HIGHWAYS AGENCY

Area 6 – 545669
A12 J 11 to J12 NB & SB
Resurfacing

amey

Safety Risk Report

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1. Executive Summary

The scheme named 'A12 J11 to J12 NB & SB Resurfacing plus' is a resurfacing scheme within Highways Agency Area 6 to be delivered as Provider Works by the Service Provider, Amey, in the financial year 2014/15. The scheme extents are Junctions 11 and Junction 12 with an overall treatment length of approximately 7.8km with a pavement surface area of approximately 67300m^2 and include the treatment of the full carriageway width. Due to the condition of the pavement, the scheme requires replacement of the wearing course to all lanes; this work would be traditionally constructed as a series of inlay patches completed in overnight closure. The main driver for the works is the age of the pavement asset, with locations identified where the road surface has, or will imminently meet, the agreed age criteria (HRA>20 years and TCS>10 years). This age based criteria is consistent with the approach now contained within the HA Simple Surfacing Schemes (SSS) identification process, incorporated within the Portfolio Control Framework. Reference is made to the Evidence Based Business Case Report for the scheme for details (Ref. A6_BC_T1.1_A12_J11-12)

The specification for ASC 6/8 allows planed surfaces to be trafficked for up to two weeks. In order to provide best value for the client Amey has proposed a long life surfacing design consisting of two layers, a pad coat and thin surface course. This approach requires the running of the planed surface during the day. The proposed method of construction provides a better engineering solution, with reduced construction cost and significant whole life cost advantages as well as minimising future interventions and the associated health and safety benefits that this brings.

Traditionally, short lengths of surfacing were planed off and resurfaced overnight, typically a single 50mm thick wearing course. The risk of this operation is high (e.g weather) as the available period of time is short and the minimum requirement is to open to traffic a road that has been constructed in accordance with the Specification for Highway Work (SHW). The padcoat method sees a construction depth of 50mm but with a lower 20mm padcoat and a wearing course of 30mm. The principle of this method is that longer sections of highway are planed overnight and the highway is opened to traffic during daytime i.e. running on a planed surface. Furthermore, once the padcoat has been laid in the ensuing night works, the road is opened during daytime and the padcoat is trafficked. An item of note is that a proportion of this scheme requires deeper treatment due to the condition of the existing pavement, up to 180mm deep.

The padcoat method with 'running on temporary surfaces' is a relatively new concept to the Highways Agency and falls outside of normal highway maintenance activities. A Safety Risk Assessment has been developed in accordance with the Design Manual for Roads and Bridges (DMRB) document GD 04/12 Standard for Safety Risk Assessment on the Strategic Road Network.

This Safety Risk Report captures the Safety Risk Assessment. The assessment has considered the risks over and above those normally associated with traditional inlay patching whether positive or negative. It has also considered the necessary control measures to reduce additional risk due to the proposed methodology.

A summary of the Safety Risk Report outcomes include;

a) The risk assessment and controls have defined the works as Broadly Acceptable and it is considered acceptable to implement the padcoat methodology with appropriate risk control.
b) The overall Project Characterisation has been determined as Category B, with four Category B and one Category C Decision Controls.
c) For this scheme, the BCR determined for capital costs of 1.27 and for whole life costing was 6.39 which was positive.

2. Background

2.1. General

2.1.1. GD 04/12 was developed to provide guidance for addressing safety risks. It introduces the concept of 'trade off' and describes how safety risk tolerance can be used to optimally balance safety risk between affected populations. In this case the trade-off of risks are between the alternative method of construction, which involves running on a temporary surface, and traditional inlay patching and the impact each would have in a different population.

2.1.2. A key requirement of this standard is that appropriate risk assessment, evaluation and management is undertaken to inform all activities, projects and decisions. This includes ensuring that the safety risk impacts for different populations are taken into account and that documentation is kept which evidences the decision making process.

2.1.3. Table 1 below defines different population groups that the Agency has a responsibility for.

Population 1 – People **directly** employed by the Agency and who work on the SRN, e.g. Traffic Officers. **Population 2** – People in a **contractural** relationship with the Agency, including Agency National Vehicle Recovery Contract operatives, all workers engaged in traffic management activities and incident support services, and any other activities where live traffic is present, (such as persons carrying out survey and inspection work).	**'Workers'**
Population 3 – Other parties, including road users, the police and emergency services and non-motorised 'Users' such as equestrians, cyclists and pedestrians, as well as those others not in a contractural relationship with the Agency, such as privately contracted vehicle recovery and vehicle repair providers.	**'Users'**
Population 4 – Third parties includes any person or persons who could be affected by the SRN, but who are neither using it, nor working on it, i.e. living or working adjacent to the SRN, using other (non-Agency) transport networks that intersect with the SRN (e.g. local roads, railways) and those who are living or working in properties owned by the Agency.	**'Other Parties'**

Table 1 - Extract of table 1 Defining and Brigading Populations from GD04/12

2.2. Duties and Responsibilities

2.2.1. In the context of duties of a highway authority, the safety of 'Users', 'Workers' and 'Other Parties' is generally regulated under statute. There is only one exception to this principle and that is when the use of the road is temporarily constrained by the Agency implementing road works. In this instance only, the road is not in a state of normal operation and the Agency's responsibility under health and safety legislation changes.

2.2.2. In practice this means that during construction and maintenance works the Agency has interfered with the normal operation of the road and the liability remains unchanged but the way in which the liability is discharged changes, which means that during the period of road work activity the Highways Authority must manage the enhanced risk exposure.

2.2.3. Amey maintains Area 6 on behalf of the Highways Agency. Under Amey's responsibilities under the Asset Support Contract (ASC) an assessment in accordance with GD04/12 has been undertaken for the A12 J11– J12 NB & SB Resurfacing plus scheme.

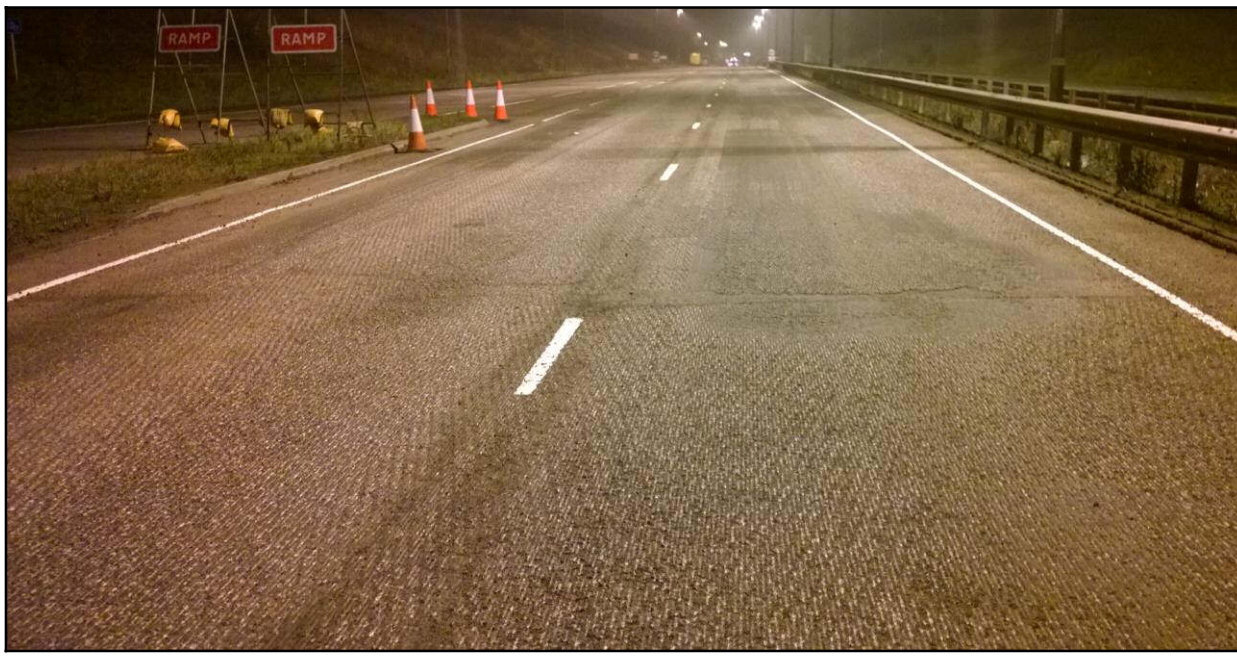
2.3. Previous Examples of Running on Temporary Surfaces

2.3.1. A421 Bedford Southern Bypass E/B and W/B Resurfacing Schemes

This is the third scheme that shall be constructed as Running on Temporary Surfaces (RoTS) by Amey under this contract, the first two being the A421 Bedford Southern Bypass E/B and W/B Resurfacing Schemes (HA Pins 545407 and 545408). This scheme commenced circa 17 November 2014 and is due for completion in January 2015.

Highways Agency had engaged Aecom to undertake a variety of monitoring during the site works including speed, noise and traffic counts for the schemes. The outputs from the Aecom study have yet to be collated, but anecdotal evidence suggests that the scheme has been a success in relation to these elements and also from a safety perspective, there have been no incidents during the site works including vehicular collisions.

Photograph 1 shows the quality of the surface produced.



Photograph 1 – Quality of Surface at A421 Bedford Southern Bypass.

There are several other schemes off the Area 6 and 8 Network that have been identified as examples or running on temporary surfaces, these include;

- M42 Resurfacing Scheme (Jct 3a – 4 and Jct 9-10) - Highways Agency Area 9
- A6 Deadmans Hill – Southbound – Bedfordshire County Council
- M25 Jct 23 to Jct 24 Resurfacing – Highways Agency

2.3.2. M42 Resurfacing Scheme (Jct 3a – 4 and Jct 9-10)

Works involved refurbishing the concrete pavement between Junction 3a to 4 and Junction 9 to 10. This was followed by the installation of bituminous surface course. The existing carriageway was milled to give a uniform surface on which to lay the surface course. The depth of milling was between 0-30mm as defined by the designed thickness of the surface course.

The dates of the construction elements of the scheme were;

- M42 J10 – J9 Construction Start 27/07/2013; Construction End 29/10/2013
- M42 J3A – J4 Construction Start 18/11/2013; Construction End 21/02/2014

Traffic management was in the form of overnight total closures and daytime running. This method had the added benefit of milling the concrete carriageway at equal lengths across all lanes at night. The temporary surface was then cleaned with a road brush and temporary lane lines installed. Longitudinal steps or tie-ins were not allowed. Traffic was permitted to run on the surface at a reduced speed limit of 50mph and with additional signage throughout the length.

Whilst running on the temporary surface, accident data captured on Area 9 Collision database shows there were 5 No. accidents during the works on the M42. Detailed data is only available for four collisions that occurred between Junctions 9 -10. All of these accidents can be attributed to driver error or recklessness, none were as a result of the conditions of the road, details are shown in Table 2;

Incident	Time of Day	Weather and Light Conditions	Cause of Incident
1 (9-10)	07:25	Fine, dry and daylight	Driver following too close to the vehicle in front. Careless/Reckless driving.
2 (9-10)	13:28	Fine, dry and daylight	Vehicle collided with another whilst changing lanes. Failed to look properly, careless/reckless driving.
3 (9-10)	19:15	Rain, wet, dusk light conditions	Vehicles stopped in traffic, another vehicle crashes into the rear. Driver not paying attention and was distracted in the car. Careless/Reckless driving.
4 (9-10)	00:05	Fine but wet surface from earlier rainfall, dark, no street lights	Driver fatigue, driver fell asleep at the wheel, woke and swerved. Careless/Reckless driving.

Table 2 – M42 Scheme Accident Data

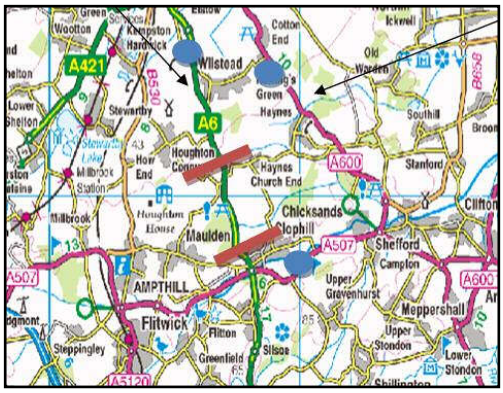
Although the scheme involved a milled concrete carriageway, the traffic was still running on a milled surface. The similarity in the case of the A421 schemes is that the users were using ramps and travelling on an unfamiliar surface compared the surface that was applied at that location.

2.3.3. A6 Deadmans Hill – Southbound – Bedfordshire County Council

Deadmans Hill was a resurfacing scheme carried out between the 08th-17th November 2013 which ran on a planed temporary surface in excess of 500m and was trafficked for 5-6 days prior to resurfacing. The mandatory speed limit restriction was 40mph and was controlled with speed cameras. Photographs 2 and 3 and map 1 show the some basic details of the scheme.

Photograph 2 – A6 Deadmans Hill Running on temporary Surface

It Is anecdotally evidenced that there were no accidents or incidents during the running on the temporary surfaces.



Map 1 – A6 Deadmans Hill Location

Photograph 3 – Works included dual c/way

2.3.4. M25 Jct 23 to Jct 24 Resurfacing

A departure was granted to Connect Plus by the Highways Agency on the M25 A and B Carriageway between J23 and J24 to traffic Polymer Modified EME2 binder course. The scheme name is T102 M25 DBFO SERVICE PAYMENTS and the departure reference ID was 69044. The departure sought the use of a non-standard surface to be used as a temporary running surface under identified restrictions such as speed limit reduction and other appropriate measures.

In this particular departure the contractor asked the Highways Agency for approval for the use of EME2 with polymer modified binder with fine grit as sacrificial surface course for maximum period of four weeks with Mandatory 50mph speed within the Latest Upgrade Section which was granted and the works carried out.

Amey are not aware of any issues raised regarding the Connect Plus approved departure on the M25 A and B Carriageway between J23 and J24 Resurfacing with Polymer Modified EME2. Nor is Amey aware that there were any additional actions implemented by the contractor following the carriageway surfacing outlined in the departure

2.4. Report Limitations

2.4.1. The basis of this report is to identify and determine the safety implications of running on temporary surfaces (pad coat or planed surface) the methodology is explained in Section 3.1.2. Industry standard practice is to replace surfacing utilising overnight closures where short sections are completed with the road being opened the next day, this is explained briefly in Section 3.1.3. and referred to as 'traditional inlay patching".

2.4.2. The limit of this report is the consideration of running on temporary surfaces against traditional inlay patching. Optioneering was undertaken at the scheme identification stage in relation to utilising full closures or contraflow and details are shown in Section 3.1.4. Detailed costings of the options were not undertaken as part of this exercise.

3. The Project Being Considered

3.1. A12 Junctions 11 to Junction 12 Resurfacing

The proposed methodology is described in Section 3.1.2, the traditional inlay patching to which the proposed methodology is compared is detailed in Section 3.1.3.

3.1.1. Description of Pavement

The pavement construction is a majority rigid overlay with small sections of flexible construction. The slip roads are a mixture of flexible and flexible composite construction. The current profile of the main carriageway was formed in a 2002 reconstruction and was installed in both directions. The surface was re-textured in 2008. A typical construction profile for the main carriageway is shown in Table 3. An Overview Plan of the carriageway construction is in Appendix A.

Typical main carriageway pavement construction	TSCS	(30-35mm)
	Heavy Duty Macadam	(150mm) (layered)
	PQ Concrete	(280mm)
	Cement Bound Material	(200mm)

Table 3 – Typical Pavement Profile – Main Carriageway (HAPMS Data)

3.1.2. Running on Planed Surface/ Padcoat

The basis of this methodology is that a long section of road is planed overnight and opened the following day for normal traffic operations but running on the planed surface. Over a sequence of evenings, the planed surface is resurfaced; giving a higher quality product and the construction programme is reduced.

Surfacing repairs (up to 7.8km) are to be undertaken on the A12 between Junctions 11 and 12, covering areas on both lanes of the northbound and southbound carriageway together with the slip roads at junction 11. Works involve plane-out and inlay pavement treatment comprising:

- 50mm cold milling
- 20 mm of 6 mm Polymer modified SMA binder course (padcoat) and 30 mm polymer modified TSC
- 100mm inlays (20 mm padcoat, 30 mm TSC & 50mm of SMA binder) to address structural rutting defects
- Depth of treatment to 160-180mm
- Replacing of road markings and studs
- Disconnection and reinstatement of affected traffic detection loops

- All works are to be carried out in accordance with DMRB and Bridges and Specifications for Highway Works (MCHW) full material specifications, except where departures from standards have been agreed. Detailed design drawings of proposed works are available in Appendix A.
- The required departures to traffic the temporary surfaces have been submitted to Netserv for approval incorporating in full their guidance from previous approved departures.

The scope of this assessment covers road users running on a temporary surface over a length of up to 3.5km. The benefits of this scenario over traditional methods using lane closures/contraflow include the following:

- Less disruption to road users as 2 lanes of traffic are still maintained during peak times
- Cost benefits to Highways Agency, refer to section 4.5.15
- Reduced future maintenance requirements for carriageway surfacing

3.1.3. Traditional inlay patching is an alternative in which, under this methodology, the new surface would be constructed in a series of patches that are planed out and inlayed every night with the road being opened for normal daytime running.

This method of working is inefficient and expensive; the finished works may have more joints and a shorter life.

There is also an increased risk of works overrunning and preventing timely opening of the carriageway causing significant disruption to the travelling public.

3.1.4. Scheme delivery options were progressed from the use of full closures to the final option of night-time contraflow working and running on a temporary surface during the day at a reduced speed limit of 40mph. The options were assessed and the findings are detailed in Table 4.

EFFECT	CONTRA-FLOW	ROAD CLOSURE
Local Authority Impact	No nightly diversion routes - reduced liaison with local authorities. Minimised disruption to network.	Increased liaison with local authorities due to running traffic on their roads. Increased disruption to network.
Site Safety	Reduced road worker safety due to increased carriageway crossings.	Increased road worker safety due to complete sterile working zone.
Maintenance Requirements	Potential daytime maintenance of lane cylinders.	No daytime maintenance Working windows: 21:30-05:00hrs
Facilitation / Enabling Works Required	Building of new/improving of existing crossovers. Increased future network resilience.	Limited facilitation works. No change to existing network resilience.
Recovery Vehicle	Recovery vehicle required	No recovery vehicle required.
Duration of Works	Potential saving in duration if running on a planed surface is approved.	Potential saving in duration if running on a planed surface is approved.
TM Cost	Increased costs due to preliminary works and building/improving crossovers.	Cheaper alternative – increased disruption.

Table 4 – Considered Traffic Management Options

Under contraflow conditions, the traffic management includes a stepped speed limit through the works of 70mph to 50mph to 40mph in addition to SPECS cameras to provide risk mitigation to speeding.

3.1.5. On the scheme, due to the condition of the pavement it will be necessary to apply deeper treatments to rectify defects. The methodology applied for areas of deeper treatment is as follows:

- Visual Survey – Drive Through - video data [Hi Resolution]
- Visual Survey – walkthrough
- Core survey data
- FWD Data

On this basis there are three treatment options that are required to be applied as follows:

Treatment Option 1 – 50mm

30mm of 0/10 Thin Surface Course Polymer Modified Binder

20mm 0/6 SMA Binder Course Polymer Modified Binder.

Treatment Option 2 – 100mm

30mm of 0/10 Thin Surface Course Polymer Modified Binder

20mm 0/6 SMA Binder Course Polymer Modified Binder

50mm 0/20mm SMA Binder Course Polymer Modified Binder.

Treatment Option 3 – 100mm+ [covers total pavement thicknesses of 160-180mm]

30mm of 0/10 Thin Surface Course Polymer Modified Binder

20mm 0/6 SMA Binder Course Polymer Modified Binder

110mm – 130mm 0/20mm SMA Binder Course Polymer Modified Binder.

Polymer Modified Binder has been selected for all materials as it is able to better resist any reflective cracking and the depths of the treatment are appropriate for the removal of any defects identified.

3.2. Other Considerations

3.2.1. Users

The expectations of the Users are considered to include the increase in safety risk and increase in daily journey time to be balanced by the reduced scheme length and reduced future maintenance of that length of carriageway i.e. increased network occupancy. This trade-off is demonstrated within this report and shall be communicated to the Users accordingly through the communications strategy.

3.2.2. Stakeholders

A full detailed communication proposal has been developed as part of this scheme. This proposal will require full approval of the HA's communications team. The following issues will be addressed; safety, political sensitivity, timings, options, briefings for ministers, local MP's, Essex County Council, Brentwood District Council, Connect Plus, Transport for London, locally affected business, and residents of A12 towns and villages.

In addition, liaison with the local police authorities has been sought in relation to considerations of risk to users under this scheme where it is proposed to run on a temporary surface. Essex Police have confirmed that the proposed approach is suitable and that they can provide additional officers for enforcement, depending on available resources, provided that costs are recovered from the Highways Agency.

3.2.3. Route Importance

The A12 forms an important strategic link for cross-country freight from the Ports at Harwich, Felixstowe to and from the M25 Motorway and East London. The route is also a Heavy Load Route designated on the Highways Agency listing of routes. It would be beneficial for the network occupancy of this route be maintained or improved through these works.

4. Principles of Safety Risk Assessment and Control

This section of the document follows the assessment process as outlined in GD 04/12 where each heading is as defined in Part 2 – "Principles of Safety Risk Assessment and Control".

4.1. Stage 1 – Determine the Scope

4.1.1. The change in risk by adopting a 'running on temporary surface' approach on the resurfacing of the A12 between Junctions 11 and 12 on the North and Southbound carriageway, as opposed to a traditional inlay patching. The traditional option is the 50mm plane and inlay patching in overnight closures for which detailed assessment is considered unnecessary notwithstanding the essential elements for comparison to the 'running on temporary surfaces'.

4.1.2. Details of the proposed scheme and proposed signage for daytime running are included in Appendices A and B respectively.

4.2. Stage 2 - Identify the Hazards

The following additional hazards and the populations affected have been identified due to the activity defined in Section 3.1. These hazards are considered to be those over and above those that would be regarded under traditional overnight inlay works. The hazard identification that captures the hazards described in the following sub-sections is included in Appendix D.

Users

4.2.1. A hazard for motorists would be the running on a planed surface at a speed not normally associated with these surfaces. This unfamiliarity may cause hesitation and shunts or drivers may believe that the road is to be treated as a normal wearing surface course and ignore speed restrictions thus creating a collision hazard. This issue may also be exacerbated by poor weather conditions including snow, fog, poor light and freezing temperatures.

4.2.2. The surface is not prepared to a standard that prevents collision due to skidding. The rough texture can cause risk to cyclists and motorcyclists. The planed surface may also be vulnerable to significant degradation and breaking-up under traffic loads causing chippings on the road, a risk to users' windscreens, and skidding and pot-holing.

4.2.3. The entry and exits ramps are of a poor construction which may create hesitation as users may believe their cars may be damaged at higher speeds, this may cause shunts.

4.2.4. The padcoat is not suitable in the temporary trafficked condition and is at risk of deterioration causing chippings and a risk of vehicle damage.

4.2.5. When running on planed surfaces there are likely to be a number of raised ironworks either within the carriageway or verge that may cause a collision or vehicle damage, particularly related to cyclists and motorcyclists.

4.2.6. With the planed surface being in place for a period of time prior to surface laying, there is a possibility of flooding as the drainage system is temporarily at a higher level than the existing planed surface.

4.2.7. Vertical longitudinal joints either in the main carriageway, adjacent to laybys, at entry and exits of each section, service roads and slip roads may cause a hazard in relation to tyre and wheel damage and possibly loss of vehicle control by the user.

4.2.8. The adjacent vehicle restraint system (VRS) will be a minimum of 50mm higher than the planed surface during running. The risk is that the VRS will not operate as it should under its specification under collision.

4.2.9. The temporary road marking may wear and become unclear causing poor road positioning causing potential for collision between vehicles, motorcyclists and cyclists.

Workers

4.2.10. The maintenance of traffic management (TM) including general inspections of surface condition and white lining is a risk under daytime traffic conditions. The risk would include a collision of a vehicle with a TM operative through any of the relevant hazards listed in 4.2.1 through 4.2.9.

These hazards identified in 4.2.1 to 4.2.10 have been compiled through liaison with the contractors engaged on this scheme, an Amey CDM Coordinator, construction teams and designers.

Other Parties

4.2.11. All parties considered have been included under Users or Workers in some form, but further consideration of this is detailed in 4.5.16-17.

4.3. Stage 3 - Identify Relevant Criteria for Populations

4.3.1. Users – Vehicles, Motorcyclists, Cyclists.

If the risk of death is greater than 1 in 1,000,000 then the risk is Broadly Acceptable. If the risk of death is less than 1 in 1,000,000 but greater than 1 in 10,000 the risk is Tolerable. If the risk is less than 1 in 10,000 then the risk is unacceptable.

4.3.2. Workers.

If the risk of death is greater than 1 in 1,000,000 then the risk is Broadly Acceptable. If the risk of death is less than 1 in 1,000,000 but greater than 1 in 1,000 the risk is Tolerable. If the risk is less than 1 in 1,000 then the risk is unacceptable.

4.3.3. Considering 4.3.1 and 4.3.2, within the confines of this report in relation to the proposal of running on temporary surfaces, it is difficult to apply a calculation to determine incident frequency rates. However, the existing highway under normal traffic conditions has been calculated in Section 4.4.2.

4.3.4. Daytime running on temporary surface requires an enhanced duty of care as the operation, outside of local authority roads, apart from the A421 schemes as detailed in 2.3.1, has not been routinely used on Trunk Roads by the Highways Agency. The enhanced duty of care needs to ensure Users and Workers are safe and appropriate control measures are in place and the operation can be defined as Broadly Acceptable. The consideration of what defines Broadly Acceptable in this instance of utilising a methodology that has not been used by the Highways Agency frequently is relatively subjective. Several examples have been presented, Section 2.3, where statistical or anecdotal accident data has been provided. Based on this small sample of accident data, running on a temporary surface cannot be discounted as an increase in accidents is not in evidence. In this instance, it is considered that the proposed works can be defined as Broadly Acceptable if the level of risk has been reviewed and mitigated by experienced professionals with the works implemented by competent contractors.

4.4. Stage 4 – Consider Existing Risk Exposure for Each Population

4.4.1. Accident Data for the A12 is shown in Table 5 for the Northbound and Southbound carriageways with data taken from Highways Agency database TRADS. The data seems to be similar across several years on both carriageways, however, this may be due to the relative period between data updates.

Year	2010/11	2011/12	2012/13	Average
Annual Average AADT	64,672	66,744	66,719	66,045
All crashes	5	9	10	8
Fatal crashes	0	0	0	0
Wet crashes	3	2	7	4
Skid crashes	4	4	8	5
Wet Skid crashes	2	1	5	3
Darkness: No Street Lighting	0	0	0.3	0.3
Darkness: Street Lighting	0	0	0	0.0
Overall Accident Rating	**Above Average**		**Length, km**	15

Table 5 – Combined Northbound and Southbound AADT and Accident Data

4.4.2. Under current conditions i.e. full unrestricted operations, an analysis of the accident data (24no. in 36 months) of the route and AADT (66,045 vehicles) figures puts the current risk level in the "Broadly Acceptable Range" for all populations. This equates to an accident frequency rate of 1 in 3.01M (24/365days x 3 years x 66,045). It must be noted that these figures simply give an indication for the safety of the existing highway and are not appropriate for the temporary situation of running on the planed surface.

4.4.3. No data is available for incidents in relation to cyclists or motorcyclists, however, the use of the A12 by cyclists is considered to be limited due to the high speed nature of the road..

4.4.4. As additional hazards will be introduced as part of running on a planed surface this will increase the risk exposure for each of the affected populations. However, the risk exposure can be controlled to a tolerable level through the practical mitigation measures as described in Section 4.5.

4.5. Stage 5 - Risk Analysis, assessment and evaluation

The implementation of the works through the use of 'running on planed surfaces' introduces some additional risks but also reduces risks associated with traditional inlay works. These risks are discussed.

Users

4.5.1. Through risk assessment and discussions with Amey CDM-C , the police and Highways Agency, in addition to a "no overtaking" restriction, a mandatory 40mph speed restriction is appropriate through these works as this would force behavioural change. The driver for the reduced speed limit is to ensure that the risk associated with the works is As Low As Reasonably Practicable. Enforcement is also considered to be required. Weather conditions have been considered and control measures have been placed to cater for additional spray and temporary changes to how the drainage system works. Risks associated with additional spray are controlled through the use of a reduced speed limit, a finer planed surface and Variable Message Signs providing additional information as to the current traffic conditions. The drainage system is maintained through the use of grips and lowering raised gulley ironworks to ensure capacity is maintained.

A method statement has been developed containing a decision making criteria for when certain poor weather conditions prevail (refer to Appendix E). Contact details in the event of poor weather conditions can be found in Appendix G.

4.5.2. Departures from Standard have been submitted for the similar situation where the Users run on the planed surface and also on the padcoat material. These are based on WebDAS reference numbers;

74187 Junction 11-12 Running Planed Surface

74189 Junction 11-12 Running on Padcoat

4.5.3. The planing machine will have the capability to produce a good quality surface through the use of a finer milling drum. The quality of planing finish normally seen on the network on surfaces not trafficked can be seen in Area 2 and that proposed for these works shown in Area 1 in Figure 1.

AREA 1 ***AREA 2***

Figure 1 – Planing Finishes

The risk associated with cyclists or motorcyclists losing control by their wheels being caught in 'ribs' is diminished with a much finer surface. In addition, the chance of skidding is reduced through the surface being swept prior to opening the road to daytime traffic. During daytime running, the surface would be inspected at 2-hourly intervals to identify any areas of concern. With the high quality finish that is envisaged, issues are minimised but should chippings occur or local pot-holes, these will be repaired at the next overnight closure or under daytime lane closures should the conditions necessitate. A contingency plan has been developed to provide decision making criteria for the situation where the temporary surface does deteriorate.

4.5.4. A Sector Scheme 12 qualified Traffic Safety and Control Officer (TSCO) with a minimum of 5 years' experience will be employed to inspect the road surface at 2 hourly intervals.

4.5.5. A qualified engineer will be required to confirm that the road is suitable for re-opening each morning. Appendix F details the list of engineers and their contact details.

4.5.6. As seen on local authority networks, temporary ramps sometimes comprise a crude arrangement of chippings creating a virtual 1 in 1 (45°) that breaks up under traffic. In the works, the ramps will be formed using the planer creating a ramp within the existing material with a slope of 1 in 10. This ensures a homogenous ramp with little opportunity for deterioration through trafficking. This also reduces the likelihood of users being hesitant in their approach to the ramps with speed maintained, generally, at the mandatory speed limit. Best practice on the A421 used a 1:100 gradient of ramp which shall be aimed for on this scheme, however, the 1:10 is the acceptable minimum standard of ramp to be used.

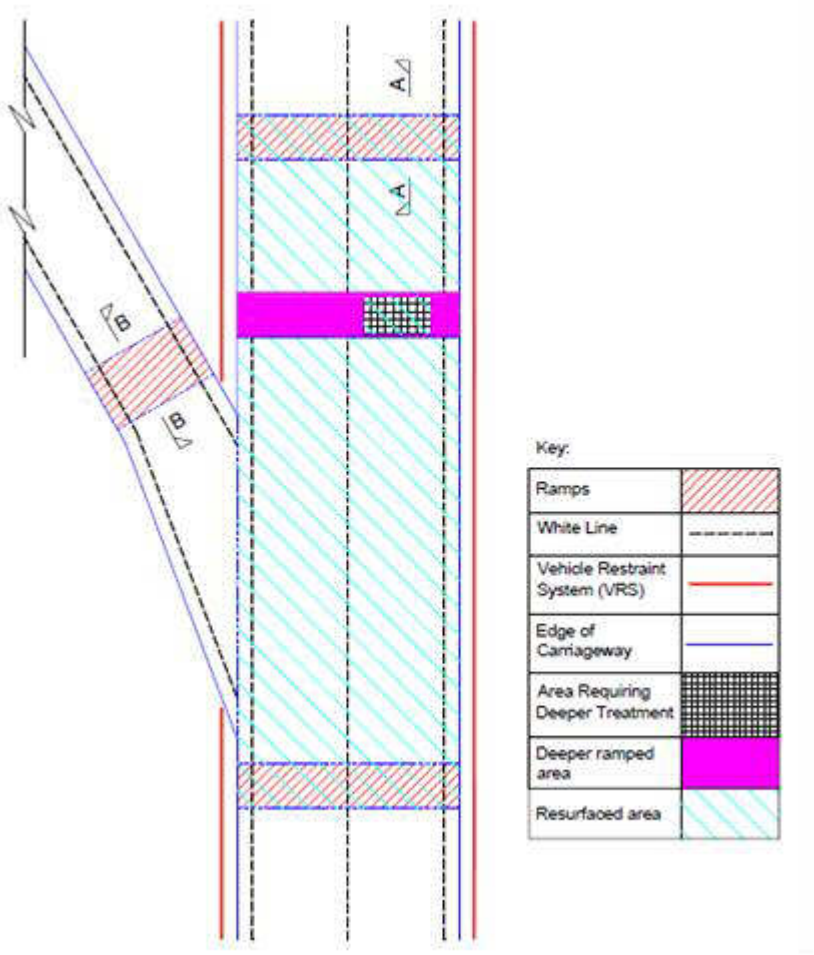
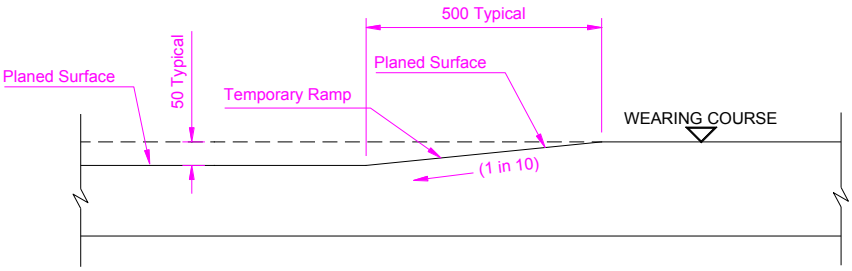


Figure 2 – Typical plan of repair area



SECTION A-A
(Section B-B Similar))
ENTRY AND EXIT ROADS

Figure 3 – Typical cross –section at entry and exit ramps

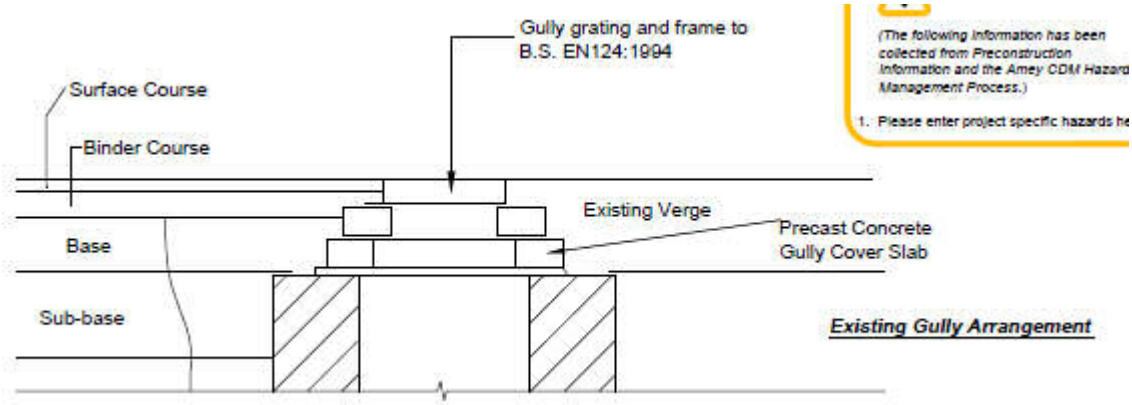
Where planed areas are uncovered that do not provide a sound surface that are suitable to be trafficked, these will be cut deeper to produce a sound surface. This treatment would be carried out across the full with of the carriageway to avoid any longitudinal steps, refer Figure 2. These deeper sections would be returned to the datum level with the use of ramps as per Figure 3 with a maximum slope of 1 in 10.

It should also be noted that where bridge expansion joints exist which are not being removed as part of the resurfacing works, the ramp detail and working principle also applies.

4.5.7. During the periods where the padcoat is trafficked, the risk of deterioration of this material is minimal. The padcoat comprising 6mm SMA, achieves a texture of 0.8 mm and the aggregate is 53 psv, this will be satisfactory to be trafficked in this temporary situation. Effectively it is a very dense surface course. During daytime running, the surface would be inspected at 2 hourly intervals to identify any areas of concern. A method statement has been developed to provide decision making criteria for the situation where the temporary surface does deteriorate.

4.5.8. Raised ironworks, including gullies, will not be permitted on any area within the carriageway and hardstrip. During works gullies hall be dealt within the following manner, see Figure 4 for existing arrangement;

- Gully grating is removed and stored safely away from site.
- The open pot is covered with a steel plate leaving sufficient gap for water flow.
- Planing and surfacing work take place.
- Gully grating is reinstated following template cutting of surfacing.



Existing Gully Arrangement

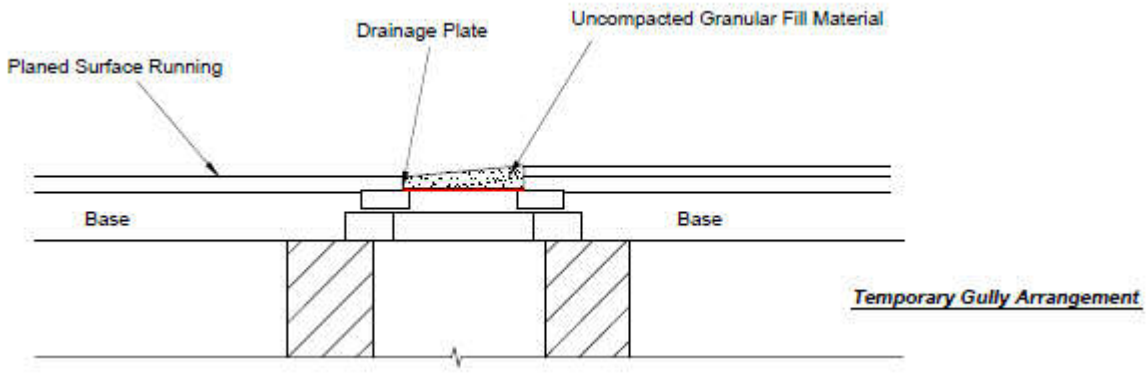


Figure 4 – Existing and Proposed Gully Arrangement

It should also be noted that the gullies will be jetted to ensure they are working .

For areas where v-drains exist, water is managed in the following manner;

- Within the expansion joints on the V-drains, the sealant shall be removed to a level below the lowest level of planed surface to allow for water to flow into the v-drain. The spacing of these joints are approximately 6m.
- The sealant shall be reinstated following resurfacing.
- Should it be deemed necessary, the front edge of the v-drain shall be broke down adjacent to gulley locations, approximately 90m spacing over a 900mm length to a level below the lowest planed level to allow direct flow into the gully within the v-drain.
- Any concrete removed shall be repaired with a proprietary repair material following surfacing.

4.5.9. In areas where there are no kerbs and filter drains, industry practice ensures the risk of flooding is minimised through the use of 'grips'. Grips are locally introduced transverse channels excavated within the verge to ensure that surface water has a clear path and is directed towards appropriate drainage.

4.5.10. Vertical longitudinal joints will not be permitted and the application of ramps described in 4.5.3 will be utilised to remove risk.

4.5.11. With regards the VRS height in the temporary situation, there will be no situation where the planed surface will result in the height of the VRS from the trafficked temporary surface being outside of the tolerance of ±75mm.

4.5.12. The use of the 'two coat' option is a long-life solution. This option has one replacement of a thin wearing course in a 20 year life cycle. This maximises the intervention periods, thus significantly improving safety of users through the reduced need to implement resurfacing works in comparison to that of traditional resurfacing at 5-10 year intervals. Also, refer paragraphs 2-5 of 4.5.15 as this is also directly relevant.

4.5.13. A further benefit is the reduction in overall shifts required for the scheme in comparison to traditional inlay. Table 6 illustrates a saving of 9 days, which provides a 20% saving. This saving to all stakeholders, users, workers and others cannot be understated.

Workers

4.5.14. Traffic Safety Control Officer inspections will be controlled through risk assessment and method statements. Although the inspections required during the day increase as the temporary surface requires inspection in addition to the diversions routes, the operations of a TSCO is industry norm and control measures are appropriate to the conditions.

4.5.15. The use of padcoat is a long-life solution. This option has one 30 mm replacement of wearing course in a 20 year life cycle. This maximises the intervention periods, thus significantly increasing safety to workers through the lesser need to implement resurfacing works in comparison to that of traditional resurfacing at 5-10 year intervals.

This is the basis on which the proposal is derived and includes significant durability factors provided by the selection of the material types and installation methods employed. The SCRIM value of the installed surfacing materials forms part of the "in-service" performance of the Thin Surface Course System [complying with The Specification for Highway Works Volume 1, Series 900 - Clause 942 and with the requirements of the BBA/HAPAS Guidelines Document which using high quality high PSV aggregate - 65PSV for the Surface Course]. This means it is capable of maintaining its surface texture and skid resisting properties over prolonged periods, even on heavily trafficked routes, in this case for a 10 year guarantee period.

This is the basis of the design of the 10 Year Long Life 2 part system using a 06/mm SMA BIN PMB options selected from the permissible options of the Specification for Highway Works, Volume 1, Series 900 – clause 937. All materials used will carry a CE Mark and will be manufactured and installed complying with the National Highway Sector Schemes – Numbers 14 & 16 as well as the manufacturers and installers Quality Management Systems that are independently assessed by a UKAS Approved Third Party Assessment Body to also meet the requirements of BS EN ISO 9001.

The method employed to install the 2 layer system is to run both the planed surface and the 0/6mm SMA BIN PMB, for which departures have been applied for to achieve this [for similar schemes the Departures have been approved – WebDAS ID's 15732,15733,15734,15735]. Constructing the pavement in this manner will allow for a reduced number of construction joints and for larger amounts of material to be installed during a night time working shift. Each layer will be fully bonded together using a Hot Applied performance Polymer Modified Bond Coat.

Using these durable and certified long life materials combines to achieve the stated goal that the use of a 2 layer system is a long-life solution and able to provide that this option has one replacement of surface course in a 20 year life cycle. This maximises the intervention periods, thus significantly improving safety of users through the reduced need to implement resurfacing works in comparison to that of traditional resurfacing at 5-10 year intervals.

Other Parties

4.5.16. There could possibly be a temporary increase traffic noise, environmental issues and disruptions to residents on the diversion route on LHA roads. Through the application of fewer shifts there will be a significant reduction in issues. Aecom has been commissioned to monitor noise levels, driver behaviour and speeds but only in the main carriageway.

4.5.17. There could possibly be a temporary increase/decrease in traffic noise to residents adjacent the A12 works as a result of trafficking the temporary surface. The surface properties will be different, however the reduced traffic speed is likely to more than mitigate this. Monitoring will be in place to determine the negative or positive effects.

Benefit Cost Ratio

4.5.18. Whole life costing of control measures as described in Annex D of GD/04 is not necessarily easily applied here as the consideration is for implementing temporary road works rather than implementing permanent geometrical alignments as an example. A basic Benefit Cost Ratio (BCR) has been calculated and shown in Table 6.

Option	Capital Cost (£)	20 Year Life Cycle Cost (£)	Total Cost (£)	Days
50 mm inlay patching	10,203,602	30,610,012	40,813,614	64
20/30 mm long life option	7,999,334	4,785,126	12,444,799	55
BCR (>1.0 positive)	1.27	6.39	3.19	-

Table 6 – Cost Comparison (20 year cycle)

Table 6 illustrates the typical variances in capital costs and future replacement costs between the use of padcoat against traditional inlay patching. The costs are indicative and are derived at current rates with no consideration of the Retail Price Index (RPI); below is a brief explanation of the assumptions in the derivation of costs for each option along with unquantified benefits.

50 mm inlay patching: Traditional night time inlay requires 50 mm laid in a single layer with many joints and the inability to address any underlying issues discovered. The material is only guaranteed for 5 years and this excludes joints and underlying issues therefore we have allowed for this material to be replaced 3 times in the @ 20 year life cycle.

20/30 long life surfacing (padcoat): This option utilises polymer modified two layer solution the materials have extended guarantees and superior resistance to transverse cracking and the performance of the underlying material. As the wearing course thickness is reduced to 30 mm the future intervention is a 30 mm surfacing operation (Saving significant quantities of high PSV material). This option has one replacement of wearing course in the @ 20 year life cycle.

Evaluation

Through risk analysis in Section 4.5, it is apparent that there are significant risks that require control. However, the controls that have been identified are appropriate for the conditions. It is considered that the risks and associated control deem the works to be 'Broadly Acceptable'.

For the scheme, the Capital Cost and Whole Life Cost BCR is 1.27 and 6.39 respectively.

4.6. Stage 6 - Risk Control Decisions

4.6.1. Risk control decisions require consideration by a variety of people operating in a spectrum of roles from Designers to HA Regional Managers to Professional Safety Advisors, all dependent on the impact of the scheme on Users, Workers, Highways Agency and other Stakeholders.

Features	Type A Specialist Technical/ Coordinator Roles	Type B Professional Safety Advisors	Type C Professional Roles
What is the size of the decision impact? (geographically and in impact terms; extent of the network, number of 'Users'/'Workers')	Local, low density	Local, high density or national, low density	National, high density
What are the cost implications of the decision for the Agency?	Low	Medium	High
What is the lifetime of the decision? (how long will the Agency be affected by the decision)	Rest of the day	Months to a few years	Decades
What is the level of safety risk or uncertainty associated with the decision?	Low	Medium	High
What is the policy or stakeholder interest level? (how sensitive is it?)	Low	Medium	High

Table 7 - Risk Control Decisions

4.6.2. The AADT on the A12 between these junctions is 66,045 and the length of works is 7.8km. This is considered significant for a dual two-lane carriageway. This has resulted in a Category B.

4.6.3. The BCR is for Capital Costs and for Whole Life Costing, this benefit results in a Category B.

4.6.4. The number of shifts for this scheme is, therefore limited to less than one month, therefore Category B.

4.6.5. The level of uncertainty on this scheme, in relation to running traffic at 40mph on a planed surface has not been used extensively by the Highways Agency on the Strategic Network, resulting in a Category B.

4.6.6. The A12 is an important link across the East side of the country and attracts significant stakeholder interest. This is defined as Category C.

5. Conclusion

Through the development of this Safety Risk Assessment, a number of advantages and disadvantages have been identified. Overall, it is has proven difficult to quantify the increase/decrease in safety through using the running on temporary surfaces methodology. However, what is apparent through this process is that running on temporary surfaces can be undertaken under controlled conditions carried out by competent contractors as demonstrated by the A421 Bedford Southern Bypass E/B and W/B Scheme delivered by Amey recently, described in 2.3.1. The primary safety trade-offs between running on temporary surfaces and traditional inlay are included in Table 8.

Running on Temporary Surfaces – Increase Risk	Trade-off
Additional daytime inspections are required by a TSCO thus increasing safety risk - ***Worker***	An overall reduction in scheme compared to traditional inlay patching, which reduces the time under which Users use overnight diversions including Abnormal Loads – ***Worker/User***
The quality of the surface being run on has not been tested in practice on the UK trunk road network - ***User***	The capital cost of the scheme reduces compared to traditional inlay patching – ***Other***
Increase journey times of users during works - ***User***	Reduced future maintenance interventions due to construction methodology – ***Worker/User***

Table 8 – Trade-off Overview

A summary of this Safety Risk Report outcomes include;

a) The risk assessment and controls have defined the works as Broadly Acceptable
b) The overall Project Characterisation has been determined as Category B, with four Category B and one Category C Decision Controls.
c) The typical BCR determined for capital costs is 1.27 and for whole life costing is 6.39.

Considering the outcomes, it is considered acceptable to implement the padcoat methodology with appropriate risk control.

Appendix A

Scheme Drawings

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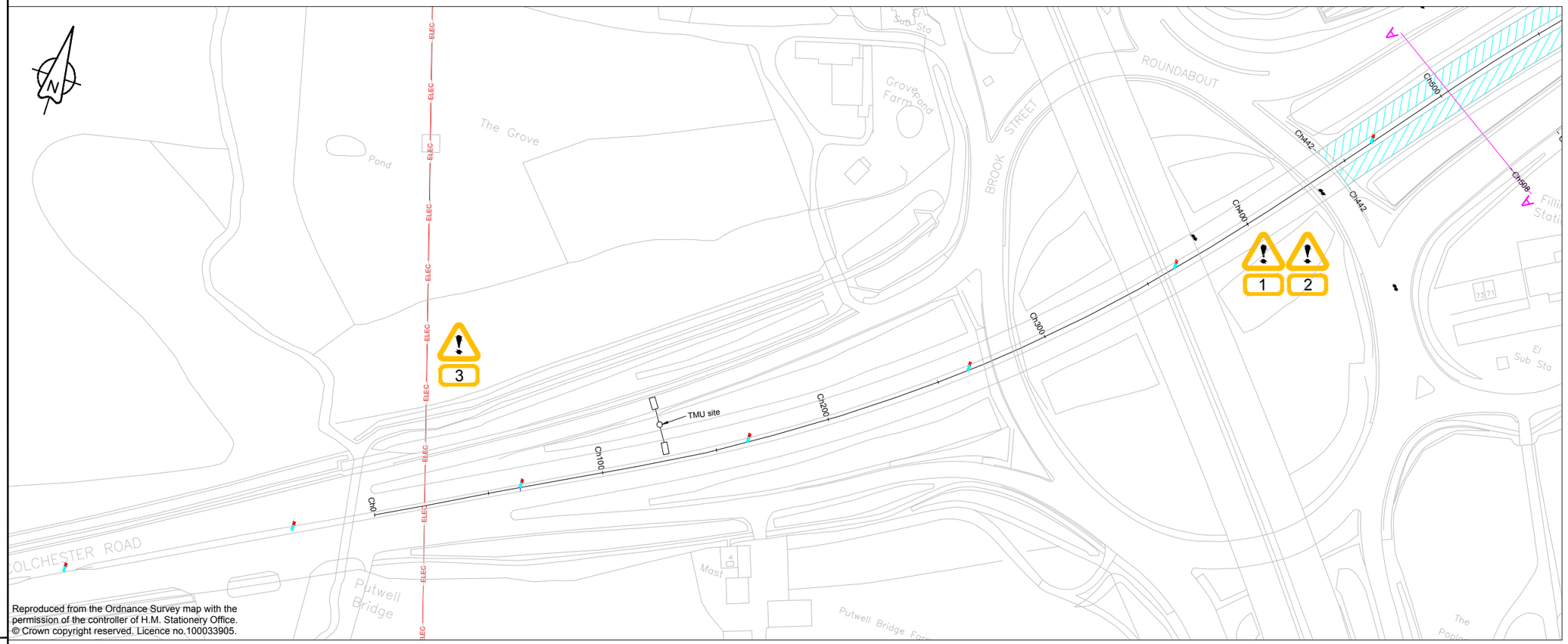

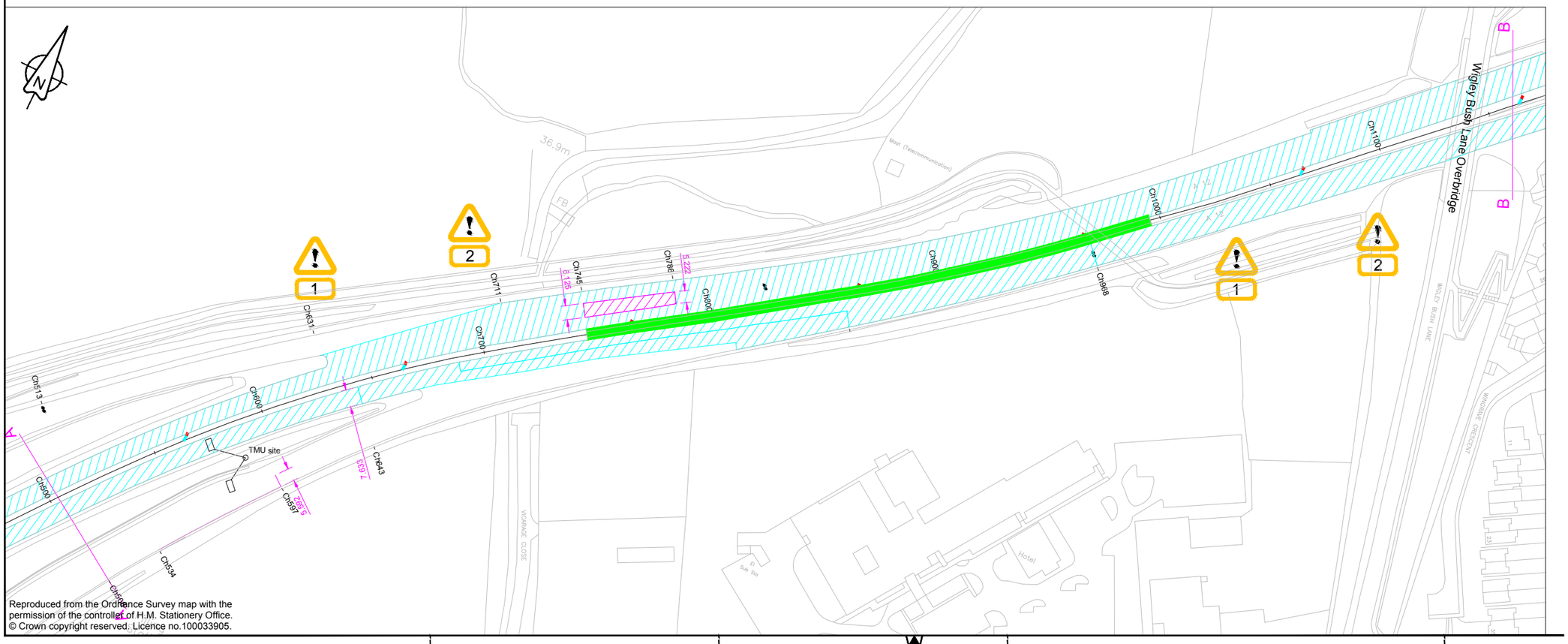

RESIDUAL DESIGN HAZARDS

(The following information has been collected from Preconstruction Information and the Amey CDM Hazard Management Process.)

1. Please enter project specific hazards here.

NOTES

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- Treatment D - Removal by cold milling 180mm of the existing pavement treatment (to concrete interface)and replace with 30mm Clause 942 thin surface course system, Agg.10mm, PSV=65, 2nd 20mm cl. 937 SMA6 reg. Agg. 6mm, PSV 53 cl.939 and 130mm SMA20 bin Agg. 20mm.
- Crossover Points
- Overhead Power Line
- Traffic Loops and Connectors

Rev	Revision details	Chkd	Appd	Date

Drawn:	JEB	Preliminary	
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A12 J11 - J12 NB and SB RESURFACING 2YD

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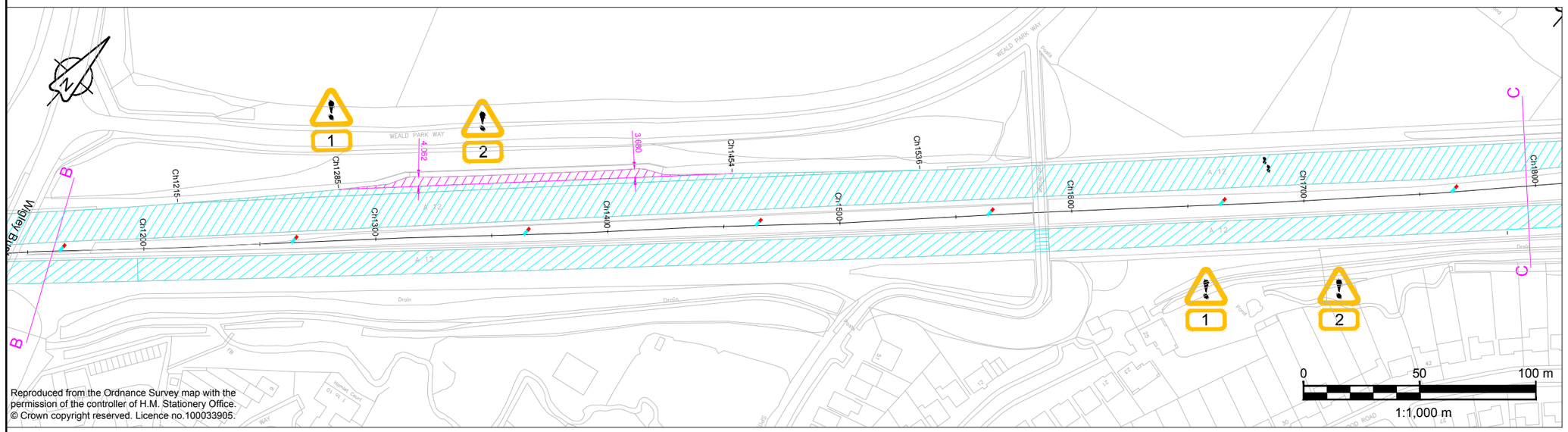

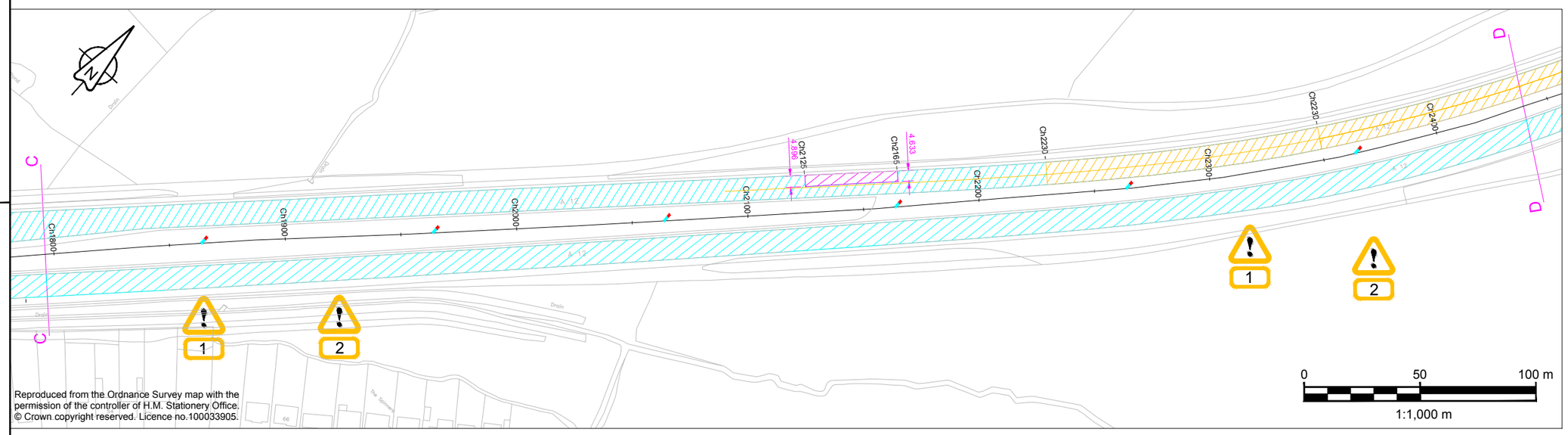

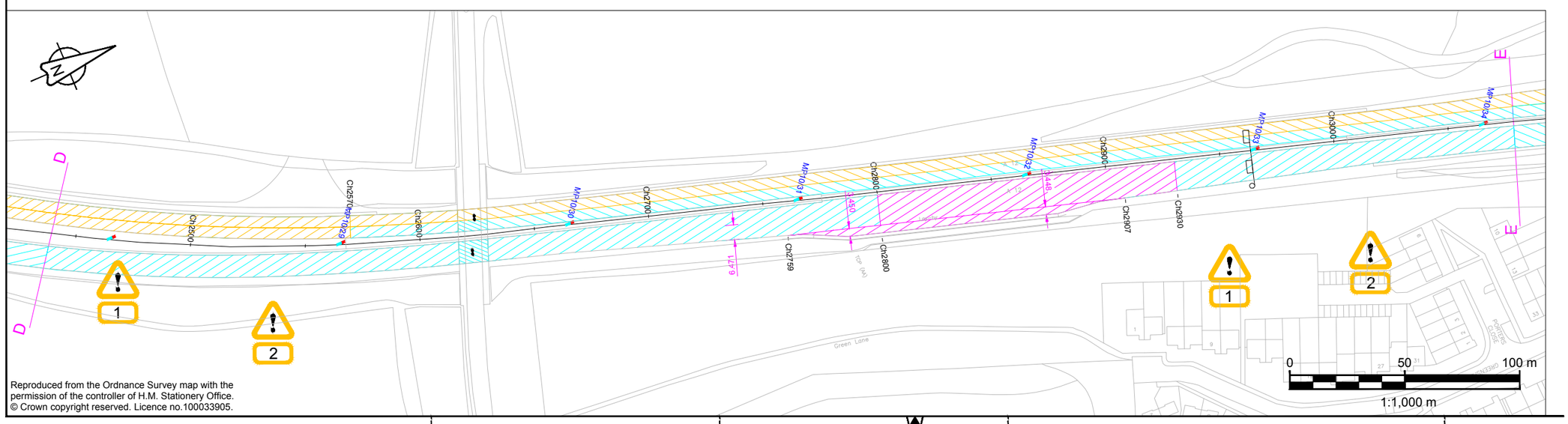

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- Crossover Points
- Overhead Power Line
- Traffic Loops and Connectors

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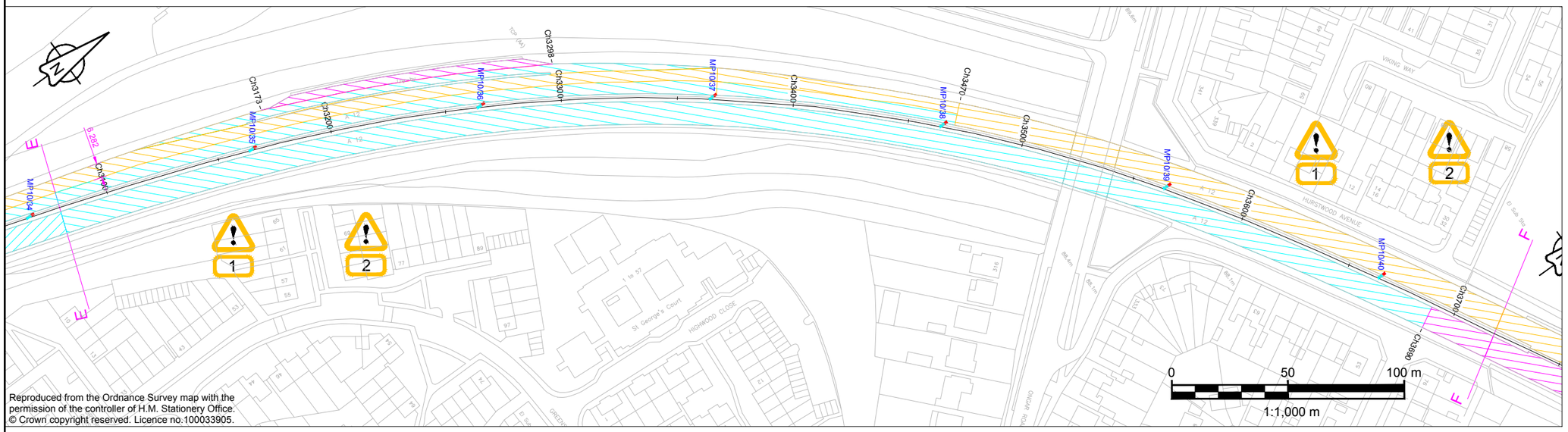

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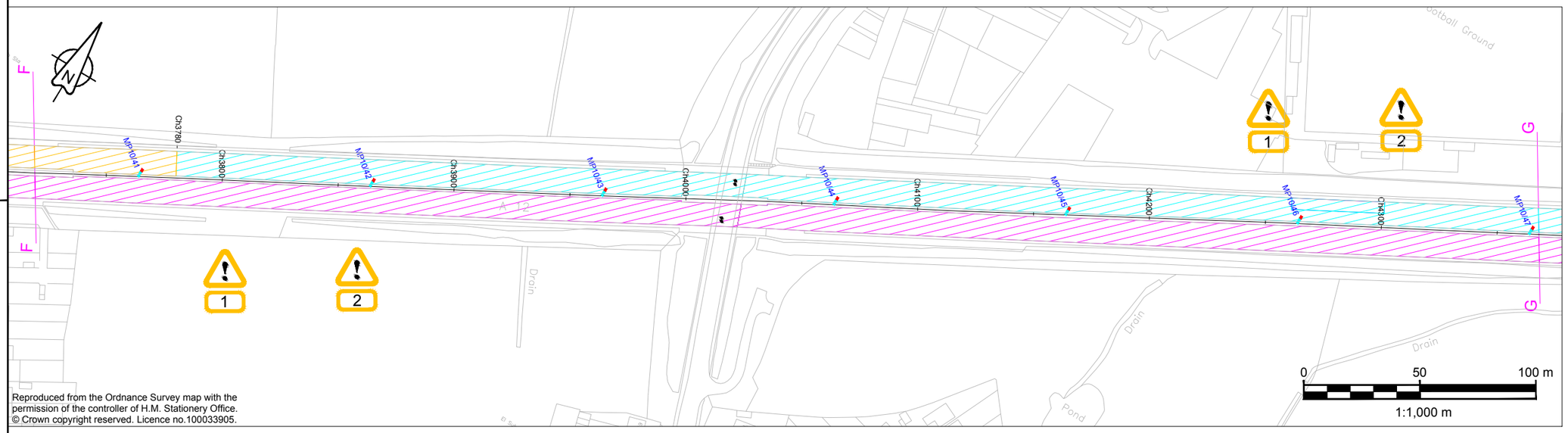

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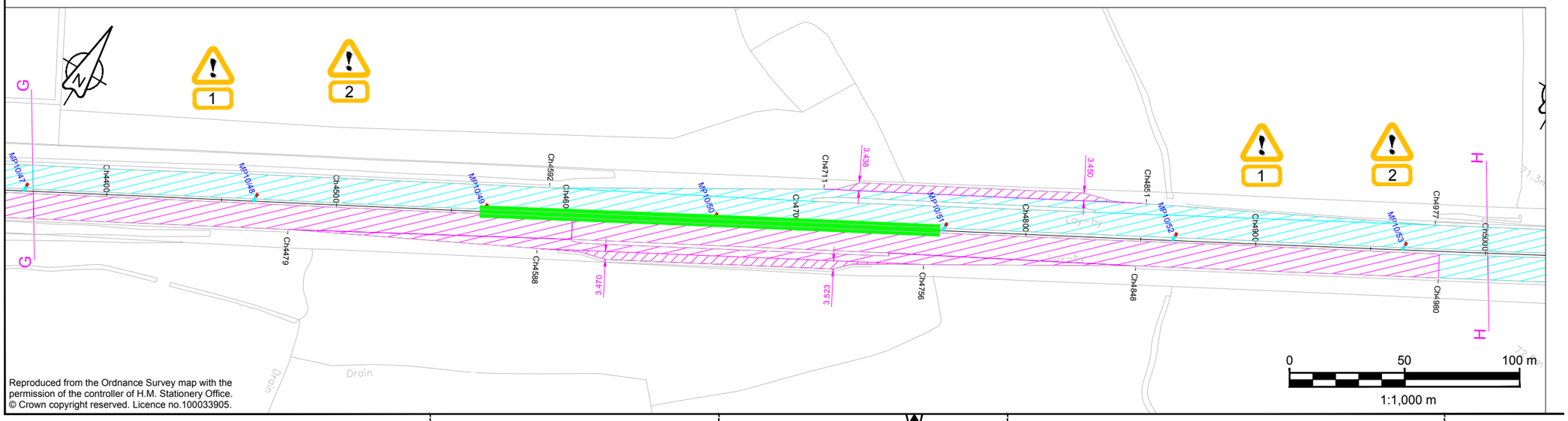

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Crossover Points

Overhead Power Line

Traffic Loops and Connectors

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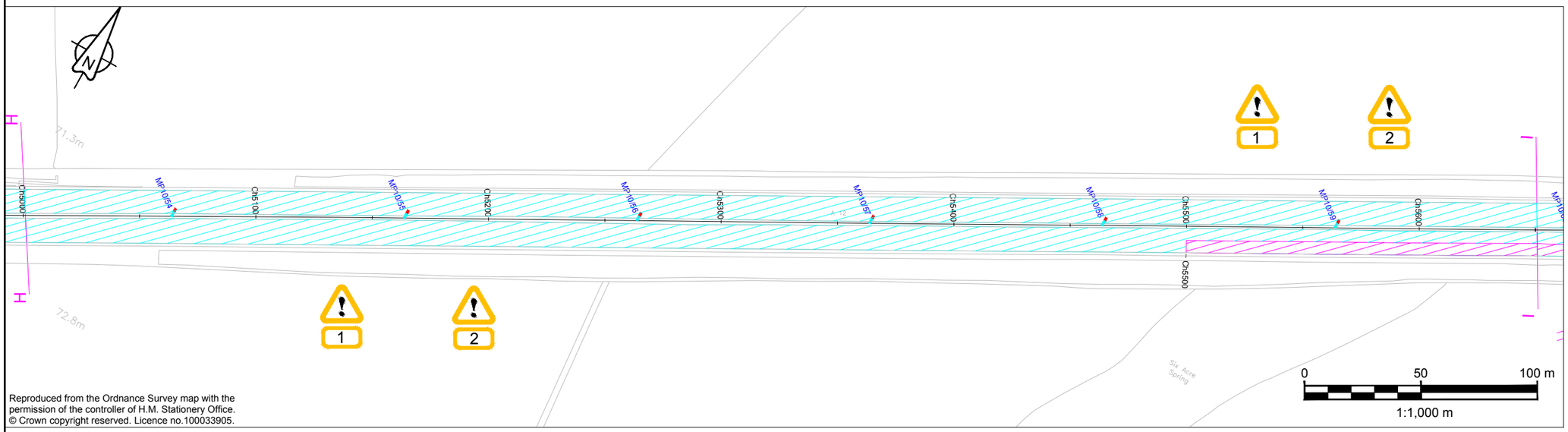

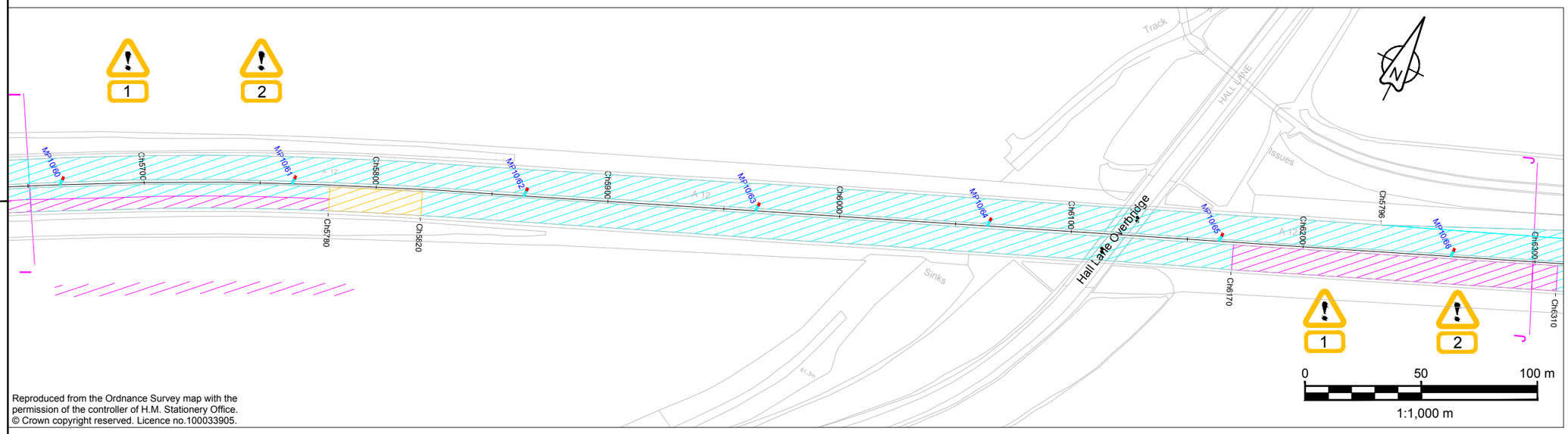

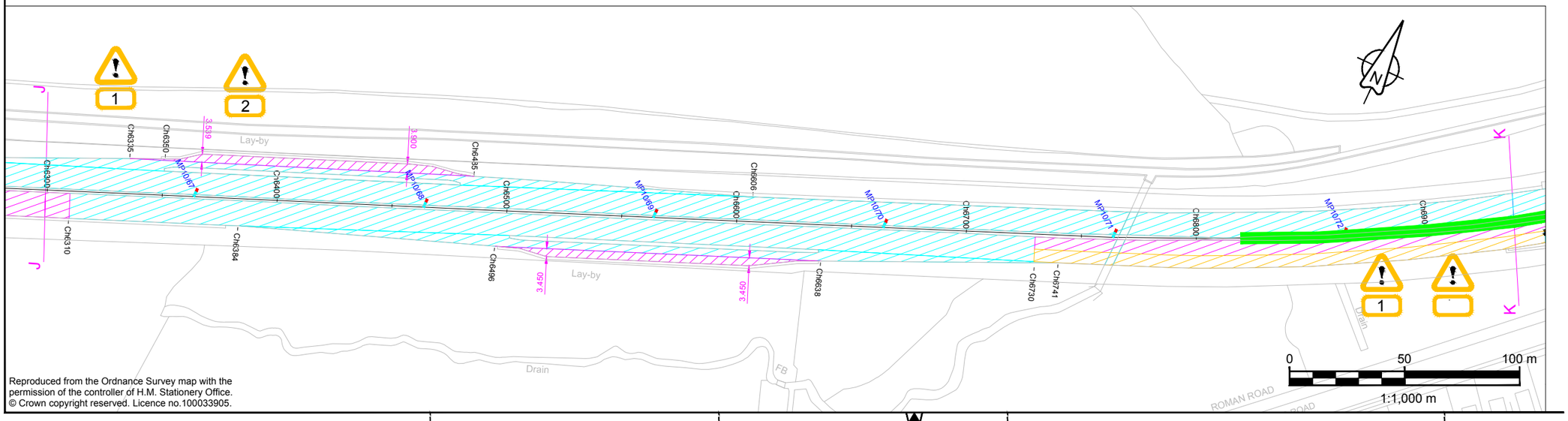

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Crossover Points

Overhead Power Line

Traffic Loops and Connectors

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6/549764/DR/0700/04	-

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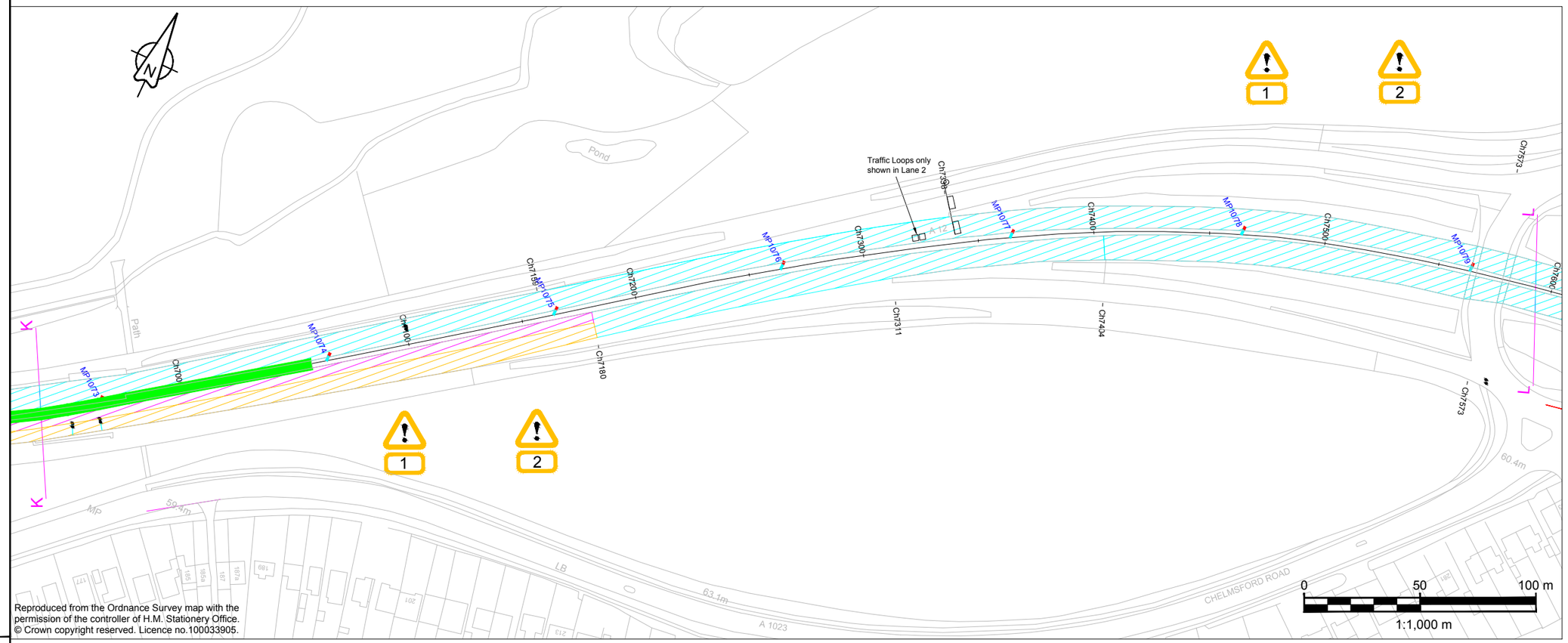

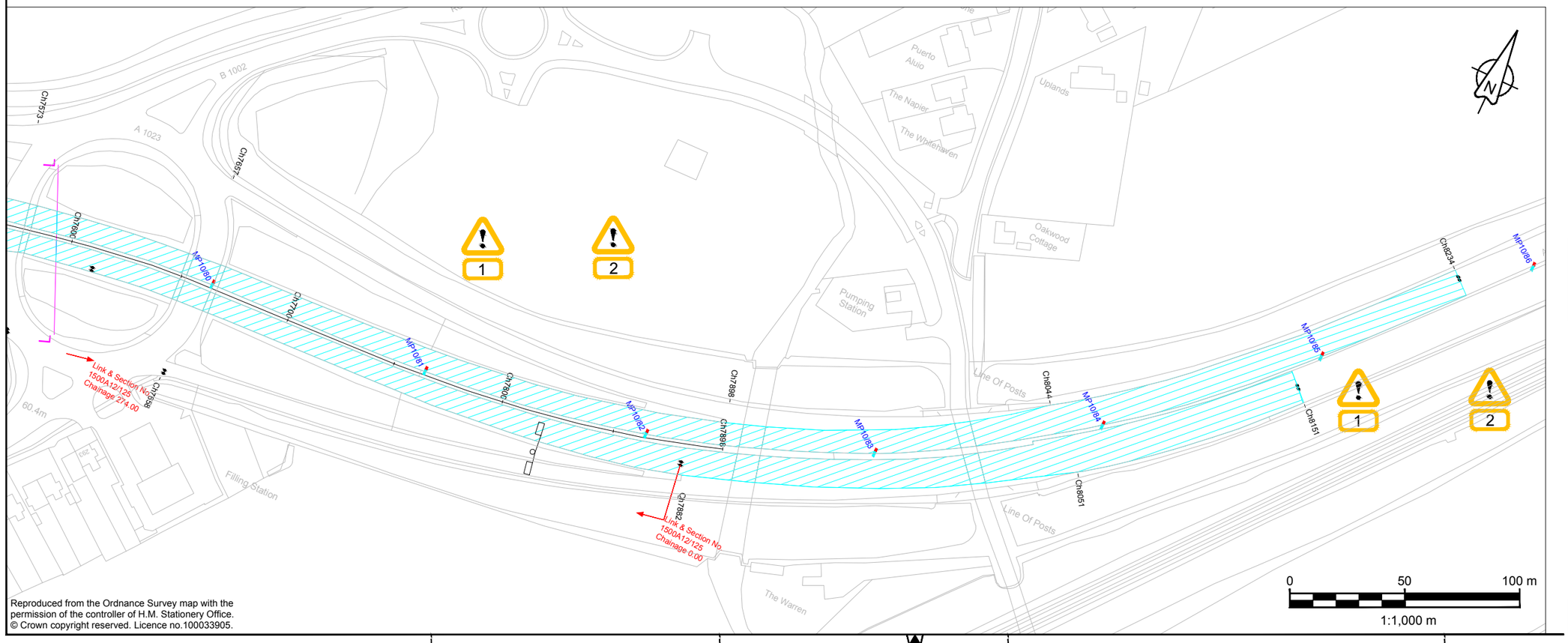

RESIDUAL DESIGN HAZARDS

(The following information has been collected from Preconstruction Information and the Amey CDM Hazard Management Process.)

1. Please enter project specific hazards here.

NOTES

1. This drawing is to be read in conjunction with drawing : Proposed Treatments: 6-549764/0700/01 - 05 & the specification appendices 7/1, 15/1 and 26/3 of the Contract documents.
2. Lane widths taken from desk top information. Widths of lanes may vary along this section of dual carriageway.
3. All nodes shown of this drawing are to be replaced using Thermoplastic Node markers.

KEY

- Treatment A - Removal by cold milling 50mm of the existing pavement treatment and replace with 30mm of Clause 942 Thin surface course system, Agg.10mm, PSV 65 and 20 mm SMA Regulating layer, agg 6mm. PSV 53
- Treatment B - Removal by cold milling 100mm of the existing pavement treatment and replace with 30mm Clause 942 thin surface course system, Agg.10mm, PSV=65, 2nd 20mm cl. 937 SMA6 reg. Agg. 6mm, PSV 53 cl.939 and 50mm SMA20 bin Agg. 20mm.
- Treatment D - Removal by cold milling 180mm of the existing pavement treatment (to concrete interface)and replace with 30mm Clause 942 thin surface course system, Agg.10mm, PSV=65, 2nd 20mm cl. 937 SMA6 reg. Agg. 6mm, PSV 53 cl.939 and 130mm SMA20 bin Agg. 20mm.
- Crossover Points
- Overhead Power Line
- Traffic Loops and Connectors

Rev	Revision details	Chkd	Appd	Date

Drawn:	JEB	Preliminary	
Design:	LP	For comment	
Chkd:	DT	For tender	✓
Appd:	DT	For construction	
Date:	24-12-14	As constructed	
		Other	

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www.amey.co.uk

Client
HIGHWAYS AGENCY

Project Name
A12 J11 - J12 NB and SB RESURFACING 2YD

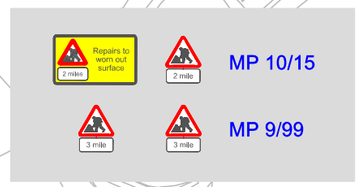
Drawing Title
Proposed Pavement Treatment Sheet 5 of 5

Original Drawing Size : A1	Dimensions : -
Scale : 1:1000	Copyright © Amey

Drawing No	Rev
6/549764/DR/0700/05	-

Appendix B

Proposed Signage for Daytime Running



MP 10/15

MP 9/99

NOTES:

KEY:

Preliminary		For approval	
For comment		Final Design	X

Drawn by: Phil Thompson	Date: 30/09/2014
Checked by: Adam Shaw	Date: 16/10/2014
Approved by: Mark Sludds	Date: 16/10/2014

Original size	A3	Scale	NTS

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Scheme PIN & Title.

A12 Junction 11 to 12

Drawing Title.

A12 Junction 11 to 12 Northbound Section
Daytime layout / Southbound Buffer Zone
Drawing 1 of 2

Drawing No.

HWM/TM/C2132/PIN545669/011

Revision	3	Sheet No.	

Revision details

Revised by:	Rev:	Date:
Phil Thompson	1	14/10/2014
Phil Thompson	2	16/10/2014
Phil Thompson	3	22/12/2014

NOTES:

KEY:

Preliminary		For approval	
For comment		Final Design	X

Drawn by: Phil Thompson	Date: 30/09/2014
Checked by: Adam Shaw	Date: 16/10/2014
Approved by: Mark Sludds	Date: 16/10/2014

Original size	A3	Scale	NTS

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amey

Scheme PIN & Title.

A12 Junction 11 to 12

Drawing Title.

A12 Junction 11 to 12 Northbound Section
Daytime layout / Southbound Buffer Zone
Drawing 2 of 2

Drawing No.

HWM/TM/C2132/PIN545669/012

Revision	3	Sheet No.	

Revision details

Revised by:	Rev:	Date:
Phil Thompson	1	14/10/2014
Phil Thompson	2	16/10/2014
Phil Thompson	3	22/12/2014

Appendix C

Padcoat Details

ASPHALT TYPE TEST REPORT

Date of Issue:	13th November 2009	Expiry date:	12th November 2014
Product Designation and Categories:	SMA 6 BIN PMB H/S		
Specification	EN 13108 - 5 2006		
Product Code:	126B6NB6		
Originating Production Unit:	Ipswich Asphalt	Laboratory Design Ref:	09-1550
Mixing Plant / Plants Identification:	D138 IPSWICH		

Constituents	Source	Grading Category	Apparent Density	LA	FI (FI_{35})	PSV	AAV	Water absorption $WA_{24}2$	Magnesium Sulphate Soundness WA>2% MS_{25}
3/6mm Gritstone	Craigantlet Quarry	Gc85/20	2.75	13	28	64	7.8	0.6	2
0/4mm Gritstone	Craigantlet Quarry	$G_A85/G_{TC}20$	2.75	-	-	f_{NR}	-	0.6	-
Filler Aggregate	Francis Flowers	Supplier Declared	Loose Bulk Density in Kerosene 0.5 - 0.9Mg/m^3 Calcium Carbonate CC_{70}						
Additive	Rettenmaier UK Ltd.	Cellulose Fibre	Viatop Premium						
Bitumen	Total Bitumen	45-80 Pen Sft Pt. >65°C	Styrelf eXtreme 70						

Product Properties	**Details**		**Output Target Grading % Passing**	
Average insitu air void content BS EN 12697-8	2.1% (V_{max} 4%)†	D1.4	10mm	100
Resistance to Deformation EN 12697-22 - 60°C Procedure B	NPD - WTS_{AIR1} NPD - PRD_{AIRNR}	D	6.3mm	93
Maximum mix density EN 12697-5	2.456Mg/m^3	D/2 / CCS	4.0mm	40
Binder Drainage EN 12697-18	NPD ($D_{0.3}$)		2.0mm	28
			0.063mm	10.0
		Binder	B_{act} %	6.6
		Binder	B_{min} %	6.8
		Temp	Max °C	190

†Maximum Density & void content taken from site trials using 40/60 grade bitumen.

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ASPHALT TYPE TEST REPORT

Date of Issue:	13th November 2012	Expiry date:	12th November 2017
Product Designation and Categories:	SMA 6 BIN PMB H/S		
Specification	EN 13108 - 5 2006		
Product Code:	126B6NB6		
Originating Production Unit:	Mountsorrel Quarry	Laboratory Design Ref:	12-2361 & 09/1248b rt
Mixing Plant / Plants Identification:	D129 HARLOW		

Constituents	Source	Grading Category	Apparent Density	LA	FI (FI_{35})	PSV	AAV	Water absorption $WA_{24}2$	Magnesium Sulphate Soundness WA>2% MS_{25}
2/6mm Granite	Mountsorrel Quarry	Gc85/20	2.69	19	19	53	2.0	0.4	3
0/4mm Granite Dust	Mountsorrel Quarry	$G_A85/G_{TC}20$	2.67	-	-	f_{NR}	-	0.7	-
Filler Aggregate	Francis Flowers	Supplier Declared	Loose Bulk Density in Kerosene 0.5 - 0.9Mg/m^3 Calcium Carbonate CC_{70}						
Additive	Rettenmaier UK Ltd.	Cellulose Fibre	Viatop Premium						
Bitumen	Shell Bitumen	45-80 Pen Sft Pt. >65°C	Cariphalte High Performance						

Product Properties	**Details**		**Output Target Grading % Passing**	
Average insitu air void content BS EN 12697-8	1.7% (V_{max} 4%)	D1.4	10mm	100
Resistance to Deformation EN 12697-22 - 60°C Procedure B	0.20mm/1000cycles – $WTR_{AIR1,0}$ 8.0% - PRD_{AIRNR}	D	6.3mm	95
Maximum mix density EN 12697-5	2.411Mg/m^3	D/2 / CCS	4.0mm	45
Binder Drainage EN 12697-18	NPD ($D_{0.3}$)		2.0mm	26
			0.063mm	10.5
		Binder	B_{act} %	6.6
		Binder	B_{min} %	6.6
		Temp	Max °C	190

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ASPHALT TYPE TEST REPORT

Date of Issue:	13th November 2012	Expiry date:	12th November 2017
Product Designation and Categories:	SMA 6 BIN PMB H/S		
Specification	EN 13108 - 5 2006		
Product Code:	126B6NB6		
Originating Production Unit:	Mountsorrel Quarry	Laboratory Design Ref:	12-2361
Mixing Plant / Plants Identification:	D608 Higham & D603 Elstow		

Constituents	Source	Grading Category	Apparent Density	LA	FI (FI_{35})	PSV	AAV	Water absorption $WA_{24}2$	Magnesium Sulphate Soundness WA>2% MS_{25}
2/6mm Granite	Mountsorrel Quarry	Gc85/20	2.69	19	19	53	2.0	0.4	3
0/4mm Granite Dust	Mountsorrel Quarry	$G_A85/G_{TC}20$	2.67	-	-	f_{NR}	-	0.7	-
Filler Aggregate	Francis Flowers	Supplier Declared	Loose Bulk Density in Kerosene 0.5 - 0.9Mg/m^3 Calcium Carbonate CC_{70}						
Additive	Rettenmaier UK Ltd.	Cellulose Fibre	Viatop Premium						
Bitumen	Total Bitumen	45-80 Pen Sft Pt. >65°C	Styrelf eXtreme 70						

Product Properties	**Details**		**Output Target Grading % Passing**	
Average insitu air void content BS EN 12697-8	1.7% (V_{max} 4%)	D1.4	10mm	100
Resistance to Deformation EN 12697-22 - 60°C Procedure B	NPD - WTS_{AIR1} NPD - PRD_{AIRNR}	D	6.3mm	95
Maximum mix density EN 12697-5	2.411Mg/m^3	D/2 / CCS	4.0mm	45
Binder Drainage EN 12697-18	NPD ($D_{0.3}$)		2.0mm	26
			0.063mm	10.5
		Binder	B_{act} %	6.6
		Binder	B_{min} %	6.6
		Temp	Max °C	190

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Appendix D

Hazard identification and Risk Assessment

Project/Decision	Area 6 – A12 J11 to J12 NB & SB Resurfacing	Date	02/01/2015
Decision Maker/Assessor	Highways Agency	Contact Details	-

Ref	Hazard Description	P	S	R	Response/Control Measure	P	S	R	Details
000	Users speed exceeding safe levels on unfamiliar surfaces.	4	4	16	Through liaison with police, CDM-C and specialist advisors, a mandatory speed limit of 40mph will be introduced. Th	3	3	9	LOW RISK CLASSIFICATION
001	Cyclists and Motorcyclists causing an incident due to poor quality surface of road	2	4	8	The road surface will be finely planed and swept. The surface will be inspected by a Section Scheme 12 qualified Traffic Safety and Control Officer on a 2-hourly basis to ensure the surface is in a trafficable condition.	1	4	4	LOW RISK CLASSIFICATION
002	Cyclists and Motorcyclists causing an incident due to raised ironworks in the road	5	4	20	Raised ironworks will be lowered. Raised ironworks will not be permitted in any planed area.	1	4	4	LOW RISK CLASSIFICATION
003	Chippings being created and causing 'shrapnel' effects under traffic to vehicles on both carriageways	5	2	10	The road surface will be finely planed and swept. The surface will be inspected by a Section Scheme 12 qualified Traffic Safety and Control Officer on a 2-hourly basis to ensure the surface is in a trafficable condition.	2	2	4	LOW RISK CLASSIFICATION
004	Vertical joints in planed surfacing creating hesitation in driver behaviour and potential for Road Traffic Collisions (RTC)	5	3	15	Vertical joints will not be used, they will be planed at a 1:10 gradient.	2	3	6	LOW RISK CLASSIFICATION
005	Deterioration of the planed surface during daytime traffic, causing potholes and risk of RTC.	2	3	6	The surface will be inspected by a Sector Scheme 12 qualified Traffic Safety and Control Officer on a 2-hourly basis to ensure the surface is in a trafficable condition. Any deficiencies will be managed as per any usual deterioration of surfacing.	2	3	6	LOW RISK CLASSIFICATION
006	Deterioration of the pad coat surface during daytime traffic, causing potholes and risk of RTC.	2	3	6	The surface will be inspected by a Sector Scheme 12 qualified Traffic Safety and Control Officer on a	2	3	6	LOW RISK CLASSIFICATION

					2-hourly basis to ensure the surface is in a trafficable condition. Any deficiencies will e managed as per any usual deterioration of surfacing.				
007a	Heavy rainfall may cause flooding adjacent gullies and filter drains	4	4	16	Gullies will be lowered, grips will be introduced into filter drains	2	3	6	LOW RISK CLASSIFICATION
007b	Heavy rainfall may cause flooding adjacent V-drains	4	4	16	The joints between sections will have their sealant removed allowing water to enter the V-drain with the selant replaced thereafter. In addition, lateral sawcuts will be made within the v-drains to allow for additional drainage.	2	3	6	LOW RISK CLASSIFICATION
008	Reduction in skid resistance of the planed surface or pad coat material may cause RTC.	3	4	12	The surface is a swept prior to being trafficked and inspection by a TSCO. The planed and pad coat surfaces have sufficient skid resistance and to ensure this is maintained, a skid –resistance test will be undertaken weekly. Should the resistance be proven to be sub-standard, then appropriate measures will be taken in line with normal incident response procedures.	2	3	6	LOW RISK CLASSIFICATION
009	Abnormal vehicles using the route may cause significant deterioration to the planed surface	2	3	6	The surface will be inspected by a Sector Scheme 12 qualified Traffic Safety and Control Officer on a 2-hourly basis to ensure the surface is in a trafficable condition. Any deficiencies will e managed as per any usual deterioration of surfacing.	2	3	6	LOW RISK CLASSIFICATION
010	Height of VRS is out of vertical tolerance in areas of planed surfacing, particularly in deeper treatment areas, thus resulting in the VRS possibly not acting as the original design intended. Tolerance is ±75mm.	1	3	3	Deeper treatments will always be returned to 50mm depth so remains within tolerance.	1	3	3	LOW RISK CLASSIFICATION
011	Daytime inspections by Traffic Safety and Control Officer posing a safety risk through increased exposure.	2	3	6	The TSCO is Sector Scheme 12 qualified of sufficient experience to work safely.	2	3	6	LOW RISK CLASSIFICATION
012	The temporary road marking may wear and become unclear causing poor road positioning causing a potential for collision between vehicles, motorcyclists and cyclists.	2	3	6	The TSCO will determine if temporary markings are adequate, if not, new markings will be laid at the next overnight closure.	2	3	6	LOW RISK CLASSIFICATION

013	Heaving braking of vehicles from 70mph to 40mph causing collision.	3	3	9	Stepped speed limits from 70mph to 50mph to 40mph as per Chapter 8.	2	3	6	LOW RISK CLASSIFICATION
014	Winter weather, freezing temperatures, causing	2	3	6	Salting remains as per normal winter maintenance measure requirements.	2	3	6	LOW RISK CLASSIFICATION
015	It has been noted that “No Overtaking” signs have been ignored on the A421 Bedford Southern Bypass Scheme. Risk of collision.	2	3	6	Consideration of additional “Stay in Lane Signs” has resulted in the addition of sign be considered as not having a benefit to the scheme.	2	3	6	LOW RISK CLASSIFICATION
016	Other schemes exit within the vicinity of this scheme for the duration of the works. The risk is that traffic to avoid the A12 they may find alternate routes thus impacting traffic management on other schemes, possibly causing collision.	2	3	6	The scheme, in essence, removes the need to provide diversion routes overnight thus reducing impact on other schemes, the impact is beneficial to other schemes.	2	3	6	LOW RISK CLASSIFICATION
017	Scheme overruns due to plant breaking down thus increasing safety risk min general	2	3	6	The supply chain have sufficient contingency in place to minimise the risk of plant breaking down.	2	3	6	LOW RISK CLASSIFICATION
018	Within areas that are required to be planed to the concrete sub-base, vehicles could run on the concrete causing issues in relation to potholes and skid resistance.	3	3	9	On this scheme, running on a concrete surface is not permitted, only running on the materials detailed in Section 3.1.5 SMA Binder and Surface course will be permitted.	2	3	6	LOW RISK CLASSIFICATION

Appendix E

Overall Method Statement

PIN 545669

A12 Junction 11-12 Northbound and Southbound Resurfacing Plus Scheme

Overall Method Statement for the scheme to be constructed using running on temporary surfaces

Revision	Date	Amendment	Content Owner	Authorised By
001	Nov-14	Initial Issue	Sandeep Aheer / Louise Parker	Alan Chambers
002	Jan-15	Second Issue	Sandeep Aheer / Louise Parker	Alan Chambers

1.0 Summary

This method statement details the general approach, the risks and mitigation actions for construction of the scheme using the day-time trafficking of temporary surfaces during the proposed resurfacing works on the A12 between Junction 11 and Junction 12 on the northbound and southbound carriageways.

2.0 Scope

This method statement is for use by the appointed competent contractors in conjunction with risk assessments and method statements for the individual activities.

3.0 Process

3.1 Preconstruction Activities:

Establish site compound at the laybys on the eastbound and westbound carriageway each night using the mobile welfare units as identified in the Pre-Construction Information Pack.

An Amey site operative will conduct a site investigation to confirm the presence of statutory utility apparatus within the works area as identified in the Preconstruction Information Pack.

An Amey engineer will establish chainage markers and set out the initial 500m of works prior to commencement.

3.2 Construction Activities:

- **Traffic management and access:** The works will be carried out under both night time full closures with all lanes open to traffic during the day, and under a night-time contraflow system with traffic runnning in both directions on one carriageway allowing resurfacing works to be carried out on the 'sterile' carriageway. During the day traffic will run on temporary surfaces either the planed surface or binder course, with temporary markings, a 40 mph mandatory speed limit, and no overtaking. The temporary surface and ramped areas will be clearly signed. The speed limit and restrictions will be enforced by visiting police units.

- **Assessment of temporary surfaces:** Prior to reopening the carriageway to traffic the surface will be inspected by the Traffic Safety and Control Officer (TSCO) the Amey Site Supervisor and a senior pavement engineer. The road will not be opened to traffic unless all three managers are satisfied. On the first night of planing and installation of the pad coat and weekly throughout the works the surface will be subject to a grip test (to confirm skid resistance) with a minimum intervention level set at 0.39.
  As we become more experienced and the site supervisors gain experience we will review the role of the Senior Pavement Engineer.

  During day-time the site will be inspected every two hours by a dedicated TM maintenance crew patrolling in a vehicle.

The Site Team will log each night the number of potholes on the planed surface and the number of potholes repaired to understand the level of deterioration of the planed surface after a day being trafficked.

- **Cold milling:** will commence in both lanes 1 and 2 simultaneously of the A12 on one carriageway with a 1:10 ramp down to proposed treatment level. 1:10 ramps will also be milled out at the end of individual shifts in order to provide a smooth transition back to the existing carriageway level. As milling outputs are approximately half that of the surfacing operation the milling will continue ahead of any surfacing being laid for at least three shifts up to a maximum of four shifts. This will expose a maximum of 3.5km of carriageway to be run on a milled surface at any one time. The milled surface will be inspected as work proceeds to ensure that excessive grooving does not occur. If an area is excessively grooved the milling machine will be called back and the surface will receive a second slow pass with a high drum speed to produce the required surface.

- **Sweeping:** Road sweepers will be on site with the cold millers and, throughout the shift, will clean the exposed surface and ensure the surface is in a fit condition to receive public traffic on completion of the milling shift. As the scheme is high profile and one of the first to utilise running on planed surface we will maintain a dedicated sweeper on site during the day to respond to any sweeping requirement.

- **Drainage:** A drainage gang will work alongside the milling operation to remove the gully grating and temporarily plate the gullies leaving a drainage gap at the rear. The level will be made up to the planed surface with temporary material. Surfacing will be laid over the plates maintaining the drainage gap. After completion of the surface course the gullies will be cut out and the gratings bedded to the correct level using the Paco patch installation system. The gullies will be inspected and cleaned as the grating works are completed

- **Overhead cables:** Blue cones with 'overhead power' warning sleeves will be placed at 1m centres for 20m on either side of the approaches to any overhead power hazards as per Guidance Note GS6 'Avoiding danger from overhead power lines' prior to works being carried out in the vicinity of overhead cables. This will demark a 'No Tipping' zone for all delivery trucks and mobile plant where overhead cables cross the works area.

- **Temporary markings:** White lines are to be laid on a shift-by-shift basis on the planed running surface and the 20mm pad coat layer. Permanent road markings and studs will be applied / installed once finished surface course has been laid.

- **Deeper treatment:** Where areas have been identified for treatment at additional depth, a surfacing crew will be on site to reinstate the binder course during the same shift, back to the level of the planed surface.

- **Surfacing:** When sufficient area has been milled the surfacing operation will commence. The milling machine will return to the 1:10 ramp and remove the ramp in order to allow the 20mm pad coat to be keyed into the existing carriageway level with a 1:10 ramp. A 1:10 ramp from pad coat to milled surface will also be provided at the

end of each surfacing shift. The above process will be repeated to allow for the laying of the surface course.

3.3 Risks / Mitigation / Contingency

- **Unstable milled Surface:** The works will be monitored by site supervisor as work proceeds; the supervisor will be advised by a pavement engineer who will attend site prior to reopening of the road to traffic as operations proceed. If loose unstable material is exposed then either the milling level will be lowered over all lanes to remove the unstable layer. If this is not practical works will be suspended and the surfacing works bought forward to treat the affected area by additional depth milling and laying back in the same shift, in line with the deeper treatment procedure.
  In addition a we will keep a supply of fine delayed set macadam on site to allow small areas of pitting to be filled to prevent further detrition.

- **Grip test failure:** If any area of temporary surface falls below the required grip test intervention level of 0.39 the application of surface course will be bought forward and the affected area surfaced the following night.

- **Deterioration of the temporary surface:** If whilst being trafficked the 2 hr inspections identify areas of the surface that are deteriorating, this will be raised as an incident to the Network Control Centre and the appropriate incident resources mobilised. This maybe additional sweeping or temporary repairs. These works will be carried out in line with normal incident response procedures and the appropriate temporary traffic management. A dedicated supply of temporary repair material will be maintained on site along with a dedicated day time sweeper.

- **Enhanced signage:** We will place a mobile VMS sign in advance of the works this sign will be used to warn of specific issues that may arise and to help corrected driver behaviour issues that are identified during the works.

- **Striking services:** The primary risk of a service strike relates to overhead cables, all locations will be clearly marked with blue cones 20 m either side and signage, the approximate locations will briefed in the daily site briefing.

- **Delayed reopening:** If in the opinion of the TSCO the section of carriageway is not safe to open the closure will be extended until the necessary emergency works have been completed.

- **Poor weather:** Weather conditions will be monitored daily by the Site Team and in event of unfavourable conditions the escalation procedure detailed in Figure 1 will be used to approve continuation of the works. Escalation by the Site Team is to the Site Manager in the first instance.

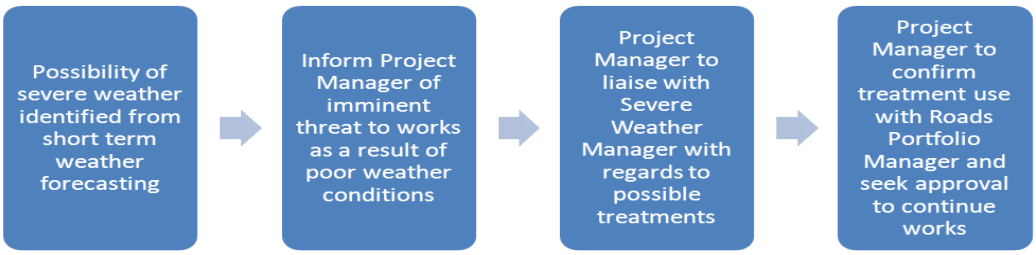

Figure 1: Approval procedure for working in severe weather conditions

In line with the procedure above the following actions will be put in place as appropriate if the weather deteriorates:-

- Heavy rain: The drainage grips, temporary gully and v-drain arrangements will be inspected by the Site Team and any accumulated debris that could impede the effectiveness of the drainage will be removed prior to the road being opened to traffic. If debris accumulates during the day this will be removed by the Traffic Management maintenance crew accessed from a place of safety via the verge. If the accumulation is significant the appropriate temporary traffic management will be deployed and the on call sweeper will be utilised to clear the debris. The TSCO / TM maintenance crew will be responsible for ensuring the drainage system is operating effectively.
- Freezing conditions: If freezing conditions occur during the night time closures or are forecast to occur in the following day the section will be treated with the required salt prior to opening to ensure that ice does not form. The TSCO and site supervisor will liaise directly with the Severe Weather Manager.
- Poor visibility: If visibility is poor due to fog or spray the mobile VMS sign deployed in advance of the works section will be used to warn / advise the road users. The TSCO will be responsible for instigating this action.

4.0 Associated Documents

This document should be read in conjunction with the GD04 for Running on Planed Surface and the task specific method statements and risk assessments.

Produced by Amey on behalf of the Highways Agency

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