West Sussex County Council

A29 REALIGNMENT PHASE 1

Environmental Statement - Chapter 4

VERSION 2
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4 CONSIDERATION OF REASONABLE ALTERNATIVES

4.1 INTRODUCTION

4.1.1. This chapter outlines the reasonable alternatives to the Scheme that have been considered by the Applicant, together with the principal reasons for proceeding with the Scheme. This chapter covers the alternatives investigated during development of the A29 realignment as a whole where they are relevant to Phase 1, as well as options investigated for the Scheme (Phase 1 only).

REQUIREMENT FOR THE CONSIDERATION OF ALTERNATIVES

4.1.2. Schedule 4 of the EIA Regulations (Ref. 4.1) states that an ES should include:

4.1.3. "A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects".

4.1.4. To accord with the EIA Regulations, the following alternatives have been considered:

- 'Do Nothing' Scenario;
- Alternative Alignments; and
- Design Alternatives.

4.2 'DO NOTHING' SCENARIO

4.2.1. The 'do-nothing' scenario would result in the A29 staying as it is today. The existing problems would remain, including:

- Congestion - during the peak periods, notably at the Woodgate level crossing and War Memorial junctions;
- Journey time unreliability - at busy times, journey times can vary considerably during peak periods, making it difficult for road users to predict the time needed for their journeys; and
- Road Accidents – experienced along the entire A29 route particularly at locations such as the Lidsey Bends.

4.2.2. Background traffic growth will make existing congestion problems worse, but without mitigation, the level of traffic generated by the planned development in the area would exacerbate these issues. The A29 Realignment Scheme has been identified as a key component of the Strategic Infrastructure Package to support the Arun Local Plan and ensure that impacts are satisfactorily mitigated. The Strategic Transport Business Case (Ref. 4.2) set out when, where and by how much traffic will increase on existing roads in the absence of the Scheme. For these reasons the 'Do-nothing' scenario has not been considered further.

4.3 ALTERNATIVE ALIGNMENTS

4.3.1. Several feasibility and viability studies have been undertaken for the Scheme since 2012, the main studies are:

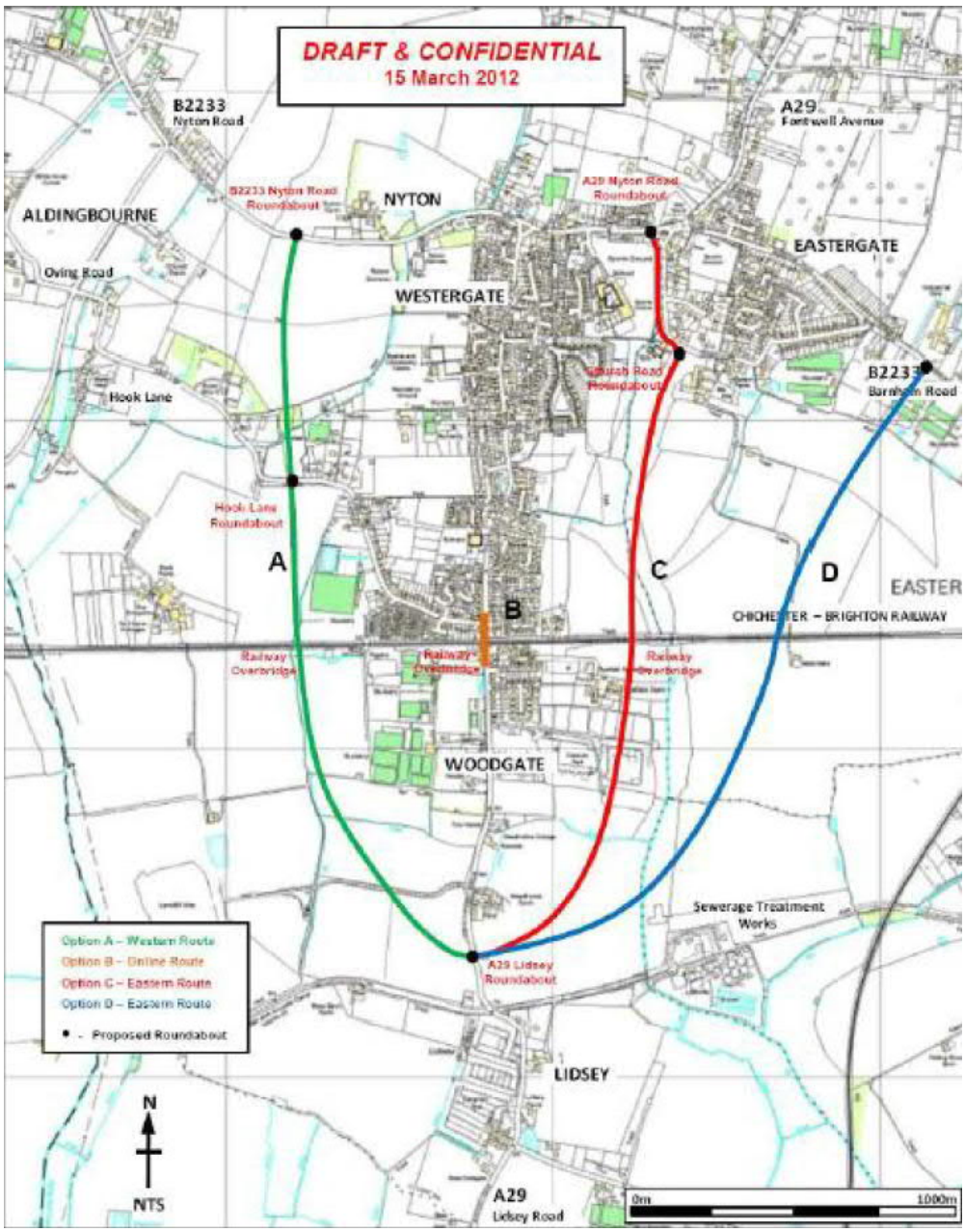
- Parsons Brinckerhoff. A29 Woodgate Study, 2012 (Ref. 4.3);
- MVA. A29 Realignment Viability Study, 2013 (Ref. 4.4); and
- Systra. A29 Realignment Feasibility Study (Ref. 4.5), 2014.

PARSONS BRINCKERHOFF. A29 WOODGATE STUDY, 2012

4.3.2. In 2012, Parsons Brinkerhoff were appointed by WSCC on behalf of Arun District Council to undertake a feasibility study into bypassing the level crossing on the A29 at Woodgate.

4.3.3. The A29 Woodgate Study considered four local route options as shown in **Figure 4-1** below. Two of these of routes emerged as potential options to consider, these being route option A (a western alignment) and option D (an eastern alignment).

Figure 4-1 - Parsons Brinkerhoff Options -2012



MVA. A29 RE-ALIGNMENT VIABILITY STUDY, 2013

4.3.4. In April 2013, MVA Consultancy (now SYSTRA Ltd) were appointed by Arun District Council to undertake an A29 Realignment Viability Study. The key driver of the Study was to identify a

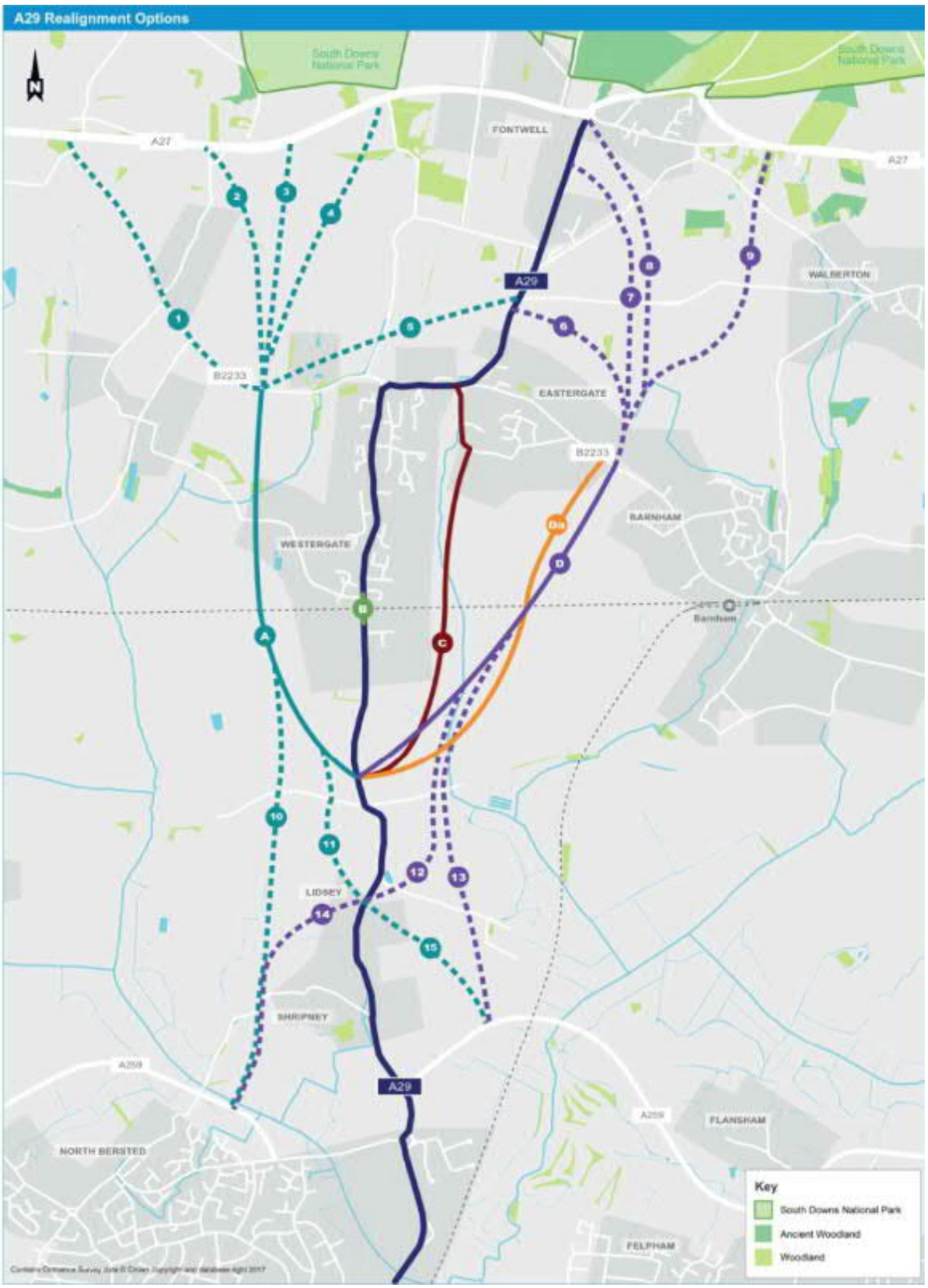
preferred route alignment for the A29 Realignment which bypasses the railway crossing at Woodgate and ties in appropriately with the existing highway.

4.3.5. The A29 Realignment Viability Study identified a number of potential route alignments options which could extend from the routes A and D (both routes previously identified as part of the A29 Woodgate Study), connecting them back into the existing highway network. These initial alignment options are shown in **Figure 4-1** and were based on:

- Five extensions north from Route A;
- Four extensions north from Route D;
- Two extensions south from Route A, one of which has a further option to extend the alignment to provide a direct access to the Bognor Regis Relief Road to the east of the existing A29; and
- Two extensions south from Route D, one of which has a further option to extend the alignment to provide a direct access to the Bognor Regis Relief Road to the west of the existing A29.

4.3.6. The A29 Realignment Viability Study used a two-stage evaluation process to assess the performance of the options and refine the long list of options.

Figure 4-2 - Options identified in the A29 Realignment Viability Study (2013)



4.3.7. The initial 'high level' assessment was then carried out for each alignment option which ranked them on an evaluation criteria consisting of:

- Environmental Impact;
- Deliverability (in engineering terms);
- Traffic Impacts;
- Road Safety Impacts; and
- Scheme Costs.

Figure 4-3 - First Stage Evaluation Summary Table (Northern Extensions to Route A)

	Option 1	Option 2	Option 3	Option 4	Option 5
Environmental Impact	Good	Average	Very Good	Good	Poor
Deliverability	Very Good	Average	Very Good	Good	Poor
Traffic Impact Benefits	Average	Good	Good	Good	Average
Road Safety Benefits	Average	Very Good	Very Good	Very Good	Average
Scheme Costs	Very Good	Poor	Good	Poor	Poor

Figure 4-4 - First Stage Evaluation Summary Table (Northern Extensions to Route D)

	Option 6	Option 7	Option 8	Option 9
Environmental Impact	Good	Average	Poor	Very Poor
Deliverability	Very Good	Poor	Poor	Good
Traffic Impact Benefits	Poor	Good	Very Good	Good
Road Safety Benefits	Average	Good	Very Good	Very Good
Scheme Costs	Good	Average	Poor	Average

Figure 4-5 - First Stage Evaluation Summary Table (Southern Extensions to Route A)

	Option 10	Option 11	Option 11 & 15
Environmental Impact	Good	Good	Good
Deliverability	Average	Very Good	Very Good
Traffic Impact Benefits	Very Good	Average	Very Good
Road Safety Benefits	Very Good	Good	Very Good
Scheme Costs	Poor	Good	Good

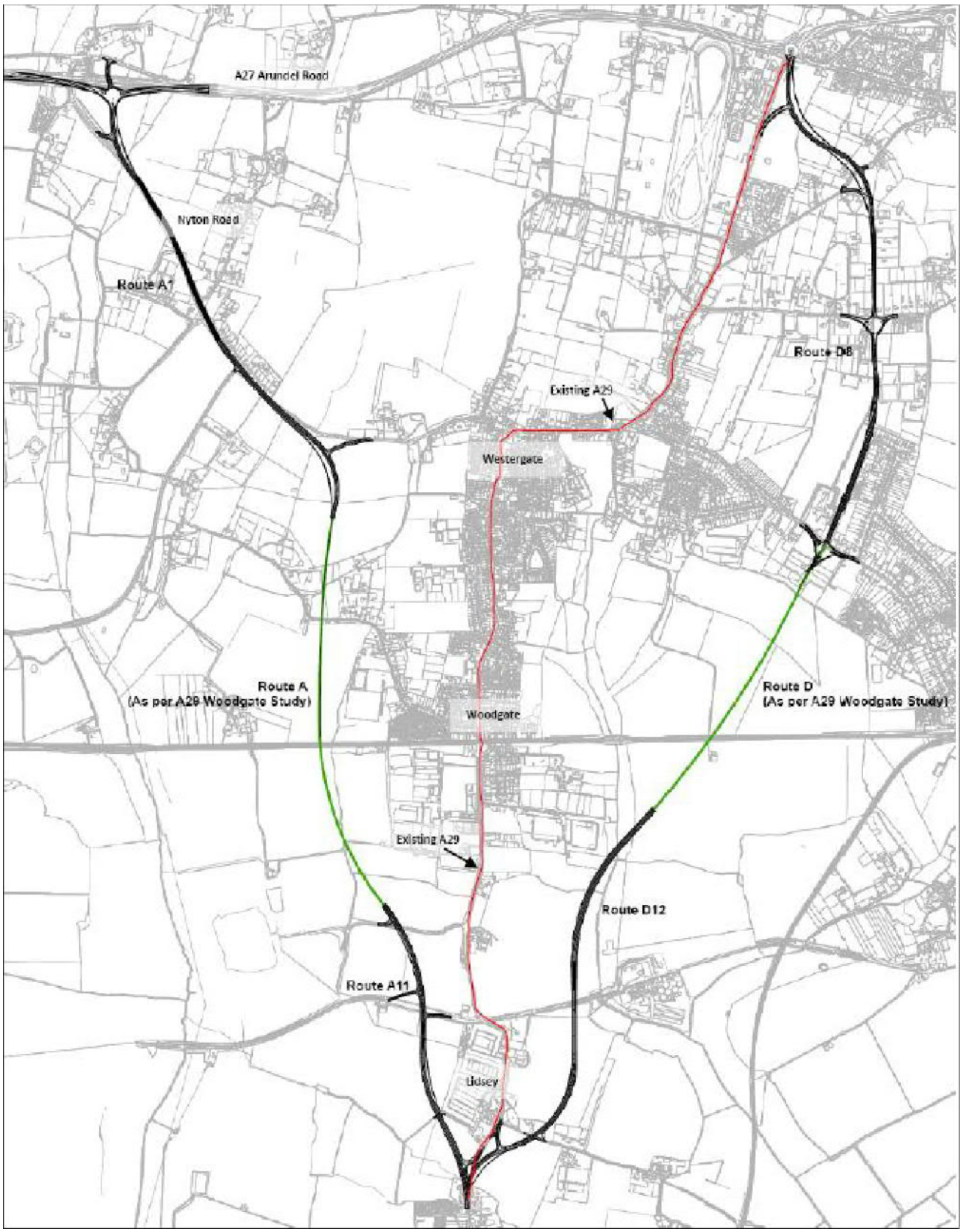
Figure 4-6 - First Stage Evaluation Summary Table (Southern Extensions to Route D)

	Option 12	Option 13	Option 12 & 14
Environmental Impact	Good	Good	Good
Deliverability	Very Good	Very Good	Average
Traffic Impact Benefits	Average	Very Good	Very Good
Road Safety Benefits	Good	Very Good	Very Good
Scheme Costs	Good	Good	Poor

4.3.8. As a result of the first stage evaluation, the following alignment extensions were identified to be taken forward to the second stage of assessment. These alignment options were renamed as follows to take into account their links with the routes A and D identified within the previous A29 Woodgate Study.

- Northern extension to Route A = A1 (also referred to as part of the A29 western bypass option);
- Southern extension to Route A = A11 (also referred to as part of the A29 western bypass option);
- Northern extension to Route D = D8 (also referred to as part of the A29 eastern bypass option); and
- Southern extension to Route D = D12 (also referred to as part of the A29 eastern bypass option).

Figure 4-7 - Second stage options from A29 Realignment Viability Study (2013)



4.3.9. **Table 4-1** provides a comparison of the environmental review of the options considered in the A29 Realignment Viability Study.

Table 4-1 - Comparison of Environmental Constraints of Realignment Viability Study Options. (Western Bypass versus Eastern Bypass)

A29 Western Bypass Scenario (Routes A1, A and A11)	A29 Eastern Bypass Scenario (Routes D8, D and D12
Option A1 – Northern Extension Flood plain constraints need to be considered	Option D8 – Northern Extension Lesser environmental constraints compared to Option A1 although greatest local impacts on built environment with property demolitions likely.
Option A – Central Section Minimal environmental issues beyond floodplain constraints	Option D – Central Section Minimal environmental issues but floodplain constraints
Option A11 – Southern Extension Flood plain constraints and impact on West Sussex Internal Drainage District to be considered within design	Option D12 – Southern Extension Floodplain constrains, impact on West Sussex Internal Drainage District and crossing of Lidsey Rife river need to be considered within design.

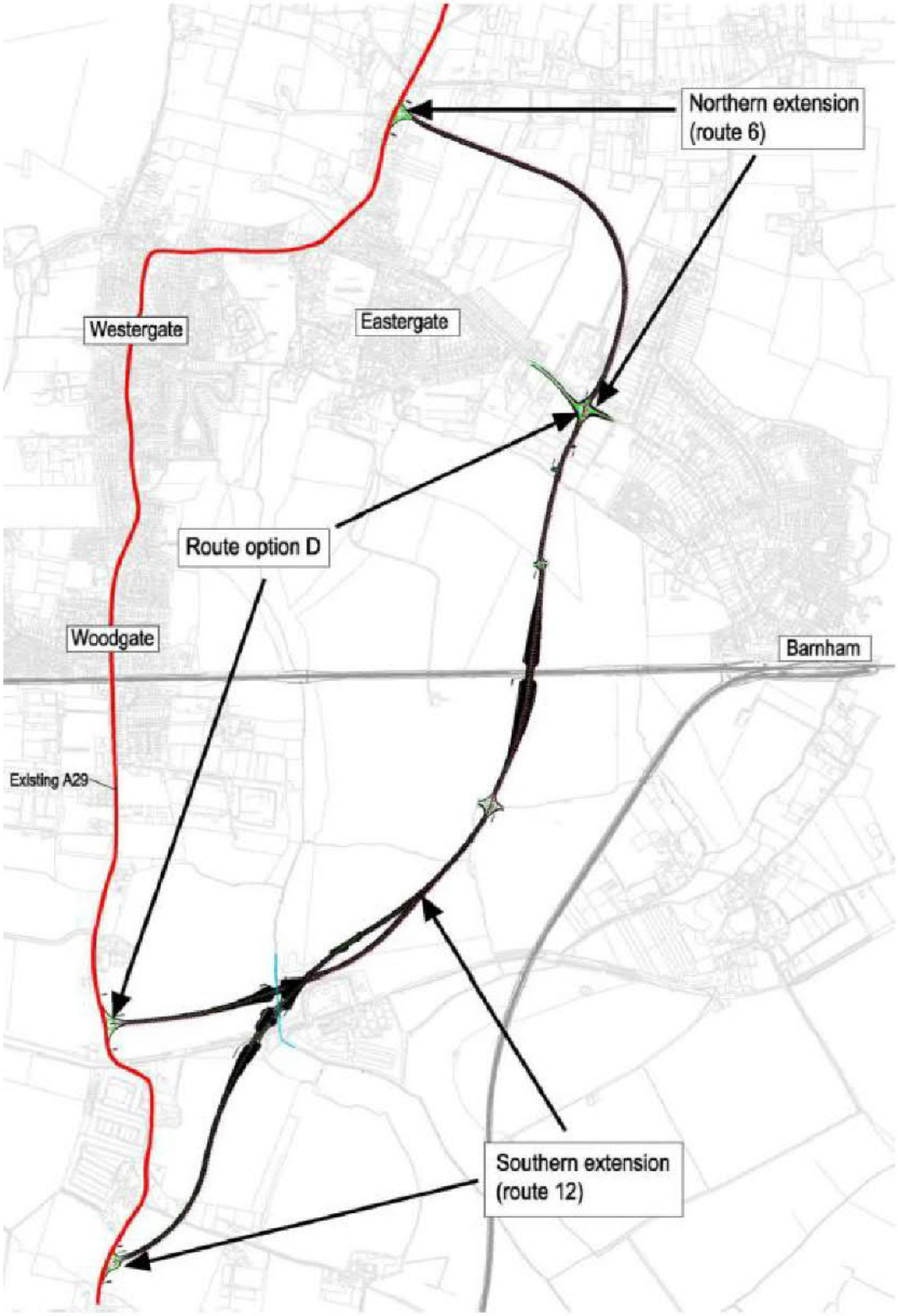
4.3.10. Following a second stage evaluation, the A29 eastern bypass scenario (alignments D8, D and D12) emerged as the preferred route alignment of the A29 Realignment Viability Study. This included consideration of funding from the private sector including Section 106 contributions.

SYSTRA. A29 RE-ALIGNMENT FEASIBILITY STUDY, 2014

4.3.11. In July 2014, SYSTRA Ltd in association with Campbell Reith Hill Ltd and Temple Group were commissioned by Arun District Council to prepare the A29 Realignment Feasibility Study to establish the feasibility, viability and deliverability for a proposed A29 realignment highway scheme.

4.3.12. This study developed a preferred route which considered the findings of the A29 Realignment Viability Study (April 2013) together with northern and southern tie-in extensions. It was acknowledged that the northern section of the route (D8) would have required demolition of many properties and have associated higher costs with its delivery. Route D6 was considered as a more viable option. This lead to the preferred option as shown in **Figure 4-8** below.

Figure 4-8 - Systra. A29 Realignment Feasibility Study, 2014



ARUN DISTRICT COUNCIL AND WEST SUSSEX COUNTY COUNCIL DESIGNS

4.3.13. Since the last study in 2014, Arun District Council and WSCC continued to work with developers to prepare a Masterplan vision for the area to allow the land to be opened up for housing, schools and other uses.

4.3.14. Building upon the 2014 Systra Report, an Option Summary Table was prepared focusing on the pros and cons of the following route options:

- Option 1 – Option 6, D (never considered as a standalone option within any previous study);
- Option 2 – Option 6, part D (excluding link to the A29 north of Lidsey Bends), 12; and
- Option 3 – Option 6, full D (tie in to the A29 north of Lidsey Bends -shown as a dotted line), 12 (never considered as an option within any previous study).

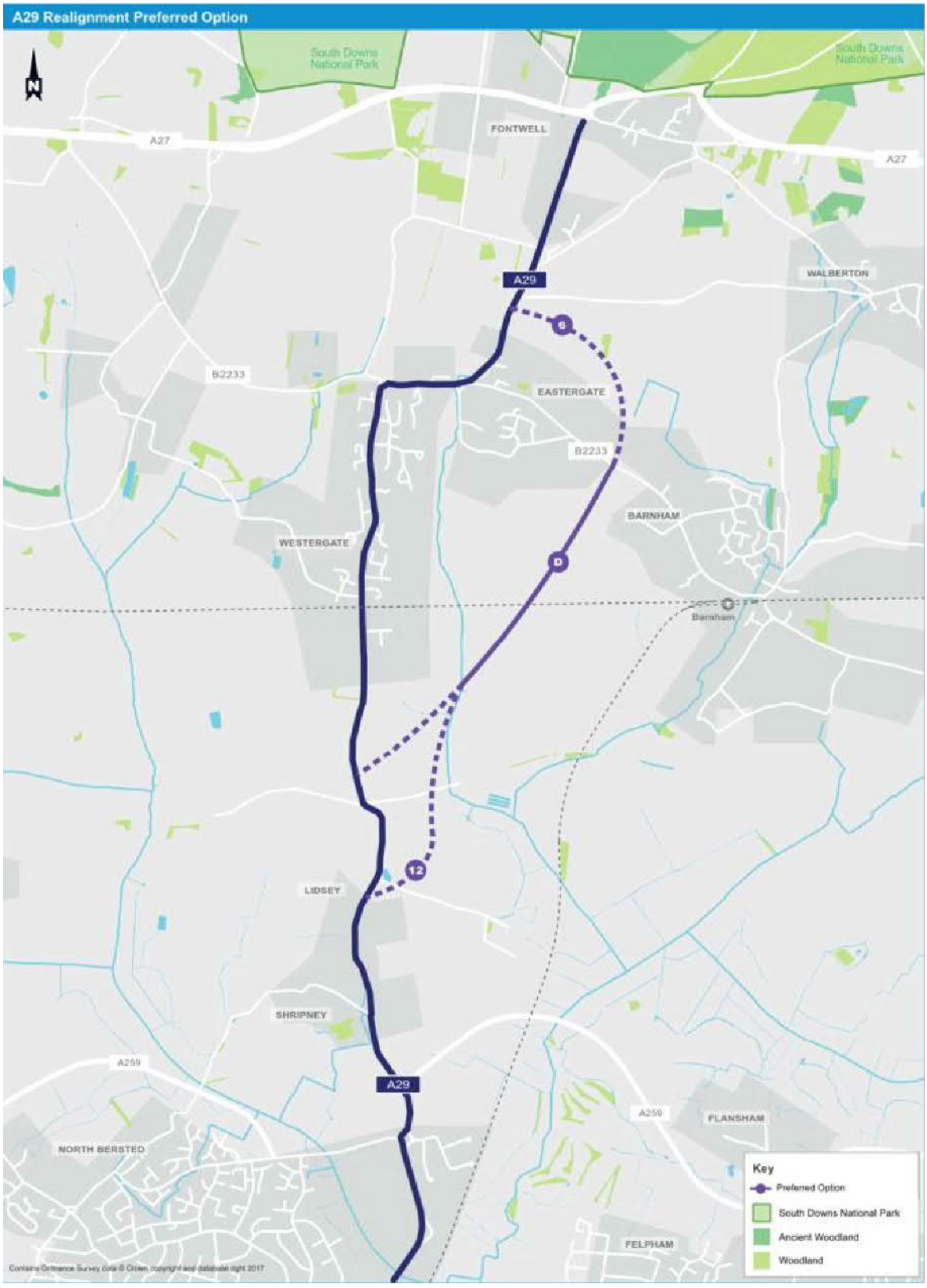
4.3.15. The routes are shown on **Figure 4-9** and a comparison between the options is outlined in **Table 4-2**.

Table 4-2 - Comparison between preferred options

	Section 6 and Option D	Section 6, Part Option D and Section 12	Section 6, Option D (with extension) and section 12.
Route Length	3.8km	4.34km	Approximately 5.34km
Negatives	Limited housing delivery. Oil extraction and waste treatment site close by. Railway Bridge and watercourse bridges. Flood plain remediation. Noise mitigation to north. Safety benefits reduced as southern tie in doesn't avoid 'Lidsey bends'. Grade I and II agricultural land required.	Oil extraction and waste treatment site close by. Railway Bridge and watercourse bridges. Flood plain remediation. Noise mitigation to north. Terrain near old canal could be challenging. Grade I and II agricultural land required. Section 12 crosses a ProW – additional planning issues if diverted. Ecology – additional hedgerows taken in Section 12 – possible issues with net biodiversity gain/ loss	Oil extraction and waste treatment site close by. Railway Bridge and watercourse bridges Flood plain remediation, additional area required due to additional structure. Noise mitigation to north Terrain near old canal could be challenging. Additional Grade I and Grade II agricultural land compared with alternatives. Additional access point onto A29 will need to be agreed with WSCC highway authority. Parcel of land between D extension and Route 12 might not be visually attractive. Additional conservation land required. Section 12 crosses a ProW – planning issues if diverted. Ecology – additional hedgerows taken in Section 12 – possible issues with net biodiversity gain/ loss.

	Section 6 and Option D	Section 6, Part Option D and Section 12	Section 6, Option D (with extension) and section 12.
Benefits	Open up housing delivery but note as much as Option 2. Improved journey time reliability. Improves cycle/ pedestrian facilities.	Opens up housing delivery. Improved journey time reliability. Resolves issue of HGVs negotiating right turn into Fontwell Avenue from Barham Road. Safety benefits increased as southern extension avoids 'Lidsey bends'. Improves cycle/ pedestrian facilities.	Opens up housing delivery but not as much as the other options. Improved journey time reliability. Resolves issues of HGVs negotiating right turn into Fontwell Avenue from Barnham Road. Safety benefits reduces as 1st Route D extension doesn't avoid 'Lidsey Bends'. Hainv additional access point onto A29 may raise safety concern from highway authority (WSCC). Improves cycle/ pedestrian facilities.

Figure 4-9 - Preferred Options



4.3.16. Key stakeholders were invited to comment on the Options Summary Table either virtually or through attendance at a risk and opportunity workshop held on the 22nd January 2018.

4.3.17. Stakeholders whom provided comments included representatives from:

- Police (separate meeting);
- Historic England (virtually);
- Natural England (virtually);
- West Sussex County Council (virtually as well as attendance at workshop);
- Arun District Council (workshop);
- Chichester District Council (workshop);
- Highways England (workshop);
- Environment Agency (workshop);
- Angus Energy Plc (workshop);
- Network Rail (workshop); and
- Southern consortium (virtually).

4.3.18. The outcome of the stakeholder engagement to review the options confirmed that Option 2 (option 6 & D (part) and 12) would provide the best fit with key stakeholders' objectives for the scheme taking account of known impacts and deliverability issues at that time.

4.3.19. Following further traffic modelling, the ability to unlock development parcels and safety considerations, the final scheme was determined to be:

- Option 2 – Route 6 Part D, 12.

4.3.20. Option 2 forms Phase 1 (Route 6) (i.e. the Scheme) and Phase 2 (Part D and 12).

4.4 SCHEME DESIGN ALTERNATIVES

ALTERNATIVE NOISE MITIGATION DESIGNS

4.4.1. A noise optioneering study was undertaken early in the design process to model the operation noise impacts and identify potentially suitable noise mitigation. A requirement for noise mitigation was identified in the early stages of the design process to minimise adverse noise effects at noise sensitive receptors to the east of the Scheme on Murrell Gardens and Chantry Mead.

4.4.2. Specifications for a noise mitigation feature were confirmed taking into consideration other factors such as landscape/visual and maintenance requirements. This identified the requirement for a 3m high noise barrier, with absorptive features between chainages 765-1040. The airborne sound insulation performance of the noise mitigation feature is required to meet the specifications set out in BS EN 1973-2 (1998) (Ref 4.6) for a class B3 barrier (DLR> 24dB).

4.4.3. The absorptive section of the noise mitigation feature is required to meet the requirements set out in BS EN 1793-1 (Ref 4.7) and have a minimum performance of class A3 (DLα 8 to 11 dB).

4.4.4. A noise barrier is required to mitigate road noise on the south eastern end of the Scheme. **Table 4-3** outlines the noise barrier designs considered, the preferred option and reasons why other options were not taken forward. The options were presented to local residents in a teleconference on 16th July 2020.

Table 4-3 - Noise mitigation alternatives

Noise barrier type	Description	Reasoning
Earth Bund	An earthworks structure comprising of engineering fill to form a landscaped 'barrier' for noise mitigation purposes.	Un-tested sound absorptions properties. Takes up large footprint on site – to achieve the height required for noise mitigation, the footprint doesn't fit within the site boundary. Requirement for significant imported fill material.
Crib Wall	A retaining wall structure to form a cage which is then filled with granular material to provide a barrier for noise mitigation.	Not being a tried and tested acoustic barrier solution - un-tested sound absorption properties. Would require timely laboratory testing. Takes up large footprint on site. Requirement for extensive imported fill material.
Green Wall	A steel frame containing soil as a growing medium. The frame can be planted with a variety of vegetation.	Slow and awkward construction. Labour intensive construction, majority of which carried out by hand. Concerns over settlement, particularly of fill material within cage which can be lost over time, therefore compromising acoustic properties of barrier.
Absorptive Timber Fence	A 3m high timber fence with sections of absorptive material.	Low design life – timber shrinks and cracks causing gaps in the barrier which can seriously affect acoustic and structural performance. Can be damaged by fire, wind, natural elements.
Preferred Option – Acoustic fence	A 3m high fence comprising steel, metal or plastic. Options presented to local residents included: ▪ Weathering steel acoustic fence (COR-TEN finish) (Figure 4-10). ▪ Painted metal acoustic fence (Figure 4-11). ▪ Plastic 'eco' acoustic fence (Figure 4-12). For the first two options the panel side facing the road would have small holes within it to reduce reflected noise by allowing it to enter inside of the barrier. The inside is made up of sound absorbing mineral wool to achieve the required noise absorption properties. The plastic fence using recycled PVC for the fence panels with absorptive material within the	Excellent reflective and absorptive noise reducing qualities. Minimal maintenance. Quick and easy to construct. 40+year lifespan (60+ years for weathered steel fence).

Noise barrier type	Description	Reasoning
	panels made from recycled plastic bottles.	

Figure 4-10 – Acoustic fence weathering steel finish

4.4.5. Figure 4-10 shows an example of the COR-TEN finish approximately six months after installation when the weathered finish is almost fully formed. Climbers such as ivy, clematis or honeysuckle can be incorporated on the western side facing the road to provide a soft landscape screen as shown in the Proposed Elevations for the Acoustic Barrier (Appendix 3.1).

Figure 4-11 – Acoustic fence painted metal finish

4.4.6. Figure 4-11 shows an example of the painted metal acoustic fence. The surface has a painted finish and is available in a number of shades. This option has minimal maintenance and a design life of 40+ years. Maintenance requirements include painting.

Figure 4-12 – Acoustic fence plastic 'eco' material

4.4.7. Figure 4-12 shows an example of the plastic 'Eco' acoustic fence. This is manufactured from high strength reinforced polymers. Recycled PVC is used to form the fence panels, with absorptive material within the panels made from recycled plastic bottles. The material comes in four standard colours (brown, green, grey and black). The lifespan of this fence is 40+ years.

4.4.8. Of the three preferred fence options investigated, the weathered steel (COR-TEN finish) is the recommended option as it provides the required reflective and absorptive noise reducing qualities, requires no maintenance in terms of painting and has a lifespan of 60+ years.

Table 4-4 - Environmental Considerations in the Evolution of the Proposed Design

Technical Topic	Alternative Options Considered
Noise and Vibration	As outlined above, several designs and alternative technologies were considered during the evolution of the Proposed Design. This took into account the available land for construction and location of sensitive receptors including, both current and future residential receptors.
Biodiversity and Landscape and Visual	The Landscape Strategy (**Appendix 3.3**) has been prepared following a comprehensive suite of landscape and ecological surveys. The Strategy has evolved, taking into account habitat replacement requirements, landscaping and screening requirements, biodiversity metrics and maintenance requirements.

4.5 SUMMARY AND CONCLUSION

4.5.1. The Scheme has been designed following a robust study on alternative corridors, alignments and designs. The design of the Scheme has evolved following baseline environmental studies and design feed-in following initial assessments. Mitigation has been 'designed-in' to the Scheme in the form of acoustic fencing and a landscape strategy, which takes into account landscaping and biodiversity mitigation requirements.

4.6 REFERENCES

- Reference 4.1 Town and Country Planning (Environmental Impact Assessment) Regulations 2017, 2017 No. 571.
- Reference 4.2 WSP (2019), A29 - Realignment Transport Business Case
- Reference 4.3 Parsons Brinckerhoff (2020), A29 Woodgate Study;
- Reference 4.4 MVA (2013), A29 Realignment Viability Study
- Reference 4.5 Systra (2014), A29 Realignment Feasibility Study
- Reference 4.6 BS EN 1793-2:1998 Road traffic noise reducing devices – Test method for determining the acoustic performance. Part 2: Intrinsic characteristics of airborne sound insulation.
- Reference 4.7 BS EN 1793-1:1998 Road traffic noise reducing devices – Test method for determining the acoustic performance. Part 1: Intrinsic characteristics of sound absorption.

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