8 CONSTRUCTION

8.1 Context

8.1.1 High level aspects of a construction methodology identified by the Contractor are presented in this Chapter. The description below is based on current best practice and the most likely arrangements. The construction works will be explained on a link-by-link basis.

8.2 Mainline construction activities

Overview

8.2.1 Construction of smart motorway schemes is fundamentally different to new build or road widening schemes. The works are substantially contained within the existing highway boundary and involve a sequence of operations that progress along the length of any carriageway. In any one location the operations pass through at a rate of 50m to 200m per day and otherwise the location will be inactive, standing available. The operations are carried out in disciplines, e.g. excavation gang, concreting gang, etc., or by subcontractor activity sequentially to ensure some reasonable continuity of work for each discipline in one or other carriageway to minimise costly stoppages. Slower activities will proceed for some time and length along the road before a quicker activity follows on and catches up with it. A 50m per day activity like pipework and chamber installation takes four weeks to prepare 1km. A 200m per day activity like slip-forming completes 1km in just one week. The final resurfacing of a full 3.7m lane over the same 1km takes six hours.

8.2.2 Within each work area there is a primary sequence where the verge works and lane widening is carried out, then the central reserve works are carried out and finally any unfinished road resurfacing, finishes and communications works are done. Then there is a period of commissioning and testing of the technology systems.

Construction compounds

8.2.3 Construction of the Scheme will require the establishment of a main office compound (c.5ha) originally identified at Ascot Road; however, it was not used due to its vicinity to residents. A new location for the main compound has instead been developed at Junction 10 off A321, utilising National Highways' permitted development powers. Several smaller section compounds (c.1ha each) are required to accept material deliveries, provide distribution of plant and equipment and provide office and welfare facilities for workers and a base for vehicle recovery. These locations will need to be adjacent to the motorway or motorway junctions to allow easy access and egress from site. Initially 13 possible areas along the Scheme were identified through desktop study and preliminary site visits. Four compounds were then regarded as unsuitable as follows:

a) compound 1 (Bardon Theale Depot at the junction off Wigmore Lane, near junction 12. Access via A4) on the basis that the proposed area required the removal of screening to adjacent residences, significant earthworks and increased risk of the presence of ecological receptors;

b) compound 10 (existing London Concrete (Bardon) site adjacent to the M25 (northbound) and to the M4 (westbound slip road)) on the basis that further investigations identified the area as more significantly developed than expected and insufficient area was available for a suitable compound without affecting existing businesses;

c) compound 12 (Shepiston Lane, Hayes near junction 4) on the basis of potential disturbance to an immediately adjacent hotel; and

d) compound 13 (Agency Depot at Heston Motorway Service Area at junction 3) on the basis of potential disturbance to an immediately adjacent traveller park.

8.2.4 The remaining potential compound areas are described below, and are included within the Order limits (compound numbers refer to the original numbering criterion):

a) compound 2: existing farmland, off A4 Dorking Way, near junction 12, half of the site used only;

b) compound 3: existing farmland at the end of A33 Old Basingstoke Road, adjacent to junction 11 – not used;

c) compound 4: within looped slip roads at junction 10;

d) compound 5: previous compound area off A308(M) adjacent to junction 8/9; - not used

e) compound 6: within looped slip roads at junction 7;

f) compound 7: previous compound off A355, near junction 6;

g) compound 8: triangle of land between the M4, Datchet Road and Recreation Ground access road;

h) compound 9: Colnbrook Landfill site at Sutton Lane, near junction 5; and

i) compound 11: Prologis Park off A408 adjacent to junction 4.

Construction traffic and working hours

8.2.5 The number of communities or individual households in the immediate vicinity of the M4 corridor is relatively high in some places. However, the works traffic in relation to the prevailing high volumes of traffic and HGVs on the M4 is assessed as not being significant.

8.2.6 To provide context; the existing motorway between junctions 3 and 12 carries about 130,000 vehicles per day (“vpd”) of which 10% are HGVs. The Scheme involves

about 1,500,000 tonnes of old and new materials and temporary works. Typical 32 tonne lorries carry 20 tonnes per load with two lorry movements per load (one full one empty) is 150,000 HGV movements to bring in all works materials and remove all waste or surplus. Over four years, or 1,000 working days, this equates to an average of 150 vpd due to the works compared to the existing HGV traffic of about 13,000 vpd.

8.2.7 The working hours will be Monday to Saturday and some Sunday work on specific tasks including demolition and bridge installation agreed with the respective Local Authorities. Winter and summer working hours will vary to suit the daylight time available.

8.2.8 Night-time working is to be expected on activities that require full or significant occupation of the existing M4 carriageways. This means not being able to maintain three lanes open on both M4 carriageways. These activities will include: setting out TM, alterations and removals; bridge works, demolitions and bridge beam erection for new bridges and gantries; carriageway re-surfacing and white- lining. For these types of activities National Highways has extensive experience in necessary TM and programming, which would be applied as necessary.

8.2.9 A CEMP is in place and it will address all matters pertaining to dust noise and disturbance.

8.2.10 TM is put in place to safeguard the travelling public and for the safety of the work force doing the works. Three lanes of traffic will be maintained, at all times, during daytimes and peak flows. At night, as necessary, single lane running will occur, and motorway closures will be necessary for bridge and gantry erection. The initial phase in any length of works will move the traffic towards the central reserve in narrow lane running. This gives a working area and safety zone, for the verge works. When the verge works and lane widening are complete in both carriageways, the traffic is moved to give working access and a safety zone on both sides of the central reserve.

8.2.11 The Contractor's working areas and the live running lanes will be delineated with temporary safety barriers with clearly signed access and egress points for Contractor's vehicles.

Site clearance

8.2.12 This includes some removal of vegetation where necessary at bridges and areas of widening for EAs. Additionally, some vegetation clearance might be needed for clearance and realigning of open ditches, technology ducting and installation of environmental barriers and badger/Otter fences. The operation is not unlike the maintenance activity when managing landscaped area, with most of the greenery and branches being chipped on site and left on the verge slopes. Larger branches or trunks of trees will be removed from site and taken to a timber yard of the subcontractor's choice.

8.2.13 Other works will involve the removal of existing steel crash barrier, lighting poles,

ducting and cabling, and communications equipment. They will be removed and taken to store for re-use or taken for recycling. Fencing and environmental barriers may need to be taken down and these would be replaced at a later date in the works process on a like-for-like basis, unless replacements are needed immediately to mitigate the environmental impacts of any works.

Demolition

8.2.14 There are two types of demolition activity. The major demolition of bridges will be carried out by a specialist subcontract with an established and competent demolition contractor. These works will usually be at night and, at the weekend during off-peak traffic flow using a full motorway closure. It can be expected that a large number of 360 excavators with hydraulic concrete shears and breakers will be used. Also, there will be large cranes to lift out steelwork and 32 tonne lorries with wheeled loaders. Dust suppression, temporary noise barriers, generators and lighting will also be required. The Contractor will produce a detailed demolition plan and conduct liaison with adjacent residents and businesses prior to the operation.

8.2.15 There will also be minor demolition work to remove old concrete bases and footings to barriers and posts. This will be carried out in normal working hours with small breakers on mini excavators and the arisings removed to a compound for separation and recycling.

Earthworks

8.2.16 Earthworks are fairly limited on construction of smart motorways and will mainly involve necessary widening for road realignment and EAs. The topsoil will initially be stripped and set aside for re-use as near to the earthworks area as is possible, this may involve haulage on lorries to a suitable compound or storage area.

8.2.17 Following this excavation, filling will be carried out using wheeled 360-degree excavators, moving earth by lorry and compacting with rollers. It is expected that the Contractor will carry out detailed mass haul assessments and programming of the works to endeavour to balance the earthworks arising and fill requirements, minimising off-site disposal and the cost of the operations. The large operating lengths in the outline planning are designed to facilitate this.

Retaining walls

8.2.18 In conjunction with earthworks, there are retaining walls to be constructed. Smaller walls are built by traditional concrete construction or gabion walling. In some areas, steel sheet piles are required. Initially a piling platform is formed using imported stone and roller compaction. The piles will then be installed using specialist rigs and vibratory drivers. Where there is close proximity of sensitive locations adjoining the motorway, low-noise, vibrationless installers can be used.

Piling for structures

Where piling is required, a piling platform will be created and specialist rotary or flight auger rigs used to install the piles. The rigs will be matched in size to suit the piles being installed. The rigs can install approximately 80m length of typical bridge pile in one day, i.e. eight 10m piles per day. Thus, for the bridges affected by the Scheme, the piling operations can be expected to be present for a matter of days at each bridge location.

Drainage and ducting

8.2.19 Alterations to the drainage and new communications ducting will be carried out with wheeled 360-degree excavators for any deeper drains and, more generally, with mini excavators or JCB-type loader backhoes. Materials will be brought to the work area just-in-time for installation having been previously stored in the nearest suitable construction compound. Chambers and pits are generally pre- formed rings or plastic units and are installed with the pipework. Trench filling is done with a small roller and plate compactors.

8.2.20 For some drainage or ducting works, the size of verge slot drain or concrete channel will suit a slip-form process. The specialist slip-forming machine to be used is the same as the one for central reserve stepped concrete barrier. This can achieve approx. 200m per day. On this basis, whilst this is a large and potentially noisy operation, it is transient and should only affect any adjacent receptors for no more than a day.

Gantry construction

8.2.21 The concrete foundations will be constructed using traditional methods for reinforced concrete: shuttering, scaffolding, reinforcement fixing and casting of concrete. The superstructures will have masts erected with a small crane or crane-lorry in normal working hours. Cantilever gantries will be similarly erected, but this will be at night with TM confining the traffic to single-lane running. For larger and full-span gantries the motorway will be closed and the gantries erected by larger hydraulic cranes. The gantries will be erected in batches between junctions to minimise the number of closures required.

Verge furniture and finishes

8.2.22 Following on from the drainage and ducting, and reinforced concrete base construction operations, the verges will be filled to level and compacted using material previously set aside for re-use and/or material brought in on small lorries. Sign installation, maintenance walkway paving, barrier installation and, topsoil and seeding will then be carried out.

Pavement and surfacing

8.2.23 Following on from the verge or central reserve works at lower levels, the existing pavement will be planed-out using large rotary planers and 32 tonne lorries

transporting the arising aggregate mix directly off-site to the subcontractor's recycling yard. Any local widening and strengthening for the sub-base stone layers will then be carried out using imported stone and rollers. This latter operation may be carried out in conjunction with the drainage and ducting works.

8.2.24 The final resurfacing of the new lane 1 and 2 (previously the hard shoulder and lane 1 respectively) will be carried out as a night-time operation with the traffic in single lane running in lane 4 (previously lane 3). The old surface will be planed off and the new surface re-laid in a continuous process.

8.2.25 A similar set of operations will occur for the re-surfacing of lanes 3 and 4 (previously lanes 2 and 3 respectively) following on from completion of the central reserve works.

8.2.26 Road finishes, white lining and any loop cutting for communications are carried out in the same night shift as the paving operation.

Central reserve works

8.2.27 When the verge works are complete the TM is switched over to have the traffic running in narrow lanes adjacent to the verge with the temporary safety barriers moved to provide lane 4 and the central reserve on both carriageways as a safe working area. Similarly, to verge operations the central reserve is cleared of existing redundant materials and then excavated out to formation layer. Stone formation layers and road subbase is laid with materials brought in just-in-time. Slip-forming operations for channels and slot drains will be carried out with the base of the RCB. The road construction widening is then carried out and then the RCB formed. Finally, the surfacing is laid. In some links the works will start on the verge followed by the central reserve and in other links will start on the central reserve followed by the verges.

Communications installation

8.2.28 Laying of the communications cabling, equipment boxes wiring, etc. will be carried out sequentially as the Contractor's works make ducting, bases and gantries available. Cabling requires 1km to 2km sections of the works to be available. Therefore the works will be conducted as long sections - to provide completed lengths of works for the communications teams to work in. Sections of the communications will be completed and tested, however, full commissioning and testing can only be carried out following the completion of the verge and central reserve works. This is the final activity within each phase and during this the TM is removed and the motorway traffic will run in the new completed layout.

8.3 Construction programme sequence

Overview

8.3.1 The works programme approximately 4 years has been planned to balance the cost and time taken to carry out the works with the length of TM and associated 50mph speed restrictions in place at any time. It has been established from similar highway

schemes that regularly implementing TM and then removing it with speed variance 50mph to 70mph creates driver frustration and is less safe to the travelling public and the road construction workers.

8.3.2 The philosophy behind the programme allows the work required to be carried out in a safe and efficient manner with the minimum amount of disruption to the travelling public. TM would be kept to a minimum and clear signs and diversions would be provided.

8.3.3 The proposed design and construction works are integrated to maximise the re- use of existing infrastructure and available materials and to minimise the impact on local roads and adjacent landowners and households.

8.3.4 The Contractor will establish proactive processes to minimise the effects on the local community and to engage in good public liaison. This will be secured in the CEMP.

8.3.5 The works of 51km length have been split into two Sections. The first is from junction 12 (Theale) to junction 8/9 (Holyport) a length of 27km and, the second is from junction 8/9 to junction 3 (Hayes) a length of 24km. Within Section 1, the works might be split from junction 8/9 and 10 and from junction 10 to 12. Section 2 will be split from junction 3 to 4b, from junction 4b to 7 and from junction 7 to 8/9.

Overall construction sequence

8.3.6 The outline construction programme included as Annex B shows the basic overriding plan for carrying out the works. The boxes shaded yellow or green show when and where the main works with TM are happening. These works have been programmed with a scheme delivery plan commitment ~~f~~or completion and opening to traffic of the scheme by June~~March~~ 2022.

8.3.7 An advantage of this broad split is that the first section of the Scheme (junction12 to junction 8/9) can be completed and opened as smart motorway in about two years and 9 months, thereby giving early benefits to road users and minimising the length of time for potential disturbance to adjacent stakeholders. ~~Also during this period, road users and adjacent stakeholders between junction 8/9 and junction 3 will not be adversely affected.~~60 mph All-Lane Running (ALR) will be introduced once the main works are complete in this first section; before introducing a 70mph ALR.

8.3.8 The broad split allows time for the construction of new, modified and replacement structures that are required between junction 8/9 and junction 4b, in advance of the road works in this section. During construction of the bridges, there will only be isolated pockets of activity on the bridge sites, with construction traffic predominantly using the M4 for access and egress. This then enables the road works for junction 8/9 to junction 3 to be carried out in Years 3 and 4 of the programme.

The following sections provide an outline construction sequence. The dates given are based on the outline construction programme in Annex B of this EDR and show the dates from establishing TM to removing the TM. ~~These dates are purely indicative as~~

~~a Contractor has not been appointed to the Scheme and they do not include the mobilisation and demobilisation periods.~~

Junction 12 to junction 11 ~~**(note - timings are indicative)**~~

8.3.9 Work in this section will be undertaken in three phases. The majority of the smart motorway infrastructure is installed in the ~~Work in this section will be undertaken in four phases. The majority of the smart motorway infrastructure is installed in the verge~~ central reserve during the first phase.

Phase 1 Central Reserve Works (April 2019 to January 2020)

a) traffic switch to move motorway traffic next to verge constructed in Phase 1;
b) site clearance;
c) drainage;
d) installation of RCB;
e) installation of new lighting columns;
f) lighting commissioning; and
g) surfacing and lining works.

Phase 2 Verge Works (January ~~2017~~2020 to October 2021)

a) initial site establishment;
b) install TM. During this phase the traffic will be moved over to three narrow lanes positioned next to the central reserve providing sufficient space to construction the new works in the verge;
c) following TM installation, the site will be cleared of vegetation and existing infrastructure in the verge not required to be retained by the Scheme;
d) installation of new drainage infrastructure;
e) installation of new communications ducting and chambers;
f) gantry construction;
g) retaining wall construction;
h) construction of EAs;
i) installation of any required replacement fencing / screening;
j) installation of new safety barriers;
k) installation of new communications cabling and equipment;
l) verge furniture and finishings; and
e) surfacing and lining works.

a)

Phase 3 Full Commissioning (November 2021~~0~~ to June ~~anuary~~ 2022~~1~~)

a) full commissioning of smart motorway system (junction 12 to junction 8/9); and

a) removal of remaining TM and full implementation of the Scheme from junction 12 to junction 8/9.

Junction 11 to junction 10 ~~*July 2017*~~

8.3.10 Work in this section will be undertaken in three phases. The majority of the smart motorway infrastructure is installed in the verge during the first phase.

Phase 1 Verge Works (March 2019 to September 2020)

a) initial site establishment;
b) install TM. During this phase the traffic will be moved over to three narrow lanes positioned next to the central reserve providing sufficient space to construction the new works in the verge;
c) following TM installation, the site will be cleared of vegetation and existing infrastructure in the verge not required to be retained by the Scheme;
d) installation of new drainage infrastructure;
e) installation of new communications ducting and chambers;
f) gantry construction;
g) retaining wall construction;
h) construction of ~~ERAs~~EAs;
i) installation of any required replacement fencing / screening;
j) installation of new safety barriers;
k) installation of new communications cabling and equipment;
l) verge furniture and finishings; and
m) surfacing and lining works.

Phase 2 Central Reserve Works (~~July 2017~~June 2020 to ~~December 2017~~October~~November~~ 2020~~10~~)

a) traffic switch to move motorway traffic next to verge constructed in Phase 1;
b) site clearance;
c) drainage;
d) installation of RCB;
e) installation of new lighting columns;
f) lighting commissioning; and
g) surfacing and lining works.

Phase 3 ~~Local~~ Commissioning (December~~November~~ 2020~~10~~ to June~~January~~ 2021~~1~~)

a) traffic switch to move motorway onto permanent outside three lanes;
b) local commissioning of new Technology Equipment;
c) ~~*2018 to March 2018*~~full commissioning of smart motorway system (junction 12 to junction 8/9); and
d) removal of TM and full implementation of the scheme from junction 12 to junction 8/9.

Junction 10 to junction 8/9

~~8.3.10~~8.3.11 Work in this section will be undertaken in three phases. The majority of the smart motorway infrastructure is installed in the central reserve during the first phase.

Phase 1 Central Reserve Works (July 2018 to April 2019)

a) traffic switch to move motorway traffic next to verge constructed in Phase 1;
b) site clearance;
c) drainage;
d) installation of RCB;
e) installation of new lighting columns;
f) lighting commissioning; and
g) surfacing and lining works.

Phase 2 Verge Works (April 2019 to May 2021~~0~~)

a) initial site establishment;
b) install TM. During this phase the traffic will be moved over to three narrow lanes positioned next to the central reserve providing sufficient space to construction the new works in the verge;
c) following TM installation, the site will be cleared of vegetation and existing infrastructure in the verge not required to be retained by the Scheme;
d) installation of new drainage infrastructure;
e) installation of new communications ducting and chambers;
f) gantry construction;
g) retaining wall construction;
h) construction of EAs;
i) installation of any required replacement fencing / screening;
j) installation of new safety barriers;
k) installation of new communications cabling and equipment;
l) verge furniture and finishings; and
m) surfacing and lining works.

Phase 3 Commissioning (July~~November~~ 2021~~0~~ to J~~une~~anuary~~ 2021~~)

a) traffic switch to move motorway onto permanent outside three lanes;

b) local commissioning of new technology equipment;

c) full commissioning of smart motorway system (junction 12 junction 8/9); and

d) removal of TM and full implementation of the scheme from junction 12 to junction 8/9.

Junction 8/9 to junction 7

~~8.3.11~~8.3.12 Work in this section will be undertaken in four phases. The initial phase involves works to allow the replacement / extension of the existing bridges where there is currently insufficient width to deliver a smart motorway ALR scheme.

Phase 1 Structures Works (December 2018 to December 202~~0~~)

a) **Ascot Road overbridge**:

i. construction of new Ascot Road overbridge offline maintaining vehicular and pedestrian access across Ascot Road during the construction period. Works commence with abutment construction then continue with deck construction, diversion of services and surfacing work;

ii. diversion of traffic and utilities over new structure;

iii. demolition of original Ascot Road bridge structure. The intention is that the bridge will be demolished using large 360-degree excavators with hydraulic concrete shears and breakers; and

iv. completion of new side road alignment over new structure.

b) ***Monkey Island overbridge***:

i. construction of new Monkey Island overbridge off-line maintaining vehicular and pedestrian access across Ascot Road during the construction period. Works commence with abutment construction then continue with deck construction, diversion of services and surfacing work;

ii. diversion of traffic and utilities over new structure;

iii. demolition of original bridge structure. Whilst the proposed method of demolition will be decided following the appointment of the Contractor and specialist demolition subcontractor, the intention is that the bridge will be demolished using large 360-degree excavators with hydraulic concrete shears and breakers; and

iv. completion of new side road alignment over new structure.

c) **Thames Bray underbridge**:

i. Thames Bray bridge will be widened asymmetrically to the north of the M4;

ii. existing footpath to the north of Thames Bray underbridge will be closed for the duration of the works; and

iii. construction of extended bridge requiring preparation of abutment piling area, piling works, construction of substructure and then installation of new bridge beams, deck and approach embankments.

d) **Marsh Lane overbridge**:

i. closure of Marsh Lane and diversion of services;

ii. construction of new Marsh Lane overbridge online. Works commence with abutment construction then continue with deck

iii. construction, diversion of services and surfacing work;

iv. diversion of traffic and utilities over new structure;

v. demolition of original bridge structure. Whilst the proposed method of demolition will be decided following the appointment of the Contractor and specialist demolition subcontractor, the intention is that the bridge will be demolished using large 360-degree excavators with hydraulic concrete shears and breakers; and

vi. completion of new side road alignment either side of new structure.

e) **Lake End Road overbridge**:

i. construction of new Lake End Road overbridge offline maintaining vehicular and pedestrian access across Ascot Road during the construction period. Works commence with abutment construction then continue with deck construction, diversion of services and surfacing work;

ii. diversion of traffic and utilities over new structure;

iii. demolition of original bridge structure. Whilst the proposed method of demolition will be decided following the appointment of the Contractor and specialist demolition subcontractor, the intention is that the bridge will be demolished using large 360-degree excavators with hydraulic concrete shears and breakers; and

iv. completion of new side road alignment over new structure.

Phase 2 Verge Works (December 2019 to March~~January~~ 2021)

a) initial site establishment;

b) install TM. During this phase the traffic will be moved over to three narrow lanes positioned next to the central reserve provided sufficient space to construction the new works in the verge;

c) following TM installation, the site will be cleared of vegetation and existing infrastructure in the verge not required to be retained by the Scheme;

d) installation of new drainage infrastructure;

e) installation of new communications ducting and chambers;

f) gantry construction;

g) retaining walls;

h) construction of EAs;

i) installation of any required replacement fencing / screening;

j) installation of new safety barriers;

k) installation of new communications cabling and equipment;

l) verge furniture and finishings; and

m) surfacing and lining works.

Phase 3 Central Reserve Works (March~~January~~ 2021 to March~~July~~ 202~~21~~)

a) traffic switch to move motorway traffic next to verge constructed in Phase 1;

b) site clearance;

c) drainage;

d) installation of RCB;

e) installation of new lighting columns;

f) lighting commissioning; and

g) surfacing works.

Phase 4 Commissioning (January~~August~~ 202~~21~~ to June~~October~~ 202~~21~~)

a) traffic switch to move motorway onto permanent outside three lanes;

b) local commissioning of new technology equipment; and

c) full commissioning of smart motorway system (in parallel with the works to junction 6 to junction 3).

Junction 7 to junction 6

~~8.3.12~~8.3.13 Work in this section will be undertaken in four phases. The initial phase involves works to allow the replacement / extension of the existing bridges where there is currently insufficient width to deliver a smart motorway ALR scheme.

Phase 1 Structures Works (~~January 201~~July 2019 to March 2021~~October 2020~~)

a) Huntercombe Spur overbridge (junction 7):

i. construction of new Huntercombe Spur overbridge online with a temporary bridge to maintain vehicular access during the construction period.

ii. Works commence with abutment construction then continue with deck construction, diversion of services and surfacing work;

iii. diversion of traffic and utilities over new structure;

iv. demolition of original bridge structure. Whilst the proposed method of demolition will be decided following the appointment of the Contractor and

specialist demolition subcontractor, the intention is that the bridge will be demolished using large 360-degree excavators with hydraulic concrete shears and breakers; and

v. completion of new side road alignment over new structure.

f) Oldway Lane overbridge:

i. closure of Oldway Lane and diversion of services;

ii. construction of new overbridge online (vertical alignment has been lowered by circa 1.0m). Works commence with abutment construction then continue with deck construction, diversion of services and surfacing work;

iii. diversion of traffic and utilities over new structure;

iv. demolition of original bridge structure. Whilst the proposed method of demolition will be decided following the appointment of the Contractor and specialist demolition subcontractor, the intention is that the bridge will be demolished using large 360-degree excavators with hydraulic concrete shears and breakers; and

v. completion of new side road alignment either side of new structure.

g) Wood Lane overbridge:

i. construction of Wood Lane overbridge offline maintaining vehicular and pedestrian access across Ascot Road during the construction period. Vertical alignment has been lowered by 1.0m and it is part of a Non-Material Change Application. Works commence with abutment construction then continue with deck construction, diversion of services and surfacing work;

ii. diversion of traffic and utilities over new structure;

iii. demolition of original bridge structure. Whilst the proposed method of demolition will be decided following the appointment of the Contractor and specialist demolition subcontractor, the intention is that the bridge will be demolished using large 360-degree excavators with hydraulic concrete shears and breakers; and

iv. completion of new side road alignment over new structure.

Phase 2 Verge Works (February 2020 to February 2021)

a) initial site establishment;

b) install TM. During this phase the traffic will be moved over to three narrow lanes positioned next to the central reserve provided sufficient space to construction the new works in the verge;

c) following TM installation, the site will be cleared of vegetation and existing infrastructure in the verge not required to be retained by the Scheme;

d) installation of new drainage infrastructure;

e) installation of new communications ducting and chambers;

f) gantry construction;

g) retaining walls;

h) construction of EAs;

i) installation of any required replacement fencing / screening;

j) installation of new safety barriers;

k) installation of new communications cabling and equipment;

l) verge furniture and finishings; and

m) surfacing and lining works.

Phase 3 Central Reserve Works (March~~January~~ 2021 to December~~July~~ 2021)

a) traffic switch to move motorway traffic next to verge constructed in Phase 1;

b) site clearance;

c) drainage;

d) installation of RCB;

e) installation of new lighting columns;

f) lighting commissioning; and

g) surfacing works.

Phase 4 Commissioning (January~~une~~ 202~~1~~1 to June~~October~~ 202~~1~~1)

a) traffic switch to move motorway onto permanent outside three lanes;

b) local commissioning of new Technology Equipment; and

c) full commissioning of smart motorway system (in parallel with the works to junction 8/9 to junction 7 and junction 6 to junction 3).

Junction 6 to junction 5

~~8.3.13~~8.3.14 Work in this section will be undertaken in four phases. The initial phase involves works to allow the replacement / extension of the existing bridges where there is currently insufficient width to deliver a smart motorway ALR scheme.

Phase 1 Structures Works (May 202~~019~~ to July 202~~10~~)

a) Windsor Branch Railway underbridge**:**

i. The existing bridge will no longer be widened as Through Junction Running has been removed at J6. The main works will be that the central reserve is to be reconstructed. This is achieved by joining the two existing bridges decks together.

b) Datchet Road overbridge**:**

ii. construction of new Datchet Road overbridge offline maintaining vehicular during the construction period. Works commence with abutment construction then continue with deck construction, diversion of services and surfacing work;

iii. diversion of traffic and utilities over new structure;

iv. demolition of original bridge structure. Whilst the proposed method of demolition will be decided following the appointment of the Contractor and specialist demolition subcontractor, the intention is that the bridge will be demolished using large 360-degree excavators with hydraulic concrete shears and breakers; and

v. completion of new side road alignment over new structure.

c) Recreation Ground overbridge**:**

i. closure of Recreation Ground bridge access and diversion of services;

ii. construction of new overbridge online. Works commence with abutment construction then continue with deck construction, diversion of services and surfacing work;

iii. diversion of traffic and utilities over new structure;

iv. demolition of original bridge structure. Whilst the proposed method of demolition will be decided following the appointment of the Contractor and specialist demolition subcontractor, the intention is that the bridge will be demolished using large 360-degree excavators with hydraulic concrete shears and breakers; and

v. completion of new side road alignment either side of new structure.

d) Riding Court Road overbridge:

i. construction of Riding Court Road overbridge offline maintaining vehicular and pedestrian access during the construction period. Works commence with abutment construction then continue with deck construction, diversion of services and surfacing work;

ii. diversion of traffic and utilities over new structure;

iii. demolition of original bridge structure. Whilst the proposed method of demolition will be decided following the appointment of the Contractor and specialist demolition subcontractor, the intention is that the bridge will be demolished using large 360-degree excavators with hydraulic concrete shears and breakers; and

iv. completion of new side road alignment over new structure.

Phase 2 Verge Works (February 2020 to February 2021)

a) initial site establishment;
b) install TM. During this phase the traffic will be moved over to three narrow lanes positioned next to the central reserve provided sufficient space to construction the new works in the verge;
c) following TM installation, the site will be cleared of vegetation and existing infrastructure in the verge not required to be retained by the Scheme;
d) installation of new drainage infrastructure;
e) installation of new communications ducting and chambers;
f) gantry construction;
g) retaining walls;
h) construction of EAs;
i) installation of any required replacement fencing/screening;
j) installation of new safety barriers;
k) installation of new communications cabling and equipment;
l) verge furniture and finishings; and
m) surfacing and lining works.

Phase 3 Central Reserve Works (February 2021 to December~~July~~ 2021)

a) traffic switch to move motorway traffic next to verge constructed in Phase 1;
b) site clearance;
c) drainage;
d) installation of RCB;
e) installation of new lighting columns;
f) lighting commissioning; and
g) surfacing works.

Phase 4 Commissioning (January ~~uly~~ 2021 to June ~~October~~ 2021)

a) traffic switch to move motorway onto permanent outside three lanes;
b) local commissioning of new technology equipment; and
e) full commissioning of smart motorway system (in parallel with the works to junction 8/9 to junction 6 and junction 5 to junction 3).

Junction 5 to junction 4b

Work in this section will be undertaken in four phases. The initial phase involves works to allow the replacement / extension of the existing bridges where there is currently insufficient width to deliver a smart motorway ALR scheme.

Phase 1 Structures Works (February 2020 to November 2020)

a) Langley Interchange overbridges:

i. Langley Interchange underbridges will no longer be widened – the proposed environmental barriers will be attached to the existing parapets.

ii. Langley Interchange Pedestrian subway: Widening is no longer required.

b) Old Slade Lane overbridge:

i. closure of Old Slade Lane and diversion of services;

ii. construction of new overbridge online. Works commence with abutment construction then continue with deck construction, diversion of services and surfacing work;

iii. diversion of traffic and utilities over new structure;

iv. demolition of original bridge structure. Whilst the proposed method of demolition will be decided following the appointment of the Contractor and specialist demolition subcontractor, the intention is that the bridge will be demolished using large 360-degree excavators with hydraulic concrete shears and breakers; and

v. completion of new access alignment either side of new structure.

Phase 2 Verge Works (February 2020 to January 2021)

a) initial site establishment;

b) install TM. During this phase the traffic will be moved over to three narrow lanes positioned next to the central reserve provided sufficient space to construction the new works in the verge;

c) following TM installation, the site will be cleared of vegetation and existing infrastructure in the verge not required to be retained by the Scheme;

d) installation of new drainage infrastructure;

e) installation of new communications ducting and chambers;

f) gantry construction;

g) retaining walls;

h) construction of EAs;

i) installation of any required replacement fencing / screening;

j) installation of new safety barriers;

k) installation of new communications cabling and equipment;

l) verge Furniture and finishings; and

m) new Road Surfacing and lining works.

Phase 3 Central Reserve Works (February 2021 to NovemberJune 2021)

a) traffic switch to move motorway traffic next to verge constructed in Phase 1;
b) site clearance;
c) drainage;
d) installation of RCB;
e) installation of new lighting columns;
f) lighting commissioning; and
g) surfacing works.

Phase 4 Commissioning (Januaryuly 20221 to June September 20221)

a) traffic switch to move motorway onto permanent outside three lanes;
b) local commissioning of new technology equipment; and
c) full commissioning of smart motorway system (in parallel with the works to junction 6 to junction 3).

Junction 4b to junction 4

8.3.148.3.15 Work in this section will be undertaken in three phases.

Phase 1 Verge Works (October 2019 to June 2020)

a) initial site establishment;
b) install TM. During this phase the traffic will be moved over to three narrow lanes positioned next to the central reserve provided sufficient space to construction the new works in the verge;
c) following TM installation, the site will be cleared of vegetation and existing infrastructure in the verge not required to be retained by the Scheme;
d) installation of new drainage infrastructure;
e) installation of new communications ducting and chambers;
f) gantry construction;
g) retaining walls;
h) construction of EAs;
i) installation of any required replacement fencing / screening;
j) installation of new safety barriers;
k) installation of new communications cabling and equipment;
l) verge furniture and finishings; and
m) surfacing and lining works.

Phase 2 Central Reserve Works (May 2020 to March 2021)

a) traffic switch to move motorway traffic next to verge constructed in Phase 1;

b) site clearance;
c) drainage;
d) installation of RCB;
e) installation of new lighting columns;
f) lighting commissioning; and
g) surfacing works.

Phase 3 Commissioning (January~~May~~ 202~~21~~ to June~~September~~ 202~~21~~)

a) traffic switch to move motorway onto permanent outside three lanes;
b) local commissioning of new technology equipment; and
c) full commissioning of smart motorway system (in parallel with the works to junction 8/9 to junction 4b and junction 4 to junction 3).

Junction 4 to junction 3

~~8.3.15~~8.3.16 Work in this section will be undertaken in three phases.

Phase 1 Verge Works (October 2019 to April 2020)

a) initial site establishment;
b) install TM. During this phase the traffic will be moved over to three narrow lanes positioned next to the central reserve provided sufficient space to construction the new works in the verge;
c) following TM installation, the site will be cleared of vegetation and existing infrastructure in the verge not required to be retained by the Scheme;
d) installation of new drainage infrastructure;
e) installation of new communications ducting and chambers;
f) gantry construction;
g) retaining walls;
h) construction of ~~ERAs~~EAs;
i) installation of any required replacement fencing/screening;
j) installation of new safety barriers;
k) installation of new communications cabling and equipment;
l) verge furniture and finishings; and
m) surfacing and lining works.

Phase 2 Central Reserve Works (~~July~~May 2020 to ~~June~~February 2021)

a) traffic switch to move motorway traffic next to verge constructed in Phase 1;
b) site clearance;
c) drainage;

d) installation of RCB;

e) installation of new lighting columns;

f) lighting commissioning; and

g) surfacing works.

Phase 3 Commissioning (January~~une~~ 202~~21~~ to June~~September~~ 202~~21~~)

a) traffic switch to move motorway onto permanent outside three lanes;

b) local commissioning of new technology equipment; and

c) full commissioning of smart motorway system (in parallel with the works to junction 8/9 to junction 4).