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4 SCHEME CONTEXT

4.1 Current challenges

- 4.1.1 The M4 between junctions 3 and 12 carries over 130,000 vehicles per day, and more in places. At peak times, traffic flows in many links are close to or exceed the total flow that the link is capable of handling, i.e. its capacity. Therefore, the motorway suffers from heavy congestion, which leads to unpredictable journey times. Section 4.3 provides detail of predicted capacities. Although traffic volumes reduced in 2008 at the start of the global financial crisis, long-term traffic trends still show significant growth. Traffic flows are forecast to increase further, which, without road improvements, will result in more severe congestion.
- 4.1.2 The Organisation for Economic Co-operation and Development ("OECD") has highlighted previously that the current road transport infrastructure network is one of three key barriers to UK growth requiring action from government (Ref 6).
- 4.1.3 The physical works comprised in the Scheme, and the implementation of smart motorway infrastructure, will help to relieve congestion by permanently converting the hard shoulder to a running lane and using technology to vary speed limits and manage traffic. Signs and signals will be used to inform drivers of conditions on the highway network, when and where variable speed limits are in place, and when lanes are closed.

4.2 Site context

- 4.2.1 The Scheme passes through eleven local authority areas:
- Greater London Authority
 - London Boroughs of Hillingdon and Hounslow;
 - West Berkshire Council;
 - South Bucks District Council;
 - Buckinghamshire County Council;
 - The Royal Borough of Windsor and Maidenhead; and
 - Boroughs of Slough, Bracknell, Wokingham and Reading.
- 4.2.2 The main conurbations along the proposed Scheme are Reading, Maidenhead, Slough, Hillingdon and Hounslow. Smaller, but notable urban areas include Wokingham, Bracknell, Windsor, West Drayton and Hayes. Figure 1 provides an overview of the location of the Scheme and Table 1 below provides a summary of locations accessed from the Scheme.

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Figure 1 M4 junctions 3 to 12 smart motorway scheme

Table 1 Locations accessed directly off the Scheme

Junction	Locations accessed
12	A4, Reading (west), Theale
Services	Reading Motorway Service Area ("MSA")
11	A33, Basingstoke, Reading (central and south)
10	A329(M), Reading (east), Wokingham, Bracknell
8/9	A404(M), High Wycombe, Henley, A308(M), Maidenhead
7	A4, Slough (west)
6	A355, Slough (central); A322, Windsor
5	A4, Colnbrook, Langley; B470, Eton, Datchet
4b	M25, M40, M1, M11, M3, M23, M20, Heathrow Airport (Terminals 4, 5 & Cargo), Gatwick Airport, Watford, Oxford, Stansted Airport, Maidstone
4	Heathrow Airport (Terminals 1, 2 & 3), A408, Uxbridge, Hillingdon
3	Heathrow Airport (Terminals 4, 5 & Cargo), A312, Hayes, Harrow, Hillingdon, Hounslow

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Junction 12 to junction 11

- 4.2.3 Between junctions 12 (Theale) and 11 (Three Mile Cross) of the M4, the motorway skirts the southern edge of Reading, which forms the principal settlement in this location.
- 4.2.4 To the western extremity of the Scheme, west of junction 12, lies the North Wessex Downs Area of Outstanding Natural Beauty ("AONB"), the Sulham and Tidmarsh Woods and Meadows, and Pincen's Kiln Site of Special Scientific Interest ("SSSI"). To the east of junction 12, the M4 crosses the Kennet and Avon Canal and then skirts south of the Reading urban area, through an area of agricultural land within which extensive gravel extraction activity has occurred, resulting in water filled gravel pits.
- 4.2.5 Reading MSA (eastbound and westbound) is located between these junctions.
- 4.2.6 Average weekday traffic flows along the M4 taken from the Agency's traffic counting system in 2013 indicate that this link carries 109,800 vehicles per day, of which 10% are heavy goods vehicles ("HGVs").
- 4.2.7 This link of the M4 is located within the local authority areas of West Berkshire, Wokingham Borough Council and Reading Borough Council respectively.

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Junction 11 to junction 10

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- 4.2.8 From junction 11 (Three Mile Cross), the M4 continues around the southern Reading suburbs of Whitley and Lower Earley to Winnersh at junction 10. To the south of the motorway, the area is characterised by smaller villages and settlements, including Shinfield and Sindlesham, until reaching the outskirts of Wokingham to the south of junction 10.
- 4.2.9 Between junction 11 and junction 10, the M4 passes through an area of agricultural land predominantly within the low lying floodplain of the River Loddon, and to the east passes between the urban edges of Sindlesham, Winnersh and Wokingham. Agricultural land is interspersed with a number of woodlands and copses, with trees along the River Loddon corridor. The urban areas nearest to the M4 predominantly comprise modern residential suburbs situated to the north of the M4.
- 4.2.10 Average weekday traffic flows along the M4 taken from the Agency's traffic counting system in 2013 indicate that this link carries 117,100 vehicles per day, of which 11% are HGVs.
- 4.2.11 This section of the M4 is located within the Reading Borough Council and Wokingham Borough Council areas respectively.

Junction 10 to junction 8/9

- 4.2.12 Between junction 10 (Winnersh) and junction 8/9 (Holyport), the M4 passes through a relatively sparsely populated rural area, characterised by scattered farms, homesteads and rural businesses. This rural area lies between Reading/Wokingham to the west and Maidenhead to the east.
- 4.2.13 The M4 is located within the Green Belt from The Straight Mile overbridge (east of junction 10) to junction 8/9. Gently undulating agricultural land is interspersed with considerable woodland cover, and mature hedgerows define field boundaries. Settlement is limited, with Shurlock Row, White Waltham, Paley Street and Stud Green forming the principal villages prior to reaching Maidenhead. The M4 verges provide established tree planting which integrates well with the local wooded landscape.
- 4.2.14 Average weekday traffic flows along the M4 taken from the Agency's traffic counting system in 2013 indicate that this link carries 124,300 vehicles per day, of which 9% are HGVs.
- 4.2.15 This section of the M4 is located within Wokingham Borough Council, Bracknell Forest Borough Council and the Royal Borough of Windsor and Maidenhead's areas respectively.

Junction 8/9 to junction 7

- 4.2.16 From junction 8/9 (Holyport) to junction 7 (Huntercombe), the motorway is located within the Green Belt and passes to the north of Holyport before crossing the A330 and through the urban fringe area to the south of Maidenhead, before returning to the Green Belt east of the A308. From here, the M4 passes the village of Bray to the north before crossing the River Thames on an existing, three-span bridge and then continuing east

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past the villages of Dorney Reach and Dorney to the south.

- 4.2.17 The River Thames and the nearby man-made Jubilee River (which functions as a flood alleviation channel) and recreational lakes, together with adjacent wet pasture, occupy most of the land between settlements. These watercourses and areas of open water are lined by riparian tree species, giving considerable vegetation cover to the local landscape.
- 4.2.18 Average weekday traffic flows along the M4 taken from the Agency's traffic counting system in 2013 indicate that this link carries 132,400 vehicles per day, of which 10% are HGVs.
- 4.2.19 This section of the M4 is located within the Royal Borough of Windsor and Maidenhead and South Bucks District Council's areas.

Junction 7 to junction 6

- 4.2.20 Between junction 7 (Huntercombe) and junction 6 (Chalvey), the M4 is located within the northern fringe of the Green Belt and between the outskirts of Slough to the north (including the area of Cippenham) with Eton Wick and the River Thames floodplain to the south.
- 4.2.21 Slough sewage treatment works occupies land to the south-east of junction 7, between the M4 and the Jubilee River.
- 4.2.22 As it approaches junction 6, the motorway lies immediately north of, and runs parallel to, the Jubilee River. The River Thames is located further south of the M4 beyond the villages of Dorney and Eton Wick.
- 4.2.23 To the south of junction 6 are the towns of Windsor and Eton where Windsor Castle and Eton College are located. The town of Windsor is located on an escarpment to the south of the River Thames and south east of junction 6.
- 4.2.24 Average weekday traffic flows along the M4 taken from the Agency's traffic counting system in 2013 indicate that this link carries 132,200 vehicles per day, of which 9% are HGVs.
- 4.2.25 This section of the M4 is located within Slough Borough Council and South Bucks District Council's areas.

Junction 6 to junction 5

- 4.2.26 Junction 6 (Chalvey) lies immediately to the north of the Green Belt, and the M4 crosses the Windsor Branch railway line on the Windsor Branch Railway overbridge en route to junction 5 (Langley). After passing over the A332, as it continues to the south of the Slough suburbs, including the areas of Upton Court Park, Ditton Park and Langley, the motorway again lies within the Green Belt until reaching junction 5. This link of the M4 also passes to the north of the confluence of the Jubilee River with the River Thames, the town of Datchet and the Queen Mother reservoir.
- 4.2.27 Average weekday traffic flows along the M4 taken from the Agency's traffic counting

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system in 2013 indicate that this link carries 143,700 vehicles per day, of which 9% are HGVs.

4.2.28 This section of the M4 is located within Slough Borough Council and the Royal Borough of Windsor and Maidenhead's areas.

Junction 5 to junction 4b

4.2.29 After passing under Sutton Lane overbridge, the motorway between junction 5 (Langley) and junction 4b (M25) is located within the Green Belt. From junction 5, the M4 passes from the eastern edge of Slough, through semi-rural surroundings, to the M25 intersection at junction 4b. Where the urban area of Slough lies immediately adjacent to the Scheme, it predominantly comprises modern residential estates.

4.2.30 To the east of Slough, Richings Park, Richings Park golf course and farmland (traversed by high voltage power lines) lie to the north of the M4; a gravel pit, gravel pit lakes, sewage works, an industrial estate, and farmland (traversed by high voltage power lines) lie to the south of the M4.

4.2.31 Average weekday traffic flows along the M4 taken from the Agency's traffic counting system in 2013 indicate that this link carries 152,800 vehicles per day, of which 10% are HGVs.

4.2.32 This section of the M4 lies on the boundary of Slough Borough Council's area to the west, with the London Borough of Hillingdon's area to the east and South Bucks Council's area to the north-west.

Junction 4b to junction 4

4.2.33 From junction 4b (M25) to junction 4 (Heathrow), the M4 crosses the Wraysbury River and the River Colne before passing Saxon Lake to the south. The motorway in this link is located within the Green Belt west of Saxon Lake and forms the northern boundary of the Green Belt between Saxon Lake and junction 4.

4.2.34 The motorway then passes into the London Borough of Hillingdon between the urban area of West Drayton to the north which predominantly comprises modern residential and commercial estates and the villages of Harmondsworth, Sipson and Heathrow to the south.

4.2.35 Harmondsworth and Sipson are situated between the Green Belt to the south of the M4, featuring active and reclaimed gravel pits, farmland and Heathrow Airport, the internationally important transport hub. The presence of the airport to the south of these settlements together with its extensive ancillary developments, represents a major land-use within the area.

4.2.36 Average weekday traffic flows along the M4 taken from the Agency's traffic counting system in 2013 indicate that this link carries 166,600 vehicles per day, of which 7% are HGVs.

4.2.37 This section of the M4 is located within the London Borough of Hillingdon.

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Junction 4 to junction 3

- 4.2.38 The M4 between junction 4 (Heathrow) and junction 3 (Hayes) is located within the Green Belt and crosses over Frogs Ditch and the River Crane. The motorway in this link is bounded to the north by the modern residential areas of Hayes and to the south by the village of Harlington and more open areas including Little Harlington Playing Fields and Cranford Park. Further south from the motorway corridor lies the eastern section of Heathrow Airport.
- 4.2.39 Areas to the south of the M4 include open areas and wooded parkland, including Cranford Park.
- 4.2.40 Immediately west of junction 3, the motorway passes from the London Borough of Hillingdon into the London Borough of Hounslow.
- 4.2.41 Average weekday traffic flows along the M4 taken from the Agency's traffic counting system in 2013 indicate that this link carries 149,600 vehicles per day, of which 7% are HGVs.
- 4.2.42 Between junction 4b and junction 3 the M4 is located within the London Borough of Hillingdon and on the approach to and at junction 3 the motorway is located within the London Borough of Hounslow.

4.3 Forecast traffic flows

- 4.3.1 As discussed in ES chapter 1, although traffic volumes reduced at the start of the global financial crisis in 2008, long-term traffic trends still show significant growth. Traffic flows are forecast to increase further, which is predicted to result in more severe congestion without road improvements.
- 4.3.2 The ratio of actual traffic flow to its capacity (the total flow that a link is capable of handling), is a general way of indicating congestion. Capacity per lane is calculated based on information from DMRB which was set out in ES chapter 13.
- 4.3.3 ~~Table 2~~Table 2 shows forecast ratios for each link without implementation of the Scheme. Traffic flow forecasts are taken from the traffic model developed to assess the Scheme. Two years' data are shown - 2022 and 2037 - for the morning and evening peak periods. In each case, without the Scheme, the number of links shaded red (where the ratio of flow to capacity exceeds 85%, which indicates that the links are predicted to become congested) increases over time. Similarly, the number of links where flow has reached capacity (shaded black) is also forecast to increase. The links which are shaded yellow in ~~Table 2~~Table 2 are those which are predicted to be near to having a ratio of flow to capacity exceeding 85%. Those links shaded green do not have capacity issues.

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4.3.4 Table 2 shows forecast ratios for each link without implementation of the Scheme.

Table 2 Forecast ratios of traffic flow to capacity without implementation of the Scheme

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	Morning peak-hour (07:00-08:00)				Evening peak-hour (17:00-18:00)			
	Eastbound		Westbound		Eastbound		Westbound	
	2022	2037	2022	2037	2022	2037	2022	2037
J12-J11	99.4	100.0	82.1	88.9	94.5	100.0	88.2	90.8
J11-J10	100.0	100.0	85.7	92.1	96.1	100.0	92.8	96.1
J10-J8/9	96.7	100.0	82.7	87.2	85.1	90.1	94.7	97.9
J8/9-J7	97.0	100.0	80.1	84.9	83.8	87.7	100.0	100.0
J7-J6	91.6	93.5	82.9	88.6	83.0	85.5	94.5	98.6
J6-J5	96.9	99.6	87.9	93.0	91.4	95.0	97.3	100.0
J5-J4b	74.0	76.2	73.1	75.2	75.1	78.2	80.0	82.3
J4b-J4	77.2	78.5	73.7	74.9	77.9	79.6	77.0	77.7
J4-J3	84.2	88.5	86.8	88.0	91.6	91.4	83.7	83.9

4.3.4.3.5 Table 3 shows forecast ratios for each link with implementation of the Scheme.

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Table 3 Forecast ratios of traffic flow to capacity with implementation of the Scheme

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	Morning peak-hour (07:00-08:00)				Evening peak-hour (17:00-18:00)			
	Eastbound		Westbound		Eastbound		Westbound	
	2022	2037	2022	2037	2022	2037	2022	2037
J12-J11	83.7	87.7	65.9	72.4	77.0	86.0	73.3	77.2
J11-J10	92.6	97.7	72.8	78.9	80.4	88.2	78.5	83.1
J10-J8/9	86.2	92.6	70.0	74.8	73.9	80.3	83.4	87.9
J8/9-J7	86.6	92.6	69.0	74.9	74.1	80.1	88.4	93.3
J7-J6	83.0	87.0	72.1	78.0	73.3	77.6	83.2	88.1
J6-J5	85.1	89.9	75.2	79.9	78.3	83.2	83.9	87.2
J5-J4b	83.4	87.3	80.3	83.1	82.1	86.9	87.7	89.7
J4b-J4	65.6	67.0	61.6	62.8	65.4	67.6	64.7	65.4
J4-J3	67.4	71.0	68.4	69.5	72.4	72.7	65.9	66.4

Key:

Capacity reached	Ratio of flow to capacity >85%	Ratio of flow to capacity nearly 85%	No capacity issues
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