supplier has a large number of IPVs which were bought in response to “Gearing for Growth”, and which are not being used. There is room to grow here.”</li> </ul> <p style="text-align: right;">Tier 1 supplier</p>	
Surfacing	<ul style="list-style-type: none"> <li>Some interviewees saw pavers as a potential issue in scaling up, though noted they had already taken action to enable this</li> </ul>	<ul style="list-style-type: none"> <li>“Pavers may be more of an issue in scaling up, so we have taken the decision to renew our fleet of 57.”</li> </ul> <p style="text-align: right;">Tier 2 supplier</p>	
Haulage	<ul style="list-style-type: none"> <li>Comments on haulage were mixed. No concerns were raised by materials suppliers themselves, though higher tiers of supply chain emphasised the importance of forward visibility to scale haulage successfully</li> <li>More efficient usage of haulage assets, such as through 24/7 utilisation, will support capacity growth</li> </ul>	<ul style="list-style-type: none"> <li>“Capacity of materials is constrained by the number of wagons on the road. This can only be solved with forward visibility – we need 6-8 months notice to scale availability.”</li> <li>“There is currently spare capacity in haulage – we have no concerns here.”</li> <li>“Haulage assets can be used more efficiently than they currently are. We are engaging clients to move them towards accepting deliveries 24/7.”</li> </ul> <p style="text-align: right;">Tier 1 supplier Tier 3 supplier Tier 3 supplier</p>	
Bespoke	<ul style="list-style-type: none"> <li>Bespoke plant has a long lead-time, and is therefore an area of potential risk</li> <li>This applies particularly to white-lining, where a high proportion of plant is bespoke               <ul style="list-style-type: none"> <li>– However, there is currently a significant level of unused capacity in the market</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>“We build all our plant ourselves. An extrusion truck [white-lining] carries a 15-month lead time. However, we are currently at 50% utilisation, so there is scope to scale further.”<sup>1</sup></li> <li>“Though off-the-shelf plant won’t be a problem, ours is bespoke, with a long lead time. We’ve recently invested in two new machines, and could deliver a further six if necessary.”</li> </ul> <p style="text-align: right;">Tier 2 supplier Tier 2 supplier</p>	



**Lead times for new plant are generally long, presenting risk particularly where plant is bespoke. This emphasises the need for forward visibility of the highways workbank**

Focus area: **2 – Plant**  
Difficulty of scaling: **MED**

1	PEOPLE	Capacity Constraints
2	PLANT	Ability to scale
3	MATERIALS	Existing mitigations

# Mitigations for the strongest constraints (HGVs, earthworks) include technical innovation, global sourcing and flexibility of requirements

Mitigation	Description	Evidence	Status	Implication for RIS
1. Increased automation	<ul style="list-style-type: none"> <li>Particularly for asphalt-laying Plant, the level of automation is increasing</li> <li>This will drive higher utilisation of existing plant, mitigating capacity pinches</li> </ul>	<ul style="list-style-type: none"> <li><i>“Machine automation is improving efficiency very rapidly, and we should see the impact of this over the RIS time-frame.”</i></li> </ul> <p>Tier 1 supplier</p>	Advanced	<ul style="list-style-type: none"> <li>Increasing efficiency of automated Plant over the RIS time-frame may reduce not only demand for equipment, but also its operators</li> </ul>
2. Global marketplace	<ul style="list-style-type: none"> <li>Market participants did not feel capacity issues with Plant would present major difficulties, given the global nature of the market. However, this may come with a cost increase</li> </ul>	<ul style="list-style-type: none"> <li><i>“Plant can be brought back from overseas if necessary, though this may increase cost.”</i></li> </ul> <p>Tier 1 supplier</p>	Early	<ul style="list-style-type: none"> <li>Off-the-shelf Plant is unlikely to prevent delivery of RIS, though cost may rise if imported from overseas</li> </ul>
3. Workaround	<ul style="list-style-type: none"> <li>Plant requirements are rarely specific to a particular piece of equipment, opening the opportunity to use alternative equipment in times of high demand</li> </ul>	<ul style="list-style-type: none"> <li><i>“If you can’t source the Plant you need, you can use a slightly different piece of equipment, e.g. a loader of different tonnage.”</i></li> </ul> <p>Tier 2 supplier</p>	Advanced	<ul style="list-style-type: none"> <li>Capacity constraints are less likely to be felt in generic, replaceable Plant (e.g. loaders)</li> </ul>
4. Multipurpose plant	<ul style="list-style-type: none"> <li>Feedback suggested that there is high usage of single-purpose plant (compared to the continent) and that moving towards multipurpose plant could help to improve the flexibility of plant resources</li> </ul>	<ul style="list-style-type: none"> <li><i>“Plant in the UK is underutilised due to the prevalence of single-use plant: using multi-function plant is sometimes more cost-effective”</i></li> </ul> <p>Industry expert</p>	Early	<ul style="list-style-type: none"> <li>Improved ability for supply chain to respond to specific plant requirements with short lead time</li> </ul>



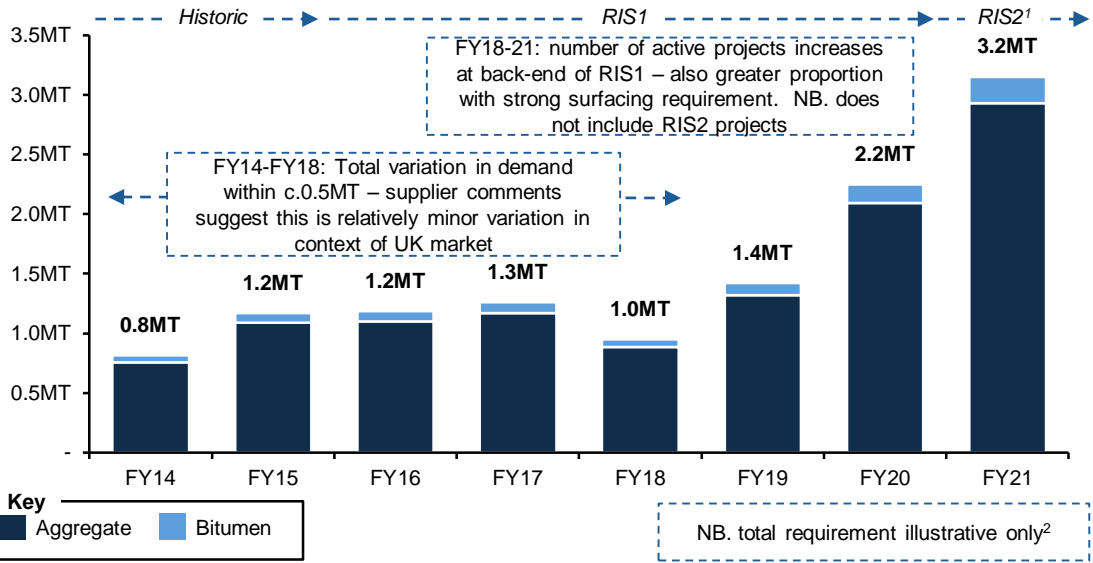
**Mitigating factors offer comfort to users of ‘off-the-shelf’ Plant. However, where Plant requirements are bespoke, we identify no clear mitigations for capacity constraints**

Focus area: **2 – Plant**  
 Impact of existing mitigations: **MEDIUM**

1	PEOPLE	Capacity Constraints
2	PLANT	Ability to scale
3	<b>MATERIALS</b>	Existing mitigations

# Demand for surfacing materials (aggregate and bitumen) tracks project construction schedules, and is unlikely to peak until the first year of RIS 2

**Modelled growth in Materials requirements (FY14-21) MAJOR PROJECTS ONLY**



**Pinch points: FY20-21** (Significant body of work due to start Mar 2020)  
**Volatility:** Maximum variance from average FY16-FY21: **+1.4m tonnes (85%)** in FY21  
**Geographic constraints:** Haulage in South East (given geological factors)

### Key issues highlighted by suppliers

- Reduced domestic bitumen production capacity
- Aggregate overcapacity
- Potential for local pinch points in haulage

Bitumen production capacity has reduced within the UK, though suppliers note that levels of demand are currently low

- “Refining capacity has more or less disappeared: currently there are only two manufacturing assets in the UK. However, demand is low: this year we will move 70% of what we did in FY05.”  
Tier 3 supplier
- The reduction in refining capacity has been met by rising import capacity
  - “The margins no longer favour production in the UK, and we are moving to an import market, investing in depots to support this.”  
Tier 3 supplier
- In Aggregates, the supply chain reports no capacity pinch, and suppliers emphasised that HE represents only a small proportion of UK demand
  - “We have made investments in quarries across the UK, and are over-supplied relative to current demand. Bear in mind HE represents only 5% of our national market: an increase won't be unmanageable for the industry.”  
Tier 3 supplier
- There are some concerns over haulage of materials
  - These dominate in the south-east, where there are few deposits of hard stone
    - “There is no hard stone in the south, and it needs to be transported in – we sometimes see pinch points here.”  
Tier 2 supplier
  - However, the concerns generally are not shared by raw materials suppliers themselves
    - “There are enough trucks – we have no concerns here.”  
Tier 3 supplier

**The market is currently well-supplied with materials. Concerns over haulage are localised, and not shared by raw materials suppliers**

Focus area: **3 - Materials**  
 Overall capacity constraint: **LOW**

# In other areas of materials, constraints around finished products such as signage and technology appear to be low – though visibility of demand is key for suppliers

Traditional signage	<ul style="list-style-type: none"> <li>Signage providers sometimes come close to running at full capacity, responding to highly variable demand               <ul style="list-style-type: none"> <li><i>“We find the market to be highly cyclical: sometimes we run at over 85% for several weeks to fulfil highways orders and then see nothing for months.”</i></li> </ul> </li> </ul>	Tier 3 Supplier
	<ul style="list-style-type: none"> <li>There is evidence that such peaks in demand, as well as some lack of visibility around requirements, mean the production process is not as efficient as it could be               <ul style="list-style-type: none"> <li><i>“We often have design periods of months, but are expected to deliver signs in weeks – with more notice and quicker sign off we could deliver signage at lower cost.”</i></li> </ul> </li> </ul>	Tier 3 Supplier
	<ul style="list-style-type: none"> <li>Overall, however, suppliers feel that significant capacity constraints for signage are unlikely               <ul style="list-style-type: none"> <li><i>“There is plenty of capacity in road signage in terms of people, plant and materials.”</i></li> </ul> </li> </ul>	Tier 3 Supplier
Technology (incl. Smart Motorways)	<ul style="list-style-type: none"> <li>Technology products include CCTV, variable message signs, sensors, communication equipment and lighting</li> <li>As Smart Motorways have grown to become an established concept the equipment required has been standardised               <ul style="list-style-type: none"> <li>This has allowed products to be sourced from global markets and yielded efficiencies in installation</li> <li><i>“Tech is getting easier as kit becomes more standardised – Smart Motorways are now relatively straightforward projects”</i></li> </ul> </li> </ul>	Tier 1 Supplier
	<ul style="list-style-type: none"> <li>Consequently most equipment can be purchased off-the shelf               <ul style="list-style-type: none"> <li><i>“At the end of the day you can get hold of most tech items with enough lead time”</i></li> </ul> </li> </ul>	Tier 1 Supplier
	<ul style="list-style-type: none"> <li><i>“It is easy to get hold of products. The only exception may be if there is a global peak in demand for specific components”</i></li> </ul>	Tier 1 Supplier
	<ul style="list-style-type: none"> <li>However, the equipment available has issues with reliability, which results in a continuous requirement for technology products               <ul style="list-style-type: none"> <li><i>“Tech component reliability is shockingly bad – we need to replace components on a regular basis”</i></li> </ul> </li> </ul>	Tier 1 Supplier



**Barriers to scaling capacity for signage and technology components are low, with finished materials readily available on the global market**



# In materials, lead times are comparatively long. However, the industry has already begun to make investments, and is running with significant spare capacity – supporting efforts to scale up

Area	Comment	Evidence	Difficulty of scaling
Bitumen	<ul style="list-style-type: none"> <li>The UK market for bitumen is moving away from production and into import</li> <li>Depot investments have been made to enable this, and there was felt to be sufficient supply at a global scale</li> </ul>	<ul style="list-style-type: none"> <li>“Although refining capacity has dropped off in the UK, this has been met by rising import capability. I’m confident we can source sufficient bitumen internationally, and we have built more depots to enable import. There is not much cost difference<sup>1</sup>.”</li> </ul> <p style="text-align: right;">Tier 3 supplier</p>	
Aggregate	<ul style="list-style-type: none"> <li>Materials suppliers reported localised capacity constraints on aggregate in the south, with relatively long lead-times to scale up</li> <li>However, there is currently spare capacity in the market, and investments have been made to improve efficiency</li> </ul>	<ul style="list-style-type: none"> <li>“There is a 3 month minimum lead time to gear up supply, and there are some supply problems in the south, where there is no hard stone.”</li> <li>“Our superquarry has a capacity of 10 million tonnes – it is currently at 50% utilisation, and we are undertaking efficiency and capacity works at our other sites. We are already gearing up.”</li> </ul> <p style="text-align: right;">Tier 3 supplier</p>	
Asphalt	<ul style="list-style-type: none"> <li>Some asphalt plants have been mothballed, and there is the potential to bring these back on-line</li> <li>However, the lead-time is significant (over 12 months), and HE will need to make volume commitments to the market before the plants are reopened</li> </ul>	<ul style="list-style-type: none"> <li>“There is 12-18 month lead time to flex capacity in asphalt plants – some have been mothballed, and will not come back online without volume guarantees.”</li> <li>“We have recently invested in a large new-build asphalt plant – I do not think there will be an issue with manufacturing capacity.”</li> </ul> <p style="text-align: right;">Tier 3 supplier</p>	
Streetlighting	<ul style="list-style-type: none"> <li>The importance of forward visibility was again emphasised in streetlighting: although there is no absolute capacity constraint, work is currently commissioned too late</li> </ul>	<ul style="list-style-type: none"> <li>“In streetlighting, the lead time for columns and luminaries is 10-14 weeks. We currently have one week notice, and need better visibility of work to scale up streetlighting.”</li> </ul> <p style="text-align: right;">Tier 3 supplier</p>	



**Capacity issues in materials appear unlikely at the national level, though there may be localised shortages in regions less accessible to the industry**

Focus area: **3 - Materials**  
 Difficulty of scaling: **LOW**

# Some quarries are operating below capacity (suggesting clear ability to scale) and there is potential to expand imports with minimal impact on cost

## Strategic outlook

## Supplier-led mitigation strategies

**Mineral Product Association Briefing 2015<sup>1</sup>**

**Background**

- Comprehensive review of historical (2013-2015) and future projected (2016-2030) supply and demand of aggregates, asphalt and ready-mixed concrete (RMC)
  - Includes construction of both highways, infrastructure and housing
- Report models 2 demand scenarios (baseline and low materials intensity) and 5 supply scenarios (with a variety of land-based v maritime dredged aggregate ratios)

**Key findings**

- Aggregate, concrete and asphalt production is **25-32% lower than pre-recession levels**
- There is **spare capacity in the supply chain to meet industry demand** in the foreseeable future
  - However, the ability of the market to meet demand for aggregates in the medium term (5-10 years) is dependent on planning permission, both in quarries and marine dredging
- The **cement industry is running at c. 70%** of max capacity
  - Importation of cement is possible to address short-term increases in demand

	Domestic capacity expansion	Overseas materials sourcing
Description	<ul style="list-style-type: none"> <li>Suppliers highlighted a number of mothballed quarries and plants that could be re-opened in response to renewed demand</li> <li>In addition, existing plant and quarry output capacities can be expanded</li> </ul>	<ul style="list-style-type: none"> <li>The option of importing cement, bitumen and aggregate is used as a backup sourcing route by suppliers</li> <li>Relies on seaborne transport and appropriate docking facilities</li> </ul>
Barriers	<ul style="list-style-type: none"> <li>High capital cost to suppliers, requires guaranteed pipeline to ensure a return on investment</li> <li>Regulatory issues and planning permission cited as past barrier to efficient capacity expansion</li> </ul>	<ul style="list-style-type: none"> <li>Limited ability to cost-effectively receive and distribute aggregate to non-coastal projects</li> <li>Aggregate imports are more expensive than domestically sourced stone</li> </ul>
Benefits	<ul style="list-style-type: none"> <li>Long-term guarantee of materials resource</li> <li>Economic benefit and jobs creation in regions</li> </ul>	<ul style="list-style-type: none"> <li>Agile response to peaks in demand</li> <li>Underutilised port facilities can be used if commercially viable</li> </ul>
Impact on RIS delivery	<ul style="list-style-type: none"> <li>Improved ability to meet predicted FY 2021 demand peak</li> <li>Long-term ability to deliver RIS 2 and beyond</li> </ul>	<ul style="list-style-type: none"> <li>International supply highly likely to meet RIS demand, but at increased material unit costs</li> <li>Supply chain able to respond more effectively to short-term changes in materials demand</li> </ul>

**Domestic capacity expansion offers long-term savings with high up-front capital investment from suppliers; imports offer a short-term solution but at higher cost**

Focus area: **3 – Materials**  
 Impact of existing mitigations: **HIGH**

# In summary, the most significant area of risk is around people, given that an overall increase in demand is expected but under an uneven profile, with barriers to scaling resource and limited impact of mitigations

Area	Key findings	Capacity constraint	Ability to scale	Impact of existing mitigations	Demand from adjacent sectors	Overall perspective
<b>People</b>	<ul style="list-style-type: none"> <li>Difficult to maintain “right sized” workforce given uneven demand profile, especially around FY18</li> <li>Highways sector considered unattractive by potential new entrants</li> <li>Shortage of experienced designers, where requirement likely to peak earlier in RIS than other categories</li> </ul>	<b>(High)</b>	<b>(High)</b>	<b>(Medium)</b>	<ul style="list-style-type: none"> <li>Strong competition for resource with HS2 and abroad, likely to be most acute amongst Tier 2 specialists (e.g. earthworks, drainage) , but also clear at Tier 1 level given breadth of work in adjacent markets</li> </ul>	<ul style="list-style-type: none"> <li>‘People’ are identified by almost all suppliers as the key capacity constraint</li> <li>The uneven demand profile across RIS 1 will prove particularly challenging for smaller suppliers to support</li> </ul>
<b>Plant</b>	<ul style="list-style-type: none"> <li>Current overcapacity/low utilisation of plant</li> <li>Strong overlap in demand with other sectors</li> <li>Bespoke plant is more difficult to source, but is currently not an issue</li> </ul>	<b>(Low)</b>	<b>(Medium)</b>	<b>(Medium)</b>	<ul style="list-style-type: none"> <li>Earthworks plant likely to come under strain given HS2 and Hinkley Point requirements (HS2 estimated at 180m tonnes)</li> </ul>	<ul style="list-style-type: none"> <li>Severity of ‘plant’ constraint depends on forward guidance signalled to suppliers - availability of plant is generally perceived to be good, but only given sufficient lead time to source and supply machinery</li> </ul>
<b>Materials</b>	<ul style="list-style-type: none"> <li>Bitumen production capacity in the UK has fallen in recent years in favour of import (though this is not perceived to impact capacity)</li> <li>Where local supply of raw materials is low, haulage may prove a pinch point</li> </ul>	<b>(Low)</b>	<b>(Low)</b>	<b>(High)</b>	<ul style="list-style-type: none"> <li>Competition for materials across most adjacencies; surfacing materials likely to form part of associated road construction for HS2 and potential south-east runway</li> </ul>	<ul style="list-style-type: none"> <li>Market shows some ability to scale in terms of aggregates and bitumen supply</li> <li>Increases in capacity beyond this will require capital investment (with an associated cost impact), but appear to be feasible</li> </ul>



**Constraints around people are evident from suppliers’ concerns around shortages of skilled management resource, and quantification suggests a challenging variability in year-on-year demand**

# A number of the capacity constraints highlighted may impact the cost of delivering the RIS programme

## Indicators of cost risk

- We indicate, right, a series of areas where supply chain risk may lead to cost escalation over the period of the RIS
  - Where demand exceeds the level of supply, constrained resources are likely to lead to price inflation
- Beyond this, there are clearly a range of further factors that will influence the cost of delivery:
  - While the fieldwork element of this study has allowed identification of key supply chain risk areas, costs are also impacted by a series of macroeconomic influences (e.g. commodity or fuel pricing, levels of unemployment) over which suppliers have limited control
  - Risk to cost from overrun or delay to the programme is inherent
  - Similarly, we have not sought to assess the validity of budgeted costs for each of the RIS projects

## Supply-chain cost risk factors evidenced from fieldwork

Risk area	Description	Pinch-points
<b>People:</b> volatility in demand profile	<ul style="list-style-type: none"> <li>• The forecast resource profile for people shows fluctuation in demand – this can either leading to businesses operating with surplus headcount (and thereby seeking to recover excess cost through pricing) or without appropriate resource (potentially attracting a premium)                             <ul style="list-style-type: none"> <li>– <i>“In my opinion, only a portion of the RIS workbank is planned to the level of detail we need to scale appropriately for growth. This means we are unable to be exact in our resourcing, which is the most straightforward means of controlling cost.”</i> Tier 1 supplier</li> <li>– <i>“The Tier 2 suppliers we work with are cautious; work is likely to be delivered at a much higher cost, given that the supply chain will be much less responsive to HE’s calls.”</i> Tier 1 supplier</li> </ul> </li> </ul>	FY18 (contraction); FY19-21 (subsequent expansion)
<b>Plant:</b> Haulage cost	<ul style="list-style-type: none"> <li>• Analysis indicates an increase in demand for plant overall, though suppliers are confident in ability to scale. There is indication of potential for cost variability in haulage                             <ul style="list-style-type: none"> <li>– <i>“Logistics make up 20% of our cost base. Bitumen haulage is largely sub-contracted to partners like DHL – there may be some cost inflation here over the next 4-5 years through driver wage inflation. Having said this, the overall cost may be stabilised by low oil prices.”</i> Tier 3 supplier</li> </ul> </li> </ul>	FY20-21 (peak haulage demand)
<b>Materials:</b> lack of supplier management / forward planning	<ul style="list-style-type: none"> <li>• Materials suppliers suggest a likely, but avoidable, source of cost inflation is inappropriate forward planning of requirements                             <ul style="list-style-type: none"> <li>– <i>“Suppliers are seeing potential cost inflation; most clients tend to secure their supply chain well in advance of delivery in order to mitigate this.”</i> Tier 1 supplier</li> <li>– <i>“We currently run at c.25% spare capacity, and yet when we don’t receive sufficient advance notice from clients this leads to unnecessary price inflation as we need to rearrange production schedules.”</i> Tier 2 supplier</li> </ul> </li> </ul>	Throughout, though mitigated through appropriate planning
<b>Materials:</b> regional effects	<ul style="list-style-type: none"> <li>• Given high transportation costs, localised capacity constraints could significantly impact cost of supply                             <ul style="list-style-type: none"> <li>– <i>“A tonne of rock salt costs £20 locally, but this would increase to £45 if it needs to be transported 200 miles.”</i> Industry Expert</li> </ul> </li> </ul>	South East & South West have peak demand in FY20/21

# Agenda

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- Executive summary
- Market situation and background
- Supply chain capacity assessment
- **HE approach to procurement and project management**
- Key Performance Indicators and recommendations for ORR
- Appendix

# HE and HA's performance over recent years has demonstrated improvements in its approach to the delivery of major projects

c.1998 - 2007  
Delivery of the  
TPI



2007  
Nichols review



c. 2007 - 2011  
Transformation  
Programme



2015  
ORR's Six  
month review

- In the last 10 years, Highway England / Highways Agency has come under scrutiny for project delivery, and as a result has implemented a number of changes in its approach to delivering major projects
- In the late 2000s, Highways Agency attracted criticism from various organisations (including the PAC, NAO and the Transport Committee) for the way it handled its Targeted Programme of Improvements (TPI)
  - The TPI was a programme of major road improvement schemes, directing investment across maintenance, operations and improvement of the trunk road network
- In particular, the Nichols Group's 2007 Review of Highways Agency's Major Roads Programme highlighted shortcomings in HA's methods of procurement, governance and delivery and the interface between DfT and HA
  - *"First, the nature of the programme needs to be properly reflected in its structure and funding. Second, DfT needs to give clearer policy guidance and provide more effective sponsorship and the Highways Agency needs to be more clearly accountable for delivery. Third, the Highways Agency needs to develop its delivery capability. I have recommended how these can be addressed."*  

Conclusions, Nichols Review (2007)
- However following this criticism, the Government and Highways Agency adopted the recommendations of the Nichols project, and started a major transformation programme to address the issues raised
- This programme was successful and led to significant improvement in the Agency's project delivery performance
  - *"The Highways Agency's response was to focus on a review and staged improvements of their governance and programme structure [...] This has resulted in notable performance improvements across their projects."*  

HM Treasury: Improving Infrastructure Delivery (2014)
  - *"Major Schemes are generally successful in delivering against their scheme specific objectives with 94% of the objectives being achieved."*  

Atkins Report (2014)
- Most recently, the ORR's Six Month review of Highways England's performance, published in December 2015, was positive towards project delivery
  - *"Highways England has made good progress in delivering against the capital programme commitments for 2015-16 and has delivered in line with its plans. In the six months to September 2015 HE has also delivered greater volumes of asset renewals than it planned, whilst spending below its budget."*  

ORR Six Month Review (2015)



**HE (formerly HA) has recently undergone a transformation programme to improve its approach to project delivery; this pre-dates the start of the RIS1 period**

# With the increased volume of work to be delivered, the RIS materially alters demand for resources from HE. It has set out a Delivery Plan to address this, with both internal and external objectives

## HE's plan to deliver the RIS

- The RIS brings a significant increase in spending by HE, with an upturn in annual spend from a historical average of £704m to over £2bn by 2020 (see pp.17-21)
  - A total £10.7bn has been allocated for enhancement and modernisation of the SRN during the RIS
- HE has set out a Delivery Plan to address this, structured around 4 key themes:
  - Driving efficiency
  - Mitigating risk
  - People deployment
  - Collaboration with other agencies
- The initiatives in the delivery plan split broadly into those with an internal focus on HE's own people and processes, and those with an external focus, where HE engages other agencies and supply chain partners

Key enabler		Detail
Internal	People and Company	<ul style="list-style-type: none"> <li>• By anticipating future resource needs, HE intends to make sure it deploys the right people at the right time, enabling efficient resourcing                             <ul style="list-style-type: none"> <li>– This will be supported by its HR strategy: improving employee training, ensuring accountability of senior leadership against RIS targets, and close performance management</li> </ul> </li> </ul>
	Managing Risk and Uncertainty	<ul style="list-style-type: none"> <li>• Risk and uncertainty have the potential to materially impact the efficiency and cost of the RIS                             <ul style="list-style-type: none"> <li>– Key risks include severe weather, assumptions about customer demand estimates and implementation costs</li> <li>– Although HE's monitoring will give some warning of upcoming risks, no extra funding is available, so unforeseen costs may prevent the deliverability of the full RIS package</li> </ul> </li> </ul>
	Delivering Performance and Efficiency	<ul style="list-style-type: none"> <li>• HE has committed to make capital efficiency savings of c.£1.2bn by 2020                             <ul style="list-style-type: none"> <li>– Internally, lean resource allocation and risk management techniques will be applied to drive efficiencies in the organisation</li> <li>– Engagement with the supply chain, particularly through the CDF, will incentivise suppliers to deliver efficiencies within projects</li> <li>– Category Management frameworks are in place, leveraging the scale of HE's national demand for goods and services to achieve volume pricing</li> </ul> </li> </ul>
External	Collaborative Relationships	<ul style="list-style-type: none"> <li>• Effective collaboration with adjacent organisations will be critical to the effective delivery of the RIS                             <ul style="list-style-type: none"> <li>– HE has created an Engagement Council of c.90 suppliers, meeting quarterly, which is aimed at driving early collaboration all the way down the supply chain</li> <li>– Elected representatives from each supplier category (representing, e.g. CDF contractors, category suppliers) then sit on HE's Collaboration Board where action can be taken to implement change initiatives</li> </ul> </li> </ul>



**HE's approach to the supply chain focuses on efficiency and collaboration. In the coming slides we present views from suppliers on programme management and their relationships with HE...**

# Across the whole supply chain, visibility of work is a critical factor. This visibility needs to be issued at a sufficiently early stage to enable suppliers to build the business case for investment

- The need for early visibility of workload was frequently emphasised by interviewees, the vast majority of whom identified this as a key risk area
  - *“The biggest challenge for scaling up is in the visibility and timing of upcoming spend.”* Tier 1 supplier
  - *“The key issue is the lack of a detailed workbank, as well as little confidence that it will be delivered “* Tier 2 supplier
  - *“What is needed is a steady programme, with a visible pipeline of work.”* Tier 3 supplier
  
- Some market participants described the communications by HE to date as insufficiently specific
  - *“Demand visibility is currently quite poor. It isn’t clear how much of the announced RIS figure is funding which was already in place, and how much is incremental to that.”* Tier 1 supplier
  
- In order to scale up operations, suppliers need enough confidence that volumes will increase to support the business case for investments. Without sufficient visibility, there is the risk that investments will not be ‘right-sized’ for the volume of work...
  - *“Since we don’t know what the quantity of growth will be, there is some risk we won’t have sufficient capacity – or we may be oversupplied and bear additional costs.”* Tier 1 supplier
  - *“We can deliver any volume of work increase, given enough notice. However, currently we have c.1 week’s notice before work commences, and this is likely to cause some issues with materials for streetlighting.”* Tier 3 supplier
  
- ...and suppliers want to see volume commitments from HE before scaling up in the future
  - *“Increasing capacity is very much dependent on specific volume commitments from HE. The industry has had its fingers burned in the past, and will need some degree of certainty to invest further.”* Tier 3 supplier

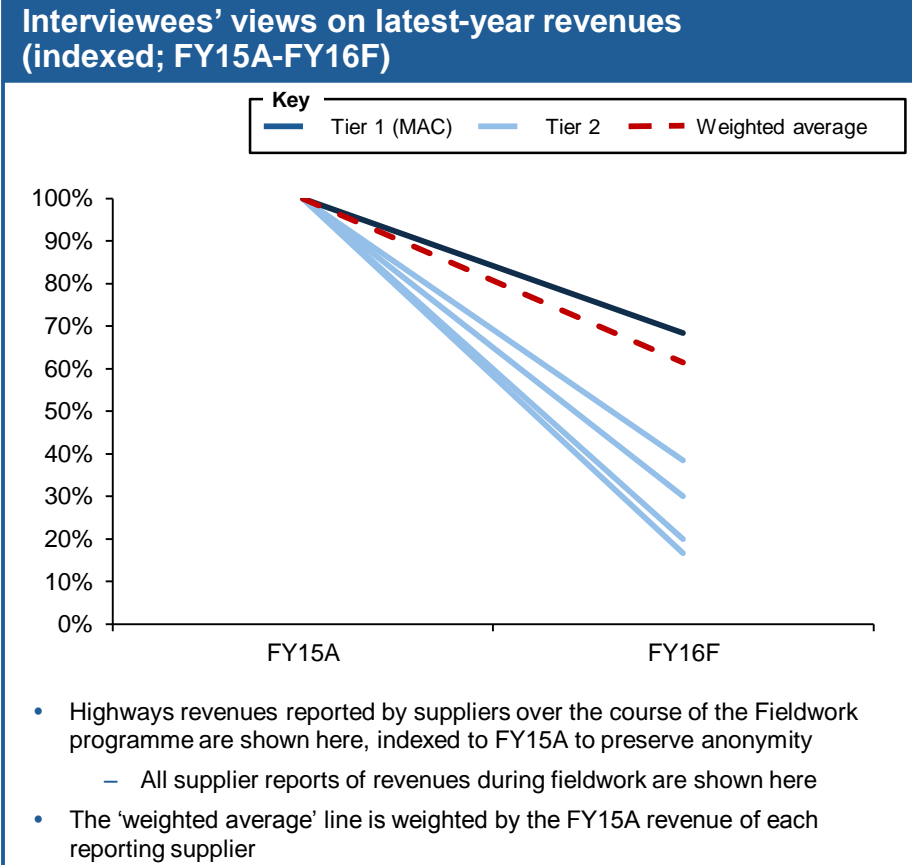


**Suppliers’ confidence in visibility of RIS projects appears low. There is a balance to be struck between ensuring communications are accurate, and issuing guidance early enough for suppliers to act on**



# This view is compounded by some uncertainty in message from the Highways Agency / HE in previous years. In particular, cyclicality and withdrawal of previously ‘committed’ funding has impacted confidence

- Historic investment in highways has been cyclical since the 1960s (see p.17)
- In mid-2014, HE signalled to its supply chain that funding for capital works to highways would rise considerably
  - Many interviewees indicated that they acted on these signals, making investments to increase capacity
    - *“In response to the ‘Gearing for Growth’ announcement, we made significant capital investments in mechanisation to produce higher volumes of materials.”*  
Tier 3 supplier
- However, most companies report that work volumes actually fell following this announcement, sometimes by a significant margin (see right)
  - *“We took on 400 people in response to ‘Gearing for Growth’. Now we are doing a lot less work than before RIS.”*  
Tier 1 supplier
  - This is particularly the case for maintenance work
    - *“After 6 months, we were told the money would be turned off as they had overspent on maintenance.”*  
Tier 1 supplier
- Falling revenues of individual suppliers may not indicate a shrinking envelope overall. However, the consistency of the feedback points to emerging issues with supplier confidence
  - This highlights the need for early and open communication between HE and the market



**Falling revenues, particularly in maintenance, appear to have undermined suppliers’ confidence in HE’s statements of its future workbank**

# Changes in work volume and in management structure will also impact procurement. Some suppliers have concerns over the cost of meeting HE's requirements for tenders

## Views on HE procurement process

- HE has established a large volume of experience in letting large framework contracts, such as ASCs and MACs (see p.24)
  - Large lots on framework contracts require rigorous procurement processes, and these were seen as appropriate by the market
- However, a consistent message was that there is little flex in the scale of the process for smaller lots, which are often bid by smaller contractors
  - *“It’s not that HE can’t run a tender process, it’s that it has only ever run large-scale tenders, and there doesn’t seem to be much flexibility in its approach.”*  
Tier 1 Supplier
  - Smaller lots will increasingly be let to Tier 2s as HE moves towards its direct contracting approach piloted in Area 7 (see p.67)
- The level of detail required in ITTs raises the cost of bidding, which is felt more strongly further down the supply chain (Tiers 2 and 3)
  - In the context of smaller lots, this can harm the business case for submitting a bid
    - *“Our submission for a painting lot with an estimated value of £1m p.a. was so detailed that we incurred a direct cost of £50k for consultants, plus the opportunity cost of four internal resources for two months.”*  
Tier 3 Supplier

## Issues with tendering process

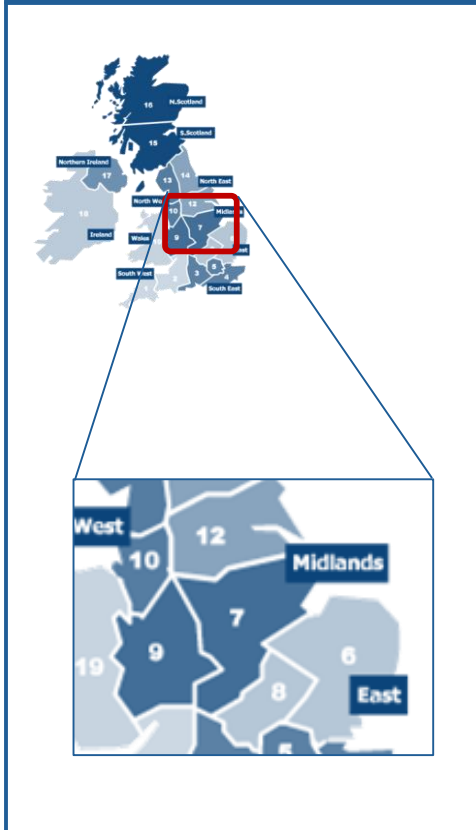
Issue	Evidence	Impact	Frequency of comment
Detail of tender does not always match size	<ul style="list-style-type: none"> <li>• <i>“The level of detail required is appropriate for ASCs and MACs, but not for a small white lining lot.”</i> Tier 1 Supplier</li> </ul>	<ul style="list-style-type: none"> <li>• Only large firms can free up enough resource to respond to all tenders, reducing competition</li> </ul>	✓✓✓
Resource requirements to write a compelling bid are high	<ul style="list-style-type: none"> <li>• <i>“The ITTs ask for a lot of technical detail, requiring a lot of senior time. We don’t have a dedicated bid team, so this is a big opportunity cost.”</i> Tier 2 Supplier</li> </ul>	<ul style="list-style-type: none"> <li>• Smaller firms need to bring in external resource to write bid documents, increasing cost of bidding</li> <li>• It may not be cost-effective to bid for small lots (e.g. white lining; waterproofing) given the direct and opportunity costs incurred to bid</li> </ul>	✓✓
Schedule of ITT release is lumpy	<ul style="list-style-type: none"> <li>• <i>“The biggest issue is that ITTs are all received at the same time, stretching our internal resource required to write a response.”</i> Tier 1 Supplier</li> </ul>	<ul style="list-style-type: none"> <li>– This further reduces competition</li> </ul>	✓
Lack of feedback after contract award	<ul style="list-style-type: none"> <li>• <i>“We have lost previous tenders on quality, but it has never been made clear to us why this was assessed poorly.”</i> Tier 2 Supplier</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of feedback means contractors with less experience of large-scale tenders are disadvantaged on subsequent occasions</li> </ul>	✓



**Issues with the tendering process disadvantage smaller Tier 2 and 3 suppliers in particular, where the investment necessary to bid is sometimes not cost-effective**

# HE has announced it will aim to manage Tier 2 contractors directly in more instances, with an associated scaling-up of its in-house management resource. Area 7 (maintenance) has been a pilot for this

## Area 7 location in UK



## Direct contractor engagement

- The traditional model in place to deliver maintenance works has been for HE to procure services from a single management contractor
  - This contractor is tasked with maintaining the roads in a defined area of the country, and enters subcontracting arrangements with other firms (Tier 2 contractors) for delivery of works
- In Area 7, HE is piloting a direct engagement approach, which sees it taking on the management role of a Tier 1 contractor, engaging with Tier 2 suppliers directly
  - “Area 7 will give HE a more granular level of cost transparency, enabling us to manage performance better.”

NDD Director, HE
- Market views on the effectiveness of the pilot are mixed. Some participants, generally Tier 2 suppliers, have welcomed the move, whilst highlighting potential risks for smaller Tier 2 players
  - “The move to direct contracting is great news for us, but we are the right size to take on a principal contractor role. Other Tier 2s may not have the systems and processes in place to manage themselves when contracting directly with HE.”

Tier 2 supplier
- However, other players believe direct engagement of Tier 2s will stretch HE management capability...
  - “There isn’t much programme management expertise in HE.”

Tier 1 supplier

  - “The HE culture is totally different from that of Tier 1 contractors: the appetite for risk is very low.”

Tier 1 supplier
- ...and that HE may struggle to recruit appropriate numbers of contract managers from the private sector to deliver the new model
  - “HE will be hoping to TUPE a large number of existing Tier 1 staff. [In my view] they will struggle to recruit sufficient numbers: the parent companies will want to hold onto the more senior staff, and HE’s public sector salaries won’t be that attractive compared to the private sector.”

Tier 3 supplier



**Suppliers express some concern over these changes – especially in terms of the capacity of HE management personnel to deliver this role on the scale required**

# Overall, relationships between HE and the supply chain appear to be under some pressure. This can be traced to a number of underlying causes

Issue	Description	Impact	Severity	Proposed resolution
Visibility of work and consistent communications	<ul style="list-style-type: none"> <li>There is some uncertainty around the RIS workbank, as well as the profile of spend and when it will come online</li> <li>Recent "Gearing for Growth" messages from HE led a number of suppliers to investments to increase capacity, after which their revenues fell</li> </ul>	<ul style="list-style-type: none"> <li>Suppliers are unlikely to make further investments to increase capacity</li> <li>The supply chain may be less responsive to future calls to action               <ul style="list-style-type: none"> <li>"[...]we need to know exactly what is going to be spent on project components, not just whole project spend. We cannot afford to invest in new plant purely by inferring future revenue (from projects which may not even go ahead)"</li> </ul> </li> </ul> <p style="text-align: right;">Tier 2 supplier</p>	●	<ul style="list-style-type: none"> <li>Suppliers would prefer to see a less accurate schedule early, which later needed to be changed, than to have little indication of the profile of spend               <ul style="list-style-type: none"> <li>"We understand the tension between getting the detail to the market and doing so in time to deliver it. Once the programme is set, we will know when to press the button on capacity."</li> </ul> </li> </ul> <p style="text-align: right;">Tier 1 supplier</p> <ul style="list-style-type: none"> <li>Towards this, HE has issued a Procurement Plan – though this is at a relatively high-level (e.g. contract value given as broad ranges)</li> </ul>
Procurement practices	<ul style="list-style-type: none"> <li>The tendering process is seen as complex for small framework lots</li> <li>The schedule of ITT releases is seen as uneven, with sharp peaks and troughs of bid activity over the course of the year</li> </ul>	<ul style="list-style-type: none"> <li>Smaller suppliers feel tendering has a disproportionate impact (even Tier 1s struggle with concurrent tenders)               <ul style="list-style-type: none"> <li>"HE overestimates tier 2 suppliers' tendering capabilities, the result of which is a prohibitively complex and costly for smaller companies."</li> </ul> </li> </ul> <p style="text-align: right;">Tier 2 supplier</p>	◐	<ul style="list-style-type: none"> <li>It would be beneficial if HE's release schedule for ITTs fully considered the impact on suppliers' bid resources e.g. using knowledge of suppliers' appetite for given contracts</li> <li>There would be benefit in HE reviewing its procurement practice to investigate more flexible terms for bidding lower-value lots</li> </ul>
Direct contractor engagement	<ul style="list-style-type: none"> <li>Supplier views on the Area 7 pilot are mixed. Some concerns were expressed around HE's capacity to deliver against the role of a Tier 1 contractor               <ul style="list-style-type: none"> <li>"HE does not currently have the capacity and people to effectively manage programmes"</li> </ul> </li> </ul> <p style="text-align: right;">Tier 1 supplier</p>	<ul style="list-style-type: none"> <li>Relationships appear stretched between HE and its Tier 1s, with the potential for the Tier 1s to sense that they are being disintermediated</li> <li>Some risk that smaller Tier 2s do not have in place the systems and processes to deliver safely without the oversight of a managing contractor</li> </ul>	◑	<ul style="list-style-type: none"> <li>There would be benefit in a review of the cost-effectiveness of the Area 7 pilot before further roll-out, including close engagement with all supply chain partners</li> <li>There would be benefit in HE providing evidence to ORR of its capacity to deliver against the programme manager role, and to better understand the supply of contract managers in the market</li> </ul>

**The clearest message from the supply chain was the desire for a detailed schedule of work; action to address this and other issues highlighted is urgent or else risk of non-delivery will increase**

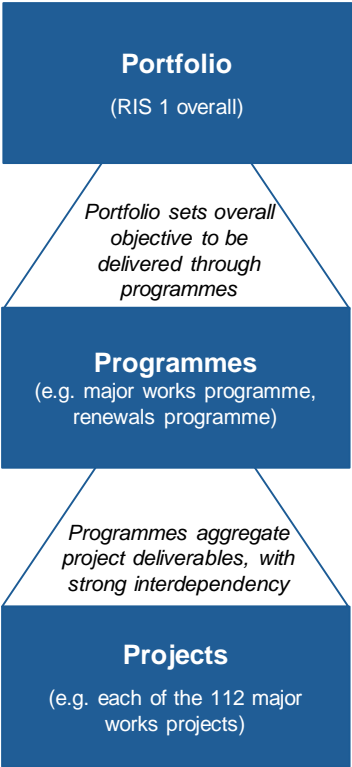
# Agenda

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- Executive summary
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- **Key Performance Indicators and recommendations for ORR**
- Appendix

# The RIS represents a complex and integrated *portfolio* of work, linking a series of separate *programmes* and large number of individual *projects*

## Considerations towards monitoring RIS progress



- The RIS is a portfolio formed of three key programmes: major projects; renewals; and maintenance. Each may contain smaller programmes, such as Smart Motorways or for the delivery of ring-fenced funds (e.g. environment, cycling, innovation)
  - The portfolio itself is designed to deliver a set of objectives owned by DfT and HE, on the basis that delivery of each of the sub-components of RIS will lead to those objectives being met
  - The objectives, or ‘strategic outcomes’, for the RIS include: supporting economic growth; providing a safe and serviceable network; providing a more free-flowing network; improving the environment; and providing an accessible and integrated network
- Key to the success of the portfolio will be the extent to which its planned deliverables (if successfully delivered) will achieve the intended outcomes – assurance of this aspect sits outside focus of this study, as arguably HE’s supply chain can have little impact
- However, a further critical component towards the success of RIS is effective programme and project management to ensure deliverables are achieved on time and to budget
  - A programme represents a set of related projects – for example, the major capital works programme is constituted of the 112 projects discussed previously, and similarly there are programmes to be delivered in renewals and maintenance
- Effective monitoring at the level of practical delivery needs to recognise that both projects and programmes require independent assurance - in particular:
  - Each project contains a set of activities and deliverables throughout its lifecycle (e.g. project scoping, procurement, design, construction, handover, open to traffic). These should be monitored for completion against a base scope, timeline and budget
  - A programme itself has strong interdependencies between and above the level of individual projects – this requires separate monitoring to ensure that knock-on effects of slippage in one area are controlled and the impact on other projects minimised



**The RIS is a large and complex portfolio with significant interdependency between projects; the portfolio management capability being developed in HE is essential to manage the wider programme risk around delivering the RIS**

# Appropriate portfolio management will be critical to provide assurance and to identify risk; a series of management actions should be owned, and reported on, by HE

## Key portfolio management principles relevant to HE's approach

Area	Description	Action for HE
<p><b>Portfolio risk management</b></p>	<ul style="list-style-type: none"> <li>HE's portfolio risk management should be able to demonstrate portfolio risks are being effectively identified and dealt with by positive management actions</li> <li>Such risks that impact the portfolio, but cannot be managed at a project level, include:                             <ul style="list-style-type: none"> <li>Aggregate or generic risks (e.g. those relating to broader economy, or management approach)</li> <li>Interdependencies between projects (e.g. overlapping demand for a given capability across multiple projects)</li> </ul> </li> </ul>	<p>HE to demonstrate how these principles are included in its current approach to Capital Programme Management</p>
<p><b>Regular audit process</b></p>	<ul style="list-style-type: none"> <li>A dashboard of portfolio information should be provided that is specific to the RIS (see next slide)</li> <li>This dashboard should be subject to regular audit to gain confidence that there is an appropriate link between project information and a change-controlled portfolio cost profile – i.e. that there is clarity in the link between (variation in) project costs and aggregated portfolio costs</li> </ul>	
<p><b>Application of portfolio changes at project level</b></p>	<ul style="list-style-type: none"> <li>Any portfolio adjustments, either in terms of cost or in schedule, are auditable and are owned by the project                             <ul style="list-style-type: none"> <li>That is, there should be a two-way feedback process between the centre and the projects to that ensure change, where stipulated at portfolio-level is actioned appropriately at project level</li> <li>Such changes might include: top-down overlays, smoothing, value management/ efficiency targets</li> </ul> </li> </ul>	
<p><b>Change control mechanism</b></p>	<ul style="list-style-type: none"> <li>Change control to be in place across all activity to monitor and document variation during delivery of the portfolio - keeping a hard link between portfolio and projects and minimising unnecessary change</li> </ul>	
<p><b>Assessment of HE management capability</b></p>	<ul style="list-style-type: none"> <li>HE plays a key role in coordinating the portfolio and should assess its competency across key management disciplines (including project management, sponsorship, commercial, procurement, etc.)</li> <li>Similarly, it has previously managed itself year-to-year without a need to develop long-term plans. For the RIS to be successfully delivered, capability in long-term planning will need to be built up within the company</li> <li>A gap analysis should be performed to identify areas for improvement, linked to an appropriate action plan (e.g. to roll out training, to recruit, etc.)</li> </ul>	

# HE currently issues a monthly performance report to ORR on all aspects of its performance. For the RIS, HE should develop a focused, dashboard-style report covering a number of potential risk areas

## HE Monthly Performance Dashboard (existing)

- The current monthly dashboard report from HE to ORR covers performance across the whole company, with detail in the following areas:
  - Financial (incl. investment profile vs. budget)
  - Operational risk register
  - KPI dashboard – this covers the whole network, and includes:
    - Safety
    - User satisfaction
    - Traffic flow & delay
    - Environmental outcomes
    - Network condition
- The RIS programme is reported on as part of these metrics, though is not immediately separable from other elements of HE delivery (such as day-to-day performance of the network)
- Furthermore, coverage of the health and status of the broader programme is relatively limited (as distinct from status of individual projects)

## Key categories for HE to monitor over RIS 1

Category	Example areas of focus
<b>Project-by-project progress</b>	<ul style="list-style-type: none"> <li>A scheme-by-scheme view of project progress and budget outturn, flagged according to progress vs. a baseline project plan (i.e. 'On Track' / 'Behind Schedule' / 'Ahead of Schedule')</li> <li>Progress should be subject to regular external audit (in a similar way to Nichols' auditing of the CP5 programme in rail) to ensure schedule and cost are risk-assessed and that cost is hard-linked to the construction schedule</li> </ul>
<b>Impact of adjacent infrastructure markets</b>	<ul style="list-style-type: none"> <li>Analysis of infrastructure plans at regional level as indicators of overlapping demand</li> <li>Identifies which parts of the RIS will be affected by which programmes (e.g. specific regions, types of construction activity)</li> </ul>
<b>Macro indicators of future trends</b>	<ul style="list-style-type: none"> <li>A dashboard of market and industry metrics that are likely to influence cost of delivery. These may include:                             <ul style="list-style-type: none"> <li>Construction output price index – a measure of trends in the price of letting construction work</li> <li>Raw materials prices, commodity indices – e.g. steel</li> <li>UK (and regional) employment statistics – e.g. a falling unemployment claimant count amongst qualified HGV drivers</li> </ul> </li> </ul>
<b>Delivery 'quality' indicators</b>	<ul style="list-style-type: none"> <li>On-time programme delivery should not be at the expense of quality or safety –therefore an holistic view of RIS status should consider:                             <ul style="list-style-type: none"> <li>H&amp;S requirements vs. target – e.g. accident frequency rate amongst construction workers</li> <li>Traffic management – lane availability, measure of free-flow of traffic around project locations</li> </ul> </li> <li>These factors are already reported on, but could also feature in the future dashboard, either standalone or incorporated into project-by-project progress</li> </ul>
<b>Portfolio health</b>	<ul style="list-style-type: none"> <li>An identification of how the above factors may impact delivery of the broader portfolio of work                             <ul style="list-style-type: none"> <li>This should be built up based on comparing an up to date latest view of the RIS programme (i.e. factoring in latest view on project progress, impact of adjacent infrastructure markets and macro factors) vs. original baseline plan – particularly in terms of cost and delivery timeframe</li> </ul> </li> </ul>



**At a high level, effective monitoring should combine views of the progress and quality of project delivery and an appropriate forward-looking forecast of upcoming risks. HE should work with ORR to develop its monitoring approach further in the coming months**



# To bring this to life, we have set out a framework for how such a reporting dashboard could work *(though this would need to be worked up in detail in terms of input data, analysis required, and format of output)*

- 1. Individual project risks**
- Identifies individual projects with material cost, timing or other risks
  - Should be a subset of a larger 'full project' dataset, that tracks the progress of every RIS project
  - Both the dataset and processes around measuring and recording data should be externally audited

- 3. Overall RIS portfolio risks**
- Gives a summary view of the overall impact of individual RIS project delays, and other infrastructure/ construction programmes
  - Based on a HE latest full view of the RIS plan (vs. baseline), incorporating both 1. individual project risks and 2. 'Competing industry' risks
  - Focus on top level cost and timings, both to date and projected over the full RIS programme

**[[Illustrative] RIS summary dashboard: Month, 201X**

**1. Individual project risks**

Project	Risk description	Risk impact					Current mitigation plan
		Cost	Delays	Network opps	H&S	Other	

**2. 'Competing industry' risks**

Infrastructure programme	Parts of RIS affected	Risk impact		Current mitigation plan
		Cost	Delays	

**3. Overall RIS portfolio risks**

RIS COSTS vs. baseline			
	Baseline	Actual	Variance
RIS to date	£Xbn	£Ybn	£(Y-X)bn
Projected full RIS	£Abn	£Bbn	£(B-A)bn

RIS timings & delays vs. baseline				
	No. of projects		£ cost of projects	
	Started	Total	Started	Total
Total				
On-time				
<6mnths delay				
>6mnths delay				

**4. Other macro risks**

Example indicators		Data	RISK
General	GDP		R/Y/G
	Construction Output		
People	Labour cost Indices		
	Other		
	HGV employment		
Plant	Other		
	Material Price Indices		
Materials	MPA data		

- 2. 'Competing industry' risks**
- Identifies other infrastructure (and broader construction) programmes that will impact the delivery of the RIS
  - Identifies which parts of the RIS will be affected (e.g. specific regions, types of construction activity)
  - Summary qualitative and quantitative information shown on dashboard e.g. 'HS2 plans currently likely to affect the following 4 projects; mitigation plan to start these projects 12 months earlier'

- 4. Other macro risks**
- Tracks key indicator data to give ORR some visibility of future trends, including:
    - Macro construction demand (e.g. GDP, CPI, Construction output)
    - Cost/ price indices around labour, plant and materials
  - Data gathered at a UK and regional level
  - Dashboard shows key trends and risks (e.g. Labour cost risen by 15% over last 12 months)
  - Should be factored into HE latest full view of the RIS plan (vs baseline)

# Recommendations: In summary, we identify a number of areas where there is opportunity for HE to develop clear action plans in order to minimise risk to delivery of the RIS

	Item	Opportunity	Page ref.	Responsible
1 Capacity assessment	Modelling of demand	<ul style="list-style-type: none"> <li>HE is building a detailed demand model at a very granular level (e.g. capturing c.43 distinct job roles in the 'people' category). This model may take some time to refine, and it will be challenging to achieve accuracy at such granularity</li> <li>There is an opportunity for HE to develop a high-level modelling approach first, to indicate the likely quantum and profile of resources, which can be compared and contrasted with the high-level quantitative analysis undertaken for this study. HE should consider sharing input assumptions with suppliers and refining its modelling on an iterative basis</li> </ul>	-	HE
	Provide suppliers with visibility	<ul style="list-style-type: none"> <li>There is an opportunity for HE to provide a more detailed view of demand/project requirements, sufficient to give Tier 2 suppliers knowledge of which specialisms are likely to be required for which projects, and at what scale. The current Procurement Plan provides only outline project and go-to-market information, applicable primarily to Tier 1s</li> <li>Better visibility of the detailed scope of works required for each RIS project (incl. specialisms required) would allow better planning throughout the supply chain</li> </ul>	pp.64, 68	HE
2 Supplier engagement	Supplier engagement	<ul style="list-style-type: none"> <li>Linked to the above actions, there is an opportunity for HE to engage more widely with the supply chain below Tier 1, to set out anticipated demand and to address concerns over its management approach. The current activity via Engagement Council / Collaboration Board had little recognition amongst suppliers interviewed</li> <li>Consideration of alternative approaches to procurement practice should form part of this – e.g. can early engagement, longer-term contracts or different frameworks improve suppliers' visibility and ability to plan?</li> </ul>	p.68	HE to lead, with industry participation
3 Monitoring progress	Baseline plan	<ul style="list-style-type: none"> <li>There would be benefit from HE setting clearer baseline delivery plans for the RIS portfolio, detailing project scope, timelines and budget</li> <li>This should be shared and agreed with ORR and subject to change control procedures going forward. All progress (and reporting) should be measured from this point</li> </ul>	p.72	HE to lead
	Portfolio management	<ul style="list-style-type: none"> <li>There would be benefit from HE ensuring and demonstrating sufficient portfolio management capability (actions listed on p69), and linking this into its reporting of progress</li> </ul>	p.71	HE to lead, reporting to ORR
	Reporting	<ul style="list-style-type: none"> <li>There would be benefit from HE ensuring it has a robust framework for reporting on progress of RIS 1 in place – including identifying a set of metrics to monitor, account for ORR's requirements, and ensure practicality (e.g. availability of data and its accuracy)</li> <li>This should result in a RIS-specific dashboard of measures, covering: individual project progress; impact of adjacent infrastructure markets; macro-economic indicators; and leading to an overall view of RIS portfolio health</li> </ul>	p.72	HE to lead, reporting to ORR
	HE capability assessment	<ul style="list-style-type: none"> <li>There is an opportunity for HE to assess, and share with ORR, its competency across key management disciplines to deliver against RIS requirements (including project management, sponsorship, commercial, procurement, etc.)</li> <li>There would be benefit from setting out a clear action plan to address any gaps identified</li> </ul>	p.71	HE to lead

**Key opportunities are for HE to articulate its future demand, communicate this to the supply chain, and propose a process for ongoing monitoring for ORR's approval**

# Agenda

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- Executive summary
- Market situation and background
- Supply chain capacity assessment
- HE approach to procurement and project management
- Key Performance Indicators and recommendations for ORR
- **Appendix**
  - **List of interviewees**

# We have spoken to a total of 41 industry representatives, drawn from across all Tiers of the supply chain and from a number of professional industry associations [1/2]

Company Name	Position
<b>TIER 1 CONTRACTORS</b>	
EM Highways	• Head of Strategic Roads
Atkins	• Market Director, Strategic Highways
CH2M Hill	• Director, Highways
Mott MacDonald	• Director, Roads • Portfolio Manager, Digital Infrastructure
WSP/ Parsons Brinkerhoff	• HE Account Manager
Kier/EM	• Executive Director, Highways
Amey	• Director, Highways
Volker Fitzpatrick	• CEO, VolkerWessels • Business Development Director, VolkerWessels (case studies only)
Balfour Beatty	• Director for New Business
BAM Nuttall/Morgan Sindall	• Business Development Manager, Highways • Director, Highways
Carillion	• Major Projects Operation Director
ToweyDuffy <sup>1</sup>	• Managing Director

Company Name	Position
<b>TIER 2 CONTRACTORS</b>	
Colas	• Business Manager, National Traffic Management
Marshall Surfacing	• Group Marketing Director
Carnell	• Managing Director
Chevron	• Managing Director
Henderson & Taylor	• Managing Director
Walters UK	• Managing Director
WJ Road Marking	• Managing Director
StirlingLloyd	• Commercial Director

**Notes:** <sup>1</sup>Note that ToweyDuffy provides consultancy services into Tier 1 contractors

# We have spoken to a total of 41 industry representatives, drawn from across all Tiers of the supply chain and from a number of professional industry associations [2/2]

Company Name	Position
<b>TIER 3 CONTRACTORS</b>	
Shell Bitumen	• Director
Signway	• Sales Director
Tensar	• Technology Manager, Pavements
Nuneaton Signs	• Executive Director
<b>OTHERS</b>	
High Speed 2 Limited	• Supply Chain Lead

Company Name	Position
<b>PROFESSIONAL ASSOCIATIONS</b>	
ADEPT	• Deputy Director - Highways and Transport
Association for Consultancy and Engineering	• Member
Chartered Institution of Highways and Transportation	• Director - Policy and Technical Affairs
Civil Engineering Contractors Association	• Chief Executive
Highways Term Maintenance Association	• Previous Chairman
Institute of Highway Engineers	• Chief Executive
Institution of Civil Engineers	• VC, Thames Valley Branch
Local Government Association	• Policy Advisor
Mineral Products Association	• Asphalt Director
Asphalt Industry Alliance	• Press Officer
Highways Maintenance Efficiency Programme	• Director
Eurobitume	• Director
Road Surface Treatments Association (RSTA)	• Chief Executive

# We have also engaged with Highways England to access supporting data for our analysis and to understand the nature of procurement and programme management

Key individual	Role / department	Activities undertaken
David Poole	Director, Commercial & Procurement	<ul style="list-style-type: none"> <li>• Input to Panel of Experts session</li> <li>• Discussion of ongoing Capacity and Capability workstream</li> <li>• Shared draft findings of the report for comment</li> </ul>
Philip Ellis	Programme Manager	<ul style="list-style-type: none"> <li>• Detailed understanding of Capacity and Capability workstream</li> <li>• Correspondence on HE approach to capacity modelling</li> </ul>
Jonathan Milburn	Major Projects Office	<ul style="list-style-type: none"> <li>• Requests for data on historic and RIS project portfolio</li> <li>• Sense-check of historic project workbank</li> </ul>
Matthew Sweeting	Divisional Director, Network Delivery Directorate	<ul style="list-style-type: none"> <li>• Understanding of anticipated vs. outturn spend on maintenance and renewals</li> </ul>
Neena Abdulla	Procurement Manager	<ul style="list-style-type: none"> <li>• Understanding of anticipated vs. outturn spend on major projects through CDF</li> <li>• Discussion on framework management</li> </ul>
Craig Marshall	Major Projects Portfolio Office	<ul style="list-style-type: none"> <li>• Requests for data on case study projects (incl. A23 Handcross, M6 J10, A11 Fiveways)</li> </ul>

**Questions or comments on this report to:**

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