APPENDIX

A EXISTING CONDITIONS APPENDIX

APPENDIX

A-1 CLIENT SCHEME REQUIREMENTS

Client Scheme Requirements

The Client Scheme Requirements is produced in SSP and reviewed at each subsequent Stage. The information given here is updated accordingly as the design evolves. Therefore certain sections below can only be completed / updated once a preferred option is selected. Where this applies to a section this will be indicated in the guidance notes below.

PROJECT DEFINITION			
PROJECT TITLE As defined in the Highways England Delivery Plan. The title provided here will be used by the MP Portfolio Office for establishing the set-up documentation and populating other products.	M2 Junction 5 Improvements		
ID NUMBERS PIN number is assigned by the MP Portfolio Office when it is entered onto the ORACLE cost system. MS number is assigned by the MP Portfolio Office when it is entered onto the PowerSteering system.	**PIN NUMBER** PIN number is assigned by MP Portfolio Office when it is entered onto the ORACLE cost system. 551521	**MAJOR SCHEME MS NUMBER** MS number is assigned by MP Portfolio Office when it is entered onto the PowerSteering system. MP 0272	
SCHEME CONTACT INFORMATION	DfT Sponsor: (if applicable) Only applicable to Tier 1 and novel or contentious projects	MP Project Manager: Vicky Ye Date: 09 June 2017	Programme Leader: Steve Hoesli
	OD Senior User: Paul Benham HE Route Sponsor: Colin Gardner	Other Key Consultees: Swale Borough Council, Maidstone Borough Council, Kent County Council, SEBs.	
SCHEME TYPE Where scheme type is uncertain in the options phase this should be completed once a preferred option is selected. Types may include Junctions, widening and bypasses, complex infrastructure projects, smart motorways.	Junction improvement		
ROAD AND/OR GEOGRAPHIC LOCATON	M2 Junction 5 , Stockbury Roundabout, Kent		
PROJECT DESCRIPTION A high level statement of the scope is required. A full project description is to be added once the preferred option can be defined and solution type identified. This should be consistent with descriptions provided in the Roads Investment Strategy (RIS) Investment Plan and/or Highways England Delivery Plan or any changes to that clearly identified.	M2 Junction 5 currently experiences network performance issues, and has a high incident rate. It is anticipated that the situation will worsen with the new development and growth in the surrounding areas, without an improvement scheme. M2 Junction 5 improvement was confirmed in the DfT's Road Investment Strategy for the 2015/16-19/20 Roads Period 1, which states: "***Additional capacity at the junction through improvements to slip roads and enhanced junction approaches***". The Highways England Delivery Plan 2015-2020 states: "***increase capacity on the M2 to improve flows between Sittingborne and Maidstone and the east/west link across Kent***". PCF Stage 1 Option Identification was completed in Nov 2016; three options were identified and presented to MP IDC. MP IDC gave budget approval in Nov 2016 to progress one option, Option 12, in Stage 2 because the estimated cost of the other two options, Option 4 &10, is more than the Capital Baseline budget of £70.6m. However, recognising the uncertainty of the BCR in Stage 1, it is agreed that all 3 options would be assessed by using the South East Regional Traffic Model (SERTM) in Stage 2		
STATUS Indicate the current Stage that the project is in. Note that this document is reviewed at every stage.	Options Phase: PCF Stage 2		
CHALLENGES AND ISSUES			
Summarise the identified transport related problems with reference to the current conditions	<u>Traffic</u>: The Stockbury Roundabout has capacity and network performance issues, both in terms of M2 east-west movements and A249 north-south, Sittingbourne / Maidstone movements, with current traffic demands significantly exceeding capacity. The approach to the junction from the east experiences high levels of delay and the junction is also identified in the list of the top 50 national casualty locations. Growth plans, as set out in the Local Economic Partnerships' Strategic Economic Plan, are likely to be inhibited by a lack of capacity at this		

	junction. <u>Environmental</u>: The junction is situated within the Kent Downs AONB and is bounded by areas of ancient woodland and potential cultural heritage.
STRATEGIC CASE Summarise the strategic case for a solution, explaining how the scheme will contribute to the RIS Strategic Vision and the Highways England Strategic Business Plan. Illustrate the alignment of the scheme with local, regional and national objectives. Refer to previous study work which has addressed the strategic case for the scheme.	The strategic case for the scheme is supported by the Kent Corridor to M25 Route Strategy 2015-2020. M2 Junction 5 forms part of the strategically important corridor linking Dover with London. Swale Borough is anticipated to grow with over 13,000 dwellings and 7,053 jobs up to 2031. This scale of development will have a significant impact on M2 J5 and the A249 which already have performance issues. To address this, the improvement to M2 junction 5 was included in the DfT's Road Investment Strategy (RIS). The improvement contributes to national transport objectives by: • Providing additional capacity; • Enhancing journey time reliability; and • Supporting the development of housing and the creation of jobs, as set out in the existing and emerging Local Plans.
TRANSPORT OBJECTIVES Define the high level objectives of the scheme, in terms of desired outcomes, such as improvement in journey times, reliability, safety, or catering for economic and housing growth. Where applicable, reference the objectives identified in the high level business case prepared through route strategies. More detailed objectives (flowing from the high level objectives) should be developed as the design evolves and particularly once the preferred option is selected. These detailed objectives, comprised of specific, targets and measures should reflect the guidance given in Webtag and be consistent with the Appraisal Summary Table (AST). There should also be an objective to deliver a scheme which matches or improves on the value for money of the selected option, as it has been assessed at completion of the Option Phase and set out in the AST and value for money (VFM) assessment. This should be consistent with objectives provided in the RIS Investment Plan and/or Highways England Delivery Plan or any changes to that clearly identified.	The scheme's objectives: • To enhance the capacity and connectivity provided by the M2 J5, including supporting planned growth as outlined in the Swale Local Plan. • A safe and serviceable network – To improve safety and security offered by M2 Junction 5 to all road users. By reducing the number of KSI (Killed and Seriously Injured) and slight collisions. • A more free flowing network – To improve the journey quality and journey time reliability for all routes through M2 Junction 5. • An improved environment – To deliver a high standard of design for any M2 Junction 5 improvement that reflects the quality of the landscape and setting, and that minimises the adverse environmental impact of new construction and supports the following objectives: o Plan for climate change; o Work in harmony with the environment to conserve natural resources and encourage bio-diversity; and o Protect and enhance countryside and historic and archaeological environments. • A more accessible and integrated network – It is believed that the M2 Junction 5 does not currently have a high Non-Motorised User presence; therefore, the objective is where reasonable and proportionate to be able to make changes that could benefit the community and provide a legacy.

PERFORMANCE SPECIFICATION

Provide a view on how the proposals relate to the RIS Performance Specification together with an indication of how they support delivery of the Key Performance Indicators (KPIs).

A high level assessment of how the scheme supports the Delivery Plan performance specification and associated KPIs is detailed below. This will evolve and be updated as the scheme details progress.

Performance Specification	KPI	Likely scheme contribution
Making the network safer	Reduction in KSIs on the SRN	Positive
Achieving real efficiency	Savings on capital expenditure	Positive
Making the network safer	Positive delivery plan progress relative to forecasts	Positive
Helping cyclists, walkers and other vulnerable users Encouraging Economic Growth	Number of new and upgraded crossings	N/A
	Reduced delay	Positive
Keeping the network in good condition	Increased % of pavement asset that does not require further investigation and maintenance	N/A
Delivering better environmental outcomes	Increase number of noise mitigated areas	To be confirmed in Aug 2017
Keeping the network in good condition	Improved biodiversity	Positive
Supporting the smooth flow of traffic	Improved network availability	positive
	At least 85% of incidents cleared within an hour	Positive
Improving user satisfaction	Achieve a score of 90% by March 2017 and then maintain or improve it	Positive

OPTIONS AND OUTPUTS

OPTIONS

At the start of the Options phase provide a list of the principal options which have been identified as meriting further investigation from the pre-options feasibility work, eg route strategies options assessment report, including details of any complementary measures.

Option 4,10 and 12 have been appraised in Stage 1

- **Option 4:** Two tier interchange - This option sees the existing roundabout replaced with a new grade-separated interchange, with free flowing movement provided on the A249 under the junction.
- **Option 10:** Three tier interchange - This option sees the existing roundabout replaced with a traditional three-tier grade separated interchange (utilising the existing M2 viaduct) while removing the unusual geometry of the junction and slip road alignments.
- **Option 12:** Option 12 is considered the 'Do Minimum' or 'low cost' option as it does not entirely meet the scheme objectives and stakeholder expectation of free movement for the A249 however does meet the RIS statement requirements and is within the current £70.6m Capital Funding Assumption. ,

Stage 2- option selection

- A budget of £1.1m for Stage 2 works was approved by MP IDC in Nov 2016. Option 12 is the only option identified in Stage 1 that can meet the revised scheme budget of £70.6m. The direction given by IDC is to progress this option in Stage 2 for design development.

- Due to the BCR confidence of the model used in Stage 1, Option's 4 and 10 will be assessed using the South East Regional Transport Model (SERTM) along with Option 12 in Stage 2 to understand these option's viabilities

- In the traffic forecasting model, the forecast year will be based on the Swale Borough Council Local Plan growth projection to 2031. The HE Spatial Planning Team and TAME will be consulted on the assumptions used in the Core scenario. The model is able to show how these options could perform with the potential additional traffic demands generated by the proposed local growth in Swale.

- Option 12 (A)mendment is the result of a Value for Money workshop held in Feb 2017, during which improvements and amendments have been made on the existing Option 12. This option includes free flow links between the M2 and the A249 and an at-grade through-about.

- Cost estimates have been provided for all four Options. The most likely cost for Option 4 is £97.66m, Option 10 £112.07m, Option 12 £51.28m and Option 12A £62.40**

- All four options have been assessed by the SERTM which indicated Option 4 and 12a both have positive BCR's, however Option 4 is outside of the Capital Baseline Budget. The direction given to the project team by the Project Board is to pursue Option 12A only.

- Some of the Stage 3 works have been brought forward to Stage 2 in order to meet the overall programme; additional £500k (MP IDC Nov 16) funding is allocated for these works which could comprise of environment surveys, archaeological investigations and site investigations.

** Updated Commercial estimate produced in October 2017 contained in the table below.

TRANSPORT AND ROAD INFRASTRUCTURE DELIVERABLES

List the principal elements of the scheme when they have been defined in the Development Phase. This should be consistent with the Roads Investment Strategy (RIS) Investment Plan and/or Highways England Delivery Plan or any changes to that clearly identified.

N/A Still in Options Phase

TIME FRAMES

Include the planned Phase and Stage dates, as given in the Project Schedule.

Option Phase			Development Phase			Construction Phase		
Stage	From	To	Stage	From	To	Stage	From	To
1	Nov 15	Nov 16	3	Jan 18	Aug 18	6	Mar 20	Jun 22
2	Dec 16	Dec 17	4	Aug 18	Dec 19	7	Jul 22	Jun 23
			5	Jan 19	Mar 20			

CONSTRAINTS

Special conditions that impact on the delivery should be noted; for example, particular environmental considerations. Factors influencing the required time table; for example, the timing of planned housing developments should be noted. Details should be provided of any other bodies involved in the delivery of the scheme or of complementary measures.

These constraints will be considered and managed during scheme development stages.

- Stakeholder expectations are high and need to be managed carefully as the option being developed may not meet all stakeholder expectations.
- There are a number of environmental constraints including the scheme being

	within the Kent Downs Area of Natural Beauty (AONB), nearby ancient woodland and potential cultural heritage concerns (WW1 defence installations). • Interface with third parties such as utilities.
Public Commitments	
To describe the announcement made by who, where and when.	Scheme need identified and confirm by Autumn Statement 2014 and subsequent inclusion in RIS 1. Forms part of Highways England Delivery Plan, specifically to Roads Period 1 and therefore the scheme needs to have started works by March 2020.
COSTS AND FUNDING	

Give the three-point estimate for the Project.
This should show separately the estimated outturn project cost, the programme risk and total cost. In the Options phase give these estimates for each option listed above under Options and Outputs. If costs for some options are not available at the start of the options phase include them as they become available. In the Development phase give the estimate for the preferred option. Note: The central /most likely outturn project cost estimate plus the central/most likely programme risk figure = the expected outturn cost. In the Development phase this relates to the preferred option.
In the Options phase there will be a separate expected outturn cost for each option. Include the assumed construction date used to calculate the Indicative Funding Assumption.

Option	Most likely estimate (£m)	Range max (£m)	Range min (£m)
Option 4	102.37	160.75	71.78
Option 10	110.15	176.37	77.33
Option 12	59.35	95.78	41.22
Option 12A	72.08	112.8	50.73

Commercial estimate produced in October 2017.

Current Capital Funding Assumption £70.6m

SOURCE OF FUNDS
Indicate the assumed source of funding for the project.

Department for Transport		Other
100% RIS		

AUTHORISED PHASE BUDGET		
IDC approval given in November 2016	**Amount**	**Phase/Stage**
	£0.64m	Stage 1 Nov 15 – Nov 16
	£1.1m	Stage 2 Dec2016 – Dec 2017

APPROVAL

AUTHOR
The form should either be completed by the Highways England SRO or for Tier 1, novel or contentious projects by the DfT Sponsor, working with the MP Project Manager. The MP Portfolio Office, Strategy and Planning and Regional Programme Board may also need to be consulted as appropriate.

PM: Vicky YE
Programme Leader for Area 3: Steve Hoesli

APPROVER
The form should be signed off by all of the following:
Central MP Portfolio Office or (for Tier 1, novel or contentious projects) the DfT Deputy Director

NDD Senior User

S&P Strategic Planning Group Manager (as Delivery Plan owner)

Name	Signature	Date
Paul Benham		
Sarah Jackson-Proes Project Sponsor		

RECORD OF REQUIREMENTS CHANGES

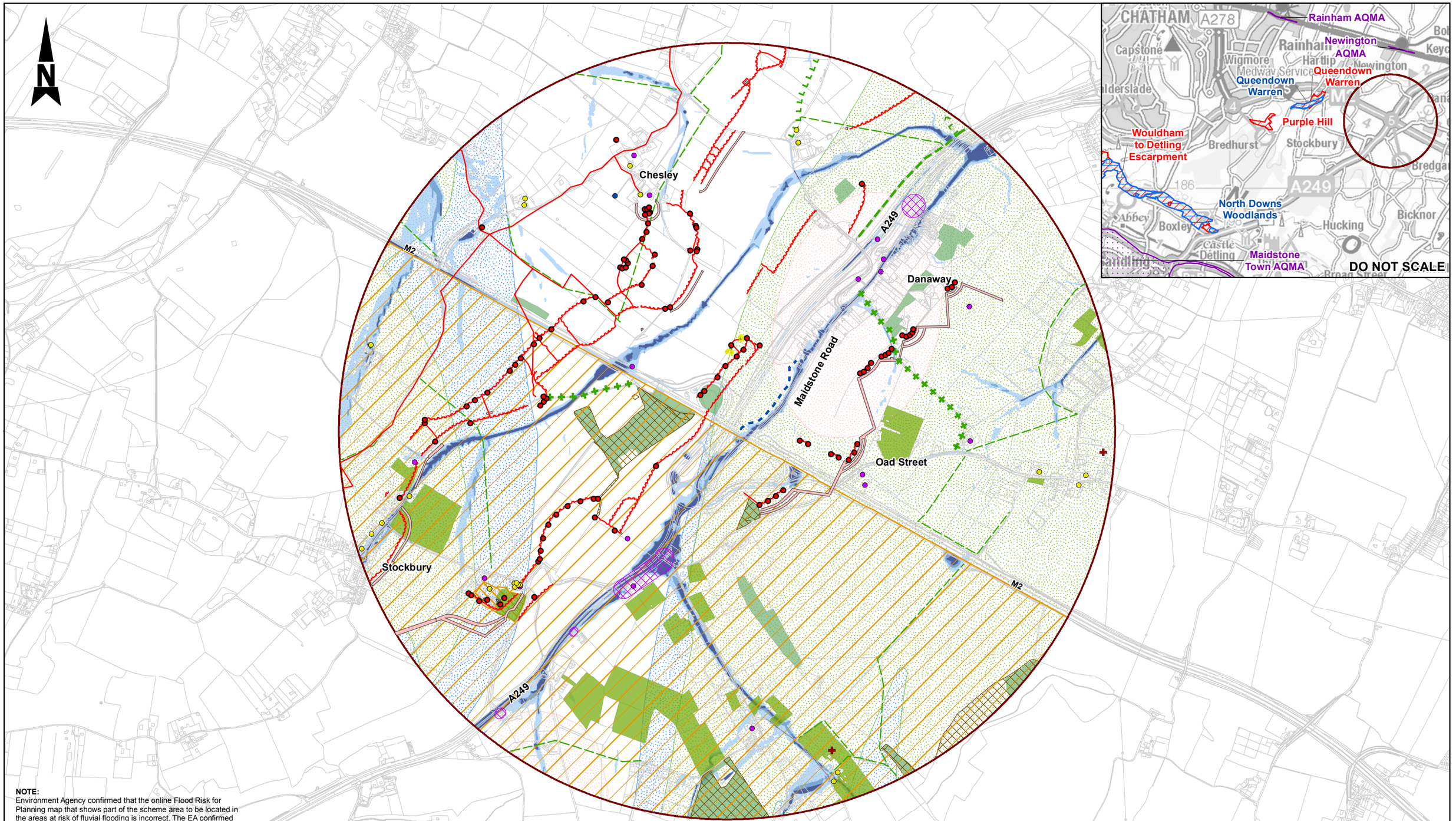
Identify the updates and changes to the Scheme Requirements. The Scheme Requirements is reviewed at each Stage Gate. Changes to the Requirements are subject to the PCF change control processes, inclusion in the Change Register and should be considered in light of the change control process for the Delivery Plan and / or RIS..

Milestone or Change Event	Date	Version No.
SGAR 1 update to begin Stage 2 Update includes: • Revised Options • Revised Options Estimates (Sept 2016) • Revised Timescales (based on DCO) • Revised Funding assumption (Approved stage and £70.6m for scheme) • Additional transport objective added (A more accessible and integrated network) • Commentary updated based on Stage 1 Outline Business Case	04/11/2016	5
Stage 2 Update includes the key changes • 4 options are being assessed via SERTM	9/06/2017	Stage 2 V2

	started in Jan 2017 • Project team was directed to pursue Option 12A by Project Board in Apr 2017 • Revised Option Estimates in Apr 2017 Update includes • Revised Option Estimates in Oct 2017 • Project Sponsor added to approval list	16/11/2017	Stage 2 V3

APPENDIX

A-2 ENVIRONMENTAL CONSTRAINTS MAP



NOTE:
Environment Agency confirmed that the online Flood Risk for Planning map that shows part of the scheme area to be located in the areas at risk of fluvial flooding is incorrect. The EA confirmed the scheme area is located entirely in the low risk Flood Zone 1.

DO NOT SCALE

0 Metres 1,000

KEY:

- SCHEME AREA 1KM BUFFER
- CRASH SITE
- FIND SPOT
- LISTED BUILDING
- NON-DESIGNATED HERITAGE
- SPECIAL AREA OF CONSERVATION (SAC)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- AIR QUALITY MANAGEMENT AREA (AQMA)

RISK OF FLOODING FROM SURFACE WATER

- HIGH (PROBABILITY OF OCCURRENCE 1 IN 30 YEARS)
- MEDIUM (PROBABILITY OF OCCURRENCE BETWEEN 1 IN 30 YEARS AND 1 IN 100 YEARS)
- LOW (PROBABILITY OF OCCURRENCE BETWEEN 1 IN 100 YEARS AND 1 IN 1,000 YEARS)

GROUNDWATER SOURCE PROTECTION ZONES

- ZONE I - INNER PROTECTION ZONE
- ZONE II - OUTER PROTECTION ZONE
- ZONE III - TOTAL CATCHMENT

PUBLIC RIGHTS OF WAY

- FOOTPATH
- BRIDLEWAY
- BYWAY
- RESTRICTED BYWAY

PRIORITY HABITAT

- DECIDUOUS WOODLAND
- TRADITIONAL ORCHARD
- DRAINAGE DITCH

- NOISE IMPORTANT AREA
- KENT DOWNS AONB
- ANCIENT WOODLAND
- SCHEDULED MONUMENT
- POTENTIAL LOCATIONS OF GUN EMPLACEMENT
- POTENTIAL LOCATIONS OF CRENELATED FIRE TRENCH
- POTENTIAL LOCATIONS OF GUN BATTERY
- DEFENCE LINE

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATON

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction

Maintenance / Cleaning

Use

Decommissioning / Demolition

Rev.	Date	Description	By	Chk'd	App'd
P01.1	---	First Issue	---	---	---

Drawing Status: FINAL
Suitability: S3

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Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME
M2 JUNCTION 5 IMPROVEMENTS SCHEME

Drawing Title: PCF Stage 2
Environmental Constraints Map

Scale	Drawn	Checked	Aproved	Authorised
1:15,000	AZ	CD		
Original Size	**Date**	**Date**	**Date**	**Date**
A3	25/01/18	---	---	---

Drawing Number Project	Originator	Volume	Project Ref. No.
70015210	WSP	GEN	70015210
M2J5	FI	GIS	
Location	Type	Role	Number

Revision: -

Path: \\uk.wspgroup.com\Central Data\Projects\700190xx\70019087 - M2 Junction 5 - Area 4 RIS-RIP Stage 1\E Models and Drawings\GIS\Mxd\ESR Figures\20180124_70019087_Environmental_Constraints.mxd: Plotted by: UKAWZ002 Date: Jan 25, 2018 - 11:16AM

APPENDIX

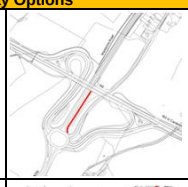
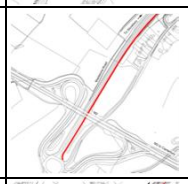
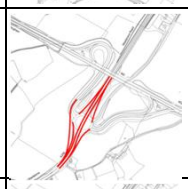
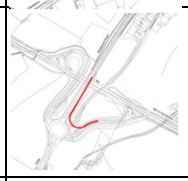
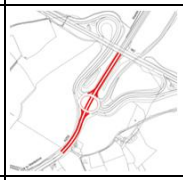
B PLANNING FACTORS APPENDIX

APPENDIX

B-1 *OPTIONS LOG*

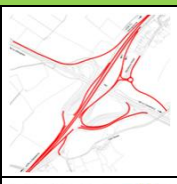
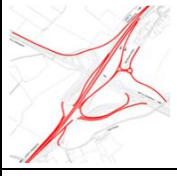
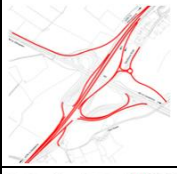
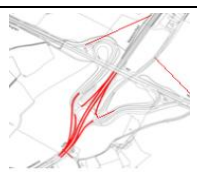
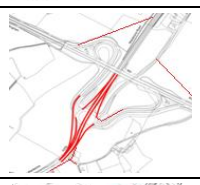
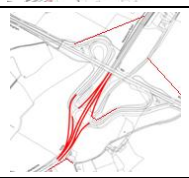
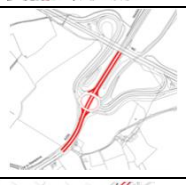
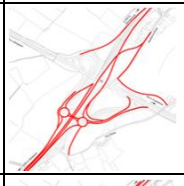
M2 Junction 5 Improvements Scheme: Options Log

Last Updated: 05/02/2018

Option	Variant	Layout	Key Features	Pros	Cons	Assessment Type	Decision
PCF Stage 0 - Non-highway Options							
Improved rail capacity provision	-		Improved train links between Swale and West Kent and the London area.		Substantial mode shift likely to be hard to achieve. Overall neutral / negative impact in solving transport related problems. Overall potentially low value for money.	Qualitative - Scored against scheme objectives during Stage 0.	Discounted.
Improved bus provision	-		Improved links from Medway and Maidstone to Swale area.		Substantial mode shift likely to be hard to achieve without providing bus services for a numerous dispersed origins & destinations, requiring large fleet & financial risks. Overall transport related impact is neutral and low overall value for money.	Qualitative - Scored against scheme objectives during Stage 0.	Discounted.
Road User charging	-		Flexible Road User Charging – time based charging could be targeted at specific peak hour traffic movements.	Could address a number of identified traffic related problems & support a good level of future growth.	Practicality issues with any charging scheme, (impact of displaced traffic, lack of PT alternative, strong public / local business opposition).	Qualitative - Scored against scheme objectives during Stage 0.	Discounted.
Park and Ride	-		Suitably located P&R sites close to J5 to facilitate N/S local traffic.	North/South trips reduced.	No impact on the E-W strategic trips, as well as issues identifying suitable sites to ensure sustainable operation and patronage. Improvements needed at J5 to ensure smooth access/egress to the site.	Qualitative - Scored against scheme objectives during Stage 0	Discounted.
Travel Demand Management	-		Sustainable Workplace/School Travel Plans, aimed at reducing the need to travel and promoting sustainable travel.	Targeted and co-ordinated TDM at key employer / school sites may reduce need to travel (home working) and more sustainable travel (e.g. car pool).	Supressed traffic associated with other traffic movements could utilise any spare capacity. Limited impact on strategic E-W trips and addressing transport related problems.	Qualitative - Scored against scheme objectives during Stage 0.	Discounted.
PCF Stage 0 - Highway Options							
1	-		At Grade Improvement:- Widen A249 Approach to 3 Lanes from M2 Stockbury Viaduct.	Increased capacity at junction with roundabout Small increase in storage capacity for queuing vehicles on A249 southbound.	Unlikely to have a significant effect on congestion or queuing traffic. Unlikely to discourage rat running along Chestnut Street/ Maidstone Road.	Qualitative - during the Options Workshop.	Discounted as it provides no long-term benefit. However, may provide some short-term benefit.
2	-		At Grade Improvement:- Widen A249 to 3 lanes from A2.	Increased capacity at junction with roundabout Significant increase in storage capacity for queuing vehicles on A249 southbound.	Unlikely to reduce effect on congestion or queuing traffic. Unlikely to significantly reduce rat. running along Chestnut Street/ Maidstone Road. Potential increase in accidents on approach to roundabout during off peak periods.	Qualitative - during the Options Workshop.	Discounted as it provides no long-term benefit. However, may provide some short-term benefit.
3	-		At Grade Improvement:- Widen A249 to 3 lanes from A2. Maidstone Road joined to A249.	Increased capacity at junction with roundabout. Significant increase in storage capacity for queuing vehicles on A249 southbound.	Unlikely to reduce effect on congestion or queuing traffic. Possible queuing traffic along Maidstone Road in morning peaks. Could be problems with weaving lengths between Maidstone Road link junction with A249 and Stockbury Roundabout.	Qualitative - during the Options Workshop.	Discounted as it provides no long-term benefit. However, may provide some short-term benefit.
4	-		Grade Separated Improvement:- Stage 0 original design. A249 Fly over / under through link provided. Existing free-flow link A249 NB to M2 EB retained.	A249 southbound and northbound traffic has grade separated route through junction. Minimal land take. Simple layout.	No free-flow links for dominant traffic movements Local connections remain as per existing layout.	Qualitative - during the Options Workshop	Taken forward from PCF Stage 0 to PCF Stage 1 as showing promise.
5	-		At Grade Improvement:- Widen A249 southbound approach to 3 lanes from M2 Stockbury Viaduct. Free-flow link A249 SB to M2 WB.	Slight increase in available capacity within the roundabout. A249 southbound traffic to London has free-flow link to the M2. Can be incorporated into other options.	Unlikely to have significant benefit if congestion caused by through traffic blocks diverge to free-flow link.	Qualitative - during the Options Workshop.	Discounted as it provides no long-term benefit. However, may provide some short-term benefit.
6	-		At Grade Improvement:- Through-about (conversion of existing junction) for A249 southbound and northbound traffic.	A249 southbound and northbound traffic has simplified route through roundabout. Increased capacity for A249 southbound and northbound traffic. Proven low cost alternative to major schemes.	Requires full signalisation of the roundabout. Introduces additional potential conflict points at the roundabout.	Qualitative - during the Options Workshop.	Taken forward from PCF Stage 0 to PCF Stage 1 as showing promise.
7	-		Grade Separated Improvement:- Stage 0 Original design. A249 grade separated through route. Two tier dumbbell junction (orientated east-west) at existing junction location. No free-flow links for dominant traffic movements. Link to connect: Oad Street to the junction.	Increased available capacity within the roundabouts. A249 southbound and northbound traffic has grade separated route through junction. Compact layout with minimal land take. Connectivity for local roads: Oad Street.	No free-flow links for dominant traffic movements. No link for Maidstone Road to/from junction.	Qualitative - during the Options Workshop. PCF Stage 0 Order of Magnitude Estimate	Taken forward from Stage 0 to Stage 1 as showing promise.
8	-		At Grade Improvement:- Two-tier dumbbell junction (orientated north-south) at M2 Stockbury Viaduct. Link to connect: Oad Street and Maidstone Road to junction.	Increased available capacity within the roundabouts. M2 slip roads revised to a conventional layout with improved alignments. Connectivity for local roads: Oad Street and Maidstone Road.	A249 southbound and northbound traffic does not have an uninterrupted route. No free flow- link for dominant traffic movements.	Qualitative - during the Options Workshop.	Taken forward from PCF Stage 0 to PCF Stage 1 as showing promise.
9	-		At Grade Improvement:- Two-tier junction (at M2 Stockbury Viaduct). Link to connect: Oad Street and Maidstone Road to junction.	Significant increase in capacity. Vertical alignment of A249 not affected. M2 slip roads revised to a conventional layout with improved alignments. Connectivity for local roads: Oad Street and Maidstone Road.	A249 southbound and northbound traffic does not have an uninterrupted route. No free flow- link for dominant traffic movements.	Qualitative - during the Options Workshop.	Discounted as Option 10 provides a more suitable solution.
10	-		Grade Separated Improvement:- Stage 0 Original design. A249 grade separated through route. Three tier junction at M2 Stockbury Viaduct. No free-flow links for dominant traffic movements. Link to connect: Oad Street and Maidstone Road to junction. Not signalised.	A249 southbound and northbound traffic has grade separated route through junction. No signalisation. M2 slip roads revised to a conventional layout with improved alignments. Connectivity for local roads: Oad Street and Maidstone Road.	Land take Difficulty for vehicles using some arms to join the roundabout.	Qualitative - during the Options Workshop.	Taken forward from PCF Stage 0 to PCF Stage 1 as showing promise.

M2 Junction 5 Improvements Scheme: Options Log

Last Updated: 05/02/2018

Option	Variant	Layout	Key Features	Pros	Cons	Assessment Type	Decision
PCF Stage 1 - Options							
4	A		Grade Separated Improvement:- A249 grade separated through route / flyover. Single lane diverges: M2 EB; A249 SB; A249 NB; immediately widening to two lanes away from the diverges. Free-flow links: M2 EB to A249 NB; A249 NB to M2 EB; and A249 SB to M2 WB. Links to connect: Oad Street and Maidstone Road; Maidstone Road to A249 SB link north of junction; Oad Street to A249 SB south of junction.	A249 southbound and northbound traffic has grade separated route through junction Free-flow links for the dominant traffic movements: M2 EB to A249 NB; and A249 SB to M2 WB Reduced land take compared to other options. Connectivity for local roads: Oad Street and Maidstone Road.	Single lane diverges restrict capacity, especially given flows using M2 EB offslip and A249 SB offslip Land take due to local road links to/from A249 north of the roundabout	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted.
4	B		Grade Separated Improvement:- As per PCF Stage 1 Option 4A, with:- Lane drops on M2 mainline between the slip roads in both directions. A249 SB diverge: two lanes with an immediate lane gain on through movement.	As per PCF Stage 1 Option 4A	Land take due to local connection and links to/from A249 north of the roundabout Lane drops on M2 mainline reduce the carriageways to a single lane.	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted.
4	C		Grade Separated Improvement:- As per PCF Stage 1 Option 4B except:- Lane drop/gain is on M2 EB mainline only.	As per PCF Stage 1 Option 4A	Land take due to local connection and links to/from A249 north of the roundabout Lane drop on M2 EB carriageway reduces it to a single lane.	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted.
4	D		Grade Separated Improvement:- As per PCF Stage 1 Option 4A except:- Free flow link: M2 EB to A249 NB in the existing location, adjacent to roundabout	As per PCF Stage 1 Option 4A Reduced land take with M2 EB - A249 NB in existing location.	Land take due to links to/from A249 north of the roundabout Free-flow link between M2 EB and A249 NB in existing location impacts on the operation of the M2 EB offslip and the roundabout. Geometry of free-flow link would also be tight.	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted.
4	E		Grade Separated Improvement:- As per PCF Stage 1 Option 4D, with: Lane drops/gains on M2 mainline Free flow link: M2 WB to A249 SB Link to connect: Oad Street to the roundabout passing under the M2 WB to A249 SB free flow link	As per PCF Stage 1 Option 4D, plus:- Free flow link for the M2 westbound to A249 southbound traffic	Land take: due to links to/from A249 north of the roundabout; and links to south east of roundabout Lane drops on M2 reduce the main carriageway to a single lane. Cost of additional structure.	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted.
4	F		Grade Separated Improvement:- As per PCF Stage 1 Option 4E, with: No lane drops/gains on M2 mainline Two lane parallel diverges from M2 EB and A249 SB.	As per PCF Stage 1 Option 4E	Land take: due to links to/from A249 north of the roundabout; and links to south east of roundabout Free-flow link between M2 EB and A249 NB in existing location impacts on the operation of the M2 EB offslip and the roundabout. Geometry of free-flow link would also be tight. Cost of additional structure.	Quantitative - Modelled and assessed at detail level in VISSIM.	Discounted.
4	G		Grade Separated Improvement:- As per PCF Stage 1 Option 4A with:- Two lane parallel diverges from M2 EB and A249 SB. Free flow link: M2 WB to A249 SB. Link to connect: Maidstone Road to Oad Street; Oad Street to the roundabout passing under the M2 WB to A249 SB free flow link (Oad Street Link Option A).	A249 southbound and northbound traffic has grade separated route through junction via flyover (viaduct). Free-flow link for the dominant traffic movements: M2 EB to A249 NB; A249 SB to M2 WB; M2WB to A249 SB. Connectivity for local roads: Oad Street and Maidstone Road. Oad Street improved from roundabout to junction with Maidstone Road Link. Reduced land take compared to other options.	Cost estimate greater than £100million. Land take: due to links to south east of roundabout.	Quantitative - Modelled and assessed at detail level in VISSIM. Initial PCF Stage 1 Options Estimate.	Discounted during PCF Stage 1, following Initial Options Estimate produced in April 2016, due to high cost. Value managed and revised version identified to be taken forward (see PCF Stage 1 Option 4 Revised below).
4	Revised		Grade Separated Improvement:- Similar to PCF Stage 1 Option 4G with: Two lane ghost island diverges from M2 EB and A249 SB. No free flow link for M2 WB to A249 SB. Oad Street Link (Option A), connecting into Stockbury Roundabout. No improvement to Oad Street between Oad Street Link and Maidstone Road Link.	A249 southbound and northbound traffic has grade separated route through junction via flyover (two bridges and earthworks). Provides a free-flow link for the main movements M2 EB - A249 NB and A249 SB - M2 WB Reduced land take compared to previous Option 4 layouts. Reduced cost compared to previous Option 4 layouts.	Cost estimate range extends higher than £100million Land take due to local connection and links to/from A249 north of the roundabout. Existing M2 WB slips retained.	Quantitative - Modelled and assessed at detail level in VISSIM. Final PCF Stage 1 Options Estimate.	Proposed to be taken forward into PCF Stage 2.
4	Revised (a)		Grade Separated Improvement:- As per PCF Stage 1 Option 4 Revised with:- Oad Street connection at the roundabout removed, and a signalised junction provided at the existing A249/ Oad Street junction.	Removes the need for another arm on the roundabout. Provides a safer entry for Oad Street - no need to seek gaps in the circulatory flow for Oad Street traffic.	Increased delays due to signals on A249 at the Oad Street junction. Distance between Oad Street junction and the roundabout/overbridge is too short Likely to encourage more trips / rat-running by strategic traffic on Oad Street due to easier exit onto A249 close to M2 Junction 5.	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted - due to increased delay around the Oad Street junction and the resulting level of dis-benefit.
4	Revised (b)		Grade Separated Improvement:- As per PCF Stage 1 Option 4 Revised with:- Oad Street connection at the roundabout removed, and replaced with left in / out lanes at the existing A249/ Oad Street junction location.	Removes the need for another arm on the roundabout. Dedicated "Left In / Out" slips to provide a safer entry / exit to the A249 southbound compared to the existing arrangement. Removes the need for gap seeking on the circulatory flow for Oad Street traffic.	Increased delay around the junction due to diverging and merging traffic. Does not provide all movements at the junction. Traffic may use the gaps to the south of the junction to undertake U-turns to head in the opposite direction. Junction type is less safe and suitable compared to the provision of a connection the roundabout.	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted - provides a lower standard of safety and design, with a lower benefit compared to PCF Stage 1 Option 4 Revised.
4	Revised (c)		Grade Separated Improvement:- As per PCF Stage 1 Option 4 Revised with:- Oad Street connection at the roundabout removed, with a left out lane at the existing A249/ Oad Street junction location.	Removes the need for another arm on the roundabout. Dedicated "Left Out" slip to provide a safer exit to the A249 southbound compared to the existing arrangement. Removes the need for gap seeking on the circulatory flow for Oad Street traffic.	Increased delay around the junction due to merging traffic. Does not provide all movements at the junction. Traffic may use the gaps to the south of the junction to undertake U-turns to head in the opposite direction. Junction type is less safe and suitable compared to the provision of a connection on the roundabout.	Qualitative - based on the results of testing the Left In / Left Out option.	Discounted based on the results of the Left In / Left Out testing. This option is a lower level of design and therefore would not be an improvement on the left in / out layout.
6	-		At-grade Improvement:- Through-about (conversion of existing junction). Full signalisation of the roundabout. No works to circulatory carriageway.	A249 southbound and northbound traffic has at-grade through movement at roundabout and increased capacity. Proven low cost alternative to major schemes.	Requires full signalisation of the roundabout. No improvements for dominant traffic movements: A249 NB to M2 WB; and M2 EB to A249 NB.	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted.
7	A		Grade Separated Improvement:- A249 grade separated through route. East-West orientated dumbbell in existing roundabout location. Single lane diverges, with free-flow links. Links to connect: Maidstone Road to A249 SB; Maidstone Road to Oad Street; Oad Street to dumbbell roundabout.	A249 southbound and northbound traffic has grade separated route through junction. Free-flow links for dominant traffic movements:- M2 EB to A249 NB; A249 SB to M2 WB. Connectivity for local roads: Oad Street and Maidstone Road. Reduced land take compared to other options.	Land take due to Maidstone Road and Oad Street links.	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted.
7	B		Grade Separated Improvement:- As per PCF Stage 1 Option 7A with:- A249 SB has a two lane diverge, with a lane gained where the Maidstone Road connection joins the A249 SB.	As per PCF Stage 1 Option 7A..	As per PCF Stage 1 Option 7A.	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted.
8	A		Grade Separated Improvement:- A249 grade separated through route. North-South orientated dumbbell type layout, with roundabouts over A249 located north and south of M2 Stockbury Viaduct. Free-flow links: M2 EB to A249 NB; A249 SB to M2 WB. Links to connect: Oad Street to Maidstone Road; Maidstone Road to northern roundabout over A249.	A249 southbound and northbound traffic has grade separated route through junction. Free-flow links for dominant traffic movements:- M2 EB to A249 NB; A249 SB to M2 WB; M2 WB to A249 SB; and A249 NB to M2 EB. Connectivity for local roads: Maidstone Road and Oad Street via northern roundabout, with A249 SB not required to use roundabout.	High cost. Large land take. Complex layout, will require clear signage/markings. Weaving on the southbound link between the roundabouts between local traffic and A249 traffic.	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted.
8	B		Grade Separated Improvement:- As per PCF Stage 1 Option 8A with:- Separate diverges on A249 SB for M2 WB and roundabout. Additional link M2 EB to A249 NB free flow and northern roundabout.	As per PCF Stage 1 Option 8A. Separate diverges on the A249 SB improve traffic flow and reduce weaving issues.	High cost. Large land take. Complex layout, will require clear signage/ markings.	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted.

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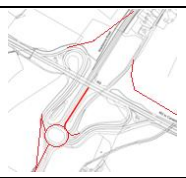
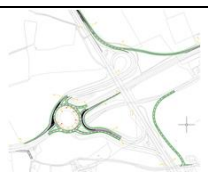
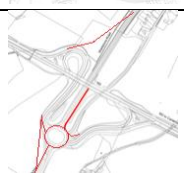
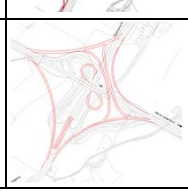
Option	Variant	Layout	Key Features	Pros	Cons	Assessment Type	Decision
8	C		Grade Separated Improvement:- As per PCF Stage 1 Option 8A with:- Separate diverges on A249 SB for M2 WB and roundabout.	As per PCF Stage 1 Option 8A. Separate diverges on the A249 SB improve traffic flow and reduce weaving issues.	Cost estimate greater than £100million. Large land take. Complex layout will require clear signage/ markings.	Quantitative - Modelled and assessed at detail level in VISSIM. Initial PCF Stage 1 Options Estimate.	Discounted during PCF Stage 1, following Initial Options Estimate produced in April 2016, due to high cost and complexity.
10	A		Grade Separated Improvement:- A249 grade separated through route. Partially signalised three-tier roundabout with conventional slip road arrangement. Free-flow links: M2 EB to A249 NB; M2 WB to A249 SB; and A249 NB to M2 WB. Links to connect: Oad Street to Maidstone Road; Maidstone Road to roundabout.	Conventional three-tier roundabout layout Local connection onto the roundabout aided by signalisation. Free-flow links for dominant traffic movements:- M2 EB to A249 NB; M2 WB to A249 SB; and A249 NB to M2 WB.	Cost estimate greater than £100million. Large land take. Signalisation required. Challenging due to viaduct piers.	Quantitative - Modelled and assessed at detail level in VISSIM. Initial PCF Stage 1 Options Estimate.	Discounted during PCF Stage 1, following Initial Options Estimate produced in April 2016, due to high cost. Value managed and revised version identified to be taken forward (see PCF Stage 1 Option 10 Revised below).
10	B		Grade Separated Improvement:- As per PCF Stage 1 Option10A with:- an additional signalised link across roundabout for A249 SB to M2 WB traffic movement.	Conventional three-tier roundabout layout. Local connection onto the roundabout aided by signalisation. Free-flow links for dominant traffic movements:- M2 EB to A249 NB; M2 WB to A249 SB; A249 NB to M2 WB; A249 SB to M2 WB	High Cost. Large land take. Signalisation required. Challenging due to viaduct piers.	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted as the additional link from A249 SB to M2 WB provides no additional benefit.
10	Revised		Grade Separated Improvement:- A249 grade separated through route. Partially signalised three-tier roundabout with conventional slip arrangement. Free-flow links: M2 EB to A249 N;, M2 WB to A249 SB; and A249 NB to M2 WB. Links to connect: Oad Street to Maidstone Road; Maidstone Road to roundabout.	Conventional three-tier roundabout layout. Local connection onto the roundabout aided by signalisation. Free-flow links for dominant traffic movements:- M2 EB to A249 NB; M2 WB to A249 SB; and A249 NB to M2 WB.	Cost estimate range extends higher than £100million. Large land take. Signalisation required. Challenging due to viaduct piers.	Quantitative - Modelled and assessed at detail level in VISSIM. Final PCF Stage 1 Options Estimate.	Proposed to be taken forward into PCF Stage 2.
11	-		Grade Separated Improvement:- A249 grade separated through route. Free-flowing links between M2 and A249. No local road connectivity to M2 Junction 5 or the A249 in the region of the junction.	Conventional free-flow interchange	High Cost. Significant land take. Challenging due to M2 Stockbury Viaduct piers. No local road connectivity.	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted due to high cost and no local road connectivity.
12	Revised		At-grade Improvement:- Improved at grade junction, with increased roundabout diameter. Free-flow links: M2 EB to A249 NB; A249 NB to M2 EB; and A249 SB to M2 WB. Links to connect: Maidstone Road and Oad Street; Oad Street to the roundabout (Oad Street Link Option A).	Provides a free-flow link for the dominant traffic movements: M2 EB to A249 NB; and A249 SB to M2 WB. Reduced land take compared to other options. Low Cost compared to Options 4 Revised and 10 Revised; and cost estimate range falls under £100million. Local connection on to the roundabout. Potential for phased delivery approach.	At grade A249 and single lane diverges restrict capacity, especially given A249 through movement flows. Land take due to local connection and free flow link to A249 north of the roundabout.	Quantitative - modelled and assessed at high-level in VISSIM. Final PCF Stage 1 Options Estimate.	Proposed to be taken forward into PCF Stage 2.
12	Revised (a)		At-grade Improvement:- As per PCF Stage 1 Option 12 Revised with:- Oad Street connection at the roundabout removed, and a signalised junction provided at the existing A249/ Oad Street junction.	Removes the need for another arm on the roundabout. Provides a safer entry for Oad Street - no need to seek gaps in the circulatory flow for Oad Street traffic.	Increased delays due to signals at A249/ Oad Street junction. Distance between Oad Street junction and the roundabout is too short. Likely to encourage more trips on Oad Street due to easier exit from Oad Street.	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted - due to increased delay around the Oad Street junction and the resulting level of dis-benefit.
12	Revised (b)		At-grade Improvement:- As per PCF Stage 1 Option 12 Revised with:- Oad Street connection at the roundabout removed, and replaced with left in / out lanes at the existing A249/ Oad Street junction location.	Removes the need for another arm on the roundabout. Dedicated "Left In / Out" slips to provide a safer entry / exit to the A249 southbound compared to the existing arrangement. Removes the need for gap seeking on the circulatory flow for Oad Street traffic.	Increased delay around the junction due to diverging and merging traffic. Does not provide all movements at the junction. Traffic may use the gaps to the south of the junction to undertake U-turns to head in the opposite direction. Junction type is less safe and suitable compared to the provision of a connection on the roundabout.	Quantitative - modelled and assessed at high-level in VISSIM.	Discounted - provides a lower standard of safety and design, with a lower benefit compared to PCF Stage 1 Option 12 Revised.
12	Revised (c)		At-grade Improvement:- As per PCF Stage 1 Option 12 Revised with:- Oad Street connection at the roundabout removed, with a left out lane at the existingA249/ Oad Street junction location.	Removes the need for another arm on the roundabout. Dedicated "Left Out" slip to provide a safer exit to the A249 southbound compared to the existing arrangement. Removes the need for gap seeking on the circulatory flow for Oad Street traffic.	Increased delay around the junction due to merging traffic. Does not provide all movements at the junction. Traffic may use the gaps to the south of the junction to undertake U-turns to head in the opposite direction. Junction type is less safe and suitable compared to the provision of a connection on the roundabout.	Qualitative - based on the results of testing the Left In / Left Out option.	Discounted based on the results of the Left In / Left Out testing. This option is a lower level of design and therefore would not be an improvement on the left in / out layout.
12	Revised (d)		At-grade Improvement:- As per PCF Stage1 Option 12 Revised with:- Link between Maidstone Road and Oad Street removed.	Reduces the traffic flow on Oad Street and removes the potential for rat-running by strategic traffic, between Key Street Junction and Stockbury Roundabout.	Maidstone Road cut off due to stopping up close to Stockbury Roundabout. Southbound traffic will need to route via Key Street Junction and A249.	Qualitative - based on modelled flows of the Option 12 Revised.	Discounted - high flows on this link, therefore removal not considered viable.
13	-		Grade Separated improvement:- A249 grade separated through route Free-flowing links between M2 and A249. No local road connectivity to M2 Junction 5 or the A249 in the region of the junction.	Conventional free-flow interchange. More environmentally friendly than a conventional cloverleaf layout.	High Cost. Significant land take. No local road connectivity.	Qualitative - during Highways design workshop.	Discounted.

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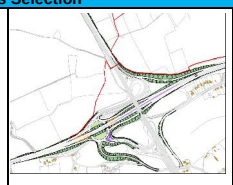
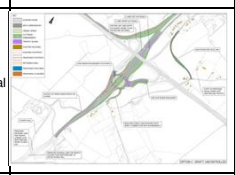
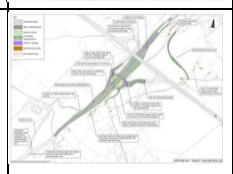
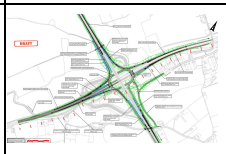
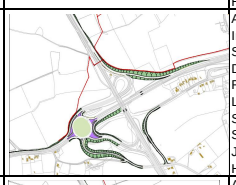
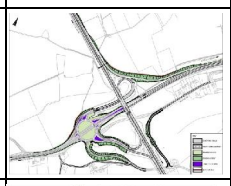
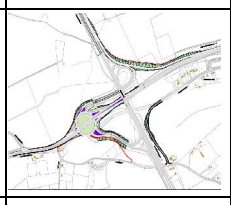
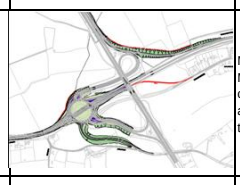
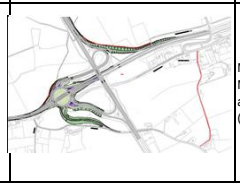
Option	Variant	Layout	Key Features	Pros	Cons	Assessment Type	Decision
PCF Stage 2 - Options Selection							
4	-		Grade Separated Improvement:- A249 grade separated through route via a flyover. Single lane slip road: M2 EB to A249 NB, including 2-lane diverge off M2 EB. Dedicated left turn lanes adjacent to M2 Junction 5 Roundabout: A249 SB to M2 WB; A249 NB to M2 EB. Links to connect: Maidstone Road to Oad Street; Oad Street to M2 Junction 5 Roundabout (Option C). Severed Local Roads: Maidstone Road from M2 Junction 5 Roundabout; Oad Street from A249; Honeycrock Hill from A249.	A249 southbound and northbound traffic has grade separated route through junction. Free-flow links for dominant traffic movements. Connectivity for local roads: Oad Street and Maidstone Road. No traffic signals at Stockbury Roundabout.	Interim No. 1 Options Estimate range extends above £100million. (Interim No. 2 Options Estimate (with Oad Street Link Option B) range extends above £100million.) Direct impact on ancient woodland (Chestnut Wood).	Taken forward into PCF Stage 2 for assessment in regional traffic model only. PCF Stage 2 Traffic & Economics assessment: M2 Junction 5 Regional Traffic Model; TUBA & COBALT. PCF Stage 2 Options Estimates. PCF Stage 2 Environmental impact assessment. Compliance with DMRB: Concept design as developed in PCF Stage 1 with change to Oad Street Link.	Not affordable. Shown at PCF Stage 2 public consultation as rejected due to cost (up to £158million). Superseded by PCF Stage 2 Option 4 Revised Local Roads.
4	Revised Local Roads		Grade Separated Improvement:- As per PCF Stage 2 Option 4, but with:- Revised links for local roads:- Oad Street Link Option E connection to roundabout, closer to A249 and with Design Speed reduced to 50 kph (speed limit of 30 mph). Maidstone Road Link moved northwards.	As per PCF Stage 2 Option 4 with:- No direct impact on ancient woodland. Reduced footprint in Kent Downs AONB compared to PCF Stage 2 Option 4. Safer junction between Maidstone Road Link and Oad Street compared to PCF Stage 2 Option 4. Reduced land take compared to PCF Stage 2 Option 4.	Final Options Estimate range extends above £100million.	PCF Stage 2 Traffic & Economics assessment: M2 Junction 5 Regional Traffic Model; TUBA & COBALT. PCF Stage 2 Options Estimates. Compliance with DMRB: Concept design as developed in PCF Stage 1 for Option 4, with changes to Oad Street Link and Maidstone Road Link.	Not affordable - PCF Stage 2 Option 4H1 developed to reduce cost. Discounted.
4	H1		Grade Separated Improvement:- As per PCF Stage 2 Option 4 Revised Local Roads, with:- Single lane slip road M2 EB to A249 NB removed and replaced with dedicated left turn lane adjacent to M2 Junction 5 Roundabout.	A249 southbound and northbound traffic has grade separated route through junction Free-flow links for dominant traffic movements. Connectivity for local roads: Oad Street and Maidstone Road. No traffic signals at Stockbury Roundabout. No direct impact on ancient woodland.	Final Options Estimate range extends above £100million M2 EB to A249 NB: Dedicated left turn lane not as direct as slip road in PCF Stage 2 Option 4, which reduces benefits.	PCF Stage 2 Traffic & Economics assessment: M2 Junction 5 Regional Traffic Model; TUBA & COBALT. PCF Stage 2 Options Estimates. PCF Stage 2 Environmental impact assessment. Compliance with DMRB: Concept design as developed in PCF Stage 1 for Option 4, with changes to Oad Street Link, Maidstone Road Link and M2 EB to A249 free flow link. Assessment of 1 lane or 2 lanes for M2 EB off slip to roundabout.	Not affordable, so not viable regarding cost. Viable regarding performance, as complies with scheme objectives. Additional funding required to be viable overall.
4	H2		Maidstone Road Link Variant:- Maidstone Road severed / stopped-up close to M2 Junction 5 Roundabout i.e. becomes a cul-de-sac.	Maidstone Road Link (compared to link layout as in PCF Stage 2 Options 4, 12(C) and12A(B)):- Reduced cost. Maidstone Road no longer a potential route for rat-running strategic traffic.	Stopping-up Maidstone Road would impact on:- Local traffic: Access to M2 Junction 5 via congested A2 / A249 Key Street Junction, significant loss of benefits predicted. Bus operators: Alternative route for buses required. Other local community impacts: Loss of connectivity between local villages; Potential security / anti-social behaviour concerns along Maidstone Road. Temporary diversion route for A249: could no longer be used as a temporary diversion route.	PCF Stage 2 Traffic assessment: M2 Junction 5 Regional Traffic Model. Local Community Impact.	Impact on local community considered unacceptable. Discounted.
10	-		Grade Separated Improvement:- Three tier junction: M2 mainline top tier; signalised roundabout mid-tier; A249 bottom tier. Conventional M2 slip road arrangement. Dedicated left turn lanes adjacent to M2 Junction 5 Roundabout: M2 EB to A249 NB; M2 WB to A249 SB; and A249 NB to M2 WB. Links to connect: Oad Street to Maidstone Road; Maidstone Road to roundabout. Severed Local Roads: Oad Street from A249; Honeycrock Hill from A249.	A249 southbound and northbound traffic has grade separated route through junction. Conventional three-tier roundabout layout. Free-flow links for dominant traffic movements. Connectivity for local roads: Oad Street and Maidstone Road. Local connection onto the roundabout aided by signalisation.	Interim No. 1 Options Estimate range extends above £100million. Interim No. 2 Options Estimate range extends above £100million. Signalisation of circulatory carriageway required. Challenging due to M2 Stockbury Viaduct piers. A249 SB to M2 WB: No free flow link for this dominant traffic movement.	Taken forward into PCF Stage 2 for assessment in regional traffic model only. PCF Stage 2 Traffic & Economics assessment: M2 Junction 5 Regional Traffic Model; TUBA & COBALT. PCF Stage 2 Options Estimates. PCF Stage 2 Environmental impact assessment. Compliance with DMRB: Concept design as developed in PCF Stage 1.	Not affordable. Shown at PCF Stage 2 public consultation as rejected due to cost (up to £184million). Discounted.
12	(C)		At-grade Improvement:- Improved roundabout with increased diameter. Single lane slip road: M2 EB to A249 NB. Dedicated left turn lanes adjacent to M2 Junction 5 Roundabout: A249 NB to M2 EB; A249 SB to M2 WB. Links to connect: Maidstone Road to Oad Street; Oad Street to M2 Junction 5 Roundabout (Option C). Severed Local Roads: Maidstone Road from M2 Junction 5 Roundabout; Oad Street from A249; Honeycrock Hill from A249.	Interim No. 1 Options Estimate range below £100million. Interim No. 2 Options Estimate (with Oad Street Link Option B) range below £100million. Free-flow links for dominant traffic movements. Connectivity for local roads: Oad Street and Maidstone Road.	At grade A249 and single lane diverges restrict capacity, especially given A249 through movement flows. Direct impact on ancient woodland (Chestnut Wood).	Taken forward into PCF Stage 2 as only viable option. PCF Stage 2 Traffic & Economics assessment: M2 Junction 5 Regional Traffic Model; TUBA & COBALT. PCF Stage 2 Options Estimates. PCF Stage 2 Environmental impact assessment. Compliance with DMRB: Concept design as developed in PCF Stage 1 with change to Oad Street Link.	Shown at Stage 2 public consultation as rejected as would not create sufficient capacity. Discounted.
12A	(B)		At-grade Improvement:- Through-about, conversion of existing junction with increased diameter. Single lane slip road: M2 EB to A249 NB. Dedicated left turn lanes adjacent to M2 Junction 5 Roundabout: A249 NB to M2 EB; A249 SB to M2 WB. Links to connect: Maidstone Road to Oad Street; Oad Street to M2 Junction 5 Roundabout (Option B, to the south of Whipstakes Farm). Severed Local Roads: Maidstone Road from M2 Junction 5 Roundabout; Oad Street from A249; Honeycrock Hill from A249.	A249 southbound and northbound traffic has at-grade through carriageways at through-about, which increases capacity. Free-flow links for dominant traffic movements. Connectivity for local roads: Oad Street and Maidstone Road. No direct impact on ancient woodland.	Interim No. 2 Options Estimate range extends above £100million. Lower accident savings compared to grade separated options and Option 12. Traffic signals on A249 at through-about, with reduced speed limit on A249 approaches. Kent County Council and Swale Borough Council oppose, and Maidstone Borough Council objects, to at-grade through-about option. Oad Street Link: Deep cutting; additional bridge; increased footprint in Kent Downs AONB; impact on Whipstakes Farm.	PCF Stage 2 Traffic & Economics assessment: M2 Junction 5 Regional Traffic Model; TUBA & COBALT. PCF Stage 2 Options Estimates. PCF Stage 2 Environmental impact assessment. Compliance with DMRB: Concept design developed in PCF Stage 2, as a variant to PCF Stage 1 Option 12.	Shown at Stage 2 public consultation as only viable option. Superseded by PCF Stage 2 Option 12A (E).
12A	(C)		Oad Street Link Variant:- Oad Street Link Option C connection to roundabout, through Chestnut Wood.	Interim No.1 Options Estimate range close to £100million. Oad Street Link: Option C (compared to Option B):- Reduced cost Reduced footprint in Kent Downs AONB Reduced impact on Whipstakes Farm	Oad Street Link: Option C (compared to Option B):- Direct impact on ancient woodland (Chestnut Wood).	PCF Stage 2 Traffic & Economics assessment: M2 Junction 5 Regional Traffic Model; TUBA & COBALT. PCF Stage 2 Options Estimates. PCF Stage 2 Environmental impact assessment. Compliance with DMRB: Concept design developed in PCF Stage 2, as a variant to PCF Stage 1 Option 12.	Discounted because: Is a viable alternative that avoids direct impact on ancient woodland.
12A	(D)		Oad Street Link Variant:- Oad Street Link Option D connection to roundabout, through Whipstakes Farm.	Oad Street Link: Option D (compared to Option B):- Reduced footprint in Kent Downs AONB	Oad Street Link: Option D (compared to Option B):- Demolition of Whipstakes Farm dwelling/ buildings.	Traffic assessment: Considered similar to PCF Stage 2 Option12A(B) . Compliance with DMRB: Concept design considered in PCF Stage 2.	Discounted because: Is a viable alternative that avoids demolition of Whipstakes Farm dwelling/ buildings.
12A	(E)		Oad Street Link & Maidstone Road Link Variant:- Oad Street Link Option E connection to roundabout, closer to A249 and with Design Speed reduced to 50 kph (speed limit of 30 mph). Maidstone Road Link: Moved northwards.	Final Options Estimate range below £100million. Oad Street Link: Option E (compared to Option B):- Reduced cost. Reduced footprint in Kent Downs AONB. Reduced impact on Whipstakes Farm. Reduced speed limit (30mph) on Oad Street Link and a section of Oad Street makes route less attractive for rat running by strategic traffic. Maidstone Road Link (compared to link layout as in PCF Stage 2 Option 12A(B)):- Improved forward visibility at Maidstone Road Link/ Oad Street Junction.	Oad Street Link: Option E (compared to Option B):- Greater impact on dwellings at existing Oad Street/ A249 junction.	PCF Stage 2 Traffic & Economics assessment: M2 Junction 5 Regional Traffic Model; TUBA & COBALT. PCF Stage 2 Options Estimates. PCF Stage 2 Environmental impact assessment. Compliance with DMRB: Concept design developed in PCF Stage 2.	Viable in terms of cost. Viable in terms of performance, as complies with scheme objectives. Viable overall.
12A	(F)		Oad Street Link Variant:- Oad Street Link Option F connection to roundabout / from A249, with:- one way link Oad Street to M2 Junction 5 Roundabout adjacent to the M2 WB offslip; and one way link A249 SB to Oad Street; reduced Design Speed of 50 kph (speed limit of 30 mph).	Oad Street Link: Option F (compared to Option B):- Reduced footprint in Kent Downs AONB. Reduced impact on Whipstakes Farm. Reduced speed limit (30mph) on Oad Street Links and a section of Oad Street makes route less attractive for rat running by strategic traffic.	Oad Street Link: Option F (compared to Option B):- Unusual layout, so a higher accident risk. Larger diameter roundabout to accommodate additional entry lane. One way link adjacent to M2 WB offslip would need to be controlled by traffic signals at its entry to the M2 Junction 5 Roundabout, reducing capacity at roundabout for strategic traffic movements. Likely impact on ancient woodland (Chestnut Wood).	Compliance with DMRB: Concept design considered in PCF Stage 2.	Discounted because:- likely to have direct impact on ancient woodland; reduces capacity for strategic traffic at M2 Junction 5 Roundabout; safety risks of unusual layout.
12A	(G)		Oad Street Link Variant:- Oad Street Link Option G connection to A249 via:- a link south of M2 Junction 5 and to east of A249; a bridge over A249; and left in/out provisions on both A249 carriageways.	Oad Street Link: Option G (compared to Option B):- Improved local connectivity. Improved route and A249 crossing facility for cyclists and equestrians. Route less attractive for rat running by strategic traffic. Reduced impact on Whipstakes Farm.	Oad Street Link: Option G (compared to Option B):- Increased cost. Increased footprint in Kent Downs AONB. Increased landtake, and associated impact.	Compliance with DMRB: Concept design considered in PCF Stage 2.	Discounted because: more expensive that other Oad Street Link options; considered outside scope of project objectives.
12A	(H)		Maidstone Road Link Variant:- Maidstone Road Link provided to A249 southbound carriageway between A2/ A249 Key Street Junction and M2 Junction 5 Roundabout on immediate approach to M2 Junction 5 roundabout.	Maidstone Road Link (compared to link layout as in PCF Stage 2 Options 4, 12(C) and12A(B)):- Reduced cost. One-way, southbound connection direct to A249 SB carriageway	Maidstone Road Link (compared to link layout as in PCF Stage 2 Options 4, 12(C) and12A(B)):- Insufficient weaving length between merge onto A249 SB and diverge nose for segregated left turn lane towards M2 WB. Route more attractive to rat-running by strategic traffic. Does not cater for northbound traffic from M2 Junction 5 to Maidstone Road/ Chestnut Street.	Compliance with DMRB: Concept design considered in PCF Stage 2.	Discounted because of: safety risks of sub-standard weaving lengths; local community impact.
12A	(I)		Maidstone Road Link Variant:- Maidstone Road Link provided to A249 southbound carriageway between A2/ A249 Key Street Junction and M2 Junction 5 Roundabout in the region of the existing layby north of Wormdale Hill overbridge.	Maidstone Road Link (compared to link layout as in PCF Stage 2 Options 4, 12(C) and12A(B)):- Reduced cost. One-way, southbound connection direct to A249 SB carriageway.	Maidstone Road Link (compared to link layout as in PCF Stage 2 Options 4, 12(C) and12A(B)):- Route more attractive to rat-running by strategic traffic. Existing layby on A249 SB carriageway, north of Wormdale Hill overbridge, removed to provide adequate weaving lengths on A249. Removal of layby would have negative impact on some road users, e.g. long-distance HGV drivers using port at Sheerness. Does not cater for northbound traffic from M2 Junction 5 to Maidstone Road/ Chestnut Street.	Compliance with DMRB: Concept design considered in PCF Stage 2. The provision of an isolated local road merge onto the A249, such as that proposed, may raise notable safety concerns at Road Safety Audit.	Discounted because of: safety risks; local community impact.
12A	(J)		Maidstone Road Link Variant:- Maidstone Road Link provided to Oad Street routed along Woodgate Lane (a Byway Open to All Traffic (BOAT)).	Maidstone Road Link (compared to link layout as in PCF Stage 2 Options 4, 12(C) and12A(B)):- Making use of existing infrastructure.	Maidstone Road Link (compared to link layout as in PCF Stage 2 Options 4, 12(C) and12A(B)):- Increased cost: Woodgate Lane would need to be upgraded, as it does not comply with current standards for a 30mph road and is not surfaced for a significant part of its length. Impact on dwellings fronting onto Woodgate Lane. Impact on the amenity value of the BOAT.	Compliance with DMRB: Concept considered in PCF Stage 2.	Discounted because of: local community impact; more expensive than other Maidstone Road Link option;

APPENDIX

B-2 VDM METHODOLOGY TECHNICAL NOTE

MEMO

TO: Transport Planning Group, Highways England

FROM: Dan Hyde, Ratnam Rajah, WSP

SUBJECT: **M2 Junction 5 (PCF Stage 2) Proposed Approach for Variable Demand Modelling**

DATE: **June 28, 2017**

Version: 1.3

1 INTRODUCTION

1.1 There is a requirement to undertake Variable Demand Modelling (VDM) for the M2 J5 Improvement PCF Stage 2 scheme. This note therefore outlines the proposed approach to carrying out VDM, in addition to a revised base and forecast model development following discussions with Highway England's Transport Planning Group representatives (Louise Wootton & Graham Powell). Discussions were held 12/06/2017 in respect to VDM elasticity testing results which indicated a need for VDM.

1.2 The M2 J5 improvement scheme aims to improve junction 5 and the A249 and the current options aim to provide dedicate through movements for the A249 northbound and southbound, whilst also introducing segregated turning movements (i.e. M2 eastbound to A249 northbound, A249 southbound to M2 westbound). Note that the scheme does not propose changes to the existing M2 through movement, which is segregated from the junction via its high level viaduct.

2 REGIONAL TRAFFIC MODEL

2.1 The RIS 1 M2 J5 improvement scheme is currently at PCF Stage 2 and as instructed by Highways England is applying the South East Regional Model (SERTM) model. The modelled area in SERTM not only covers the South East Region of England but also covers East Anglia and Greater London together with part of the East Midlands. It overlaps in part with the area of the South West Regional Model and the Midlands Regional model. The rest of the country is coded in skeletal road network as a buffer.

3 LOCAL MODEL

3.1 Given that the SERTM covers a very large area of England, for the M2 J5 study, an area that encompasses likely area of significant impact of the scheme needs to be defined and a cordoned model created with due regard to following main considerations:

- Significant impact of the scheme is contained within the defined study area;
- Ensure that the longer distance trips beyond the model area cross the cordon at the correct corridors;

- The area surrounding the core modelled area (calibration and validation area) is not too large to make undue influence on demand when VDM assignment is carried out; and

- Development of traffic forecasts do not need to cover a larger area than is necessary to represent the local growth area scenarios within the main study area.

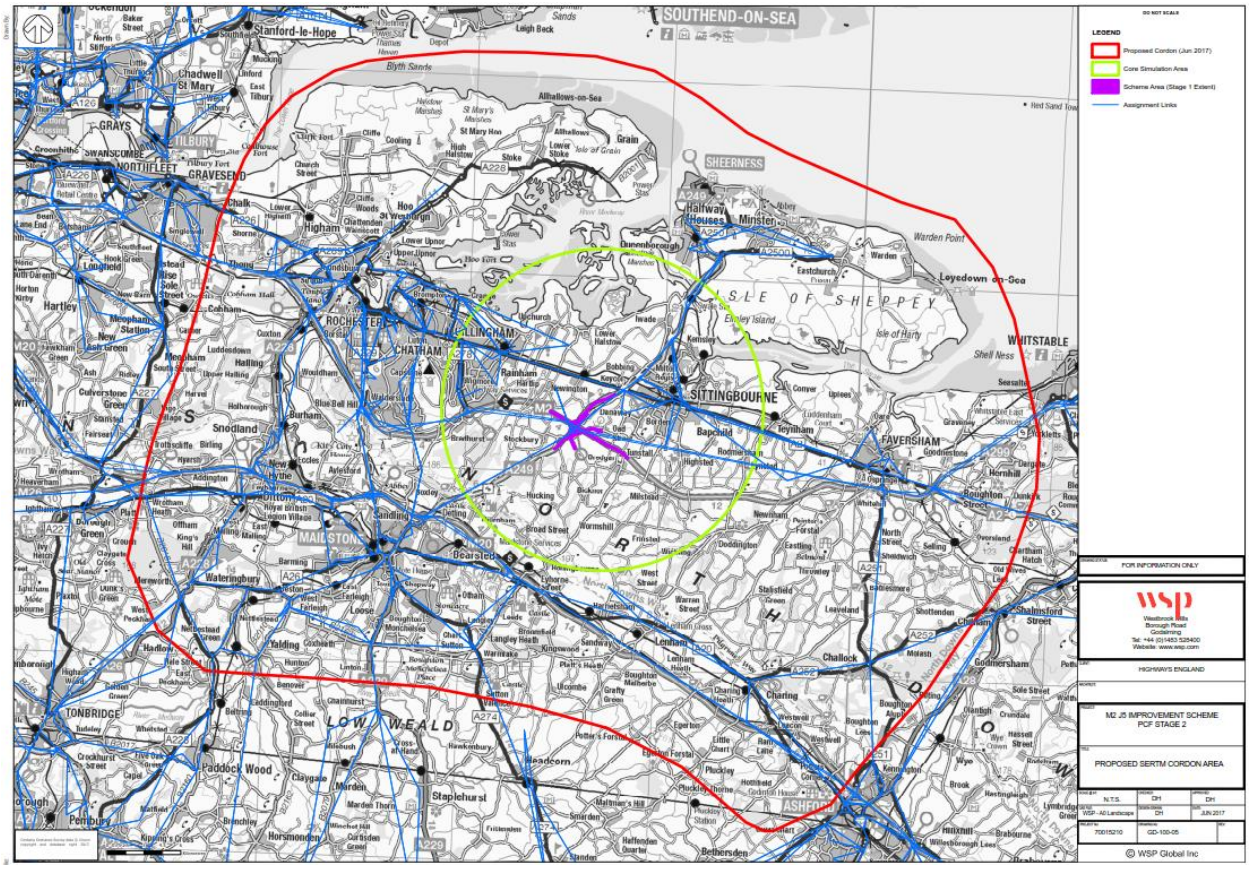
3.2 In addition to the above one further consideration is in relation to defining centroid connectors at cordon points is required when developing a cordon model, in particular, if the model is to be used for developing VDM as well. For the purpose of developing VDM, the connectors on the cordon crossing points need to characterise representative costs in terms of travel time and speed.

3.3 Proposed cordon area and an approach for developing VDM are discussed below.

Cordon Model

3.4 Figure 3.1 depicts the proposed cordon area and has taken in to consideration all the factors discussed in paragraph 3.1 of this note. The area within the red boundary is proposed to be the cordoned modelled area, whilst the green boundary represents the core modelled area.

Figure 3.1 Proposed cordon area



3.5 The area inside the red boundary line currently has simulation coding and has a tendency to generate simulation based model noise in the immediate network to the core modelled area. Firstly, we would review the level of model noise in the simulation area adjacent to the core modelled area and if the level of noise can be kept to minimal by further improvements then we will retain the network simulation structure of the network. If noise is found to be more significant in the area adjacent to simulation network this will be further examined to see if this section of the network could be converted to buffer to minimise model noise whilst ensuring that the expected traffic routing via the simulation network is not significantly altered or avoid the simulation as a result of this conversion.

3.6 Currently the SERTM network has multiple simulation centroid connectors connecting to a common node at a number of places. With zero distance between zones, an elastic assignment causes these zones to produce spurious demand. This was found during recent elasticity tests. Therefore, in addition to the above, we propose to fix many of the multiple simulation centroid connectors to control undue demand responses during an elastic assignment.

3.7 Short-distance trips, particularly intra-zonal trips can become unduly sensitive to cost changes. Tendency for occurrences of this type of phenomenon in the local model will be reviewed and a parameter value would be designed to prevent this happening.

Cost Damping

3.8 Sensitivity of drivers to changes in travel costs, in particular, trip length needs consideration when developing demand model as studies have found that sensitivity tends to decline as trip length increases. Therefore some form of cost damping is required to adjust the cost for longer trips so that their sensitivity to fuel cost or travel time is reduced. We propose that cost damping is done by either:

- function of distance or
- a power function

3.9 As the local model for this study is a derivation of a very large regional model (SERTM), its trip lengths vary from very long distance to medium and short trip lengths. Once the model is cordoned then the original properties of long distance trips are no longer retained in their entirety. This can affect the variable demand modelling because the full trip lengths are not accurately represented; for example, a small change in cost is unlikely to have the same impact as on a journey of say, 10km as for a journey of 80km. To apply cost damping, trip lengths, journey times and speeds of the trips crossing the cordon boundary need to be defined for the cordoned model. At the cordon boundary, we propose to add additional links via which external zones will be connected. These links will be coded with representative time/speed and distance and the coded time and distance will be deduced from select link analyses data obtained using the full SERTM at cordon crossing points.

Base Year Model

3.10 As undertaken previously a 2015 baser year model will be calibrated and validated using the SERTM DF3 network and matrix. We were successful in calibrating and validating the previously cordoned version of the model by retaining the zone structure and implementing network enhancements. For the proposed smaller cordon model we propose to adopt a similar approach and will implement zone disaggregation and further network enhancement if the initial results necessitate these to be carried out.

3.11 This calibrated and validated 2015 base model will then be used as the basis for forecasting from and will include the following years (2021, 2031, 2036, 2041, and 2051).

4 VARIABLE DEMAND MODELLING

4.1 For developing a variable demand model, as recommended by Highways England, we propose to use regional transport model specific version, of DIADEM, v6.3.3.

4.2 Given there is limited scope for public/passenger transport intervention and the proposed scheme does not include any changes to public transport services, we do not propose to carryout mode choice modelling. The model also does not include active modes. Hence the VDM trip frequency elasticity parameters should be stronger and capable of representing the effect of active modal transfer and model choice. Commuting and business trips are assumed to be fixed hence it is not necessary to model trip frequency of these trips. However, it may be argued that this assumption does not hold if active modes have also been omitted these are likely to form a significant percentage of commuting trips, and or the planned intervention will result in a significant impact on active mode users. Given the location and the type of proposed improvement, the impact of the improvements is unlikely to result in a significant impact on active modes users. Hence trip frequency response would not be modelled for commuting and business trips.

4.3 TAG Unit M2 provides elasticity that reflects change in car trips with respect to car journey time. For the use in the demand model, this needs to be converted to generalised cost elasticity. The formula of the following form will be used to derive generalised cost elasticity:

4.4 Generalised Cost Elasticity = Journey Time Elasticity * (1+kV)

Where:

K is the coefficient of PPK/PPM, PPK is pence per kilometre and PPM is pence per minute used in the base year, V= is the average speed in the base year in kilometres per minute

4.5 A variable demand using DIADEM V6.3.3 will be developed to model the following responses :

- trip frequency; and
- destination choice

4.6 In the traffic forecasting report we will prepare a section on Alternative Modes Assessment. This will address all the possible alternative modes and will follow the guidelines set out in TAME Advice Note No.2. Comments will be prepared in relation to alternative modes considered and their ability to meet the forecast demand. This information will help to answer the following two questions:

- Could an alternative modal intervention solve the identified problem?
- Knowing the benefits of the preferred option, what impact would a modal alternative require in order relieving the problem to the same degree, and is that viable?

4.7 The base year matrices are in O-D form, and we will undertake VDM on O-D basis. We propose to use the validated base year model for pivoting off the reference costs and the reference forecast demand will be derived on the validated base year matrix using NTEMv7.2. This will form the Core forecast scenario. High and low growth scenarios will also be produced in line with WebTAG guidance.

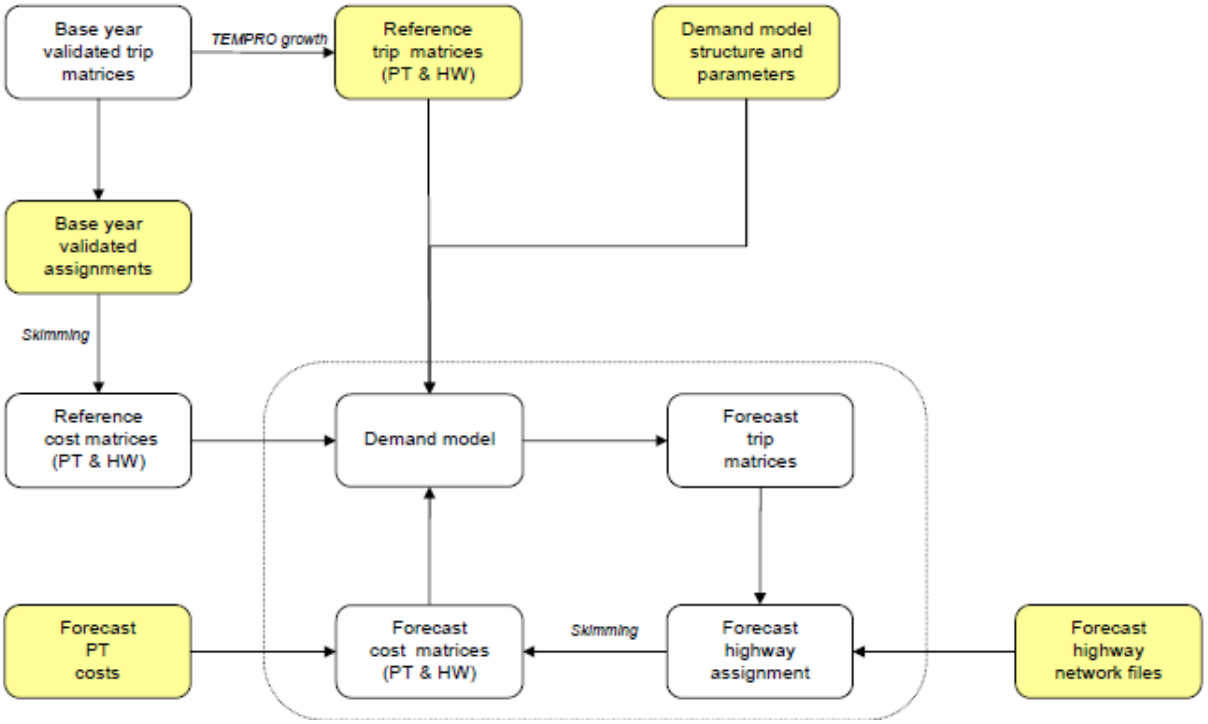
4.8 In addition to the Core scenario, an Alternative scenario will be produced with Local Plan projections applied for the areas of Maidstone, Medway and Swale, with adjusted NTEMv7.2 applied for background growth. This scenario is required. And previously agreed, as Local Plan projections are significantly higher than NTEMv7.2. Trip end growth will not be constrained in this Alternative scenario due to the level of growth at the local level.

4.9 HGV growth will be applied through the application of NTM forecasts in line with WebTAG guidance.

4.10 DIADEM requires that for every non-zero cell in the reference trip matrix there must be a corresponding cost in the reference cost file. Our forecast reference matrix has more zones than in the base matrix to represent future growth in the area due to new developments. To bring the base matrix structure in line with reference case matrix structure, we will add the new development zones to the base matrix with zero trips.

4.11 The proposed structure of the VDM using DIADEM is shown in Figure 4.1.

Figure 4.1 Structure of the proposed DIADEM run using validated base year model



Source: DIADEM User Manual Version 5 [1]

Creating cost matrices

4.12 SATURN offers the following two methods for skimming costs:

- Forest skims, which is averaging (flow-weighted) over all used paths; and
- Skims of a minimum cost path.

4.13 DIADEM recommends the minimum cost path option subject to meeting convergence criteria and maintaining consistency of cost function between the assignment and the demand model. One of the advantages of this approach is the running time is much shorter than for skimming average cost path.

Realism Testing using DIADEM

4.14 Realism testing will be undertaken in accordance with guidance provided in TAG Unit M2. It sets out that testing should be done to determine the elasticity of demand in the model to changes in car fuel cost. Whilst the main requirement is to verify the output elasticity of vehicle kilometres with respect to the cost of fuel, WebTAG recommends that elasticity of vehicle kilometres with respect to journey time are also carried out. For the car fuel cost test, the TAG Unit recommends that calculations are carried out for a 10% or a 20% fuel cost increase, with a preference for 10% increase and expects an annual average fuel elasticity to lie within the range -0.25 to -0.35 overall across all purposes. For the car journey time test, it recommends no stronger than -0.2. We propose to carry out these two realism tests.

[1] Please noted that the proposed approach does not include a mode choice response, therefore the PT costs included in the DIADEM process above are not relevant.

4.15 Initially, calibration of the demand model will start with parameters including lambda used in the SERTM as these were mean values given in WebTAG. Calibration of the demand model will try to achieve fuel price elasticities in the range of -0.25 to -0.35 by varying the lambda value. The parameters in the calibrated demand model would be within the range specified in WebTAG. The calibrated model will be used in the development of forecast scenarios.

Sensitivity Testing

4.16 Sensitivity tests will be carried out in accordance with guidance in TAG Unit M2. The main purpose of the sensitivity test is to check the behaviour of calibrated demand model to changes in the forecast network and scheme appraisal. In carrying out sensitivity tests, consideration to be given to the fact that mode choice and active modes have not been modelled. Hence sensitivity tests will focus on test the robustness of the parameters that represent the effect of mode choice and active modes on the outcome of the scheme appraisal.

4.17 TAG Unit M2 recommends that sensitivity testing is carried out to test the effects of the various parameters used in the calibrated model on the outcome of a scheme appraisal. It recommends that the model's behaviour should be tested against variation in those parameters that are judged to:

- have a substantial effect on the model's prediction of changes when forecasting, and;
- Be uncertain in their calibration.

4.18 As the calibration of the demand model was achieved using values imported from SERTM, then the sensitivity results can be tested against +50% of the mean in accordance with TAG Unit M2 guidance. This range is to reflect the greater uncertainty that can occur within the calibrated values.

APPENDIX

B-3 PCF STAGE 2 INTERIM No. 1 OPTIONS ESTIMATES (APRIL 2017)

highways england

FORM 300

PROCUREMENT & COMMERCIAL DIRECTORATE	ESTIMATE RELEASE FORM	
COMMERCIAL DIVISION	Date of This Estimate Release	12 May 2017
COST PLANNING GROUP	Date of Previous Estimate:	26 September 2016
	Is this a Multi Option Scheme?	Yes
	No. of Options: (If Applicable)	4

Scheme Details

Project Name	M2 Junction 5 Improvement: Option 4 - PCF Stage 2		
Project Manager	Vicky Ye	Options Phase PIN	551521
Type of Estimate Requested	Options	Developments Phase PIN	551521
Estimate Identification Number:	681	Construction Phase PIN	551521

ESTIMATE APPROVAL

CESS ADJUSTMENT

	(£) VALUE: MINIMUM	PROJECT TEAM COST	MAXIMUM
BASE ESTIMATE (Jan-16)	38,740,214	58,127,714	96,226,767
UNSCHEDULED ITEMS	1,847,338	2,903,707	4,052,525
RISK ADJUSTMENT:	2,814,874	4,784,853	7,013,321
Contractor/Delivery Partner Risk	-	-	-
Employer / SSSR (incl. Project Risk Managed Centrally)	2,814,874	4,784,853	7,013,321
UNCERTAINTY ALLOWANCE:	-	6,541,445	18,516,920
CESS SUBTOTAL :	43,402,426	72,357,719	125,809,534

The Estimate is based on the detailed stage dates:

Stage DATES	Start	Finish
Pre PCF	17/06/15	05/11/15
Stage 1	06/11/15	30/11/16
Stage 2	01/12/16	31/12/17
Stage 3	01/01/18	31/12/18
Stage 4	01/01/19	08/06/20
Stage 5	12/11/19	18/01/21
Stage 6	19/01/21	31/10/22
OTT (Open to Traffic)		01/11/22

Original PRODUCTION and Peer Review ACTIONS by

	G. Zelazo	Sign
COST ENGINEER	Grzegorz Zelazo	Print
DATE	08/05/17	

RANGE ESTIMATE ADJUSTMENT

	(£) VALUE: P10	ML	P90
RANGE NARROWING:	14,362,558	-	19,816,287
INFLATION ADJUSTMENT:	4,627,567	18,039,891	42,121,121
PORTFOLIO RISK ADJUSTMENT:	5,278,158	7,257,474	9,226,740
RET ADJUSTMENT SUBTOTAL:	24,268,283	25,297,365	31,531,574
RANGE ESTIMATE OUT-TURN	67,670,709	97,655,084	157,341,108

Confirmation that all technical, arithmetical, transfer, file storage and distribution checks have been successfully completed.
Peer Reviewer (Cost Engineer) Signed: J. T. [signature] Name: Jason Dayes Date: 08/05/17

Confirmation that the estimate has been produced in accordance with the MP Cost Estimation Manual and any other relevant guidance.
Estimating Manager Signed: [signature] Name: Bal Barard Date: 09/05/17

Confirmation estimate reflects information provided and will be reported consistently (SGAR's, IDC, Other Governance).
Project Manager Signed: [signature] Name: Vicky Ye Date: 9/05/17

Confirmation for estimate release.
Head of Cost Planning [initials] Signed: [signature] Name: Mark Rowley Date: 9/05/17

COMMENTS

Delivery Route for Scheme: ECI

1) Scheme has been estimated as a standalone output. No specific consideration has been given to the economy or diseconomy of including this scheme within a regional programme;
2) SGAR Dates have been provided by the Project Team, they are different to the dates provided for options assessed during Stage 1;
3) Historic cost are informed by Highways England TDR report and agreed by the Project Manager;
4) The estimate includes a most likely contractor fee percentage of 9%, with a minimum and maximum range of 6% and 12% respectively;
5) The STAT's Estimates have been provided by the Project Team;
6) The Lands Costs: Project team provided a DVS report @ Q3,2016, the cost engineer has simulated the HAL inflation and Risk profile, as agreed with Project Manager;
7) The FTE's for Options, Development, Stage 6 & Stage 7 have been provided and agreed upon by the Project Team, Stage 2 cost is based on the Task Order provided by Project Team;
8) Risk register provided by Project Team (10/03/2017) was qualitatively and quantitattively assessed. CE has to add an uncertainty around general construction risk to adjust risk cost to more realistic level for early stage of the project. This approach was agreed with the Project Team;
9) Project Team has not provided an Efficiency register.

SUMMARY FOR BUDGETARY PURPOSES

	Stage 1 Budget	Stage 2 Budget	Stage 3 Budget	Stage 4 Budget	Stage 5 Budget	Stage 6-7 Budget	Lands Total	Portfolio Risk	Totals
Scheme Min	£0.684M	£1.118M	£1.265M	£1.534M	£2.925M	£53.109M	£1.758M	£5.278M	£67.671M
Scheme Project Team Cost	£0.684M	£1.366M	£1.641M	£1.995M	£3.867M	£78.832M	£2.013M	£7.257M	£97.655M
Scheme Max	£0.684M	£1.881M	£2.413M	£2.973M	£5.774M	£129.829M	£4.561M	£9.227M	£157.341M

highways england

FORM 300

PROCUREMENT & COMMERCIAL DIRECTORATE	ESTIMATE RELEASE FORM	
COMMERCIAL DIVISION	Date of This Estimate Release	12 May 2017
COST PLANNING GROUP	Date of Previous Estimate:	26 September 2016
	Is this a Multi Option Scheme?	Yes
	No. of Options: (If Applicable)	4

Scheme Details

Project Name	M2 Junction 5 Improvement: Option 10 - PCF Stage 2		
Project Manager	Vicky Ye	Options Phase PIN	551521
Type of Estimate Requested	Options	Developments Phase PIN	551521
Estimate Identification Number:	681	Construction Phase PIN	551521

ESTIMATE APPROVAL

CESS ADJUSTMENT

	(£) VALUE: MINIMUM	PROJECT TEAM COST	MAXIMUM
BASE ESTIMATE (Jan-16)	44,474,393	65,977,991	112,754,848
UNSCHEDULED ITEMS	2,236,294	3,517,013	4,911,078
RISK ADJUSTMENT:	2,746,601	4,683,680	6,876,957
Contractor/Delivery Partner Risk		-	-
Employer / SSSR (incl. Project Risk Managed Centrally)	2,746,601	4,683,680	6,876,957
UNCERTAINTY ALLOWANCE:	-	8,625,240	22,756,080
CESS SUBTOTAL :	49,457,288	82,803,925	147,298,963

The Estimate is based on the detailed stage dates:

Stage DATES	Start	Finish
Pre PCF	17/06/15	05/11/15
Stage 1	06/11/15	30/11/16
Stage 2	01/12/16	31/12/17
Stage 3	01/01/18	31/12/18
Stage 4	01/01/19	08/06/20
Stage 5	12/11/19	18/01/21
Stage 6	19/01/21	31/10/22
OTT (Open to Traffic)		01/11/22

Original PRODUCTION and Peer Review ACTIONS by

COST ENGINEER — G Zelazo (Sign) — Grzegorz Zelazo (Print)

DATE 08/05/17

RANGE ESTIMATE ADJUSTMENT

	(£) VALUE: P10	ML	P90
RANGE NARROWING:	16,902,164	-	23,755,230
INFLATION ADJUSTMENT:	5,342,210	20,938,841	49,656,187
PORTFOLIO RISK ADJUSTMENT:	6,072,094	8,325,316	10,567,097
RET ADJUSTMENT SUBTOTAL:	28,316,468	29,264,157	36,468,054
RANGE ESTIMATE OUT-TURN	77,773,757	112,068,082	183,767,017

Confirmation that all technical, arithmetical, transfer, file storage and distribution checks have been successfully completed.
Peer Reviewer (Cost Engineer) Signed: J.T. Name: Jason Dayas Date: 08/05/17

Confirmation that the estimate has been produced in accordance with the MP Cost Estimation Manual and any other relevant guidance.
Estimating Manager Signed: [signature] Name: Bal Barard Date: 09/05/17

Confirmation estimate reflects information provided and will be reported consistently (SGAR's, IDC, Other Governance).
Project Manager Signed: [signature] Name: Vicky Ye Date: 9/05/17

Confirmation for estimate release.
Head of Cost Planning pp Signed: pp [signature] Name: Mark Rowley Date: 9/5/17

COMMENTS

Delivery Route for Scheme: ECI

1) Scheme has been estimated as a standalone output. No specific consideration has been given to the economy or diseconomy of including this scheme within a regional programme;
2) SGAR Dates have been provided by the Project Team, they are different to the dates provided for options assessed during Stage 1;
3) Historic cost are informed by Highways England TDR report and agreed by the Project Manager;
4) The estimate includes a most likely contractor fee percentage of 9%, with a minimum and maximum range of 6% and 12% respectively;
5) The STAT's Estimates have been provided by the Project Team;
6) The Lands Costs: Project team provided a DVS report @ Q3,2016, the cost engineer has simulated the HAL inflation and Risk profile, as agreed with Project Manager;
7) The FTE's for Options, Development, Stage 6 & Stage 7 have been provided and agreed upon by the Project Team, Stage 2 cost is based on the Task Order provided by Project Team;
8) Risk register provided by Project Team (10/03/2017) was qualitatively and quantitatively assessed. CE has to add an uncertainty around general construction risk to adjust risk cost to more realistic level for early stage of the project. This approach was agreed with the Project Team;
9) Project Team has not provided an Efficiency register.

SUMMARY FOR BUDGETARY PURPOSES

	Stage 1 Budget	Stage 2 Budget	Stage 3 Budget	Stage 4 Budget	Stage 5 Budget	Stage 6-7 Budget	Lands Total	Portfolio Risk	Totals
Scheme Min	£0.684M	£1.118M	£1.356M	£1.665M	£3.142M	£62.228M	£1.509M	£6.072M	£77.774M
Scheme Project Team Cost	£0.684M	£1.366M	£1.759M	£2.164M	£4.146M	£91.883M	£1.741M	£8.325M	£112.068M
Scheme Max	£0.684M	£1.881M	£2.587M	£3.224M	£6.199M	£154.415M	£4.210M	£10.567M	£183.767M

highways england

FORM 300

PROCUREMENT & COMMERCIAL DIRECTORATE COMMERCIAL DIVISION COST PLANNING GROUP	**ESTIMATE RELEASE FORM**

Date of This Estimate Release	12 May 2017
Date of Previous Estimate:	26 September 2016
Is this a Multi Option Scheme?	Yes
No. of Options: (If Applicable)	4

Scheme Details

Project Name	M2 Junction 5 Improvement: Option 12 - PCF Stage 2		
Project Manager	Vicky Ye	Options Phase PIN	551521
Type of Estimate Requested	Options	Developments Phase PIN	551521
Estimate Identification Number:	681	Construction Phase PIN	551521

ESTIMATE APPROVAL

CESS ADJUSTMENT

	(£) VALUE: MINIMUM	PROJECT TEAM COST	MAXIMUM
BASE ESTIMATE (Jan-16)	19,427,666	30,688,782	53,707,464
UNSCHEDULED ITEMS	809,083	1,271,744	1,774,895
RISK ADJUSTMENT:	3,062,503	5,186,441	7,582,415
Contractor/Delivery Partner Risk			
Employer / SSSR (incl. Project Risk Managed Centrally)	3,062,503	5,186,441	7,582,415
UNCERTAINTY ALLOWANCE:	1,669,500	1,501,745	6,308,920
CESS SUBTOTAL :	21,629,752	38,648,711	69,373,694

The Estimate is based on the detailed stage dates:

Stage DATES	Start	Finish
Pre PCF	17/06/15	05/11/15
Stage 1	06/11/15	30/11/16
Stage 2	01/12/16	31/12/17
Stage 3	01/01/18	31/12/18
Stage 4	01/01/19	08/06/20
Stage 5	12/11/19	18/01/21
Stage 6	19/01/21	30/04/22
OTT (Open to Traffic)		01/05/22

Original PRODUCTION and Peer Review ACTIONS by

COST ENGINEER — Sign: G. Zelazo — Print: Grzegorz Zelazo

DATE 08/05/17

RANGE ESTIMATE ADJUSTMENT

	(£) VALUE: P10	ML	P90
RANGE NARROWING:	8,341,632	-	11,421,784
INFLATION ADJUSTMENT:	1,832,175	8,774,304	20,779,494
PORTFOLIO RISK ADJUSTMENT:	2,774,182	3,861,889	4,944,073
RET ADJUSTMENT SUBTOTAL:	12,947,989	12,636,192	14,301,782
RANGE ESTIMATE OUT-TURN	34,577,741	51,284,904	83,675,476

Confirmation that all technical, arithmetical, transfer, file storage and distribution checks have been successfully completed.

Peer Reviewer (Cost Engineer) — Signed: — Name: Jason Dayes — Date: 08/05/17

Confirmation that the estimate has been produced in accordance with the MP Cost Estimation Manual and any other relevant guidance.

Estimating Manager — Signed: — Name: Bal Barard — Date: 09/05/17

Confirmation estimate reflects information provided and will be reported consistently (SGAR's, IDC, Other Governance).

Project Manager — Signed: — Name: Vicky Ye — Date: 09/05/17

Confirmation for estimate release.

Head of Cost Planning — Signed: — Name: Mark Rowley — Date: 9/5/17

COMMENTS

Delivery Route for Scheme: ECI

1) Scheme has been estimated as a standalone output. No specific consideration has been given to the economy or diseconomy of including this scheme within a regional programme;
2) SGAR Dates have been provided by the Project Team, they are different to the dates provided for options assessed during Stage 1;
3) Historic cost are informed by Highways England TDR report and agreed by the Project Manager;
4) The estimate includes a most likely contractor fee percentage of 9%, with a minimum and maximum range of 6% and 12% respectively;
5) The STAT's Estimates have been provided by the Project Team;
6) The Lands Costs: Project team provided a DVS report @ Q3.2016, the cost engineer has simulated the HAL inflation and Risk profile, as agreed with Project Manager;
7) The FTE's for Options, Development, Stage 6 & Stage 7 have been provided and agreed upon by the Project Team, Stage 2 cost is based on the Task Order provided by Project Team;
8) Risk register provided by Project Team (10/03/2017) was qualitatively and quantitatively assessed. CE has to add an uncertainty around general construction risk to adjust risk cost to more realistic level for early stage of the project. This approach was agreed with the Project Team;
9) Project Team has not provided an Efficiency register.

SUMMARY FOR BUDGETARY PURPOSES

	Stage 1 Budget	Stage 2 Budget	Stage 3 Budget	Stage 4 Budget	Stage 5 Budget	Stage 6-7 Budget	Lands Total	Portfolio Risk	Totals
Scheme Min	£0.684M	£1.118M	£1.028M	£1.290M	£2.018M	£24.073M	£1.593M	£2.774M	£34.578M
Scheme Project Team Cost	£0.684M	£1.366M	£1.326M	£1.669M	£2.683M	£37.865M	£1.830M	£3.862M	£51.285M
Scheme Max	£0.684M	£1.881M	£1.942M	£2.483M	£4.019M	£63.336M	£4.386M	£4.944M	£83.675M

highways england

FORM 300

PROCUREMENT & COMMERCIAL DIRECTORATE	ESTIMATE RELEASE FORM	
COMMERCIAL DIVISION	Date of This Estimate Release	12 May 2017
COST PLANNING GROUP	Date of Previous Estimate:	N/a
	Is this a Multi Option Scheme?	Yes
	No. of Options: (If Applicable)	4

Scheme Details			
Project Name	M2 Junction 5 Improvement: Option 12A - PCF Stage 2	Options Phase PIN	551521
Project Manager	Vicky Ye	Developments Phase PIN	551521
Type of Estimate Requested	Options	Construction Phase PIN	551521
Estimate Identification Number:	681		

ESTIMATE APPROVAL

CESS ADJUSTMENT

	(£) VALUE:		
	MINIMUM	PROJECT TEAM COST	MAXIMUM
BASE ESTIMATE (Jan-16)	25,213,879	37,375,117	65,057,099
UNSCHEDULED ITEMS	1,197,971	1,882,679	2,627,093
RISK ADJUSTMENT:	3,087,619	5,228,467	7,642,820
Contractor/Delivery Partner Risk			
Employer / SSSR (Incl. Project Risk Managed Centrally)	3,087,619	5,228,467	7,642,820
UNCERTAINTY ALLOWANCE:	1,575,923	2,369,440	8,986,712
CESS SUBTOTAL :	27,923,547	46,855,703	84,313,523

The Estimate is based on the detailed stage dates:

Stage DATES		
	Start	Finish
Pre PCF	17/06/15	05/11/15
Stage 1	06/11/15	30/11/16
Stage 2	01/12/16	31/12/17
Stage 3	01/01/18	31/12/18
Stage 4	01/01/19	08/06/20
Stage 5	12/11/19	18/01/21
Stage 6	19/01/21	30/04/22
OTT (Open to Traffic)		01/05/22

Original PRODUCTION and Peer Review ACTIONS by — Sign: G. Zelazo

COST ENGINEER — Print: Grzegorz Zelazo

DATE: 08/05/17

RANGE ESTIMATE ADJUSTMENT

	(£) VALUE:		
	P10	ML	P90
RANGE NARROWING:	9,494,497	-	- 13,771,509
INFLATION ADJUSTMENT:	2,316,854	10,863,074	25,837,280
PORTFOLIO RISK ADJUSTMENT:	3,383,501	4,682,087	5,974,080
RET ADJUSTMENT SUBTOTAL	15,194,852	15,545,162	18,039,851
RANGE ESTIMATE OUT-TURN	43,118,399	62,400,865	102,353,375

Confirmation that all technical, arithmetical, transfer, file storage and distribution checks have been successfully completed.

Peer Reviewer (Cost Engineer) — Signed: J.T. Ba — Name: Jason Dayes — Date: 08/05/17

Confirmation that the estimate has been produced in accordance with the M8 Cost Estimation Manual and any other relevant guidance.

Estimating Manager — Signed: — Name: Bal Barard — Date: 09/05/17

Confirmation estimate reflects information provided and will be reported consistently (SGAR's, IDC, Other Governance).

Project Manager — Signed: — Name: Vicky Ye — Date: 9/05/17

Confirmation for estimate release.

Head of Cost Planning — Signed: — Name: Mark Rowley — Date: 9/5/17

COMMENTS

Delivery Route for Scheme: ECI

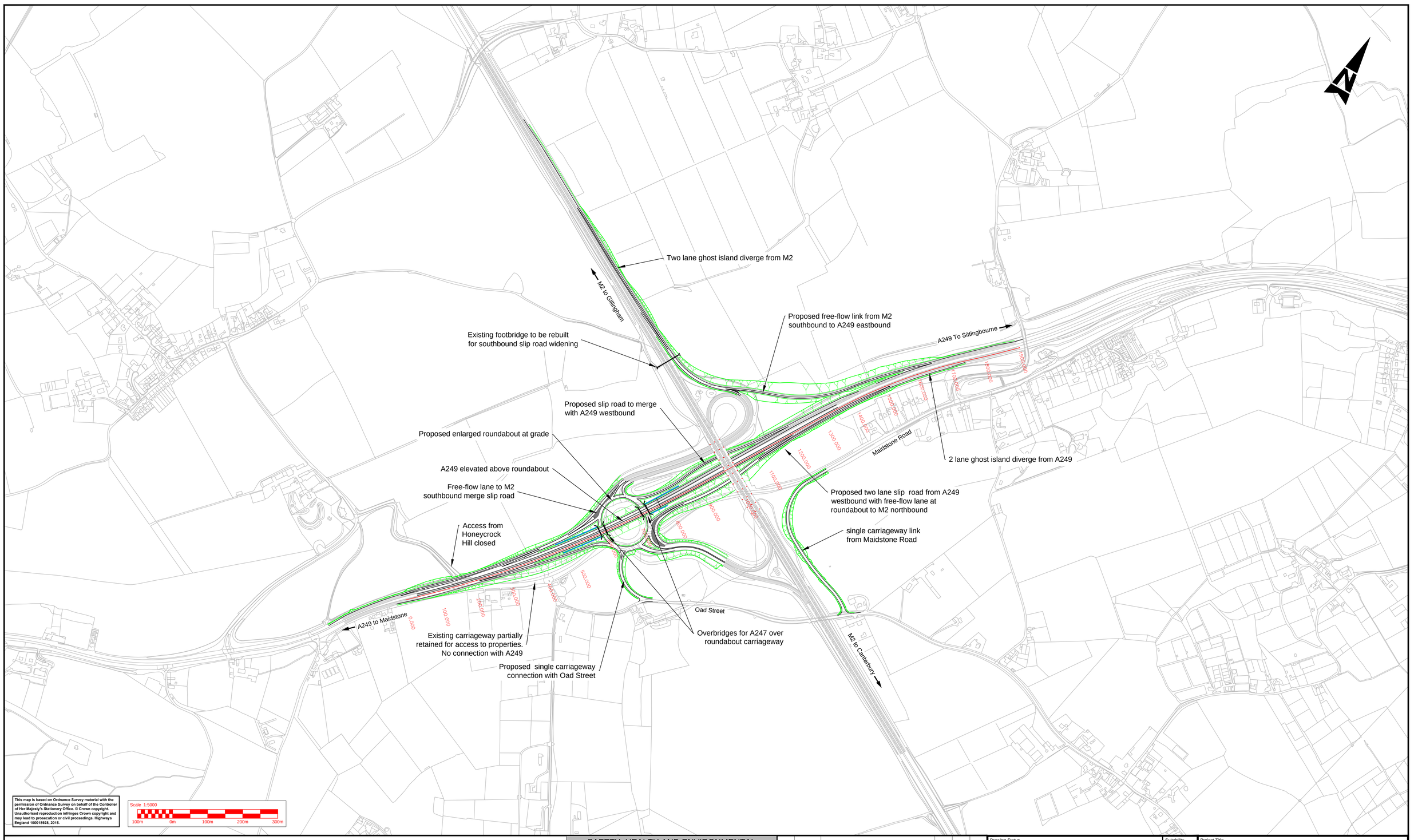
1) Scheme has been estimated as a standalone output. No specific consideration has been given to the economy or diseconomy of including this scheme within a regional programme;
2) SGAR Dates have been provided by the Project Team, they are different to the dates provided for options assessed during Stage 1;
3) Historic cost are informed by Highways England TDR report and agreed by the Project Manager;
4) The estimate includes a most likely contractor fee percentage of 9%, with a minimum and maximum range of 6% and 12% respectively;
5) The STAT's Estimates have been provided by the Project Team;
6) The Lands Costs: Project team provided a DVS report @ Q3,2016 for Option 12, cost engineer has simulated the HAL inflation and Risk profile; PT didn't provide a LCE for that option. CE was advised to use option 12 LCE and uplift it by 10, 15 and 25% for Min, ML and MAX respectively. The uplift is allocated in uncertainty around land acquisition, as agreed with Project Team;
7) The FTE's for Options, Development, Stage 6 & Stage 7 have been provided and agreed upon by the Project Team, Stage 2 cost is based on the Task Order provided by Project Team;
8) Risk register provided by Project Team (10/03/2017) was qualitatively and quantitatively assessed. CE has to add an uncertainty around general construction risk to adjust risk cost to more realistic level for early stage of the project. This approach was agreed with the Project Team;
9) Project Team has not provided an Efficiency register.

SUMMARY FOR BUDGETARY PURPOSES

	Stage 1 Budget	Stage 2 Budget	Stage 3 Budget	Stage 4 Budget	Stage 5 Budget	Stage 6-7 Budget	Lands Total	Portfolio Risk	Totals
Scheme Min	£0.684M	£1.118M	£1.027M	£1.289M	£2.021M	£31.767M	£1.829M	£3.384M	£43.118M
Scheme Project Team Cost	£0.684M	£1.366M	£1.326M	£1.669M	£2.683M	£47.896M	£2.095M	£4.682M	£62.401M
Scheme Max	£0.684M	£1.881M	£1.942M	£2.484M	£4.021M	£79.964M	£5.404M	£5.974M	£102.353M

DO NOT SCALE

Millimetres 0 10 100



Scale 1:5000

100m 0m 100m 200m 300m

KEY:

- Proposed hardshoulder / hardstrip
- Proposed verge
- Proposed geotecnical / retaining solution
- Proposed bridge structure
- Existing carriageway to remain

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	13/05/16	First issue	WE	AS	GH
P02.1	26/07/16	Revised layout for cost estimate	TC	AS	GH

Drawing Status: SUITABLE FOR STAGE APPROVAL

Suitability: S0

WSP
PARSONS BRINCKERHOFF
Westbrook Mills
Borough Road
Godalming
Surrey
GU7 2AZ
Tel: +44 (0)1483 528400
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www.wsp-pb.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT OPTION 4 SCHEME EXTENTS

Scale	Drawn	Checked	Approved	Authorised
1:5000	TC	AS	GH	DH
Original Size: A1	Date: 26/07/16	Date: 26/07/16	Date: 26/07/16	Date: 26/07/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
HE551521 - WSP - HGN - M2J5 - DR - D - 0041

Project Ref. No.: 5145771

Revision: P02.1

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Millimetres 0 10 100

DO NOT SCALE

N

M2 to Gillingham

NEW 2 LANE GHOST ISLAND DIVERGE FROM M2.

NEW 2 GHOST ISLAND MERGED TO A249.

NEW 2 LANE GHOST ISLAND MERGE TO M2.

EXISTING FOOTBRIDGE REBUILT TO ACCOMMODATE SLIP ROAD WIDENING ON M2 SOUTHBOUND CARRIAGEWAY

A249 To Sittingbourne

PROPOSED GYRATORY - ELEVATED ABOVE A249.

EXISTING A249 AND GYRATORY TO BE ABANDONED.

Maidstone Road

NEW 2 LANE GHOST ISLAND DIVERGE FROM A249.

NEW 2 LANE GHOST ISLAND DIVERGE FROM A249.

PROPOSED PRIORITY JUNCTION.

A249 REALIGNED AT GRADE. D2AP 2 X 3.65m LANES .

PROPOSED 7.3M WIDE SINGLE CARRIAGEWAY WITH 2.5M VERGE BOTH SIDES.

ACCESS FROM HONEYCROCK HILL CLOSED

PROPOSED LINK 2 X 3.65m WIDE LANES WITH HARD-SHOULDER, FREE-FLOW LANE TO A249 WEST-BOND

OAD STREET

A249 to Maidstone

NEW 2 LANE GHOST ISLAND MERGE.

EXISTING A249 SOUTHBOUND CARRIAGEWAY RETAINED FOR LOCAL ACCESS.

EXISTING ACCESS TO A249 FROM OAD STREET CLOSED

EXISTING OAD STREET BRIDGE TO BE REBUILT TO ACCOMMODATE SLIP ROAD WIDENING ON M2.

EXISTING AUXILIARY LANE FOR DIVERGE EXTENDED

M2 to Canterbury

Scale 1:5000

100m 0m 100m 200m 300m

KEY:

- Proposed hardshoulder / hardstrip
- Proposed verge
- Proposed geotecnical / retaining solution
- Proposed bridge structure
- Existing carriageway to be made redundant
- Existing carriageway to remain

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	13/05/16	First Issue	WE	AS	GH
P02	26/07/16	Revised layout for cost estimate	TC	AS	GH

Drawing Status: SUITABLE FOR STAGE APPROVAL — Suitability: S0

WSP PARSONS BRINCKERHOFF
Westbrook Mills
Borough Road
Godalming
Surrey
GU7 2AZ
Tel: +44 (0)1483 528400
Fax: +44 (0)1483 528989
www.wsp-pb.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT OPTION 10 SCHEME EXTENTS

Scale	Drawn	Checked	Approved	Authorised
1:5000	TC	AS	GH	RE
Original Size	**Date**	**Date**	**Date**	**Date**
A1	26/07/16	26/07/16	26/07/16	26/07/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
HE551521 - WSP - HGN - M3J5 - DR - D - 0101

Project Ref. No.: 5145771

Revision: P02

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DO NOT SCALE

Millimetres 0 10 100

NEW 2 LANE GHOST ISLAND DIVERGE

PROPOSED FREE FLOW LINK FROM M2 SOUTHBOUND TO A249 EASTBOUND 1 X 3.65m LANE WITH HARDSHOULDER

EXISTING SLIP ROAD ONTO M2 RETAINED.

EXISTING FOOTBRIDGE REBUILT TO ACCOMMODATE SLIP ROAD WIDENING ON M2 SOUTHBOUND CARRIAGEWAY

A249 To Sittingbourne

M2 to Gillingham

EXISTING D2AP 2x3.65m LANES

Maidstone Road

PROPOSED ROUNDABOUT AT GRADE

SINGLE LANE FREE-FLOW LINK FOR LEFT-TURNING TRAFFIC

EXISTING D2AP 2 x 3.65m LANES

SINGLE LANE FREE-FLOW LINK FOR LEFT-TURNING TRAFFIC

PROPOSED 7.3M WIDE SINGLE CARRIAGEWAY LINK FROM MAIDSTONE ROAD WITH 2.5M VERGE BOTH SIDES.

A249 to Maidstone

PROPOSED 7.3m WIDE SINGLE CARRIAGEWAY LINK TO OAD STREET WITH 2.5m VERGE BOTH SIDES.

M2 to Canterbury

EXISTING ACCESS TO A249 FROM OAD STREET CLOSED

SLIP ROADS FROM M2 NORTHBOUND REPROFILED

Oad Street

EXISTING M2 NORTHBOUND DIVERGE AND MERGE RETAINED.

Scale 1:2500

50m 0m 50m 100m 150m

KEY:

- Proposed hardshoulder / hardstrip
- Proposed verge
- Proposed structure
- Proposed A249 flyover structure
- Existing carriageway to be made redundant
- Existing carriageway to remain

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	04/08/16	First Issue	WE	AS	GH

Drawing Status: WORK IN PROGRESS | Suitability: S0

WSP
PARSONS BRINCKERHOFF
Westbrook Mills
Borough Road
Godalming
Surrey
GU7 2AZ
Tel: +44 (0)1483 528400
Fax: +44 (0)1483 528989
www.wsp-pb.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT OPTION 12

Scale	Drawn	Checked	Approved	Authorised
1:2500	WE	AS	GH	DH
Original Size	**Date**	**Date**	**Date**	**Date**
A1	04/08/16	04/08/16	04/08/16	04/08/2016

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
HE551521 - WSP - HGN - M2J5 - DR - D - 0122

Project Ref. No.: 5145771

Revision: P01

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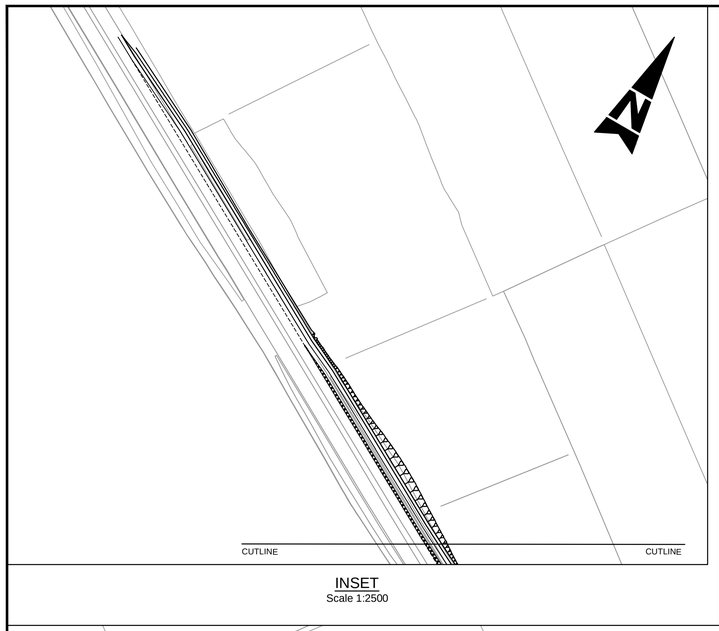
DO NOT SCALE

Millimetres 0 10 100



INSET
Scale 1:2500

CUTLINE
CUTLINE

PROPOSED TYPE B (OPTION 1) DIVERGE

PROPOSED FREE FLOW LINK FROM M2 SOUTHBOUND TO A249 EASTBOUND

EXISTING FOOTBRIDGE REBUILT TO ACCOMMODATE SLIP ROAD WIDENING ON M2 SOUTHBOUND CARRIAGEWAY

A249 To Sittingbourne

M2 to Gillingham

Maidstone Road

EXISTING ACCESS TO STOCKBURY ROUNDABOUT CLOSED

PROPOSED ROUNDABOUT AT GRADE

SINGLE LANE FREE-FLOW LINK FOR LEFT-TURNING TRAFFIC

SINGLE LANE FREE-FLOW LINK FOR LEFT-TURNING TRAFFIC

EXISTING ACCESS FROM HONEYCROCK HILL CLOSED

PROPOSED LINK FROM MAIDSTONE ROAD

PROPOSED CARRIAGEWAY LINK TO OAD STREET

A249 to Maidstone

M2 to Canterbury

Oad Street

EXISTING ACCESS TO A249 FROM OAD STREET CLOSED

PROPOSED OAD OVERBRIDGE

Scale 1:2500
50m 0m 50m 100m 150m

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	13/09/17	First Issue	KAM	EM	PG

Drawing Status: SUITABLE FOR STAGE APPROVAL
Suitability: S0

WSP
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Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME
M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT
OPTION 12A

Scale	Drawn	Checked	Approved	Authorised
1:2500	KAM	EM	PG	---
Original Size	**Date**	**Date**	**Date**	**Date**
A1	13/09/17	13/09/17	13/09/17	---

Drawing Number
Project | Originator | Volume | Location | Type | Role | Number
HE551521 - WSP - HGN - M2J5 - DR - D - 0130

Project Ref. No.: 5145771

Revision: P01

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APPENDIX

B-4 OPTIONEERING LOG (STAGE 0 AND 1)

This Optioneering Log has been prepared in support of, and should be read together with, the Options Log. Its purpose is to show the changes proposed to the existing road network in the identified scheme options in PCF[1] Stages 0 and 1, grouped under the following headings:-

- A249 Carriageway
- M2 and M2 Slip Roads
- Local Road Network

PCF Stage 0:

The purpose of PCF[2] Stage 0 from the PCF guidance is:

- Identify whether there is a transport issue
- Identifying whether there are viability of transport scheme solutions to the problem, and whether these include a road improvement project
- Initiate a roads improvement project, if appropriate

During PCF Stage 0: it was decided that there was a road improvements project to be developed for the junction; and a range of junction improvement options were considered, identifying various different ways of providing additional capacity at the junction (refer to Table 1 below). These options covered a range of complexity, from simple improvements, such as Option 1 which widens the A249 southbound approach from the M2 Stockbury Viaduct to Stockbury Roundabout, to Option 10 which relocates the junction to provide a three tier junction at the M2 Stockbury Viaduct.

Four options, as listed below, were selected covering the range of options, in terms of size, scale and operation. These four options were assessed as described in the Strategy, Shaping and Prioritisation Report[3].

- Option 4 – A249 Flyover / Fly-under;
- Option 6 – A249 Through-about (Hamburger);
- Option 7 – Two-tier Dumbbell (east-west);
- Option 10 – Three-tier intersection at the M2 Stockbury Viaduct.

These four options included revised layouts for three main elements:

- A249 carriageways
- M2 Slip Roads
- Local Roads
    - Maidstone Road
    - Oad Street

[1] PCF: Project Control Framework
[2] PCF: Project Control Framework
[3] M2 Junction 5 Improvements Scheme – PCF Stage 0: Strategy, Shaping and Prioritisation, September 2015, WSP / Atkins

Table 1: PCF Stage 0 Optioneering

Improvement Concept	Description	Option	Comments
A249 Carriageways			
At grade	Widening A249 southbound approach, as standalone options	1, 2, 3	Discounted.
	A249 southbound to M2 westbound turning movement - free flow link, as a standalone option	5	Discounted.
	Through-about for A249 at Stockbury Roundabout	6	Taken forward to PCF Stage 1
	Dumbbell roundabouts at M2 Stockbury Viaduct; A249 at grade with roundabouts	8	Taken forward to PCF Stage 1
	New roundabout under M2 Stockbury Viaduct; A249 at grade with roundabout.	9	Discounted.
Grade separated	A249 flyover / under of Stockbury Roundabout	4	Taken forward to PCF Stage 1
	Dumbbell roundabouts at Stockbury Roundabout location	7	Taken forward to PCF Stage 1
	New roundabout under M2 Stockbury Viaduct; A249 grade separated from roundabout	10	Taken forward to PCF Stage 1
M2 and M2 Slip Roads			
M2 Slip Roads: Free Flow Links	A249 northbound to M2 eastbound turning movement – dedicated lane, similar to existing	4	Forms part of option taken forward to PCF Stage 1.
	A249 southbound to M2 westbound turning movement - free flow link, as a standalone option	5	Discounted.
M2 Slip Roads: Improved Alignments	Dumbbell roundabouts at M2 Stockbury Viaduct; A249 at grade with roundabouts	8	Taken forward to PCF Stage 1
	New roundabout under M2 Stockbury Viaduct; A249 at grade with roundabout)	9	Discounted.
	New roundabout under M2 Stockbury Viaduct; A249 grade separated from roundabout	10	Taken forward to PCF Stage 1
Local Road Network			
Maidstone Road	Link to A249 southbound carriageway north of junction	3	Forms part of discounted option
	Link to new roundabout on A249	8, 9 & 10	Forms part of options taken forward to PCF Stage 1
Oad Street	Link to new roundabout	7	Forms part of options taken forward to PCF Stage 1
	Link to Maidstone Road	8, 9 & 10	Forms part of options taken forward to PCF Stage 1

PCF Stage 1

The purpose of PCF[4] Stage 1, from the PCF guidance is:

- Identify options to be taken to public consultation in PCF Stage 2
- Assess options in terms of environmental impact, traffic forecasts and economic benefits
- Refine the cost estimate of options (including an allowance for risk)

27 road improvement options were considered in PCF Stage 1, refer to Table 2 below, and were evaluated. These options included revised layouts for three main elements:

- A249 carriageways
- M2 Slip Roads
- Local Roads
    - Maidstone Road
    - Oad Street
    - Honeycrock Hill
    - Church hill

The recommendation in the PCF Stage 1 Technical Appraisal Report [5] was that three options should be taken forward into PCF Stage 2.

- Option 4 – A249 flyover
- Option 10 - Three-tier intersection at the M2 Stockbury Viaduct
- Option 12 – At-grade Through-about

At the end of PCF Stage 1 Highways England concluded that of the three options only Option 12 was affordable and, as it was considered to be compliant with the RIS 1[6] statement, it was to be the only option taken forward into PCF 2 for further development. However, due to uncertainties regarding the PCF Stage 1 BCR's[7] Options 4 and 10 were to be modelled in the SERTM8 as well as Option 12.

[4] PCF: Project Control Framework
[5] M2 Junction 5 Improvements Scheme – PCF Stage 1: Technical Appraisal Report, November 2016, Doc No. HE551521_M2J5_TAR_PCF-S1_V2.1, WSP/Atkins
[6] RIS: Road Investment Strategy for the 2015/16 – 2019/20 Road Period, March 2015, Department for Transport
[7] BCR: Benefit to Cost Ratio
[8] SERTM: South East Regional Transport Model

Table 2: PCF Stage 1 Optioneering			
Improvement Concept	Description	Option	Comments
A249 Carriageways			
At grade	Through-about for A249 at Stockbury Roundabout.	6	Discounted.
	Improvement to Stockbury Roundabout.	12 Revised, 12 Revised (a) to (d)	Option 12 Revised recommended to be taken forward to PCF Stage 2.
Grade Separated	A249 flyover of Stockbury Roundabout.	4A to 4G, 4 Revised, 4 Revised (a) to (c)	Option 4 Revised recommended to be taken forward to PCF Stage 2.
	Dumbbell roundabouts at Stockbury Roundabout location.	7A to 7B	Discounted.
	Dumbbell roundabout type layout, with roundabouts over the A249 located to the north and south of the M2 Stockbury Viaduct.	8A to 8C	Discounted.
	New roundabout under M2 Stockbury Viaduct, with A249 grade separated from roundabout.	10A to 10B, 10 Revised	Option 10 Revised recommended to be taken forward to PCF Stage 2.
	Conventional 4 way 4 level diamond interchange, with fully free-flowing links for all M2 / A249 movements.	11	Discounted.
	Variant of conventional 4 way, 3 level interchange, with fully free-flowing links for all M2 / A249 movements.	13	Discounted.
M2 & M2 Slip Roads			
M2 Mainline	Lane drop(s) on M2 mainline carriageway(s).	4B to 4C, 4E	Forms part of discounted options.
M2 Slip Roads: Free Flow Links	M2 eastbound to A249 northbound turning movement– new slip road.	4A to 4C, 4G 4 Revised, 4 Revised (a) to (c), 7A to 7B, 8A to 8C, 11, 12 Revised, 12 Revised (a) to (d), 13	Forms part of Options 4 revised and 12 Revised recommended to be taken forward into PCF Stage 2.

Table 2: PCF Stage 1 Optioneering			
Improvement Concept	Description	Option	Comments
	M2 eastbound to A249 northbound dedicated left turn lane, similar to existing layout.	4D to 4F	Forms part of discounted options.
	M2 westbound to A249 southbound dedicated left turn lane, which passes over Oad Street Link in some of the options.	4E to 4G, 8A to 8C	Forms part of discounted options.
	A249 southbound to M2 westbound dedicated left turn lane; and A249 northbound to M2 eastbound dedicated left turn lane, similar to existing layout.	4A to 4G, 4 Revised, 4 Revised (a) to (c), 7A to 7B, 8A to 8C, 12 Revised, 12 Revised (a) to (d)	Forms part of Options 4 Revised and 12 Revised recommended to be taken forward into PCF Stage 2.
M2 Slip Roads: Improved Alignments	M2 WB off slip and EB on slip realigned.	4A to 4G, 7A to 7B, 8A to 8C	Forms part of discounted options.
	All M2 slip roads realigned.	10A to 10B, 10 Revised, 11, 13	Option 10 Revised recommended to be taken forward to PCF Stage 2.
M2 / A249 Junction: Interchange	Conventional 4 way 4 level diamond interchange, with fully free-flowing links for all M2 / A249 movements.	11	Discounted.
	Variant of conventional 4 way, 3 level interchange, with fully free-flowing links for all M2 / A249 movements.	13	Discounted.
Local Road Network			
Maidstone Road	Link to A249 southbound link north of junction.	4A to 4F, 7A to 7B	Forms part of discounted options.
	Link to new roundabout on A249.	8A to 8C, 10A to 10B, 10 Revised	Forms part of Options 10 Revised recommended to be taken forward into PCF Stage 2.

Table 2: PCF Stage 1 Optioneering			
Improvement Concept	Description	Option	Comments
	Link to Oad Street.	4G, 4 Revised, 4 Revised (a) to (c), 12 Revised, 12 Revised (a) to (c)	Forms part of Options 4 Revised and 12 Revised recommended to be taken forward into PCF Stage 2.
	Maidstone Road severed from Stockbury Roundabout and stopped up close to Stockbury Roundabout.	12 Revised (d)	Discounted.
Oad Street	Link to Maidstone Road. Link to A249 southbound, left-in only.	4A to 4D	Forms part of discounted options.
	Link to Maidstone Road. Link to Stockbury Roundabout (Oad Street Link Option A). M2 WB to A249 SB on structure over Oad Street Link.	4E to 4F	Forms part of discounted options.
	Link to Stockbury Roundabout. Oad Street improved from roundabout to junction with Maidstone Road Link. M2 WB to A249 SB on structure over Oad Street Link.	4G	Forms part of discounted option.
	Link to Stockbury Roundabout (Oad Street Link Option A).	4 Revised, 12 Revised	Forms part of Options 4 Revised and 12 Revised recommended to be taken forward into PCF Stage 2.
	Traffic signals on A249 south of Stockbury Roundabout, at existing Oad Street / A249 junction location.	4 Revised (a) 12 Revised (a)	Discounted.
	Link to A249 southbound south of Stockbury Roundabout:- Left-in / Left-out at existing Oad Street / A249 junction location.	4 Revised (b) 12 Revised (b)	Discounted.
	Link to A249 southbound south of Stockbury Roundabout:- Left-out only.	4 Revised (c) 12 Revised (c)	Discounted.
	Link to dumbbell roundabout, to the south of the M2.	7A to 7B	Forms part of discounted options.

Table 2: PCF Stage 1 Optioneering			
Improvement Concept	Description	Option	Comments
	Link to new roundabout, to the north of the M2.	8A to 8C, 10A to 10B, 10 Revised	Forms part of Option 10 Revised recommended to be taken forward into PCF Stage 2.
Honeycrock Hill	Honeycrock Hill severed from A249 and stopped up close to A249: access to A249 to be via Church Hill.	All options	Forms part of Options 4 Revised, Option 10 Revised and 12 Revised recommended to be taken forward into PCF Stage 2.
Church Hill	Improved junction with A249.	All options	Forms part of Options 4 Revised, Option 10 Revised and 12 Revised recommended to be taken forward into PCF Stage 2.

PCF Stage 2

The purpose of PCF9 Stage 2, from the PCF guidance is:

- Identify whether there is a transport issue;
- Identifying whether there are viable transport scheme solutions to the problem, and whether these include a road improvement project; and
- Initiate a roads improvement project, if appropriate.

15 road improvement options were considered in PCF Stage 2, refer to Table 3 below, and were evaluated. These options included revised layouts for three main elements:

- A249 carriageways
- M2 Slip Roads
- Local Roads
    - Maidstone Road
    - Oad Street
    - Honeycrock Hill
    - Church hill

At the PCF Stage 2 Public Consultation the options listed below were included within the public consultation materials:

- Option 4: Identified as rejected due to cost.
- Option 12 (C): Identified as rejected as it would not create sufficient capacity.
- Option 12A (B): Identified as the only viable option.
- Option 10: Identified as rejected due to cost

All feedback received during the public consultation was reviewed. In response to the lack of support for Option 12A, including the local authority opposition, and the alternatives suggested a value management review was undertaken, which focussed on the elements of Option 4 that were considered to have the greatest potential to reduce costs whilst minimising the reduction in the benefits. This included the elements of Option 4 listed below.

- M2 Eastbound to A249 Northbound single lane slip road
- Oad Street Link
- Maidstone Road Link.

[9] Project Control Framework

Table 3: PCF Stage 2 Optioneering

Improvement Concept	Description	Option	Comments
A249 Carriageways			
At grade	Through-about for A249 at Stockbury Roundabout.	12A (B) to (J)	Option 12A (E) viable regarding cost and performance, in terms of scheme objectives; therefore considered viable overall.
	Improvement to Stockbury Roundabout.	12 (C)	Discounted.
Grade Separated	A249 flyover of Stockbury Roundabout.	4	Superseded by Option 4 Revised Local Roads
		4 Revised Local Roads	Discounted.
		4H1 & 4H2	Option 4H1 viable regarding performance, in terms of scheme objectives, but not viable regarding cost; therefore additional funding required before it could be considered viable overall.
	New roundabout under M2 Stockbury Viaduct, with A249 grade separated from roundabout.	10	Discounted.
M2 & M2 Slip Roads			
M2 Slip Roads: Free Flow Links	M2 eastbound to A249 northbound turning movement– new slip road.	4, 4 Revised Local Roads, 12 (C) 12A (B) to (J)	Forms part of Option 12A (E).
	M2 eastbound to A249 northbound dedicated left turn lane, similar to existing layout.	4H1 & 4H2	Forms part of Option 4H1.
	A249 southbound to M2 westbound dedicated left turn lane; and A249 northbound to M2 eastbound dedicated left turn lane, similar to existing layout.	4, 4 Revised Local Roads, 4H1, 4H2, 12 (C) 12A (B) to (J)	Forms part of Options 12A (E) and 4H1.

Table 3: PCF Stage 2 Optioneering

Improvement Concept	Description	Option	Comments
M2 Slip Roads: Improved Alignments	All M2 slip roads realigned.	10	Discounted
Local Road Network			
Maidstone Road	Link to A249 southbound carriageway, between A2/ A249 Key Street Junction and M2 Junction 5 Roundabout, on immediate approach to roundabout.	12A (H)	Discounted.
	Link to A249 southbound carriageway, between A2/ A249 Key Street Junction and M2 Junction 5 Roundabout, near to existing layby north of Wormdale Hill overbridge.	12A (I)	Discounted.
	Link to new roundabout on A249.	10	Discounted.
	Link to Oad Street adjacent to M2 eastbound carriageway.	4, 12 (C), 12A (B) to (D), 12A (F) to (G)	Discounted.
	Link to Oad Street north of M2 eastbound carriageway.	4 Revised Local Roads, 4H1, 12A (E)	Forms part of Options 12A (E) and 4H1.
	Link to Oad Street routed along Woodgate Lane (a Byway Open to All Traffic (BOAT)).	12A (J)	Discounted.
	Maidstone Road severed from Stockbury Roundabout and stopped up close to Stockbury Roundabout.	4H2	Discounted.
Oad Street	Option B: Link to M2 Junction 5 Roundabout to south of Whipstakes Farm.	12A (B)	Discounted.
	Option C: Link to M2 Junction 5 Roundabout through Chestnut Wood.	4, 12 (C), 12A (C)	Discounted.
	Option D: Link to M2 Junction 5 Roundabout through Whipstakes Farm.	12A (D)	Discounted.

Table 3: PCF Stage 2 Optioneering			
Improvement Concept	Description	Option	Comments
	Option E: Link to M2 Junction 5 Roundabout closer to A249.	4 Revised Local Roads 4H1, 4H2, 12A (E)	Forms part of Options 12A (E) and 4H1.
	Option F: One way link Oad Street to M2 Junction 5 Roundabout adjacent to the M2 WB offslip; and one way link A249 SB to Oad Street.	12A (F)	Discounted.
	Option G: Link south of M2 Junction 5 and east of A249; bridge over A249; and left in/out provisions on both A249 carriageways.	12A (G)	Discounted.
	Link to new roundabout, to the north of the M2.	10	Discounted.
Honeycrock Hill	Honeycrock Hill severed from A249 and stopped up close to A249: access to A249 to be via Church Hill.	All options	Forms part of Options 12A (E) and 4H1.
Church Hill	Improved junction with A249.	All options	Forms part of Options 12A (E) and 4H1.

APPENDIX

B-5 PCF STAGE 1 FINAL OPTION ESTIMATES

FORM 300A v.1.1

MAJOR PROJECTS DIRECTORATE	ESTIMATE RELEASE FORM	
COMMERCIAL DIVISION	Date of This Estimate Release	26 September 2016
ESTIMATING SECTION	Date of Previous Estimate:	31 May 2016
	Is this a Multi Option Scheme?	Yes
	No. of Options: (If Applicable)	3

Scheme Details

Project Name	M2 J5 Improvement - PCF Stage 1 - Option: 4	Options Phase PIN	551521
Project Manager	Ross Verhey	Developments Phase PIN	0
Type of Estimate Requested	Options	Construction Phase PIN	0
Estimate Identification Number:	596		

ESTIMATE APPROVAL

CESS ADJUSTMENT

	(£) VALUE: MINIMUM	PROJECT TEAM COST	MAXIMUM
BASE ESTIMATE (Jan-14)	33,203,564	45,222,177	70,527,631
UNSCHEDULED ITEMS	1,390,877	2,086,316	2,781,754
RISK ADJUSTMENT:	871,074	9,065,509	18,856,441
Contractor/Delivery Partner Risk	-	-	-
Employer / SSSR (incl. Project Risk Managed Centrally)	871,074	9,065,509	18,856,441
UNCERTAINTY ALLOWANCE:	94,481	565,099	2,053,221
CESS SUBTOTAL :	**35,559,997**	**56,939,100**	**94,219,047**

The Estimate is based on the detailed SGAR dates:

SGAR DATES	MONTH / YEAR
Start of Options	
SGAR1	Nov-16
SGAR2	Dec-17
SGAR3	May-19
SGAR4	Sep-20
SGAR5	Jan-21
SGAR6	Jun-22
OTT (Open to Traffic)	Jun-22

Original PRODUCTION and Peer Review ACTIONS by — Sign

COST ENGINEER — Ryan Lindfield — Print

DATE

RANGE ESTIMATE ADJUSTMENT

	(£) VALUE: P10	ML	P90
RANGE NARROWING:	9,904,866		- 13,845,881
INFLATION ADJUSTMENT:	14,070,539	17,663,535	25,277,612
PORTFOLIO RISK ADJUSTMENT:	4,351,668	6,132,882	7,508,313
RET ADJUSTMENT SUBTOTAL:	28,327,073	23,796,417	18,940,043
RANGE ESTIMATE OUT-TURN	**63,887,069**	**80,735,518**	**113,159,091**

PM sign off and confirmation of Estimate (Phase Budgets, for next investment decision will accord with any investment submission to IDC).

Project Manager	Signed	Name:	Date:

I am content that the estimate/s have been produced in accordance with the guidance set out in the MP Cost Estimation Manual.

Estimating Manager	Signed	Name: Bal Barard	Date:
Head of Cost Planning	Signed	Name: Mark Rowley	Date:

COMMENTS

The Project Manager has identified that no historic costs are to be included in this scheme estimate as Stage 0 was funded outside the current funding profile. This has been confirmed by the Regional Finance Manager.
This scheme has been estimated as a standalone output. Therefore, no specific consideration has been given to the economy or diseconomy of including this scheme within a regional programme.
Project Team has not provided an Efficiency Register.
No consideration to contributions by third parties has been considered in this estimate.
The FTE have been provided and agreed upon by the Project Team for the Options, Development, Stage 6 & Stage 7.
Estimate assumes an ECI contract with the majority of detailed design developed 'pre-Notice to Proceed'.
No C3 Statutory Undertaker information has been provided.
The Estimate includes a Most Likely Contractor Fee percentage of 9% with a minimum and maximum range of 6% & 12% respectively.
The Project Team has indicated that for this estimate a DCO should be assumed to occur.
This estimate has specifically excluded the possibility for reverting back to the original design associated with the previous estimate (Dated May 2016).

SUMMARY FOR BUDGETARY PURPOSES

	Stage 1 Budget	Stage 2 Budget	Stage 3 Budget	Stage 4 Budget	Stage 5 Budget	Stage 6-7 Budget	Lands Total	Portfolio Risk	Totals
Scheme Min	£0.557M	£1.600M	£2.212M	£1.906M	£1.095M	£50.314M	£1.852M	£4.352M	£63.887M
Scheme Project Team Cost	£0.660M	£1.966M	£2.656M	£2.412M	£1.493M	£63.131M	£2.284M	£6.133M	£80.736M
Scheme Max	£0.944M	£2.767M	£4.192M	£3.433M	£1.992M	£87.333M	£4.989M	£7.508M	£113.159M

FORM 300A v.1.1

MAJOR PROJECTS DIRECTORATE	ESTIMATE RELEASE FORM	
COMMERCIAL DIVISION	Date of This Estimate Release	26 September 2016
ESTIMATING SECTION	Date of Previous Estimate:	31 May 2016
	Is this a Multi Option Scheme?	Yes
	No. of Options: (If Applicable)	3

Scheme Details

Project Name	M2 J5 Improvement - PCF Stage 1 - Option: 10	Options Phase PIN	551521
Project Manager	Ross Verhey	Developments Phase PIN	0
Type of Estimate Requested	Options	Construction Phase PIN	0
Estimate Identification Number:	596		

ESTIMATE APPROVAL

CESS ADJUSTMENT

	(£) VALUE:			The Estimate is based on the detailed SGAR dates:	SGAR DATES	MONTH / YEAR
	MINIMUM	PROJECT TEAM COST	MAXIMUM		Start of Options	
BASE ESTIMATE (Jan-14)	37,348,255	49,554,716	84,944,269		SGAR1	Nov-16
					SGAR2	Dec-17
					SGAR3	May-19
					SGAR4	Sep-20
UNSCHEDULED ITEMS	1,534,443	2,301,664	3,068,886		SGAR5	Jan-21
					SGAR6	Jun-22
RISK ADJUSTMENT:	978,560	10,187,281	21,196,226		OTT (Open to Traffic)	Jun-22
Contractor/Delivery Partner Risk	-	-	-			
Employer / SSSR (incl. Project Risk Managed Centrally)	978,560	10,187,281	21,196,226			
UNCERTAINTY ALLOWANCE:	-	396,760	3,167,280			
CESS SUBTOTAL :	**39,861,258**	**62,440,422**	**112,376,660**			

Original PRODUCTION and Peer Review ACTIONS by		Sign
COST ENGINEER	Ryan Lindfield	Print
DATE		

RANGE ESTIMATE ADJUSTMENT

	(£) VALUE:		
	P10	ML	P90
RANGE NARROWING:	11,138,079		- 17,853,073
INFLATION ADJUSTMENT:	15,687,915	19,566,531	29,740,873
PORTFOLIO RISK ADJUSTMENT:	4,664,110	6,557,192	8,081,442
RET ADJUSTMENT SUBTOTAL:	31,490,104	26,123,723	19,969,242
RANGE ESTIMATE OUT-TURN	**71,351,363**	**88,564,144**	**132,345,902**

PM sign off and confirmation of Estimate (Phase Budgets, for next investment decision will accord with any investment submission to IDC).

Project Manager	**Signed**	**Name:**	**Date:**

I am content that the estimate/s have been produced in accordance with the guidance set out in the MP Cost Estimation Manual.

Estimating Manager	**Signed**	**Name: Bal Barard**	**Date:**
Head of Cost Planning	**Signed**	**Name: Mark Rowley**	**Date:**

COMMENTS

The Project Manager has identified that no historic costs are to be included in this scheme estimate as Stage 0 was funded outside the current funding profile. This has been confirmed by the Regional Finance Manager.
This scheme has been estimated as a standalone output. Therefore, no specific consideration has been given to the economy or diseconomy of including this scheme within a regional programme.
Project Team has not provided an Efficiency Register.
No consideration to contributions by third parties has been considered in this estimate.
The FTE have been provided and agreed upon by the Project Team for the Options, Development, Stage 6 & Stage 7.
Estimate assumes an ECI contract with the majority of detailed design developed 'pre-Notice to Proceed'.
No C3 Statutory Undertaker information has been provided.
The Estimate includes a Most Likely Contractor Fee percentage of 9% with a minimum and maximum range of 6% & 12% respectively.
The Project Team has indicated that for this estimate a DCO should be assumed to occur.
This estimate has specifically excluded the possibility for reverting back to the original design associated with the previous estimate (Dated May 2016).
This estimate has been based on a design which has had a vertical and horizontal realignment as compared to the previous option and therefore is a different option.

SUMMARY FOR BUDGETARY PURPOSES

	Stage 1 Budget	Stage 2 Budget	Stage 3 Budget	Stage 4 Budget	Stage 5 Budget	Stage 6-7 Budget	Lands Total	Portfolio Risk	Totals
Scheme Min	£0.555M	£1.597M	£2.395M	£2.087M	£1.183M	£57.225M	£1.645M	£4.664M	£71.351M
Scheme Project Team Cost	£0.660M	£1.966M	£2.903M	£2.663M	£1.614M	£70.113M	£2.089M	£6.557M	£88.564M
Scheme Max	£0.941M	£2.761M	£4.522M	£3.752M	£2.143M	£105.399M	£4.747M	£8.081M	£132.346M

FORM 300A v.1.1

MAJOR PROJECTS DIRECTORATE	ESTIMATE RELEASE FORM	
COMMERCIAL DIVISION	Date of This Estimate Release	26 September 2016
ESTIMATING SECTION	Date of Previous Estimate:	N/A
	Is this a Multi Option Scheme?	Yes
	No. of Options: (If Applicable)	3

Scheme Details

Project Name	M2 J5 Improvement - PCF Stage 1 - Option: 12	Options Phase PIN	551521
Project Manager	Ross Verhey	Developments Phase PIN	0
Type of Estimate Requested	Options	Construction Phase PIN	0
Estimate Identification Number:	596		

ESTIMATE APPROVAL

CESS ADJUSTMENT

	(£) VALUE:		
	MINIMUM	PROJECT TEAM COST	MAXIMUM
BASE ESTIMATE (Jan-14)	17,600,189	25,812,521	41,408,521
UNSCHEDULED ITEMS	827,748	1,241,621	1,655,495
RISK ADJUSTMENT:	522,756	5,440,590	11,316,725
Contractor/Delivery Partner Risk	-	-	-
Employer / SSSR (incl. Project Risk Managed Centrally)	522,756	5,440,590	11,316,725
UNCERTAINTY ALLOWANCE:	125,061	670,492	2,395,601
CESS SUBTOTAL :	**19,075,754**	**33,165,224**	**56,776,342**

The Estimate is based on the detailed SGAR dates:

SGAR DATES	MONTH / YEAR
Start of Options	
SGAR1	Nov-16
SGAR2	Dec-17
SGAR3	May-19
SGAR4	Sep-20
SGAR5	Jan-21
SGAR6	Jan-22
OTT (Open to Traffic)	Jan-22

Original PRODUCTION and Peer Review ACTIONS by		Sign
COST ENGINEER	Ryan Lindfield	Print
DATE		

RANGE ESTIMATE ADJUSTMENT

	(£) VALUE:		
	P10	ML	P90
RANGE NARROWING:	6,430,288		- 8,930,074
INFLATION ADJUSTMENT:	7,446,194	9,642,619	14,303,026
PORTFOLIO RISK ADJUSTMENT:	2,449,300	3,500,379	4,330,042
RET ADJUSTMENT SUBTOTAL:	16,325,781	13,142,998	9,702,993
RANGE ESTIMATE OUT-TURN	**35,401,535**	**46,308,222**	**66,479,336**

PM sign off and confirmation of Estimate (Phase Budgets, for next investment decision will accord with any investment submission to IDC).

Project Manager	**Signed**	**Name:**	**Date:**

I am content that the estimate/s have been produced in accordance with the guidance set out in the MP Cost Estimation Manual.

Estimating Manager	**Signed**	**Name: Bal Barard**	**Date:**
Head of Cost Planning	**Signed**	**Name: Mark Rowley**	**Date:**

COMMENTS

The Project Manager has identified that no historic costs are to be included in this scheme estimate as Stage 0 was funded outside the current funding profile. This has been confirmed by the Regional Finance Manager.
This scheme has been estimated as a standalone output. Therefore, no specific consideration has been given to the economy or diseconomy of including this scheme within a regional programme.
Project Team has not provided an Efficiency Register.
No consideration to contributions by third parties has been considered in this estimate.
The FTE have been provided and agreed upon by the Project Team for the Options, Development, Stage 6 & Stage 7.
Estimate assumes an ECI contract with the majority of detailed design developed 'pre-Notice to Proceed'.
No C3 Statutory Undertaker information has been provided.
The Estimate includes a Most Likely Contractor Fee percentage of 9% with a minimum and maximum range of 6% & 12% respectively.
The Project Team has indicated that for this estimate a DCO should be assumed to occur.

SUMMARY FOR BUDGETARY PURPOSES

	Stage 1 Budget	Stage 2 Budget	Stage 3 Budget	Stage 4 Budget	Stage 5 Budget	Stage 6-7 Budget	Lands Total	Portfolio Risk	Totals
Scheme Min	£0.558M	£1.602M	£1.786M	£1.573M	£0.714M	£25.109M	£1.610M	£2.449M	£35.402M
Scheme Project Team Cost	£0.660M	£1.966M	£2.093M	£1.942M	£0.984M	£33.223M	£1.939M	£3.500M	£46.308M
Scheme Max	£0.947M	£2.775M	£3.408M	£2.814M	£1.319M	£46.339M	£4.547M	£4.330M	£66.479M

DO NOT SCALE

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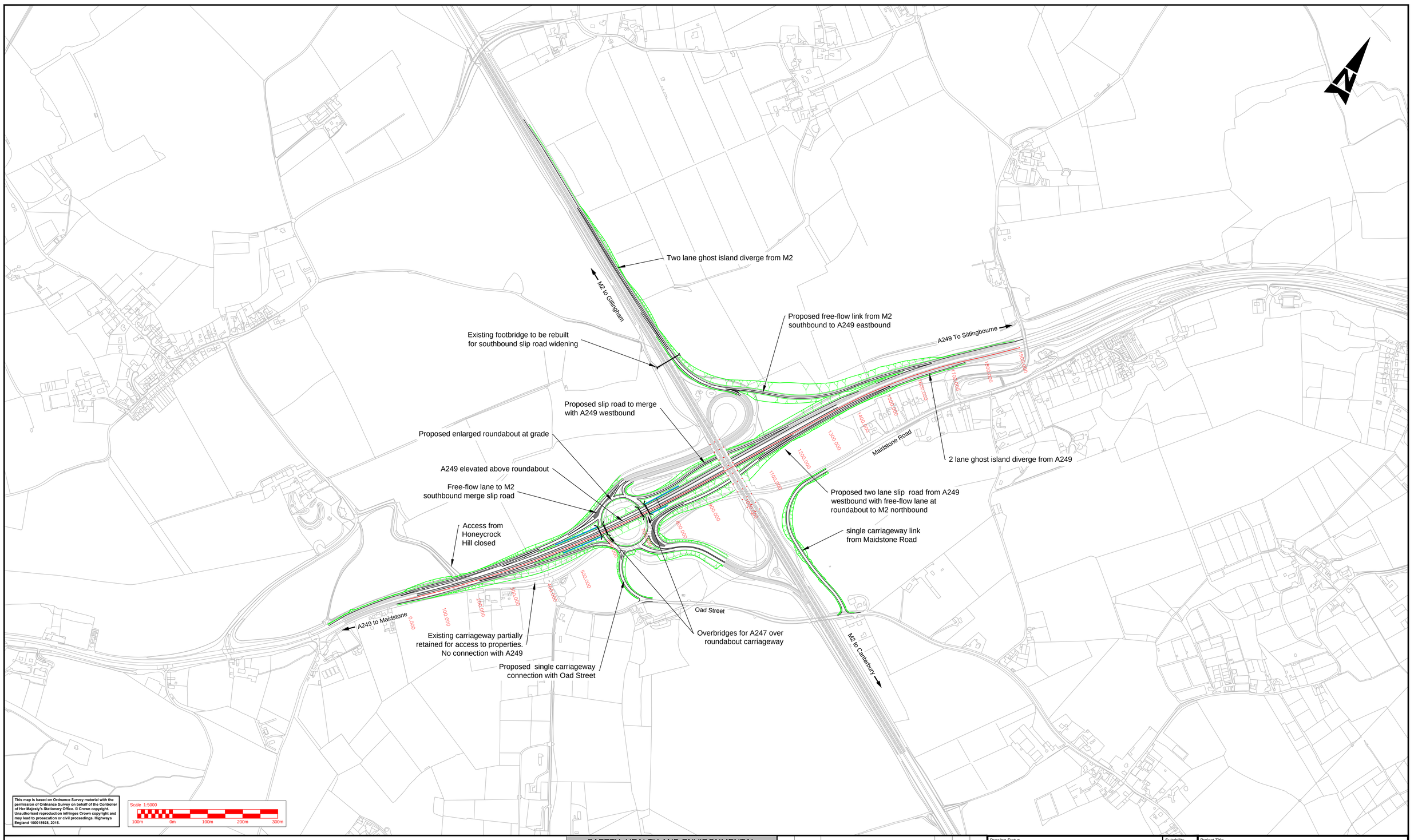

Scale 1:5000

100m 0m 100m 200m 300m

KEY:

- Proposed hardshoulder / hardstrip
- Proposed verge
- Proposed geotecnical / retaining solution
- Proposed bridge structure
- Existing carriageway to remain

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	13/05/16	First issue	WE	AS	GH
P02.1	26/07/16	Revised layout for cost estimate	TC	AS	GH

Drawing Status: SUITABLE FOR STAGE APPROVAL

Suitability: S0

WSP
PARSONS BRINCKERHOFF
Westbrook Mills
Borough Road
Godalming
Surrey
GU7 2AZ
Tel: +44 (0)1483 528400
Fax: +44 (0)1483 528989
www.wsp-pb.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT OPTION 4 SCHEME EXTENTS

Scale	Drawn	Checked	Approved	Authorised
1:5000	TC	AS	GH	DH
Original Size: A1	Date: 26/07/16	Date: 26/07/16	Date: 26/07/16	Date: 26/07/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
HE551521 - WSP - HGN - M2J5 - DR - D - 0041

Project Ref. No.: 5145771

Revision: P02.1

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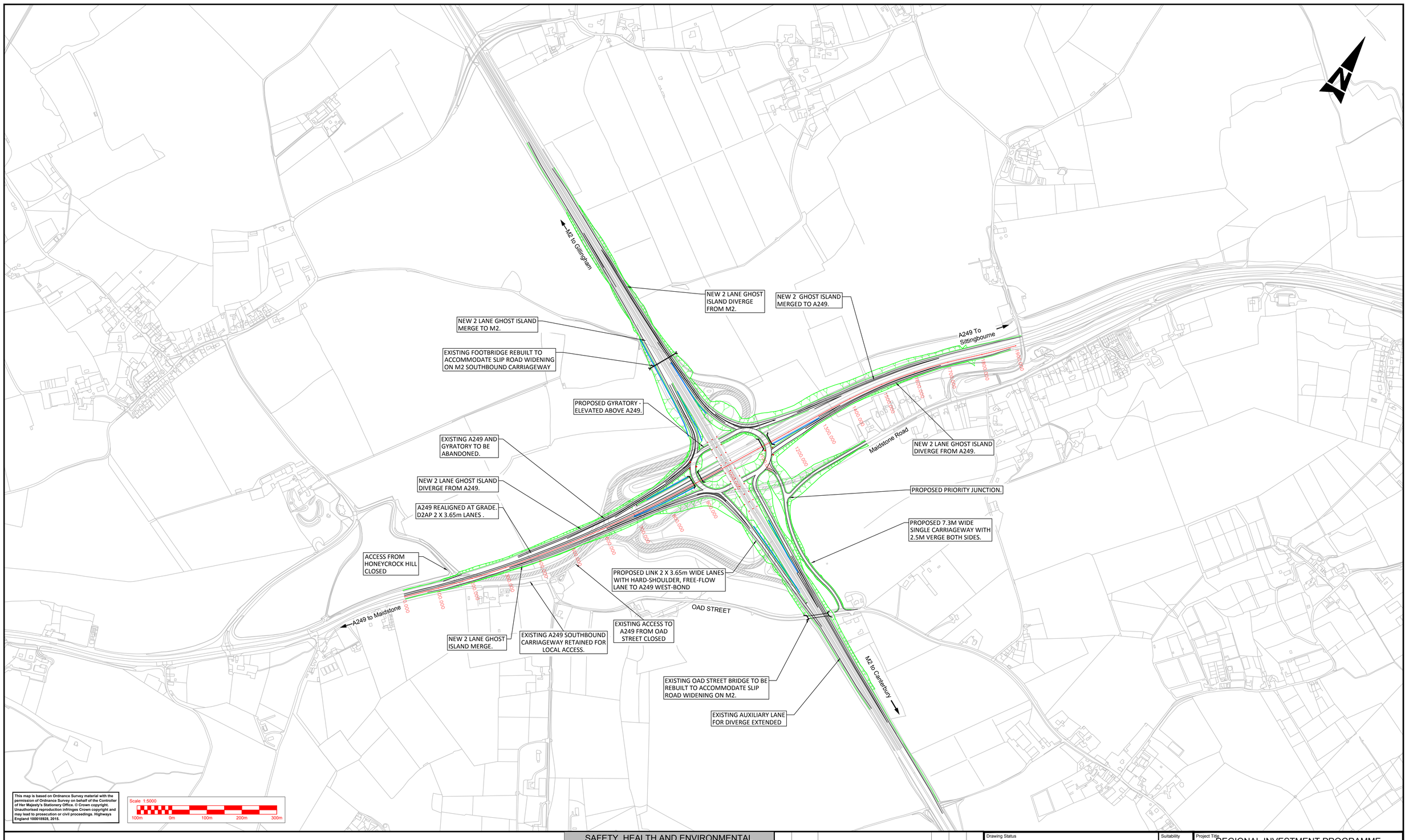
DO NOT SCALE

Millimetres 0 10 100



KEY:

- Proposed hardshoulder / hardstrip
- Proposed verge
- Proposed geotecnical / retaining solution
- Proposed bridge structure
- Existing carriageway to be made redundant
- Existing carriageway to remain

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	13/05/16	First Issue	WE	AS	GH
P02	26/07/16	Revised layout for cost estimate	TC	AS	GH

Drawing Status: SUITABLE FOR STAGE APPROVAL
Suitability: S0

WSP PARSONS BRINCKERHOFF
Westbrook Mills
Borough Road
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Surrey
GU7 2AZ
Tel: +44 (0)1483 528400
Fax: +44 (0)1483 528989
www.wsp-pb.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT OPTION 10 SCHEME EXTENTS

Scale	Drawn	Checked	Approved	Authorised
1:5000	TC	AS	GH	RE
Original Size: A1	Date: 26/07/16	Date: 26/07/16	Date: 26/07/16	Date: 26/07/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
HE551521 - WSP - HGN - M3J5 - DR - D - 0101

Project Ref. No.: 5145771
Revision: P02

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DO NOT SCALE

Millimetres 100 0 10

Two lane ghost island diverge from M2

M2 to Gillingham

Existing footbridge to be rebuilt for southbound slip road widening

Proposed free-flow link from M2 southbound to A249 eastbound

A249 To Sittingbourne

Proposed enlarged roundabout at grade

Free-flow lane to M2 southbound merge slip road

Maidstone Road

Single carriageway link from Maidstone Road

Oad Street

A249 to Maidstone

Free flow lane from A249 to M2 northbound merge slip road

M2 to Canterbury

Proposed single carriageway connection with Oad Street

Scale 1:5000

100m 0m 100m 200m 300m

KEY:

- Proposed hardshoulder / hardstrip
- Proposed verge
- Proposed structure
- Existing carriageway to remain

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	04/08/16	First Issue	WE	AS	GH

Drawing Status: SUITABLE FOR STAGE APPROVAL

Suitability: S0

WSP PARSONS BRINCKERHOFF
Westbrook Mills
Borough Road
Godalming
Surrey
GU7 2AZ
Tel: +44 (0)1483 528400
Fax: +44 (0)1483 528989
www.wsp-pb.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT OPTION 12 SCHEME EXTENTS

Scale	Drawn	Checked	Approved	Authorised
1:5000	WE	AS	GH	DH
Original Size: A1	Date: 04/08/16	Date: 04/08/16	Date: 04/08/16	Date: 04/08/16

Drawing Number: Project | Originator | Volume
HE551521 - WSP - HGN - M2J5 - DR - D - 0121
Location | Type | Role | Number

Project Ref. No.: 5145771

Revision: P01

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APPENDIX

C NOT USED

APPENDIX

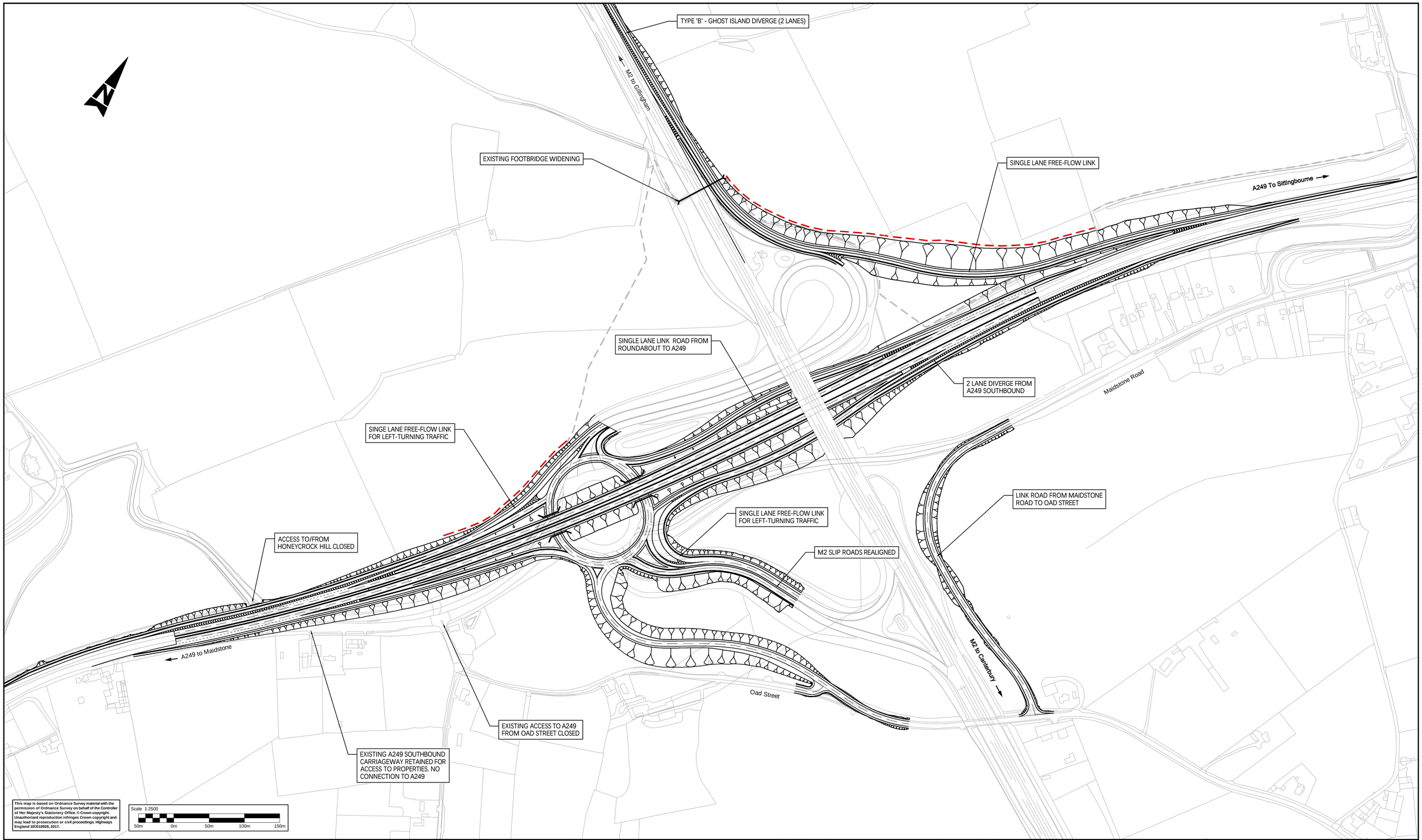
D SUMMARY OF ALTERNATIVE SCHEME APPENDIX

APPENDIX

D-1 GENERAL ARRANGEMENTS (SEPTEMBER 2017)

DO NOT SCALE

Millimetres 0 10 100



Scale 1:2500
50m 0m 50m 100m 150m

LEGEND:

EXISTING PUBLIC FOOTPATH

PROPOSED FOOTPATH

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	17/11/2017	ISSUED FOR CLIENT REVIEW	MB	AS	GH

Drawing Status: SUITABLE FOR STAGE APPROVAL
Suitability: S3

wsp
4th Floor, 6 Devonshire Square, London, EC2M 4YE, UK
T+ 44 (0) 207 337 1700, F+ 44 (0) 207 337 1701
wsp.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT GENERAL ARRANGEMENT OPTION 4

Scale	Drawn	Checked	Approved	Authorised
1:2500	WE	AS	GH	---
Original Size	**Date**	**Date**	**Date**	**Date**
A1	16/11/17	16/11/17	16/11/17	---

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
HE551521 - WSP - HGN - M2J5 - DR - D - 0042

Project Ref. No.: 5145771
Revision: P01

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DO NOT SCALE

Millimetres

NEW 2 LANE GHOST ISLAND DIVERGE.
PROPOSED LINK 2 X 3.65m WIDE LANES WITH HARD-SHOULDER, FREE-FLOW LANE TO A249 EAST-BOUND.
2 X 3.65m WIDE LANES AND GHOST ISLAND ADDED TO M2 FOR MERGE.
NEW 2 LANE GHOST ISLAND MERGE.
A249 To Sittingbourne
PROPOSED RETAINING WALL 75m LENGTH, AVERAGE HEIGHT 2.7m.
EXISTING FOOTBRIDGE REBUILT TO ACCOMMODATE SLIP ROAD WIDENING ON M2 SOUTHBOUND CARRIAGEWAY
PROPOSED RETAINING WALL LENGTH 125m, AVERAGE HEIGHT 0.9m.
PROPOSED RETAINING WALL LENGTH 350m, AVERAGE HEIGHT 4.8m.
PROPOSED GYRATORY - ELEVATED ABOVE A249.
NEW 2 LANE GHOST ISLAND DIVERGE.
SIGNALISED ARM
SIGNALISED ARM
Maidstone Road
PROPOSED RETAINING WALL LENGTH 145m, AVERAGE HEIGHT 1.0m.
PROPOSED LINK 2 X 3.65m WIDE LANES WITH HARD-SHOULDER WITH FLARE AT GYRATORY.
PROPOSED LINK 2 X 3.65m WIDE LANES WITH HARD-SHOULDER, FREE-FLOW LANE TO A249 NORTH-BOUND.
PROPOSED RETAINING WALL LENGTH 175m, AVERAGE HEIGHT 2.5m.
A249 REALIGNED AT GRADE. D2AP 2 X 3.65m LANES .
EXISTING A249 AND GYRATORY TO BE ABANDONED.
PROPOSED PRIORITY JUNCTION.
NEW 2 LANE GHOST ISLAND DIVERGE.
PROPOSED RETAINING WALL LENGTH 170m, AVERAGE HEIGHT 2.5m.
PROPOSED RETAINING WALL LENGTH 200m, AVERAGE HEIGHT 3.0m.
ACCESS FROM HONEYCROCK HILL CLOSED.
Honeycrock Hill
PROPOSED 7.3M WIDE SINGLE CARRIAGEWAY WITH 2.5M VERGE BOTH SIDES.
NEW 2 LANE GHOST ISLAND MERGE.
PROPOSED LINK 2 X 3.65m WIDE LANES WITH HARD-SHOULDER, FREE-FLOW LANE TO A249 WEST-BOUND
A249 to Maidstone
Oad Street
PROPOSED RETAINING WALL 230m LONG, AVERAGE HEIGHT 2.1m.
EXISTING A249 SOUTHBOUND CARRIAGEWAY RETAINED FOR LOCAL ACCESS.
EXISTING ACCESS TO A249 FROM OAD STREET CLOSED
EXISTING OAD STREET OVER BRIDGE TO BE REBUILT TO ACCOMMODATE SLIP ROAD WIDENING ON M2.
M2 to Canterbury
N
Scale 1:2500
50m 0m 50m 100m 150m

KEY:

- Proposed hardshoulder / hardstrip
- Proposed verge
- Proposed geotecnical / retaining solution
- Proposed bridge structure
- Proposed traffic signals
- Existing carriageway to be made redundant
- Existing carriageway to remain

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	13/05/16	First Issue	WE	AS	GH
P02	26/07/16	Revised layout for cost estimate	TC	AS	GH

Drawing Status: SUITABLE FOR STAGE APPROVAL
Suitability: S0

WSP PARSONS BRINCKERHOFF
Westbrook Mills
Borough Road
Godalming
Surrey
GU7 2AZ
Tel: +44 (0)1483 528400
Fax: +44 (0)1483 528989
www.wsp-pb.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT OPTION 10 JUNCTION AREA

Scale	Drawn	Checked	Approved	Authorised
1:2500	TC	AS	GH	RE
Original Size	Date	Date	Date	Date
A1	26/07/16	26/07/16	26/07/16	26/07/16

Drawing Number (Project | Originator | Volume | Location | Type | Role | Number): HE551521 - WSP - HGN - M2J5 - DR - D - 0102

Project Ref. No.: 5145771

Revision: P02

Plotted by: Anne.Searing Date: Jul 26, 2016 - 5:47pm ...HE551521-WSP-HGN-M2J5-DR-D-0102.dwg

DO NOT SCALE

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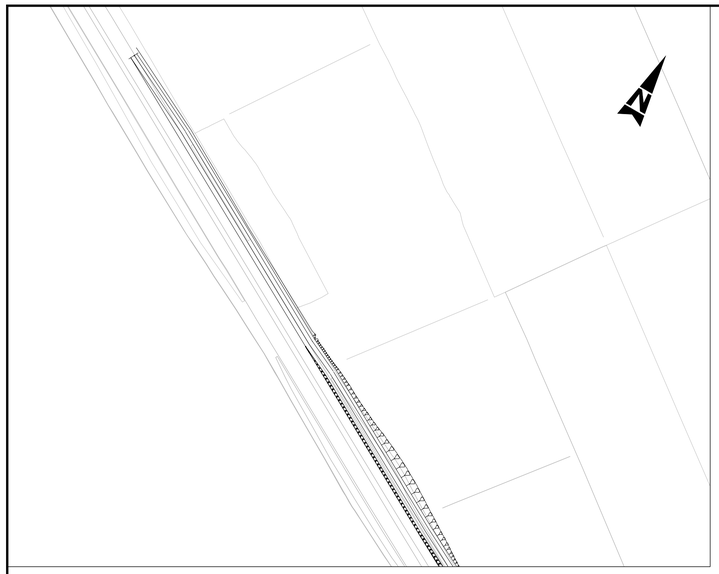

INSET
Scale 1:2500

TYPE 'B' - GHOST ISLAND DIVERGE (2 LANES)

EXISTING FOOTBRIDGE REBUILT TO ACCOMMODATE SLIP ROAD WIDENING ON M2 SOUTHBOUND CARRIAGEWAY

SINGLE LANE FREE-FLOW LINK ROAD

TRAFFIC SIGNAL CONTROLLED ROUNDABOUT

EXISTING ACCESS TO STOCKBURY ROUNDABOUT CLOSED

SINGLE LANE FREE-FLOW LINK FOR LEFT-TURNING TRAFFIC

SINGLE LINE FREE-FLOW LINK FOR LEFT-TURNING TRAFFIC

LINK ROAD FROM MAIDSTONE ROAD TO OAD STREET

M2 SLIP ROADS REALIGNED

FREE-FLOW LINK ROAD TO/FROM OAD STREET

Oad Street

EXISTING ACCESS TO/FROM A249 FROM OAD STREET CLOSED

Scale 1:2500
50m 0m 50m 100m 150m

LEGEND:

EXISTING PUBLIC FOOTPATH

PROPOSED FOOTPATH

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	17/11/2017	ISSUED FOR CLIENT REVIEW	MEC	EM	PG

Drawing Status: SUITABLE FOR STAGE APPROVAL
Suitability: S3

wsp
4th Floor, 6 Devonshire Square, London, EC2M 4YE, UK
T+ 44 (0) 207 337 1700, F+ 44 (0) 207 337 1701
wsp.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME
M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT
GENERAL ARRANGEMENT
OPTION 12

Scale	Drawn	Checked	Approved	Authorised
1:2500	WE	AS	GH	-
Original Size	**Date**	**Date**	**Date**	**Date**
A1	16/11/16	16/11/16	16/11/16	-

Drawing Number: Project HE551521 | Originator WSP | Volume HGN | Location M2J5 | Type DR | Role D | Number 0122

Project Ref. No.: HE551521

Revision: P01

DO NOT SCALE

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INSET
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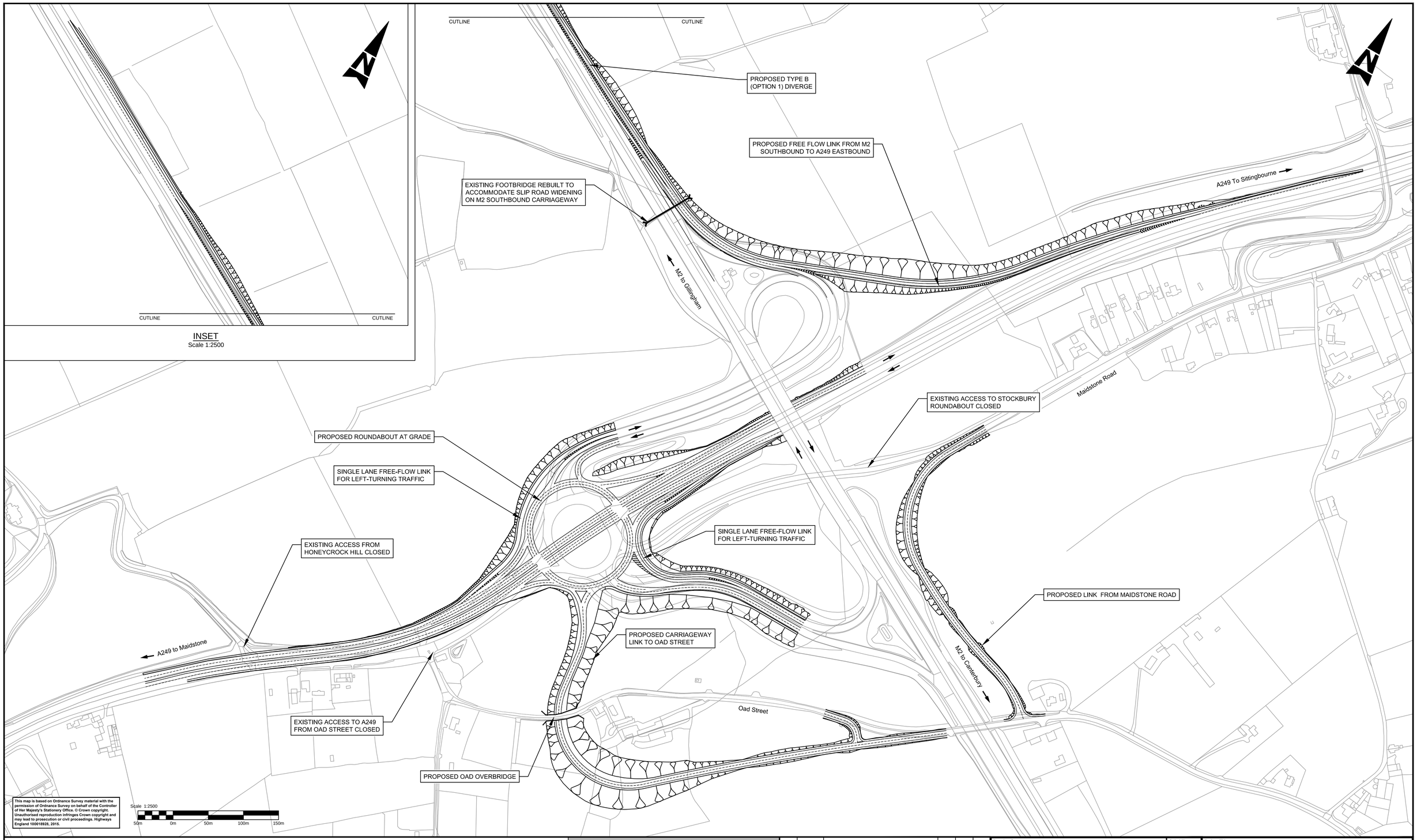

Scale 1:2500
50m 0m 50m 100m 150m

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	13/09/17	First Issue	KAM	EM	PG

Drawing Status: SUITABLE FOR STAGE APPROVAL
Suitability: S0

WSP
PARSONS BRINCKERHOFF
Westbrook Mills
Borough Road
Godalming
Surrey
GU7 2AZ
Tel: +44 (0)1483 528400
Fax: +44 (0)1483 528989
www.wsp-pb.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME
M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT
OPTION 12A

Scale	Drawn	Checked	Approved	Authorised
1:2500	KAM	EM	PG	---
Original Size	**Date**	**Date**	**Date**	**Date**
A1	13/09/17	13/09/17	13/09/17	---

Drawing Number
Project | Originator | Volume | Location | Type | Role | Number
HE551521 - WSP - HGN - M2J5 - DR - D - 0130

Project Ref. No.: 5145771
Revision: P01

\\uk.wspgroup.com\central data\Projects\70015xxx\70015210 - M2 J5 PCF Stage 2\E Models and Drawings\Highways\Option drawings\OptionHE551521-WSP-HGN-M2J5-DR-D-0130.dwg: Plotted by: UKEXM019 Date: Nov 14, 2017 - 10:58am

xref \\uk.wspgroup.com\central data\Projects\70015xxx\70015210 - M2 J5 PCF Stage 2\E Models and Drawings\Highways\NAT drawings\Option 4\RIP_A1_LH_FRAME.dwg

APPENDIX

D-2 C3 BUDGET ESTIMATES

APPENDIX

AFFECTED UTILITY	OPTION 4 COST	OPTION 10 COST	OPTION 12 COST
Genysis (Ex. VAT)	£405,116	£405,116	£405,116
Genysis (Inc VAT)	£486,139	£486,139	£486,139
Openreach (Ex VAT)	£990,097	£1,032,129	£843,581
Openreach (Inc VAT)	£1,188,117	£1,238,555	£1,012,298
Powernet (Ex VAT)	£96,000	£82,000	£96,000
Powernet (Inc VAT)	£115,200	£98,400	£115,200
Southern Water (Inc VAT)	£1,139,653	£1,183,633	£858,498
Southern Water (Ex VAT)	£1,367,584	£1,420,360	£1,030,199

Estimated Total Utility Costs / per Option (Ex. VAT)	£2, 630, 867	£2, 702, 878	£2, 203, 196
Estimated Total Utility Costs / per Option (Inc VAT)	£3, 157, 040	£3, 243, 454	£2, 643, 836

APPENDIX

E SUMMARY TABLES TRAFFIC , COSTS AND ECONOMICS APPENDIX

APPENDIX

E-1 OPTIONS ESTIMATE

highways england

FORM 300

PROCUREMENT & COMMERCIAL DIRECTORATE	ESTIMATE RELEASE FORM	
COMMERCIAL DIVISION	Date of This Estimate Release	18 October 2017
COST PLANNING GROUP	Date of Previous Estimate:	12 May 2017
	Is this a Multi Option Scheme?	Yes
	No. of Options: (If Applicable)	4

Scheme Details

Project Name	M2 Junction 5 Improvement: Option 4 revision	Options Phase PIN	551521
Project Manager	Vicky Ye	Developments Phase PIN	0
Type of Estimate Requested	Options	Construction Phase PIN	0
Estimate Identification Number:	766		

ESTIMATE APPROVAL

CESS ADJUSTMENT

	(£) VALUE:		
	MINIMUM	**PROJECT TEAM COST**	**MAXIMUM**
BASE ESTIMATE (Jan-16)	41,748,671	63,221,311	104,265,096
UNSCHEDULED ITEMS	1,941,999	3,051,960	4,258,709
RISK ADJUSTMENT:	3,123,522	12,142,067	27,190,349
Contractor/Delivery Partner Risk	-	-	-
Employer / SSSR (incl. Project Risk Managed Centrally)	3,123,522	12,142,067	27,190,349
UNCERTAINTY ALLOWANCE:	4,507	120,847	257,457
CESS SUBTOTAL :	**46,818,699**	**78,536,185**	**135,971,611**

The Estimate is based on the detailed stage dates:

Stage DATES		
	Start	**Finish**
Pre PCF	17/06/15	31/10/15
Stage 1	01/11/15	30/11/16
Stage 2	01/12/16	30/01/18
Stage 3	31/01/18	29/12/18
Stage 4	30/12/18	29/02/20
Stage 5	30/12/18	29/02/20
Stage 6	01/03/20	10/12/21
OTT (Open to Traffic)		11/12/21

Original PRODUCTION and Peer Review ACTIONS by ..... **Sign**

COST ENGINEER **Grzegorz Zelazo** **Print**

DATE .....

.....

RANGE ESTIMATE ADJUSTMENT

	(£) VALUE:		
	P10	**ML**	**P90**
RANGE NARROWING:	15,564,502	-	- 21,405,710
INFLATION ADJUSTMENT:	3,731,434	16,021,451	36,235,099
PORTFOLIO RISK ADJUSTMENT:	5,663,424	7,809,599	9,944,878
RET ADJUSTMENT SUBTOTAL:	24,959,360	23,831,050	24,774,267
RANGE ESTIMATE OUT-TURN	**71,778,060**	**102,367,235**	**160,745,878**

Confirmation that all technical, arithmetical, transfer, file storage and distribution checks have been successfully completed.

Peer Reviewer (Cost Engineer) **Signed:** **Name: Jason Dayes** **Date:**

Confirmation that the estimate has been produced in accordance with the MP Cost Estimation Manual and any other relevant guidance.

Estimating Manager **Signed:** **Name: Bal Barard** **Date:**

Confirmation estimate reflects information provided and will be reported consistently (SGAR's, IDC, Other Governance).

Project Manager **Signed:** **Name: Vicky Ye** **Date:**

Confirmation for estimate release.

Head of Cost Planning **Signed:** **Name: Mark Rowley** **Date:**

COMMENTS

Delivery Route for Scheme:	ECI

1) Scheme has been estimated as a standalone output. No specific consideration has been given to the economy or diseconomy of including this scheme within a regional programme;
2) Updated SGAR Dates have been provided by the Project Team;
3) Historic cost has been provided by the Project Manager;
4) The estimate includes a most likely contractor fee percentage of 9%, with a minimum and maximum range of 6% and 12% respectively;
5) Update to STAT's Estimates has been provided by the Project Team;
6) The Lands Costs: Project team provided an updated DVS draft report @ Q2,2017, the cost engineer has simulated the HAL inflation and Risk profile, as agreed with Project Manager;
7) The FTE's for Options, Development, Stage 6 & Stage 7 have been provided and agreed upon by the Project Team, Stage 2 cost is based on the Task Order provided by Project Team;
8) Risk register provided by Project Team (25/08/2017) was qualitatively and quantitattively assessed &
9) Project Team have provided an Efficiency register, however, this is not yet reportable.

SUMMARY FOR BUDGETARY PURPOSES

	Stage 1 Budget	Stage 2 Budget	Stage 3 Budget	Stage 4 Budget	Stage 5 Budget	Stage 6-7 Budget	Lands Total	Portfolio Risk	Totals
Scheme Min	£0.684M	£1.228M	£1.918M	£1.194M	£2.971M	£55.236M	£2.883M	£5.663M	£71.778M
Scheme Project Team Cost	£0.684M	£1.490M	£2.568M	£1.645M	£4.006M	£80.808M	£3.357M	£7.810M	£102.367M
Scheme Max	£0.684M	£1.899M	£3.693M	£2.392M	£5.861M	£129.062M	£7.211M	£9.945M	£160.746M

highways england

FORM 300

PROCUREMENT & COMMERCIAL DIRECTORATE	ESTIMATE RELEASE FORM	
COMMERCIAL DIVISION	Date of This Estimate Release	18 October 2017
COST PLANNING GROUP	Date of Previous Estimate:	12 May 2017
	Is this a Multi Option Scheme?	Yes
	No. of Options: (If Applicable)	4

Scheme Details

Project Name	M2 Junction 5 Improvement: Option 10 revision	Options Phase PIN	551521
Project Manager	Vicky Ye	Developments Phase PIN	0
Type of Estimate Requested	Options	Construction Phase PIN	0
Estimate Identification Number:	766		

ESTIMATE APPROVAL

CESS ADJUSTMENT

	(£) VALUE:		
	MINIMUM	**PROJECT TEAM COST**	**MAXIMUM**
BASE ESTIMATE (Jan-16)	44,958,748	67,810,175	114,614,501
UNSCHEDULED ITEMS	2,236,294	3,517,013	4,911,078
RISK ADJUSTMENT:	2,550,372	12,761,243	29,641,423
Contractor/Delivery Partner Risk	-	-	-
Employer / SSSR (incl. Project Risk Managed Centrally)	2,550,372	12,761,243	29,641,423
UNCERTAINTY ALLOWANCE:	-	56,680	118,720
CESS SUBTOTAL :	**49,745,415**	**84,145,111**	**149,285,722**

The Estimate is based on the detailed stage dates:

Stage DATES		
	Start	**Finish**
Pre PCF	17/06/15	31/10/15
Stage 1	01/11/15	30/11/16
Stage 2	01/12/16	30/01/18
Stage 3	31/01/18	29/12/18
Stage 4	30/12/18	29/02/20
Stage 5	30/12/18	29/02/20
Stage 6	01/03/20	12/12/21
OTT (Open to Traffic)		13/12/21

Original PRODUCTION and Peer Review ACTIONS by ..... **Sign**

COST ENGINEER **Grzegorz Zelazo** **Print**

DATE .....

.....

RANGE ESTIMATE ADJUSTMENT

	(£) VALUE:		
	P10	**ML**	**P90**
RANGE NARROWING:	17,320,191	-	- 24,105,074
INFLATION ADJUSTMENT:	4,140,291	17,585,625	40,491,127
PORTFOLIO RISK ADJUSTMENT:	6,128,098	8,417,259	10,694,797
RET ADJUSTMENT SUBTOTAL:	27,588,580	26,002,884	27,080,851
RANGE ESTIMATE OUT-TURN	**77,333,995**	**110,147,996**	**176,366,573**

Confirmation that all technical, arithmetical, transfer, file storage and distribution checks have been successfully completed.

Peer Reviewer (Cost Engineer) **Signed:** **Name: Jason Dayes** **Date:**

Confirmation that the estimate has been produced in accordance with the MP Cost Estimation Manual and any other relevant guidance.

Estimating Manager **Signed:** **Name: Bal Barard** **Date:**

Confirmation estimate reflects information provided and will be reported consistently (SGAR's, IDC, Other Governance).

Project Manager **Signed:** **Name: Vicky Ye** **Date:**

Confirmation for estimate release.

Head of Cost Planning **Signed:** **Name: Mark Rowley** **Date:**

COMMENTS

Delivery Route for Scheme:	ECI

1) Scheme has been estimated as a standalone output. No specific consideration has been given to the economy or diseconomy of including this scheme within a regional programme;
2) Updated SGAR Dates have been provided by the Project Team;
3) Historic cost has been provided by the Project Manager;
4) The estimate includes a most likely contractor fee percentage of 9%, with a minimum and maximum range of 6% and 12% respectively;
5) Update to STAT's Estimates has been provided by the Project Team;
6) The Lands Costs: Project team provided a DVS report @ Q3,2016, the cost engineer has simulated the HAL inflation and Risk profile, as agreed with Project Manager;
7) The FTE's for Options, Development, Stage 6 & Stage 7 have been provided and agreed upon by the Project Team, Stage 2 cost is based on the Task Order provided by Project Team;
8) Risk register update provided by Project Team (25/08/2017) was qualitatively and quantitattively assessed; &
9) Project Team have provided an Efficiency register, however, this is not yet reportable.

SUMMARY FOR BUDGETARY PURPOSES

	Stage 1 Budget	Stage 2 Budget	Stage 3 Budget	Stage 4 Budget	Stage 5 Budget	Stage 6-7 Budget	Lands Total	Portfolio Risk	Totals
Scheme Min	£0.684M	£1.229M	£1.973M	£1.316M	£3.162M	£61.222M	£1.621M	£6.128M	£77.334M
Scheme Project Team Cost	£0.684M	£1.490M	£2.717M	£1.820M	£4.349M	£88.692M	£1.980M	£8.417M	£110.148M
Scheme Max	£0.684M	£1.898M	£4.146M	£2.727M	£6.505M	£145.019M	£4.693M	£10.695M	£176.367M

highways england

FORM 300

PROCUREMENT & COMMERCIAL DIRECTORATE	ESTIMATE RELEASE FORM	
COMMERCIAL DIVISION	Date of This Estimate Release	18 October 2017
COST PLANNING GROUP	Date of Previous Estimate:	12 May 2017
	Is this a Multi Option Scheme?	Yes
	No. of Options: (If Applicable)	4

Scheme Details

Project Name	M2 Junction 5 Improvement: Option 12 revision	Options Phase PIN	551521
Project Manager	Vicky Ye	Developments Phase PIN	0
Type of Estimate Requested	Options	Construction Phase PIN	0
Estimate Identification Number:	766		

ESTIMATE APPROVAL

CESS ADJUSTMENT

	(£) VALUE:		
	MINIMUM	**PROJECT TEAM COST**	**MAXIMUM**
BASE ESTIMATE (Jan-16)	23,409,945	37,598,392	65,326,063
UNSCHEDULED ITEMS	1,015,295	1,595,593	2,226,493
RISK ADJUSTMENT:	1,775,610	6,934,639	16,333,257
Contractor/Delivery Partner Risk	-	-	-
Employer / SSSR (incl. Project Risk Managed Centrally)	1,775,610	6,934,639	16,333,257
UNCERTAINTY ALLOWANCE:	4,347	129,659	265,931
CESS SUBTOTAL :	**26,205,197**	**46,258,284**	**84,151,744**

The Estimate is based on the detailed stage dates:

Stage DATES		
	Start	**Finish**
Pre PCF	17/06/15	31/10/15
Stage 1	01/11/15	30/11/16
Stage 2	01/12/16	30/01/18
Stage 3	31/01/18	29/12/18
Stage 4	30/12/18	29/02/20
Stage 5	30/12/18	29/02/20
Stage 6	01/03/20	13/06/21
OTT (Open to Traffic)		14/06/21

Original PRODUCTION and Peer Review ACTIONS by ..... **Sign**

COST ENGINEER **Grzegorz Zelazo** **Print**

DATE .....

.....

RANGE ESTIMATE ADJUSTMENT

	(£) VALUE:		
	P10	**ML**	**P90**
RANGE NARROWING:	9,944,615	-	- 13,954,023
INFLATION ADJUSTMENT:	1,809,375	8,547,642	19,770,083
PORTFOLIO RISK ADJUSTMENT:	3,258,269	4,539,579	5,814,383
RET ADJUSTMENT SUBTOTAL:	15,012,259	13,087,220	11,630,443
RANGE ESTIMATE OUT-TURN	**41,217,456**	**59,345,504**	**95,782,187**

Confirmation that all technical, arithmetical, transfer, file storage and distribution checks have been successfully completed.

Peer Reviewer (Cost Engineer) **Signed:** **Name: Jason Dayes** **Date:**

Confirmation that the estimate has been produced in accordance with the MP Cost Estimation Manual and any other relevant guidance.

Estimating Manager **Signed:** **Name: Bal Barard** **Date:**

Confirmation estimate reflects information provided and will be reported consistently (SGAR's, IDC, Other Governance).

Project Manager **Signed:** **Name: Vicky Ye** **Date:**

Confirmation for estimate release.

Head of Cost Planning **Signed:** **Name: Mark Rowley** **Date:**

COMMENTS

Delivery Route for Scheme:	ECI

1) Scheme has been estimated as a standalone output. No specific consideration has been given to the economy or diseconomy of including this scheme within a regional programme;
2) Updated SGAR Dates have been provided by the Project Team;
3) Historic cost has been provided by the Project Manager;
4) The estimate includes a most likely contractor fee percentage of 9%, with a minimum and maximum range of 6% and 12% respectively;
5) Update to STAT's Estimates has been provided by the Project Team;
6) The Lands Costs: Project team provided an updated DVS draft report @ Q2,2017, the cost engineer has simulated the HAL inflation and Risk profile, as agreed with Project Manager;
7) The FTE's for Options, Development, Stage 6 & Stage 7 have been provided and agreed upon by the Project Team, Stage 2 cost is based on the Task Order provided by Project Team;
8) Risk register provided by Project Team (25/08/2017) was qualitatively and quantitattively assessed; &
9) Project Team have provided an Efficiency register, however, this is not yet reportable.

SUMMARY FOR BUDGETARY PURPOSES

	Stage 1 Budget	Stage 2 Budget	Stage 3 Budget	Stage 4 Budget	Stage 5 Budget	Stage 6-7 Budget	Lands Total	Portfolio Risk	Totals
Scheme Min	£0.684M	£1.229M	£1.611M	£0.985M	£1.990M	£28.743M	£2.718M	£3.258M	£41.217M
Scheme Project Team Cost	£0.684M	£1.490M	£2.229M	£1.357M	£2.705M	£43.227M	£3.114M	£4.540M	£59.346M
Scheme Max	£0.684M	£1.898M	£3.200M	£1.993M	£3.966M	£71.290M	£6.937M	£5.814M	£95.782M

highways england

FORM 300

PROCUREMENT & COMMERCIAL DIRECTORATE	ESTIMATE RELEASE FORM	
COMMERCIAL DIVISION	Date of This Estimate Release	18 October 2017
COST PLANNING GROUP	Date of Previous Estimate:	12 May 2017
	Is this a Multi Option Scheme?	Yes
	No. of Options: (If Applicable)	4

Scheme Details

Project Name	M2 Junction 5 Improvement: Option 12A revision	Options Phase PIN	551521
Project Manager	Vicky Ye	Developments Phase PIN	0
Type of Estimate Requested	Options	Construction Phase PIN	0
Estimate Identification Number:	766		

ESTIMATE APPROVAL

CESS ADJUSTMENT

	(£) VALUE:		
	MINIMUM	**PROJECT TEAM COST**	**MAXIMUM**
BASE ESTIMATE (Jan-16)	29,712,742	45,119,406	74,160,544
UNSCHEDULED ITEMS	1,408,406	2,213,005	3,087,515
RISK ADJUSTMENT:	2,322,638	8,309,234	18,969,434
Contractor/Delivery Partner Risk	-	-	-
Employer / SSSR (incl. Project Risk Managed Centrally)	2,322,638	8,309,234	18,969,434
UNCERTAINTY ALLOWANCE:	3,796	124,661	256,380
CESS SUBTOTAL :	**33,447,582**	**55,766,306**	**96,473,874**

The Estimate is based on the detailed stage dates:

Stage DATES		
	Start	**Finish**
Pre PCF	17/06/15	31/10/15
Stage 1	01/11/15	30/11/16
Stage 2	01/12/16	30/01/18
Stage 3	31/01/18	29/12/18
Stage 4	30/12/18	29/02/20
Stage 5	30/12/18	29/02/20
Stage 6	01/03/20	30/08/21
OTT (Open to Traffic)		01/09/21

Original PRODUCTION and Peer Review ACTIONS by ..... **Sign**

COST ENGINEER **Grzegorz Zelazo** **Print**

DATE .....

.....

RANGE ESTIMATE ADJUSTMENT

	(£) VALUE:		
	P10	**ML**	**P90**
RANGE NARROWING:	10,972,224	-	- 15,095,970
INFLATION ADJUSTMENT:	2,344,442	10,823,910	24,417,921
PORTFOLIO RISK ADJUSTMENT:	3,968,237	5,488,139	7,000,323
RET ADJUSTMENT SUBTOTAL:	17,284,903	16,312,049	16,322,274
RANGE ESTIMATE OUT-TURN	**50,732,485**	**72,078,355**	**112,796,148**

Confirmation that all technical, arithmetical, transfer, file storage and distribution checks have been successfully completed.

Peer Reviewer (Cost Engineer) **Signed:** **Name: Jason Dayes** **Date:**

Confirmation that the estimate has been produced in accordance with the MP Cost Estimation Manual and any other relevant guidance.

Estimating Manager **Signed:** **Name: Bal Barard** **Date:**

Confirmation estimate reflects information provided and will be reported consistently (SGAR's, IDC, Other Governance).

Project Manager **Signed:** **Name: Vicky Ye** **Date:**

Confirmation for estimate release.

Head of Cost Planning **Signed:** **Name: Mark Rowley** **Date:**

COMMENTS

Delivery Route for Scheme:	ECI

1) Scheme has been estimated as a standalone output. No specific consideration has been given to the economy or diseconomy of including this scheme within a regional programme;
2) Updated SGAR Dates have been provided by the Project Team;
3) Historic cost has been provided by the Project Manager;
4) The estimate includes a most likely contractor fee percentage of 9%, with a minimum and maximum range of 6% and 12% respectively;
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8) Risk register provided by Project Team (25/08/2017) was qualitatively and quantitattively assessed; &
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SUMMARY FOR BUDGETARY PURPOSES

	Stage 1 Budget	Stage 2 Budget	Stage 3 Budget	Stage 4 Budget	Stage 5 Budget	Stage 6-7 Budget	Lands Total	Portfolio Risk	Totals
Scheme Min	£0.684M	£1.229M	£1.625M	£0.985M	£2.016M	£37.746M	£2.479M	£3.968M	£50.732M
Scheme Project Team Cost	£0.684M	£1.490M	£2.249M	£1.350M	£2.715M	£55.274M	£2.829M	£5.488M	£72.078M
Scheme Max	£0.684M	£1.898M	£3.223M	£1.941M	£4.015M	£88.170M	£5.865M	£7.000M	£112.796M

DO NOT SCALE

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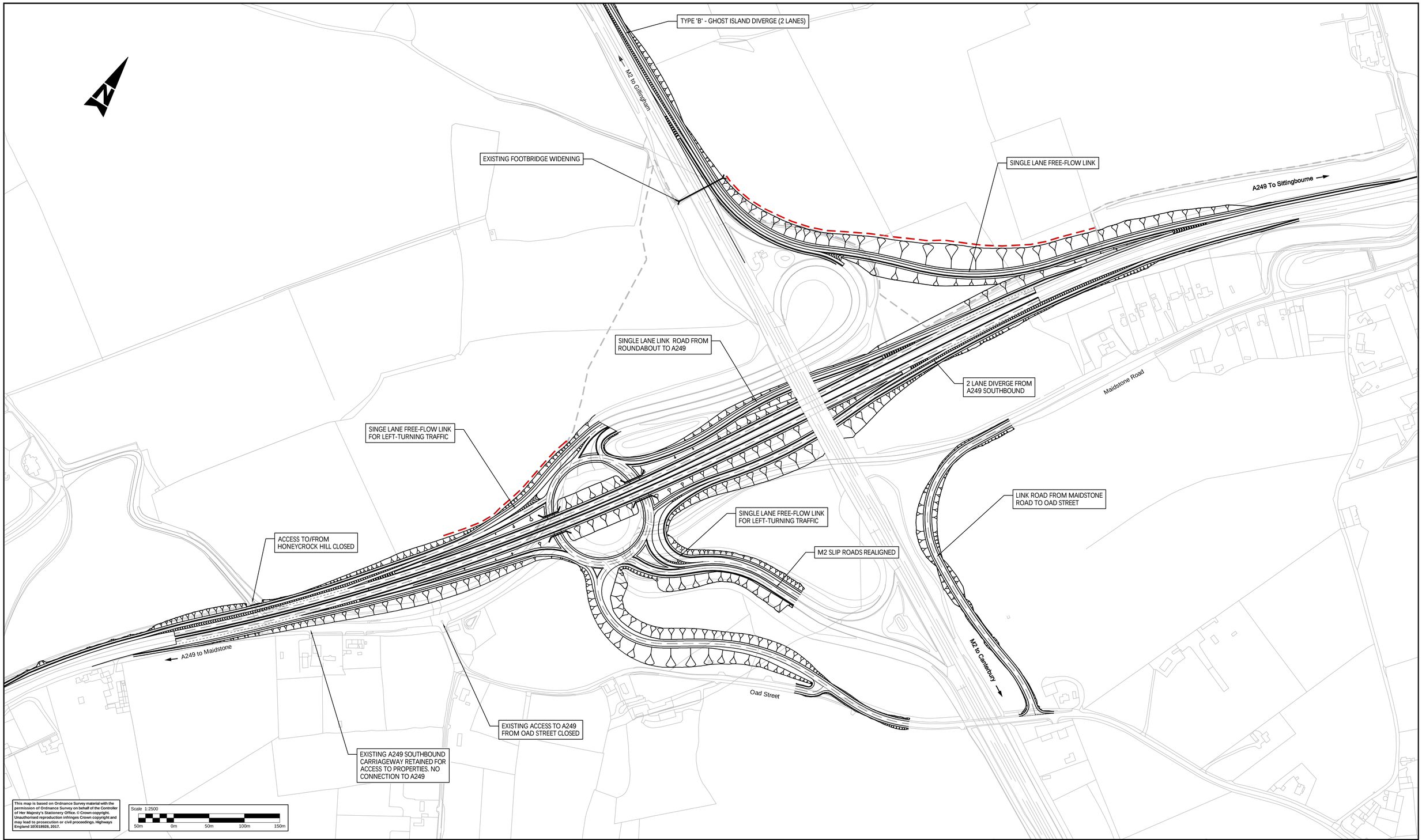

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LEGEND:

EXISTING PUBLIC FOOTPATH

PROPOSED FOOTPATH

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	17/11/2017	ISSUED FOR CLIENT REVIEW	MB	AS	GH

Drawing Status: SUITABLE FOR STAGE APPROVAL
Suitability: S3

wsp
4th Floor, 6 Devonshire Square, London, EC2M 4YE, UK
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wsp.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT GENERAL ARRANGEMENT OPTION 4

Scale	Drawn	Checked	Approved	Authorised
1:2500	WE	AS	GH	---
Original Size	**Date**	**Date**	**Date**	**Date**
A1	16/11/17	16/11/17	16/11/17	---

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
HE551521 - WSP - HGN - M2J5 - DR - D - 0042

Project Ref. No.: 5145771
Revision: P01

\\uk.wspgroup.com\central data\Projects\70015xxx\70015210 - M2 J5 PCF Stage 2\E Models and Drawings\Highways\Option drawings\Option 4\SS\HE551521-WSP-HGN-M2J5-DR-D-0042.dwg: Plotted by: bullowsm Date: Nov 23, 2017 - 11:57am

DO NOT SCALE

Millimetres

0 10 100

KEY:
- 🟥 Proposed hardshoulder / hardstrip
- 🟩 Proposed verge
- 🟦 Proposed geotecnical / retaining solution
- Proposed bridge structure
- ● Proposed traffic signals
- ▨ Existing carriageway to be made redundant
- ▭ Existing carriageway to remain

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	13/05/16	First Issue	WE	AS	GH
P02	26/07/16	Revised layout for cost estimate	TC	AS	GH

Drawing Status
SUITABLE FOR STAGE APPROVAL

Suitability
S0

WSP
PARSONS BRINCKERHOFF

Westbrook Mills
Borough Road
Godalming
Surrey
GU7 2AZ
Tel: +44 (0)1483 528400
Fax: +44 (0)1483 528989
www.wsp-pb.com

Client
Working on behalf of
highways england

Project Title
REGIONAL INVESTMENT PROGRAMME
M2 J5 IMPROVEMENTS

Drawing Title
HIGHWAYS DESIGN LAYOUT
OPTION 10
JUNCTION AREA

Scale	Drawn	Checked	Approved	Authorised
1:2500	TC	AS	GH	RE
Original Size	Date	Date	Date	Date
A1	26/07/16	26/07/16	26/07/16	26/07/16

Drawing Number
Project | Originator | Volume
HE551521 - WSP - HGN -
M2J5 - DR - D - 0102
Location | Type | Role | Number

Project Ref. No.
5145771

Revision
P02

[illegible]HE551521-WSP-HGN-M2J5-DR-D-0102.dwg: Plotted by: Anne.Searing Date: Jul 26, 2016 - 5:47pm

DO NOT SCALE

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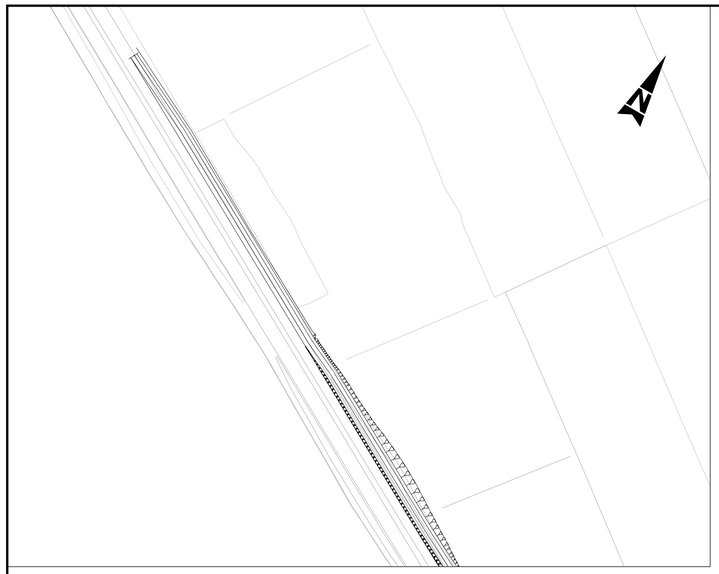

INSET
Scale 1:2500

TYPE 'B' - GHOST ISLAND DIVERGE (2 LANES)

EXISTING FOOTBRIDGE REBUILT TO ACCOMMODATE SLIP ROAD WIDENING ON M2 SOUTHBOUND CARRIAGEWAY

SINGLE LANE FREE-FLOW LINK ROAD

TRAFFIC SIGNAL CONTROLLED ROUNDABOUT

EXISTING ACCESS TO STOCKBURY ROUNDABOUT CLOSED

SINGLE LANE FREE-FLOW LINK FOR LEFT-TURNING TRAFFIC

SINGLE LINE FREE-FLOW LINK FOR LEFT-TURNING TRAFFIC

LINK ROAD FROM MAIDSTONE ROAD TO OAD STREET

M2 SLIP ROADS REALIGNED

FREE-FLOW LINK ROAD TO/FROM OAD STREET

Oad Street

EXISTING ACCESS TO/FROM A249 FROM OAD STREET CLOSED

Scale 1:2500
50m 0m 50m 100m 150m

LEGEND:

EXISTING PUBLIC FOOTPATH

PROPOSED FOOTPATH

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	17/11/2017	ISSUED FOR CLIENT REVIEW	MEC	EM	PG

Drawing Status: SUITABLE FOR STAGE APPROVAL
Suitability: S3

wsp
4th Floor, 6 Devonshire Square, London, EC2M 4YE, UK
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wsp.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME
M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT
GENERAL ARRANGEMENT
OPTION 12

Scale	Drawn	Checked	Approved	Authorised
1:2500	WE	AS	GH	-
Original Size	**Date**	**Date**	**Date**	**Date**
A1	16/11/16	16/11/16	16/11/16	-

Drawing Number: Project HE551521 | Originator WSP | Volume HGN | Location M2J5 | Type DR | Role D | Number 0122

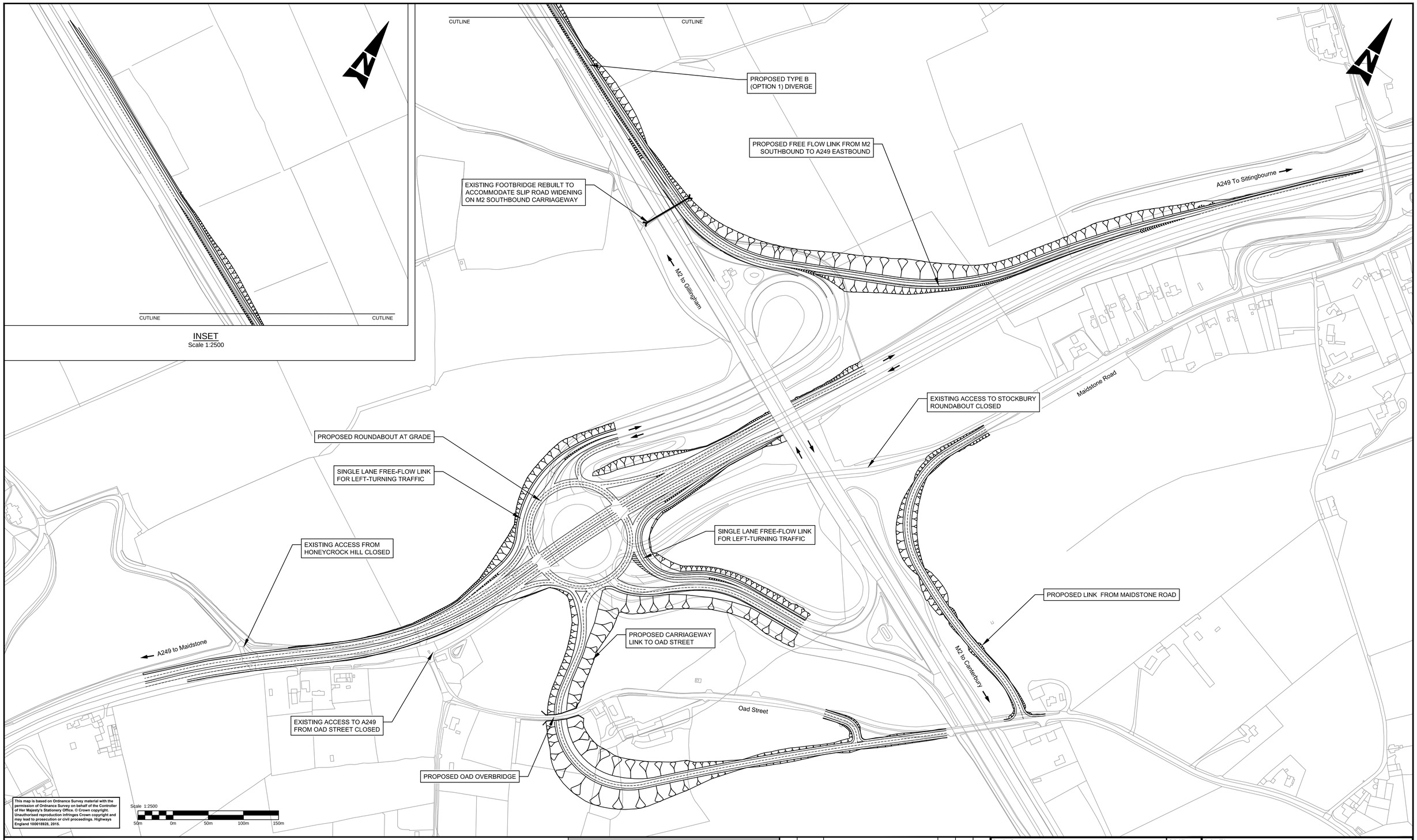
Project Ref. No.: HE551521

Revision: P01

DO NOT SCALE

Millimetres 0 10 100

INSET
Scale 1:2500



Scale 1:2500
50m 0m 50m 100m 150m

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	13/09/17	First Issue	KAM	EM	PG

Drawing Status: SUITABLE FOR STAGE APPROVAL
Suitability: S0

WSP
PARSONS BRINCKERHOFF
Westbrook Mills
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Surrey
GU7 2AZ
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Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME
M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT
OPTION 12A

Scale	Drawn	Checked	Approved	Authorised
1:2500	KAM	EM	PG	---
Original Size	**Date**	**Date**	**Date**	**Date**
A1	13/09/17	13/09/17	13/09/17	---

Drawing Number
Project | Originator | Volume | Location | Type | Role | Number
HE551521 - WSP - HGN - M2J5 - DR - D - 0130

Project Ref. No.: 5145771
Revision: P01

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E-2 CONVERGENCE TABLES (CORE)

The convergence results for the Reference Case and the four options using the Core Scenario for 2021 are shown in **Table 1** to **Table 5**

Table 1: Model Convergence Results - Core Scenario - 2021 Reference Case

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2021 Reference Case	AM Peak	31	97.8	Pass	0.019	Pass	0.041	Pass
		32	98.0	Pass	0.028	Pass	0.025	Pass
		33	98.4	Pass	0.021	Pass	0.026	Pass
		34	97.9	Pass	0.018	Pass	0.027	Pass
	Interpeak	23	97.8	Pass	0.021	Pass	0.049	Pass
		24	97.8	Pass	0.040	Pass	0.024	Pass
		25	97.8	Pass	0.036	Pass	0.037	Pass
		26	98.3	Pass	0.023	Pass	0.021	Pass
	PM Peak	23	98.2	Pass	0.037	Pass	0.042	Pass
		24	98.4	Pass	0.035	Pass	0.040	Pass
		25	98.2	Pass	0.039	Pass	0.040	Pass
		26	98.3	Pass	0.036	Pass	0.049	Pass

Table 2: Model Convergence Results - Core Scenario - 2021 Option 4

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2021 Option 4	AM Peak	25	97.9	Pass	0.022	Pass	0.034	Pass
		26	98.1	Pass	0.034	Pass	0.026	Pass
		27	98.3	Pass	0.023	Pass	0.026	Pass
		28	98.5	Pass	0.021	Pass	0.020	Pass
	Interpeak	24	98.1	Pass	0.030	Pass	0.050	Pass
		25	97.5	Fail	0.040	Pass	0.043	Pass
		26	98.2	Pass	0.033	Pass	0.029	Pass
		27	98.4	Pass	0.024	Pass	0.024	Pass
	PM Peak	29	97.8	Pass	0.044	Pass	0.042	Pass
		30	98.0	Pass	0.037	Pass	0.048	Pass
		31	98.1	Pass	0.043	Pass	0.044	Pass
		32	98.0	Pass	0.042	Pass	0.035	Pass

Table 3: Model Convergence Results - Core Scenario - 2021 Option 10

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2021 Option 10	AM Peak	23	97.8	Pass	0.023	Pass	0.024	Pass
		24	97.6	Pass	0.017	Pass	0.029	Pass
		25	98.2	Pass	0.016	Pass	0.018	Pass
		26	98.1	Pass	0.017	Pass	0.025	Pass
	Interpeak	20	97.8	Pass	0.017	Pass	0.044	Pass
		21	97.9	Pass	0.014	Pass	0.032	Pass
		22	98.1	Pass	0.019	Pass	0.025	Pass
		23	97.8	Pass	0.020	Pass	0.022	Pass
	PM Peak	31	97.7	Pass	0.046	Pass	0.037	Pass
		32	98.2	Pass	0.030	Pass	0.032	Pass
		33	98.3	Pass	0.032	Pass	0.049	Pass
		34	98.3	Pass	0.047	Pass	0.028	Pass

Table 4: Model Convergence Results - Core Scenario - 2021 Option 12

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2021 Option 12	AM Peak	27	97.7	Pass	0.019	Pass	0.023	Pass
		28	97.9	Pass	0.016	Pass	0.025	Pass
		29	97.7	Pass	0.019	Pass	0.026	Pass
		30	97.5	Fail	0.017	Pass	0.034	Pass
	Interpeak	18	97.5	Fail	0.042	Pass	0.027	Pass
		19	97.6	Pass	0.047	Pass	0.024	Pass
		20	97.9	Pass	0.023	Pass	0.023	Pass
		21	98.2	Pass	0.023	Pass	0.026	Pass
	PM Peak	36	98.1	Pass	0.034	Pass	0.045	Pass
		37	97.9	Pass	0.038	Pass	0.033	Pass
		38	98.1	Pass	0.028	Pass	0.034	Pass
		39	98.0	Pass	0.029	Pass	0.037	Pass

Table 5: Model Convergence Results - Core Scenario - 2021 Option 12A

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2021 Option 12A	AM Peak	21	97.7	Pass	0.023	Pass	0.037	Pass
		22	98.0	Pass	0.020	Pass	0.029	Pass
		23	98.2	Pass	0.020	Pass	0.025	Pass
		24	98.3	Pass	0.020	Pass	0.028	Pass
	Interpeak	24	98.0	Pass	0.018	Pass	0.034	Pass
		25	98.2	Pass	0.021	Pass	0.027	Pass
		26	98.2	Pass	0.017	Pass	0.033	Pass
		27	98.1	Pass	0.023	Pass	0.031	Pass
	PM Peak	33	98.4	Pass	0.041	Pass	0.045	Pass
		34	98.1	Pass	0.030	Pass	0.049	Pass
		35	98.1	Pass	0.027	Pass	0.044	Pass
		36	98.0	Pass	0.038	Pass	0.049	Pass

The convergence results for the Reference Case and the four options using the Core Scenario for 2031 are shown in Table 6 to **Table 10**

Table 6: Model Convergence Results - Core Scenario - 2031 Reference Case

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2031 Reference Case	AM Peak	46	98.7	Pass	0.016	Pass	0.034	Pass
		47	99.0	Pass	0.014	Pass	0.048	Pass
		48	98.7	Pass	0.013	Pass	0.034	Pass
		49	99.0	Pass	0.017	Pass	0.039	Pass
	Interpeak	17	97.6	Pass	0.026	Pass	0.036	Pass
		18	98.1	Pass	0.028	Pass	0.032	Pass
		19	98.2	Pass	0.026	Pass	0.029	Pass
		20	98.2	Pass	0.025	Pass	0.027	Pass
	PM Peak	26	97.8	Pass	0.040	Pass	0.040	Pass
		27	98.1	Pass	0.040	Pass	0.038	Pass
		28	98.0	Pass	0.037	Pass	0.034	Pass
		29	98.3	Pass	0.034	Pass	0.039	Pass

Table 7: Model Convergence Results - Core Scenario – 2031 Option 4

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2031 Option 4	AM Peak	42	98.5	Pass	0.016	Pass	0.035	Pass
		43	98.4	Pass	0.013	Pass	0.047	Pass
		44	98.7	Pass	0.014	Pass	0.040	Pass
		45	98.5	Pass	0.014	Pass	0.021	Pass
	Interpeak	17	97.9	Pass	0.029	Pass	0.029	Pass
		18	98.0	Pass	0.026	Pass	0.041	Pass
		19	97.8	Pass	0.024	Pass	0.020	Pass
		20	98.3	Pass	0.022	Pass	0.023	Pass
	PM Peak	40	97.9	Pass	0.035	Pass	0.048	Pass
		41	98.0	Pass	0.030	Pass	0.048	Pass
		42	97.9	Pass	0.026	Pass	0.044	Pass
		43	97.8	Pass	0.033	Pass	0.041	Pass

Table 8: Model Convergence Results - Core Scenario – 2031 Option 10

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2031 Option 10	AM Peak	34	98.4	Pass	0.017	Pass	0.040	Pass
		35	98.7	Pass	0.020	Pass	0.045	Pass
		36	98.2	Pass	0.015	Pass	0.036	Pass
		37	98.5	Pass	0.013	Pass	0.049	Pass
	Interpeak	44	97.6	Pass	0.008	Pass	0.029	Pass
		45	97.9	Pass	0.016	Pass	0.015	Pass
		46	98.1	Pass	0.015	Pass	0.019	Pass
		47	98.0	Pass	0.008	Pass	0.012	Pass
	PM Peak	60	97.7	Pass	0.032	Pass	0.049	Pass
		61	97.8	Pass	0.025	Pass	0.048	Pass
		62	98.0	Pass	0.027	Pass	0.041	Pass
		63	97.9	Pass	0.029	Pass	0.037	Pass

Table 9: Model Convergence Results - Core Scenario – 2031 Option 12

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2031 Option 12	AM Peak	51	97.8	Pass	0.015	Pass	0.035	Pass
		52	98.2	Pass	0.017	Pass	0.041	Pass
		53	97.5	Fail	0.012	Pass	0.045	Pass
		54	97.5	Fail	0.013	Pass	0.039	Pass
	Interpeak	16	97.5	Fail	0.027	Pass	0.034	Pass
		17	98.2	Pass	0.026	Pass	0.040	Pass
		18	97.9	Pass	0.023	Pass	0.028	Pass
		19	98.3	Pass	0.020	Pass	0.046	Pass
	PM Peak	29	97.6	Pass	0.042	Pass	0.043	Pass
		30	97.7	Pass	0.026	Pass	0.047	Pass
		31	97.5	Fail	0.042	Pass	0.037	Pass
		32	97.8	Pass	0.033	Pass	0.041	Pass

Table 10: Model Convergence Results - Core Scenario – 2031 Option 12A

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2031 Option 12A	AM Peak	51	98.4	Pass	0.018	Pass	0.035	Pass
		52	98.1	Pass	0.017	Pass	0.047	Pass
		53	98.1	Pass	0.012	Pass	0.040	Pass
		54	98.4	Pass	0.013	Pass	0.043	Pass
	Interpeak	21	97.9	Pass	0.034	Pass	0.048	Pass
		22	98.1	Pass	0.032	Pass	0.038	Pass
		23	97.6	Pass	0.042	Pass	0.038	Pass
		24	98.3	Pass	0.049	Pass	0.026	Pass
	PM Peak	31	98.2	Pass	0.028	Pass	0.042	Pass
		32	98.0	Pass	0.038	Pass	0.050	Pass
		33	98.1	Pass	0.040	Pass	0.040	Pass
		34	98.2	Pass	0.033	Pass	0.038	Pass

The convergence results for the Reference Case and the four options using the Core Scenario for 2036 are shown in Table 11 to **Table 15**.

Table 11: Model Convergence Results - Core Scenario - 2036 Reference Case

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2036 Reference Case	AM Peak	62	98.5	Pass	0.012	Pass	0.035	Pass
		63	98.5	Pass	0.016	Pass	0.048	Pass
		64	98.6	Pass	0.013	Pass	0.030	Pass
		65	98.5	Pass	0.014	Pass	0.048	Pass
	Interpeak	29	98.7	Pass	0.042	Pass	0.046	Pass
		30	98.9	Pass	0.048	Pass	0.043	Pass
		31	98.6	Pass	0.036	Pass	0.043	Pass
		32	98.8	Pass	0.048	Pass	0.039	Pass
	PM Peak	26	97.7	Pass	0.047	Pass	0.045	Pass
		27	97.9	Pass	0.046	Pass	0.042	Pass
		28	98.1	Pass	0.032	Pass	0.037	Pass
		29	98.2	Pass	0.036	Pass	0.040	Pass

Table 12: Model Convergence Results - Core Scenario - 2036 Option 4

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2036 Option 4	AM Peak	83	98.1	Pass	0.018	Pass	0.048	Pass
		84	98.6	Pass	0.014	Pass	0.028	Pass
		85	98.4	Pass	0.017	Pass	0.034	Pass
		86	98.4	Pass	0.018	Pass	0.042	Pass
	Interpeak	29	98.8	Pass	0.028	Pass	0.046	Pass
		30	98.7	Pass	0.036	Pass	0.047	Pass
		31	98.9	Pass	0.039	Pass	0.042	Pass
		32	99.1	Pass	0.028	Pass	0.037	Pass
	PM Peak	63	98.0	Pass	0.027	Pass	0.045	Pass
		64	98.1	Pass	0.024	Pass	0.047	Pass
		65	98.1	Pass	0.022	Pass	0.049	Pass
		66	98.1	Pass	0.029	Pass	0.048	Pass

Table 13: Model Convergence Results - Core Scenario – 2036 Option 10

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2036 Option 10	AM Peak	72	98.7	Pass	0.017	Pass	0.045	Pass
		73	98.5	Pass	0.017	Pass	0.050	Pass
		74	98.5	Pass	0.015	Pass	0.049	Pass
		75	98.4	Pass	0.016	Pass	0.037	Pass
	Interpeak	27	98.4	Pass	0.034	Pass	0.041	Pass
		28	97.7	Pass	0.035	Pass	0.044	Pass
		29	98.5	Pass	0.030	Pass	0.039	Pass
		30	98.7	Pass	0.029	Pass	0.047	Pass
	PM Peak	63	98.2	Pass	0.032	Pass	0.045	Pass
		64	97.6	Pass	0.026	Pass	0.035	Pass
		65	98.4	Pass	0.024	Pass	0.033	Pass
		66	98.8	Pass	0.024	Pass	0.042	Pass

Table 14: Model Convergence Results - Core Scenario – 2036 Option 12

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2036 Option 12	AM Peak	54	98.1	Pass	0.014	Pass	0.042	Pass
		55	98.2	Pass	0.015	Pass	0.043	Pass
		56	98.3	Pass	0.014	Pass	0.045	Pass
		57	98.4	Pass	0.015	Pass	0.039	Pass
	Interpeak	22	98.6	Pass	0.044	Pass	0.038	Pass
		23	98.7	Pass	0.037	Pass	0.033	Pass
		24	98.9	Pass	0.041	Pass	0.049	Pass
		25	99.0	Pass	0.044	Pass	0.037	Pass
	PM Peak	45	97.8	Pass	0.032	Pass	0.050	Pass
		46	97.5	Fail	0.023	Pass	0.047	Pass
		47	97.6	Pass	0.027	Pass	0.041	Pass
		48	97.8	Pass	0.034	Pass	0.049	Pass

Table 15: Model Convergence Results - Core Scenario – 2036 Option 12A

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2036 Option 12A	AM Peak	52	98.6	Pass	0.016	Pass	0.042	Pass
		53	98.5	Pass	0.014	Pass	0.049	Pass
		54	98.8	Pass	0.015	Pass	0.039	Pass
		55	98.7	Pass	0.015	Pass	0.042	Pass
	Interpeak	20	97.6	Pass	0.036	Pass	0.049	Pass
		21	97.9	Pass	0.029	Pass	0.048	Pass
		22	98.1	Pass	0.033	Pass	0.046	Pass
		23	98.7	Pass	0.040	Pass	0.037	Pass
	PM Peak	43	97.9	Pass	0.031	Pass	0.048	Pass
		44	97.9	Pass	0.030	Pass	0.045	Pass
		45	97.9	Pass	0.020	Pass	0.039	Pass
		46	97.9	Pass	0.028	Pass	0.044	Pass

The convergence results for the Reference Case and the four options using the Core Scenario for 2041 are shown in Table 16 to **Table 20**.

Table 16: Model Convergence Results - Core Scenario - 2041 Reference Case

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2041 Reference Case	AM Peak	53	98.5	Pass	0.019	Pass	0.036	Pass
		54	98.5	Pass	0.016	Pass	0.047	Pass
		55	98.5	Pass	0.015	Pass	0.037	Pass
		56	98.6	Pass	0.020	Pass	0.049	Pass
	Interpeak	28	98.1	Pass	0.039	Pass	0.032	Pass
		29	98.2	Pass	0.035	Pass	0.037	Pass
		30	98.4	Pass	0.037	Pass	0.038	Pass
		31	98.6	Pass	0.026	Pass	0.036	Pass
	PM Peak	30	98.1	Pass	0.047	Pass	0.043	Pass
		31	98.2	Pass	0.041	Pass	0.047	Pass
		32	98.1	Pass	0.041	Pass	0.046	Pass
		33	98.4	Pass	0.034	Pass	0.047	Pass

Table 17: Model Convergence Results - Core Scenario - 2041 Option 4

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2041 Option 4	AM Peak	60	98.0	Pass	0.013	Pass	0.044	Pass
		61	98.5	Pass	0.013	Pass	0.043	Pass
		62	98.6	Pass	0.018	Pass	0.039	Pass
		63	98.7	Pass	0.017	Pass	0.046	Pass
	Interpeak	24	97.8	Pass	0.043	Pass	0.035	Pass
		25	98.3	Pass	0.037	Pass	0.038	Pass
		26	98.3	Pass	0.034	Pass	0.032	Pass
		27	98.2	Pass	0.032	Pass	0.043	Pass
	PM Peak	68	98.0	Pass	0.036	Pass	0.049	Pass
		69	98.2	Pass	0.033	Pass	0.047	Pass
		70	98.3	Pass	0.038	Pass	0.049	Pass
		71	97.7	Pass	0.026	Pass	0.049	Pass

Table 18: Model Convergence Results - Core Scenario – 2041 Option 10

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2041 Option 10	AM Peak	67	98.4	Pass	0.021	Pass	0.048	Pass
		68	98.3	Pass	0.022	Pass	0.043	Pass
		69	98.4	Pass	0.023	Pass	0.039	Pass
		70	98.8	Pass	0.021	Pass	0.043	Pass
	Interpeak	27	98.4	Pass	0.030	Pass	0.044	Pass
		28	98.9	Pass	0.041	Pass	0.040	Pass
		29	98.0	Pass	0.039	Pass	0.033	Pass
		30	99.0	Pass	0.033	Pass	0.034	Pass
	PM Peak	97	96.0	Fail	0.052	Pass	0.064	Pass
		98	97.0	Fail	0.038	Pass	0.277	Fail
		99	92.8	Fail	0.086	Pass	0.291	Fail
		100	93.7	Fail	0.065	Pass	0.236	Fail

Table 19: Model Convergence Results - Core Scenario – 2041 Option 12

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2041 Option 12	AM Peak	57	97.7	Pass	0.021	Pass	0.034	Pass
		58	98.1	Pass	0.026	Pass	0.042	Pass
		59	98.1	Pass	0.021	Pass	0.043	Pass
		60	98.1	Pass	0.019	Pass	0.031	Pass
	Interpeak	19	97.9	Pass	0.048	Pass	0.043	Pass
		20	97.7	Pass	0.039	Pass	0.046	Pass
		21	98.0	Pass	0.045	Pass	0.046	Pass
		22	97.9	Pass	0.042	Pass	0.040	Pass
	PM Peak	32	97.8	Pass	0.034	Pass	0.045	Pass
		33	97.9	Pass	0.031	Pass	0.045	Pass
		34	97.9	Pass	0.027	Pass	0.045	Pass
		35	98.0	Pass	0.034	Pass	0.046	Pass

Table 20: Model Convergence Results - Core Scenario – 2041 Option 12A

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >97.5%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2041 Option 12A	AM Peak	47	97.9	Pass	0.016	Pass	0.043	Pass
		48	98.2	Pass	0.016	Pass	0.045	Pass
		49	98.5	Pass	0.015	Pass	0.041	Pass
		50	98.9	Pass	0.015	Pass	0.046	Pass
	Interpeak	28	98.2	Pass	0.045	Pass	0.049	Pass
		29	98.4	Pass	0.036	Pass	0.044	Pass
		30	98.6	Pass	0.039	Pass	0.039	Pass
		31	98.7	Pass	0.032	Pass	0.049	Pass
	PM Peak	66	98.0	Pass	0.025	Pass	0.045	Pass
		67	98.8	Pass	0.026	Pass	0.040	Pass
		68	98.9	Pass	0.028	Pass	0.045	Pass
		69	98.8	Pass	0.027	Pass	0.038	Pass

E-3 VOLUME TO CAPACITY RATIO

Table 1: Volume to Capacity Ratio Results - Core Scenario - Reference Case

Reference Case	2021 Ref			2031 Ref			2036 Ref			2041 Ref		
Road Name	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**
Part of J5 Roundabout- Maidstone Rd to M2 onslip Westbound	119	119	119	126	126	126	130	130	130	132	132	132
A249 heading southbound to Roundabout	102	102	102	106	106	106	108	108	108	110	110	110
M2 Junction 5 Eastbound off slip	97	97	97	100	100	100	101	101	101	103	103	103
Oad Street close to Pett Lane Junction				91	91	91	96	96	96	100	100	100
Right turn waiting area, from Oad Street to A249 northbound (Within central reservation)				100	100	100	100	100	100	100	100	100
M2 Eastbound between J4 and J5				88	88	88	91	91	91	94	94	94
Freeflow link - M2 Eastbound to A249 northbound (Existing location)	91	91	91	93	93	93	91	91	91	92	92	92
M2 Westbound between J5 and J4				88	88	88	90	90	90	92	92	92
M2 Westbound at J5 onslip merge				85	85	85	87	87	87	89	89	89
M2 Westbound between J5 offslip and J5 onslip										85	85	85

Table 2: Volume to Capacity Ratio Results - Core Scenario - Option 4

Core - Option 4	2021 Option 4			2031 Option 4			2036 Option 4			2041 Option 4		
Road Name	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**
New Oad Street connection to M2 Junction 5 Roundabout (To Roundabout)	100		92	103	96	103	103	98	103	105	101	104
Freeflow link between A249 Southbound and M2 J5 Eastbound	87		101	96	82	102	100		100	103	88	102
M2 Eastbound onslip exit from the M2 Junction 5 roundabout			101	75	55	102	100		100	103		102
M2 J5 Eastbound onslip	89		100	96	85	100	100	86	100	100	90	100
M2 Eastbound prior to diverge for M2 Junction 5			96	88		98	92	87	98	97	90	98
Freeflow link between M2 Eastbound and A249 Northbound			95			95	89		94	92		92
A249 northbound immediately after merge from M2 EB freeflow link			90			92			93			92
M2 Westbound immediately after the M2 Junction 5 onslip merge	89			97		86	100		88	101		90
M2 Eastbound to A249 northbound freeflow merge with A249			87			89			90			89
M2 Eastbound after M2 Junction 5										87		87
M2 Westbound onslip merge at M2 Junction 5	86			93			96		85	97		86
A249 northbound prior to M2 Eastbound to A249 northbound merge									85			
M2 Westbound between the offslip and onslip at Junction 5				92			97			99		
A249 Southbound prior to the diverge for the roundabout and freeflow							88			91		
A249 Southbound approach to the M2 Junction 5 roundabout after the freeflow link										87		

Table 3: Volume to Capacity Ratio Results - Core Scenario - Option 10

Core - Option 10	2021 Option 10			2031 Option 10			2036 Option 10			2041 Option 10		
Road Name	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**
Oad Street / Maidstone Road combined link - approach to roundabout	111	103	111	113	109	113	115	110	113	115	112	115
A249 northbound entry immediately prior to the M2 Junction 5 roundabout	106	99	106	106	104	106	106	106	106	106	106	106
Oad Street link to Maidstone Road											92	100
A249 northbound exit sliproad to M2 Junction 5 - second diverge point	100			103			105		100	108	100	100
A249 southbound approach to M2 Junction 5 roundabout	94		94	102		92	103		95	104	87	100
M2 Eastbound prior to M2 Junction 5 offslip			98	89		99	95	88	99	98	92	99
A249 northbound exit sliproad to M2 Junction 5 - after M2 westbound freeflow	100			103			105		96	105	100	98
M2 westbound immediately after M2 Junction 5 merge	87			94		88	97		91	99		95
M2 westbound onslip from M2 Junction 5 roundabout			88	89		86	92		88	93		93
M2 westbound merge of A249 northbound freeflow				90		85	94		88	95		92
A249 northbound immediately after freeflow from M2 eastbound			89			91			92			91
M2 westbound merge from M2 Junction 5 roundabout				90			94		87	95		91
A249 northbound between the merges from the M2 Junction 5 roundabout and the freeflow link			87			90			91			91
M2 westbound exit from M2 Junction 5 roundabout			85				87		85	88		90
A249 northbound merge with freeflow link from M2 eastbound			86			88			88			88
M2 eastbound to A249 northbound freeflow link - immediately prior to the merge						86			87			87
A249 southbound prior to diverge for M2 Junction 5 roundabout				87			90			93		
A249 southbound diverge for M2 junction 5 roundabout							88			90		
M2 westbound offslip to M2 Junction 5 roundabout - prior to freeflow to A249 southbound							89			93		
Maidstone Road prior to the junction with the new Oad Street link											101	

Table 4: Volume to Capacity Ratio Results - Core Scenario - Option 12

Core - Option 12	2021 Option 12			2031 Option 12			2036 Option 12			2041 Option 12		
Road Name	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
New Oad Street connection to M2 Junction 5 Roundabout	84	31	47	97	44	60	101	48	69	102	52	76
M2 Westbound Offslip at M2 Junction 5	95	58	77	98	60	84	100	62	88	102	63	91
M2 Westbound immediately after the M2 Junction 5 onslip merge	86	65	81	96	75	87	99	78	89	101	82	90
M2 Westbound between the offslip and onslip at Junction 5	76	47	65	91	57	73	97	61	76	100	66	79
New Maidstone Road link to Oad Street	92	31	25	97	41	31	100	44	35	99	48	44
M2 J5 Eastbound onslip	84	69	95	94	84	100	97	88	100	99	92	100
M2 Junction 5 Circulatory Carriageway between the M2 Westbound slips	80	86	77	88	97	83	94	100	84	98	101	82
Freeflow link between A249 Southbound and M2 J5 Eastbound	79	67	94	92	82	102	96	86	100	97	91	104
M2 Eastbound prior to diverge for M2 Junction 5	78	74	95	89	83	98	94	87	98	97	90	98
M2 Westbound onslip merge at M2 Junction 5	83	63	79	92	73	84	95	76	86	97	79	87
Freeflow link between M2 Eastbound and A249 Northbound	78	73	98	91	81	100	93	84	100	95	86	99
A249 Northbound approach to M2 Junction 5 Roundabout after M2 Eastbound freeflow diverge	74	65	104	84	74	105	86	77	108	88	80	107
M2 Eastbound immediately after the M2 Junction 5 merge	73	65	81	80	76	84	83	80	85	86	82	86
A249 Southbound approach to the M2 Junction 5 roundabout before the freeflow link to M2 Westbound	72	52	64	81	59	70	84	62	69	86	64	78
A249 Southbound approach to M2 Junction 5	72	55	68	81	63	74	84	65	73	86	68	75
A249 Southbound approach to the M2 Junction 5 roundabout after the freeflow link to M2 Westbound	74	66	73	80	74	88	84	76	89	86	78	101
M2 Eastbound onslip exit from the M2 Junction 5 roundabout	39	20	78	68	44	102	79	51	100	85	63	104
A249 northbound immediately after merge from M2 EB freeflow link	70	70	89	78	73	90	80	76	90	82	77	90
M2 Eastbound to A249 northbound freeflow merge with A249	68	67	86	76	71	87	78	73	87	79	75	87

Table 5: Volume to Capacity Ratio Results - Core Scenario - Option 12A

Core - Option 12A	2021 Option 12A			2031 Option 12A			2036 Option 12A			2041 Option 12A		
Road Name	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**
Freeflow link between A249 Southbound and M2 J5 Eastbound			98	98		103	100		103	102	87	103
M2 Eastbound onslip exit from the M2 Junction 5 roundabout			91	88		103	100		103	102		103
M2 Westbound immediately after the M2 Junction 5 onslip merge	89			98		87	100		89	101		90
M2 J5 Eastbound onslip	87		98	98		100	100	86	100	100	89	100
M2 Westbound between the offslip and onslip at Junction 5				94			98			99		
M2 Westbound onslip merge at M2 Junction 5	86			94			97		86	97		87
M2 Eastbound prior to diverge for M2 Junction 5			95	89		98	93	87	98	96	90	98
New Maidstone Road link to Oad Street				86			94			95		
Freeflow link between M2 Eastbound and A249 Northbound			96	90		97	92		96	94	86	95
A249 Southbound approach to M2 Junction 5							86			88		
M2 Eastbound after M2 Junction 5										87		87
A249 northbound immediately after merge from M2 EB freeflow link			89			92			92			92
M2 Eastbound to A249 northbound freeflow merge with A249			86			89			89			89

E-4 QUEUE LENGTHS (CORE)

Table 1: Queue Length Results (Vehicles) - Core Scenario - Reference Case

Core - Reference Case	2021 Ref			2031 Ref			2036 Ref			2041 Ref		
Road Name	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**
A249 heading southbound to Roundabout	37	37	37	152	152	152	205	205	205	256	256	256
M2 Junction 5 Eastbound off slip	0	0	0	8	8	8	15	15	15	54	54	54
Part of J5 Roundabout- Maidstone Rd to M2 onslip Westbound	29	29	29	35	35	35	40	40	40	43	43	43
Oad Street close to Pett Lane Junction	4	4	4	8	8	8	10	10	10	10	10	10

Table 2: Queue Length Results (Vehicles) - Core Scenario - Option 4

Core - Option 4	2021 Option 4			2031 Option 4			2036 Option 4			2041 Option 4		
Road Name	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**
Freeflow link between A249 Southbound and M2 J5 Eastbound	0	0	15	0	0	21	4	0	2	32	0	22
New Oad Street connection to M2 Junction 5 Roundabout (To Roundabout)	2	0	0	13	0	16	14	0	17	19	4	21
M2 Eastbound onslip exit from the M2 Junction 5 roundabout	0	0	5	0	0	12	1	0	1	17	0	13
M2 Westbound immediately after the M2 Junction 5 onslip merge	0	0	0	0	0	0	0	0	0	26	0	0
M2 J5 Eastbound onslip	0	0	0	0	0	0	0	0	0	4	0	0

Table 3: Queue Length Results (Vehicles) - Core Scenario - Option 10

Core - Option 10	2021 Option 10			2031 Option 10			2036 Option 10			2041 Option 10		
Road Name	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**
A249 northbound entry immediately prior to the M2 Junction 5 roundabout	49	0	48	49	30	49	49	47	49	49	49	49
Oad Street / Maidstone Road combined link - approach to roundabout	25	11	23	25	26	27	28	26	27	28	28	28
A249 northbound exit sliproad to M2 Junction 5 - second diverge point	0	0	0	14	0	0	23	0	1	33	0	0
A249 southbound approach to M2 Junction 5 roundabout	0	0	0	30	0	0	60	0	0	81	0	0
A249 northbound exit sliproad to M2 Junction 5 - after M2 westbound freeflow	0	0	0	13	0	0	21	0	0	21	1	0

Table 4: Queue Length Results (Vehicles) - Core Scenario - Option 12

Core - Option 12	2021 Option 12			2031 Option 12			2036 Option 12			2041 Option 12		
Road Name	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
A249 Northbound approach to M2 Junction 5 Roundabout after M2 Eastbound freeflow diverge	0	0	52	0	0	67	0	0	100	0	0	95
Freeflow link between A249 Southbound and M2 J5 Eastbound	0	0	0	0	0	35	0	0	5	0	0	54
M2 Eastbound onslip exit from the M2 Junction 5 roundabout	0	0	0	0	0	11	0	0	2	0	0	28
A249 Southbound approach to the M2 Junction 5 roundabout before the freeflow link to M2 Westbound	0	0	0	0	0	0	0	0	0	0	0	20
A249 Southbound approach to the M2 Junction 5 roundabout after the freeflow link to M2 Westbound	0	0	0	0	0	0	0	0	0	0	0	19
M2 Westbound immediately after the M2 Junction 5 onslip merge	0	0	0	0	0	0	0	0	0	25	0	0
M2 Westbound Offslip at M2 Junction 5	0	0	0	0	0	0	2	0	0	20	0	0
New Oad Street connection to M2 Junction 5 Roundabout	0	0	0	0	0	0	11	0	0	17	0	0
M2 Westbound between the offslip and onslip at Junction 5	0	0	0	0	0	0	0	0	0	2	0	0
New Maidstone Road link to Oad Street	0	0	0	0	0	0	1	0	0	0	0	0
M2 J5 Eastbound onslip	0	0	0	0	0	0	0	0	0	0	0	0
M2 Junction 5 Circulatory Carriageway between the M2 Westbound slips	0	0	0	0	0	0	0	5	0	0	19	0

Table 5: Queue Length Results (Vehicles) - Core Scenario - Option 12A

Core - Option 12A	2021 Option 12A			2031 Option 12A			2036 Option 12A			2041 Option 12A		
Road Name	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**
Freeflow link between A249 Southbound and M2 J5 Eastbound	0	0	0	0	0	33	0	0	42	28	0	33
M2 Eastbound onslip exit from the M2 Junction 5 roundabout	0	0	0	0	0	16	0	0	22	7	0	16
M2 Westbound immediately after the M2 Junction 5 onslip merge	0	0	0	0	0	0	0	0	0	31	0	0
M2 J5 Eastbound onslip	0	0	0	0	0	0	0	0	0	6	0	0

E-5 JOURNEY TIME RESULTS (CORE)

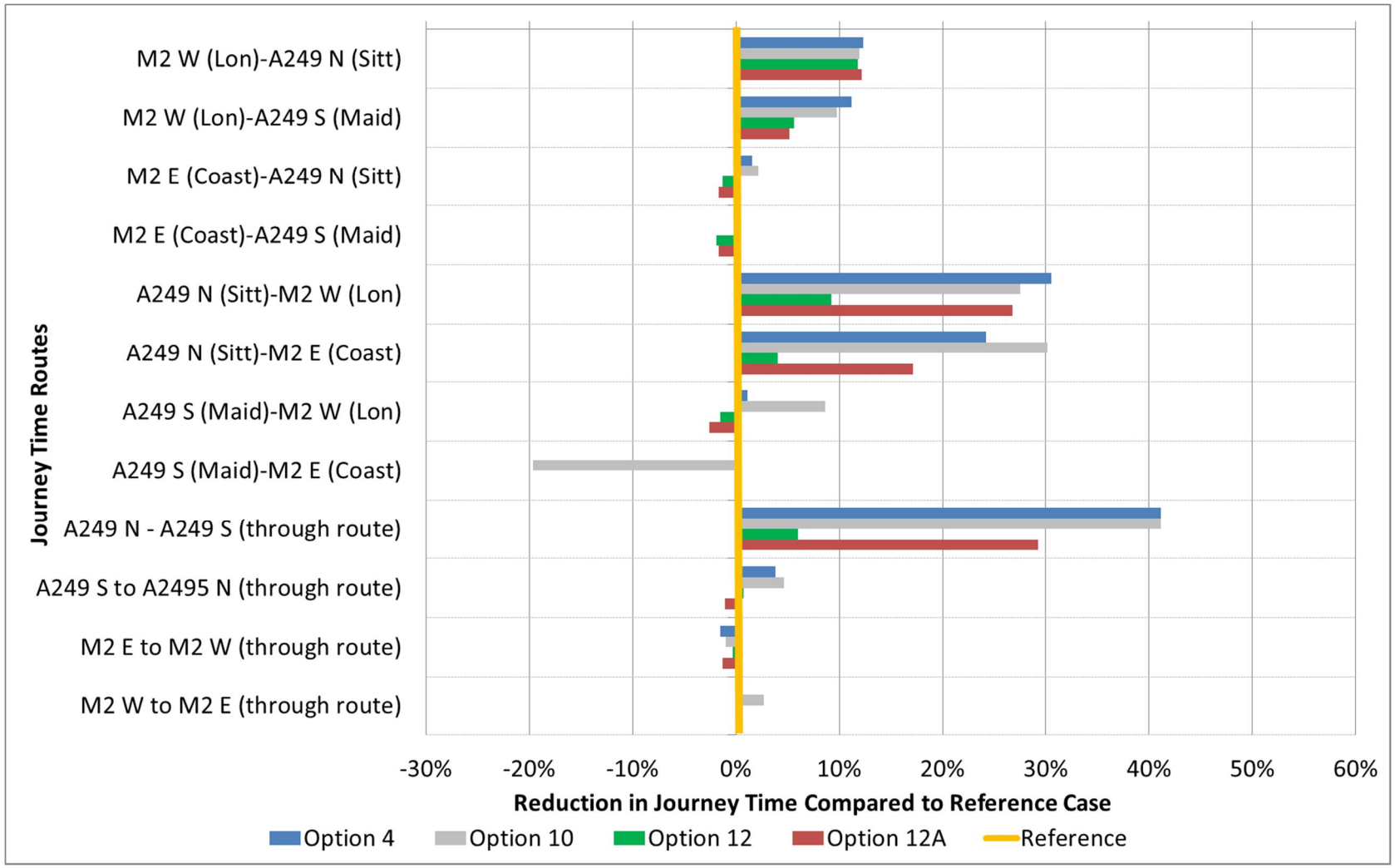


Figure 1: Journey Time Results - Core Scenario - 2021 - AM Peak

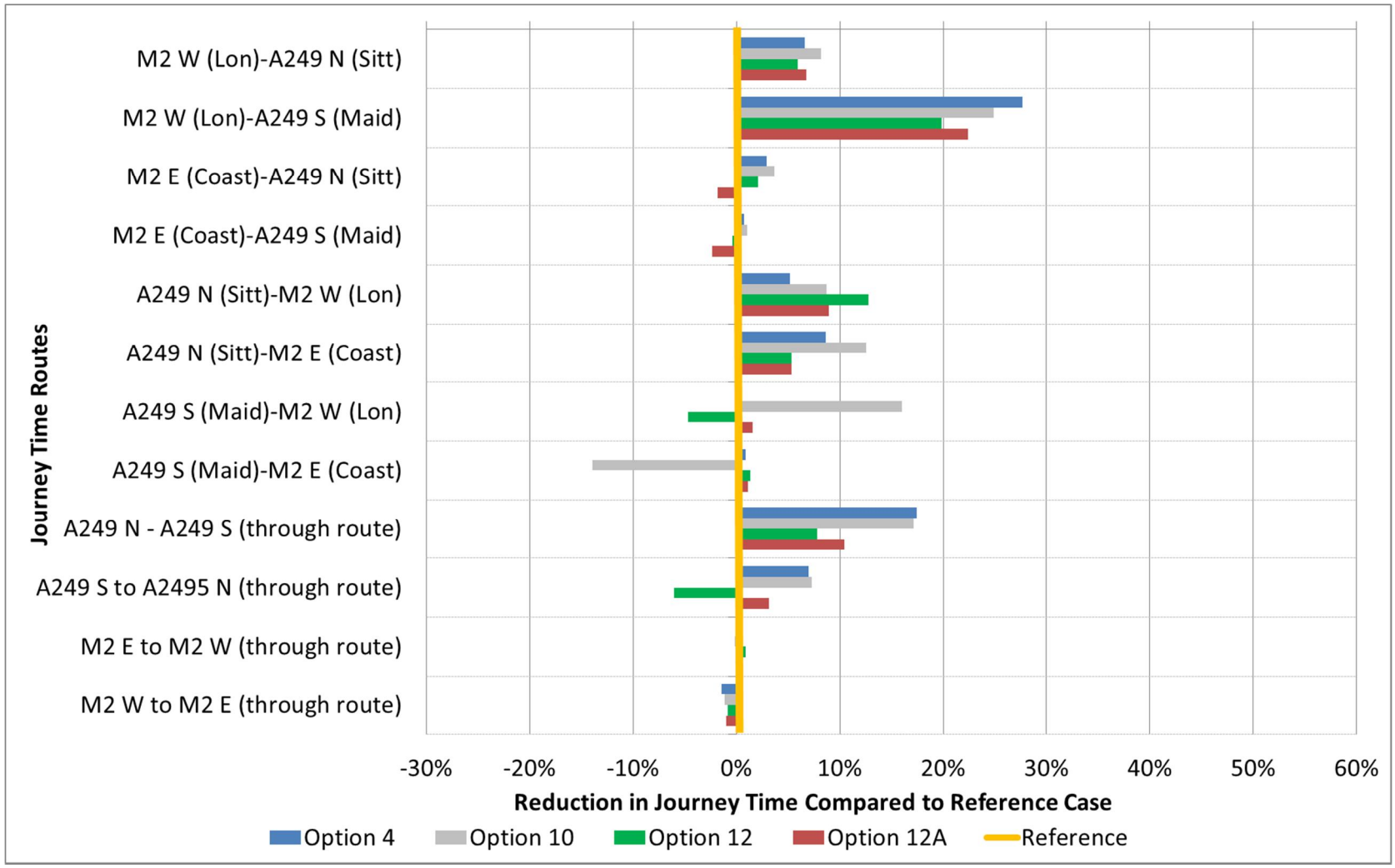


Figure 2: Journey Time Results - Core Scenario - 2021 - PM Peak

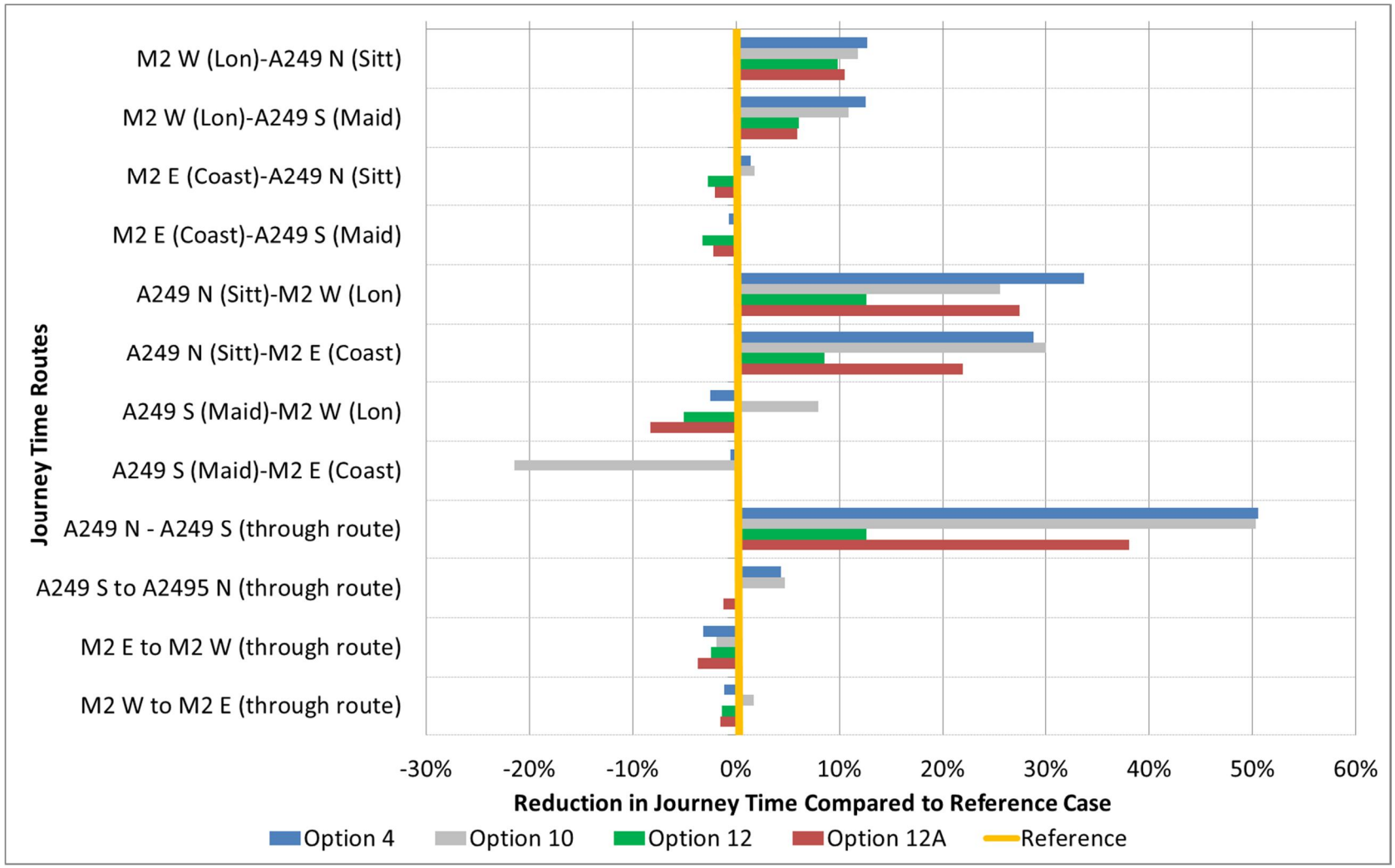


Figure 3: Journey Time Results - Core Scenario - 2031 - AM Peak

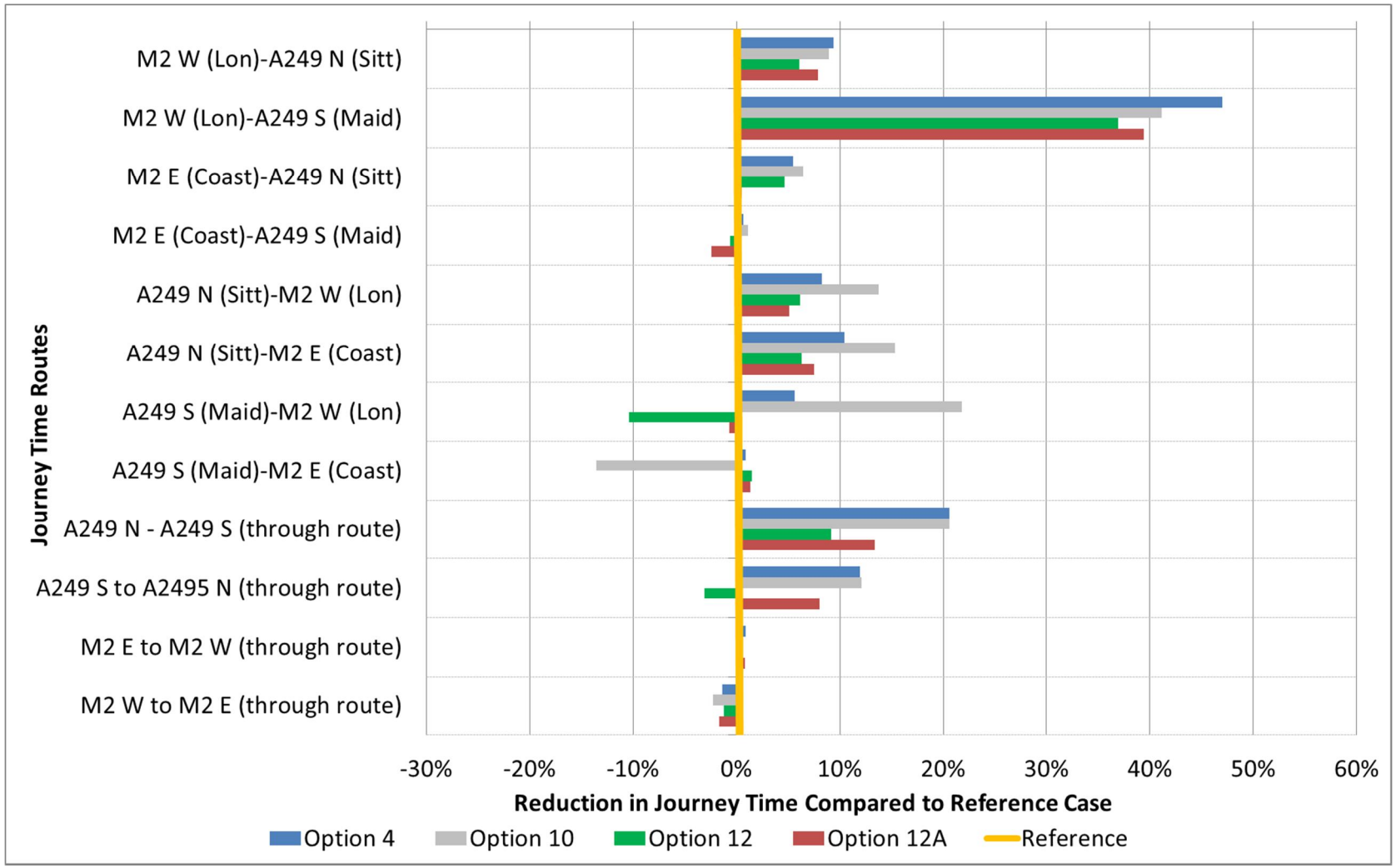


Figure 4: Journey Time Results - Core Scenario - 2031 - PM Peak

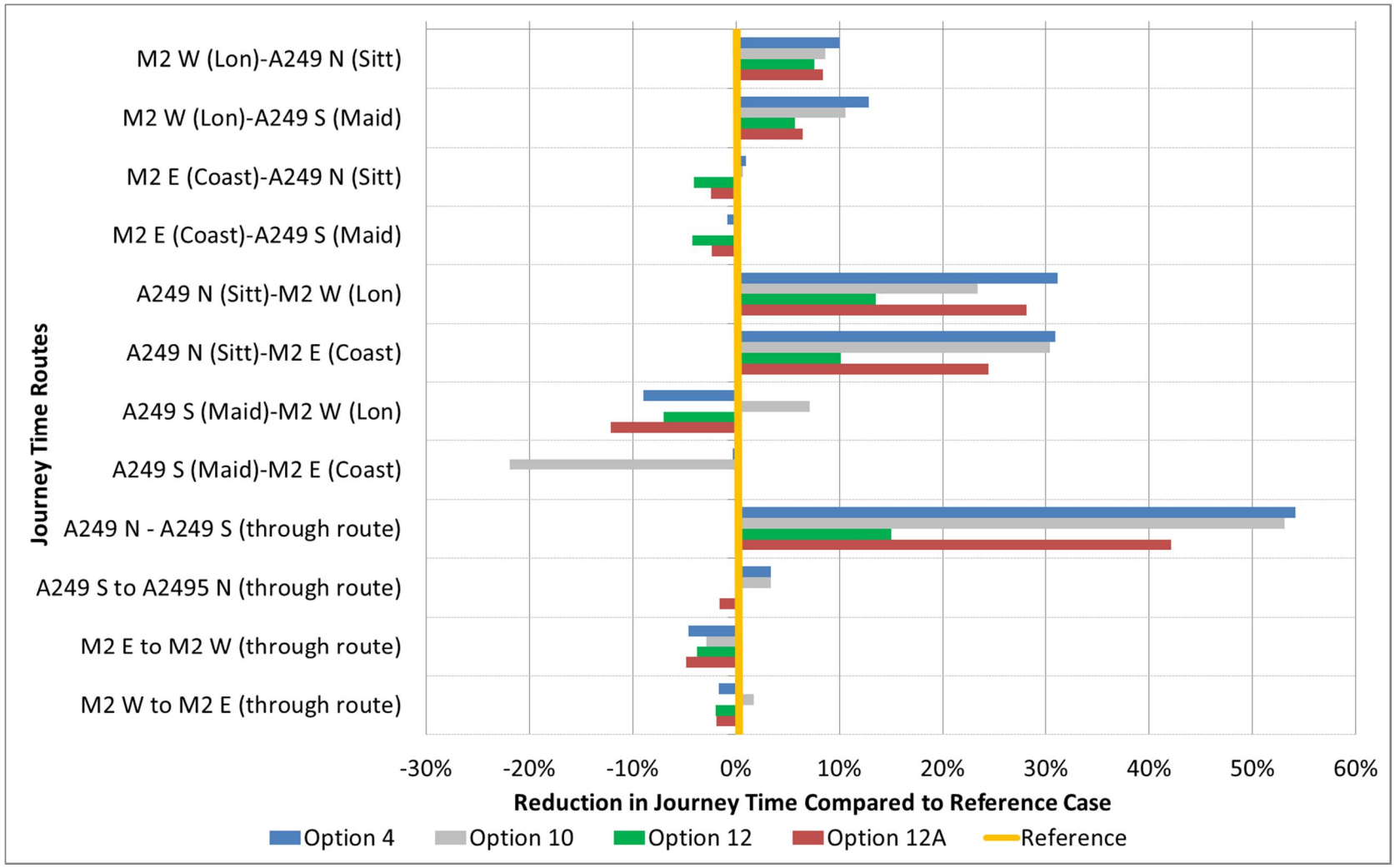


Figure 5: Journey Time Results - Core Scenario - 2036 - AM Peak

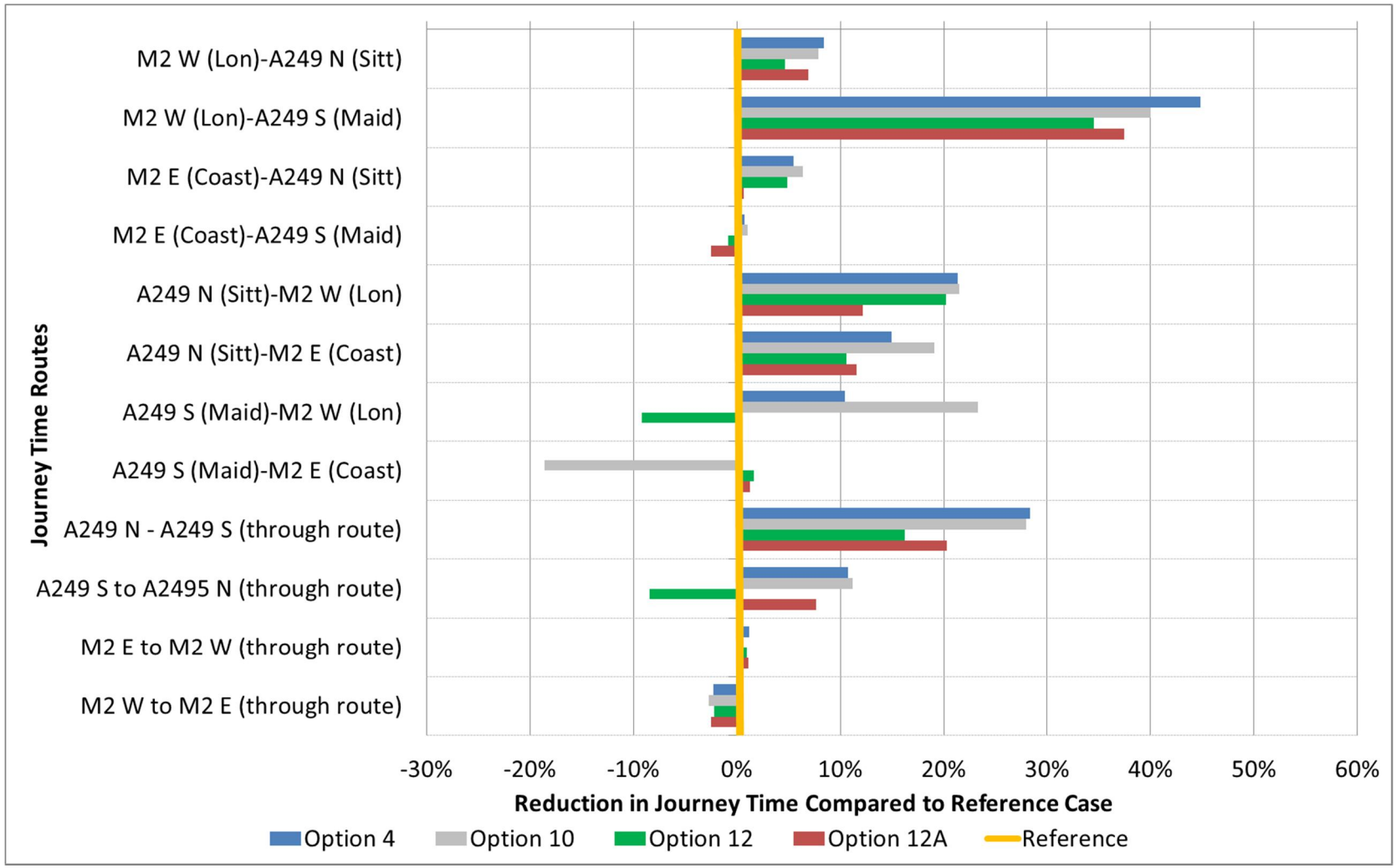


Figure 6: Journey Time Results - Core Scenario - 2036 - PM Peak

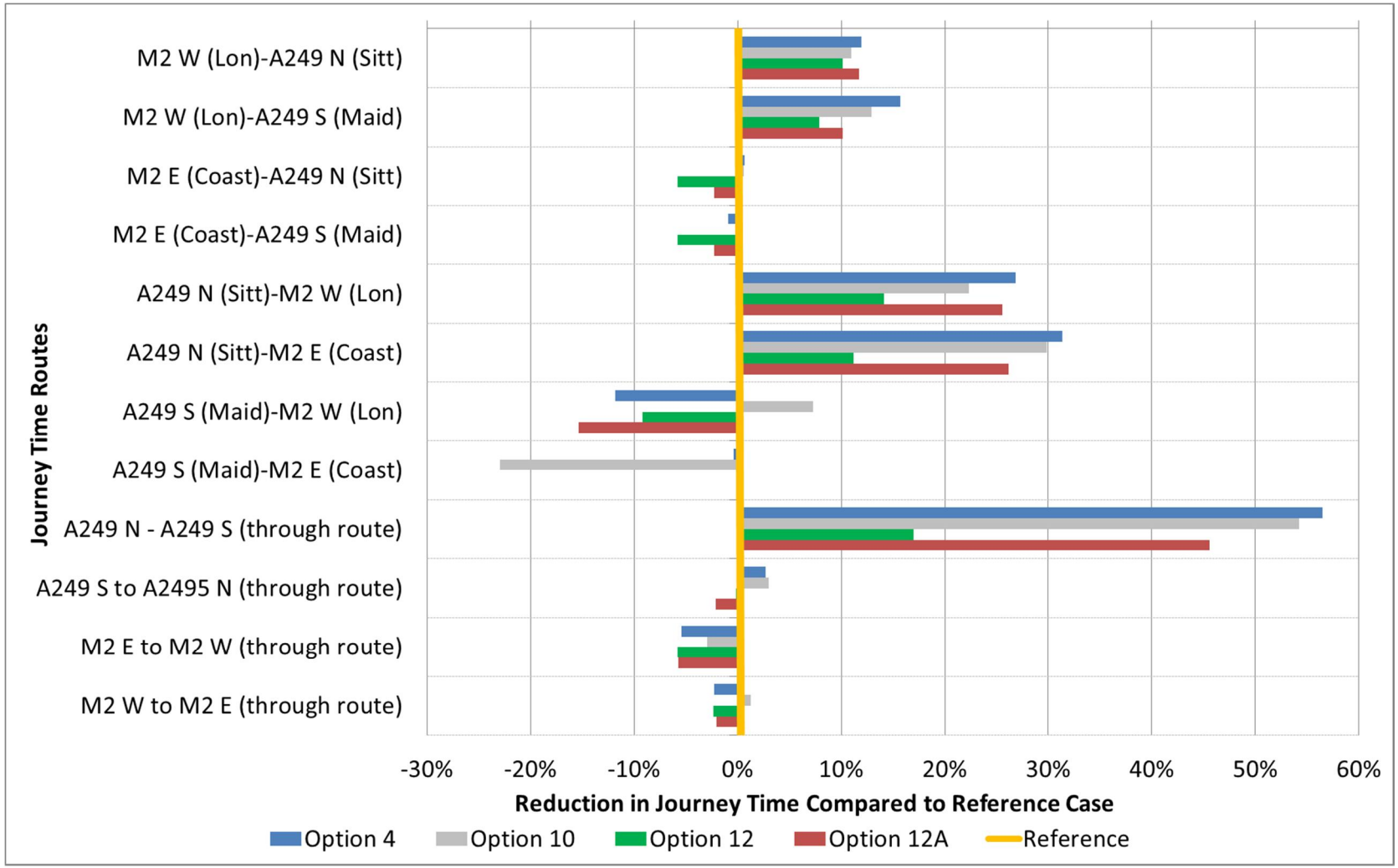


Figure 7: Journey Time Results - Core Scenario - 2041 - AM Peak

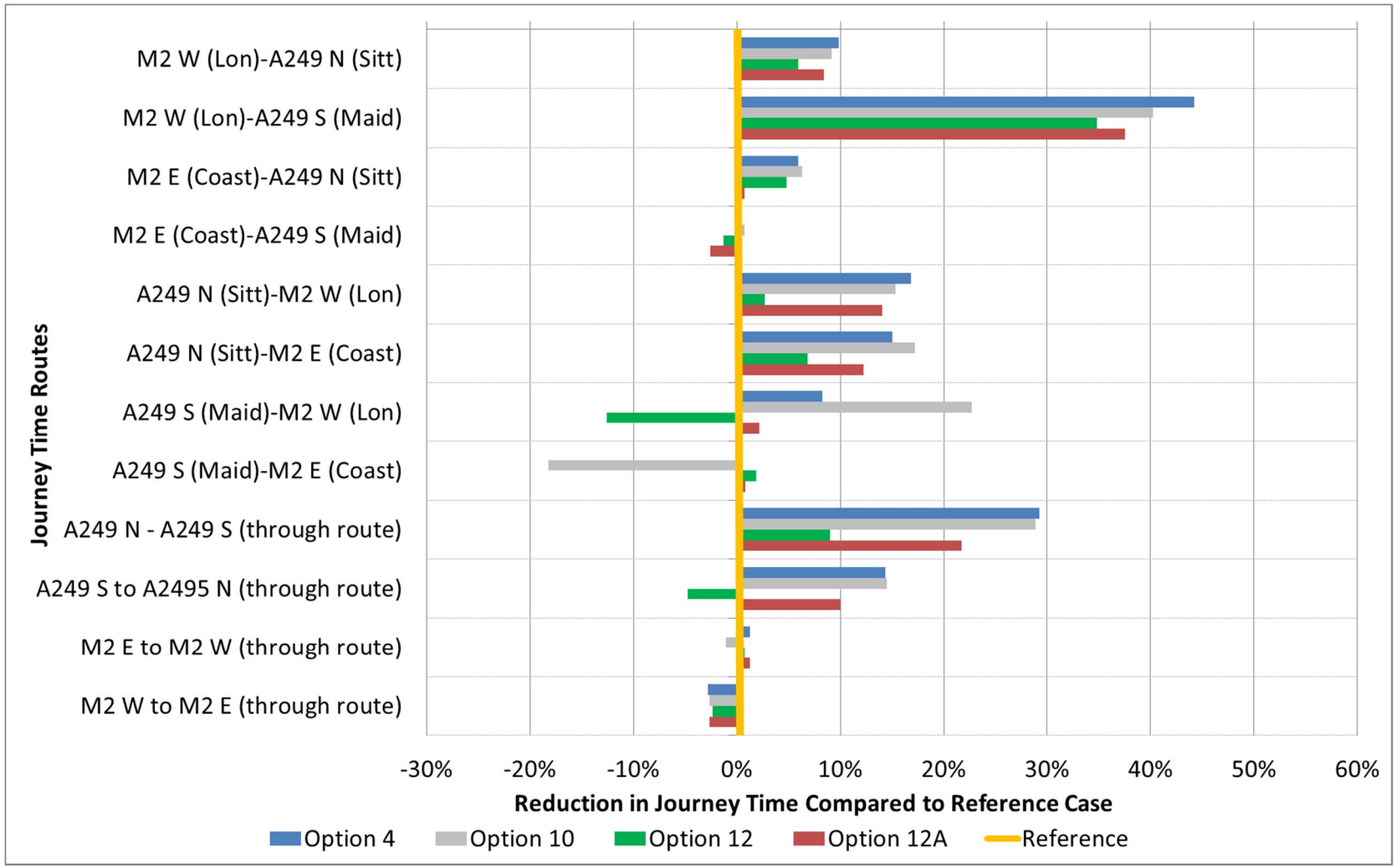


Figure 8: Journey Time Results - Core Scenario - 2041 - PM Peak

E-6 MODEL CONVERGENCE (ALTERNATIVE)

The convergence results for the Reference Case and the four options using the Alternative scenario for 2021 are shown in **Table 1** to **Table 5**.

Table 1: Model Convergence Results - Alternative Scenario - 2021 Reference Case

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2021 Reference Case	AM Peak	31	97.8	Pass	0.019	Pass	0.041	Pass
		32	98.0	Pass	0.028	Pass	0.025	Pass
		33	98.4	Pass	0.021	Pass	0.026	Pass
		34	97.9	Pass	0.018	Pass	0.027	Pass
	Interpeak	23	97.8	Pass	0.021	Pass	0.049	Pass
		24	97.8	Pass	0.040	Pass	0.024	Pass
		25	97.8	Pass	0.036	Pass	0.037	Pass
		26	98.3	Pass	0.023	Pass	0.021	Pass
	PM Peak	23	98.2	Pass	0.037	Pass	0.042	Pass
		24	98.4	Pass	0.035	Pass	0.040	Pass
		25	98.2	Pass	0.039	Pass	0.040	Pass
		26	98.3	Pass	0.036	Pass	0.049	Pass

Table 2: Model Convergence Results - Alternative Scenario - 2021 Option 4

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2021 Option 4	AM Peak	25	97.9	Pass	0.022	Pass	0.034	Pass
		26	98.1	Pass	0.034	Pass	0.026	Pass
		27	98.3	Pass	0.023	Pass	0.026	Pass
		28	98.5	Pass	0.021	Pass	0.020	Pass
	Interpeak	24	98.1	Pass	0.030	Pass	0.050	Pass
		25	97.5	Fail	0.040	Pass	0.043	Pass
		26	98.2	Pass	0.033	Pass	0.029	Pass
		27	98.4	Pass	0.024	Pass	0.024	Pass
	PM Peak	29	97.8	Pass	0.044	Pass	0.042	Pass
		30	98.0	Pass	0.037	Pass	0.048	Pass
		31	98.1	Pass	0.043	Pass	0.044	Pass
		32	98.0	Pass	0.042	Pass	0.035	Pass

Table 3: Model Convergence Results - Alternative Scenario - 2021 Option 10

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2021 Option 10	AM Peak	23	97.8	Pass	0.023	Pass	0.024	Pass
		24	97.6	Pass	0.017	Pass	0.029	Pass
		25	98.2	Pass	0.016	Pass	0.018	Pass
		26	98.1	Pass	0.017	Pass	0.025	Pass
	Interpeak	20	97.8	Pass	0.017	Pass	0.044	Pass
		21	97.9	Pass	0.014	Pass	0.032	Pass
		22	98.1	Pass	0.019	Pass	0.025	Pass
		23	97.8	Pass	0.020	Pass	0.022	Pass
	PM Peak	31	97.7	Pass	0.046	Pass	0.037	Pass
		32	98.2	Pass	0.030	Pass	0.032	Pass
		33	98.3	Pass	0.032	Pass	0.049	Pass
		34	98.3	Pass	0.047	Pass	0.028	Pass

Table 4: Model Convergence Results - Alternative Scenario - 2021 Option 12

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2021 Option 12	AM Peak	27	97.7	Pass	0.019	Pass	0.023	Pass
		28	97.9	Pass	0.016	Pass	0.025	Pass
		29	97.7	Pass	0.019	Pass	0.026	Pass
		30	97.5	Fail	0.017	Pass	0.034	Pass
	Interpeak	18	97.5	Fail	0.042	Pass	0.027	Pass
		19	97.6	Pass	0.047	Pass	0.024	Pass
		20	97.9	Pass	0.023	Pass	0.023	Pass
		21	98.2	Pass	0.023	Pass	0.026	Pass
	PM Peak	36	98.1	Pass	0.034	Pass	0.045	Pass
		37	97.9	Pass	0.038	Pass	0.033	Pass
		38	98.1	Pass	0.028	Pass	0.034	Pass
		39	98.0	Pass	0.029	Pass	0.037	Pass

Table 5: Model Convergence Results - Alternative Scenario - 2021 Option 12A

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2021 Option 12A	AM Peak	22	97.9	Pass	0.017	Pass	0.026	Pass
		23	98.3	Pass	0.017	Pass	0.026	Pass
		24	98.5	Pass	0.013	Pass	0.022	Pass
		25	98.4	Pass	0.017	Pass	0.029	Pass
	Interpeak	48	97.5	Fail	0.056	Pass	0.029	Pass
		49	98.0	Pass	0.021	Pass	0.041	Pass
		50	98.1	Pass	0.025	Pass	0.023	Pass
		51	98.3	Pass	0.016	Pass	0.022	Pass
	PM Peak	35	97.6	Pass	0.032	Pass	0.043	Pass
		36	97.9	Pass	0.033	Pass	0.030	Pass
		37	98.2	Pass	0.031	Pass	0.037	Pass
		38	97.7	Pass	0.023	Pass	0.037	Pass

The convergence results for the Reference Case and the four options using the Alternative scenario for 2031 are shown in

Table 6 and **Table 10**.

Table 6: Model Convergence Results - Alternative Scenario - 2031 Reference Case

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2031 Reference Case	AM Peak	46	98.7	Pass	0.016	Pass	0.034	Pass
		47	99.0	Pass	0.014	Pass	0.048	Pass
		48	98.7	Pass	0.013	Pass	0.034	Pass
		49	99.0	Pass	0.017	Pass	0.039	Pass
	Interpeak	17	97.6	Pass	0.026	Pass	0.036	Pass
		18	98.1	Pass	0.028	Pass	0.032	Pass
		19	98.2	Pass	0.026	Pass	0.029	Pass
		20	98.2	Pass	0.025	Pass	0.027	Pass
	PM Peak	26	97.8	Pass	0.040	Pass	0.040	Pass
		27	98.1	Pass	0.040	Pass	0.038	Pass
		28	98.0	Pass	0.037	Pass	0.034	Pass
		29	98.3	Pass	0.034	Pass	0.039	Pass

Table 7: Model Convergence Results - Alternative Scenario – 2031 Option 4

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2031 Option 4	AM Peak	42	98.5	Pass	0.016	Pass	0.035	Pass
		43	98.4	Pass	0.013	Pass	0.047	Pass
		44	98.7	Pass	0.014	Pass	0.040	Pass
		45	98.5	Pass	0.014	Pass	0.021	Pass
	Interpeak	17	97.9	Pass	0.029	Pass	0.029	Pass
		18	98.0	Pass	0.026	Pass	0.041	Pass
		19	97.8	Pass	0.024	Pass	0.020	Pass
		20	98.3	Pass	0.022	Pass	0.023	Pass
	PM Peak	40	97.9	Pass	0.035	Pass	0.048	Pass
		41	98.0	Pass	0.030	Pass	0.048	Pass
		42	97.9	Pass	0.026	Pass	0.044	Pass
		43	97.8	Pass	0.033	Pass	0.041	Pass

Table 8: Model Convergence Results - Alternative Scenario – 2031 Option 10

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2031 Option 10	AM Peak	34	98.4	Pass	0.017	Pass	0.040	Pass
		35	98.7	Pass	0.020	Pass	0.045	Pass
		36	98.2	Pass	0.015	Pass	0.036	Pass
		37	98.5	Pass	0.013	Pass	0.049	Pass
	Interpeak	44	97.6	Pass	0.008	Pass	0.029	Pass
		45	97.9	Pass	0.016	Pass	0.015	Pass
		46	98.1	Pass	0.015	Pass	0.019	Pass
		47	98.0	Pass	0.008	Pass	0.012	Pass
	PM Peak	60	97.7	Pass	0.032	Pass	0.049	Pass
		61	97.8	Pass	0.025	Pass	0.048	Pass
		62	98.0	Pass	0.027	Pass	0.041	Pass
		63	97.9	Pass	0.029	Pass	0.037	Pass

Table 9: Model Convergence Results - Alternative Scenario – 2031 Option 12

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2031 Option 12	AM Peak	51	97.8	Pass	0.015	Pass	0.035	Pass
		52	98.2	Pass	0.017	Pass	0.041	Pass
		53	97.5	Fail	0.012	Pass	0.045	Pass
		54	97.5	Fail	0.013	Pass	0.039	Pass
	Interpeak	16	97.5	Fail	0.027	Pass	0.034	Pass
		17	98.2	Pass	0.026	Pass	0.040	Pass
		18	97.9	Pass	0.023	Pass	0.028	Pass
		19	98.3	Pass	0.020	Pass	0.046	Pass
	PM Peak	29	97.6	Pass	0.042	Pass	0.043	Pass
		30	97.7	Pass	0.026	Pass	0.047	Pass
		31	97.5	Fail	0.042	Pass	0.037	Pass
		32	97.8	Pass	0.033	Pass	0.041	Pass

Table 10: Model Convergence Results - Alternative Scenario – 2031 Option 12A

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2031 Option 12A	AM Peak	37	97.7	Pass	0.017	Pass	0.050	Pass
		38	98.0	Pass	0.017	Pass	0.045	Pass
		39	98.2	Pass	0.015	Pass	0.045	Pass
		40	98.2	Pass	0.016	Pass	0.041	Pass
	Interpeak	19	97.9	Pass	0.025	Pass	0.041	Pass
		20	97.8	Pass	0.023	Pass	0.031	Pass
		21	98.5	Pass	0.023	Pass	0.047	Pass
		22	98.1	Pass	0.022	Pass	0.025	Pass
	PM Peak	36	97.9	Pass	0.033	Pass	0.049	Pass
		37	97.9	Pass	0.032	Pass	0.048	Pass
		38	98.0	Pass	0.034	Pass	0.041	Pass
		39	98.0	Pass	0.029	Pass	0.047	Pass

The convergence results for the Reference Case and the four options using the Alternative scenario for 2036 are shown in **Table 11** to **Table 15**.

Table 11: Model Convergence Results - Alternative Scenario - 2036 Reference Case

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2036 Reference Case	AM Peak	62	98.5	Pass	0.012	Pass	0.035	Pass
		63	98.5	Pass	0.016	Pass	0.048	Pass
		64	98.6	Pass	0.013	Pass	0.030	Pass
		65	98.5	Pass	0.014	Pass	0.048	Pass
	Interpeak	29	98.7	Pass	0.042	Pass	0.046	Pass
		30	98.9	Pass	0.048	Pass	0.043	Pass
		31	98.6	Pass	0.036	Pass	0.043	Pass
		32	98.8	Pass	0.048	Pass	0.039	Pass
	PM Peak	26	97.7	Pass	0.047	Pass	0.045	Pass
		27	97.9	Pass	0.046	Pass	0.042	Pass
		28	98.1	Pass	0.032	Pass	0.037	Pass
		29	98.2	Pass	0.036	Pass	0.040	Pass

Table 12: Model Convergence Results - Alternative Scenario - 2036 Option 4

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2036 Option 4	AM Peak	83	98.1	Pass	0.018	Pass	0.048	Pass
		84	98.6	Pass	0.014	Pass	0.028	Pass
		85	98.4	Pass	0.017	Pass	0.034	Pass
		86	98.4	Pass	0.018	Pass	0.042	Pass
	Interpeak	29	98.8	Pass	0.028	Pass	0.046	Pass
		30	98.7	Pass	0.036	Pass	0.047	Pass
		31	98.9	Pass	0.039	Pass	0.042	Pass
		32	99.1	Pass	0.028	Pass	0.037	Pass
	PM Peak	63	98.0	Pass	0.027	Pass	0.045	Pass
		64	98.1	Pass	0.024	Pass	0.047	Pass
		65	98.1	Pass	0.022	Pass	0.049	Pass
		66	98.1	Pass	0.029	Pass	0.048	Pass

Table 13: Model Convergence Results - Alternative Scenario – 2036 Option 10

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2036 Option 10	AM Peak	72	98.7	Pass	0.017	Pass	0.045	Pass
		73	98.5	Pass	0.017	Pass	0.050	Pass
		74	98.5	Pass	0.015	Pass	0.049	Pass
		75	98.4	Pass	0.016	Pass	0.037	Pass
	Interpeak	27	98.4	Pass	0.034	Pass	0.041	Pass
		28	97.7	Pass	0.035	Pass	0.044	Pass
		29	98.5	Pass	0.030	Pass	0.039	Pass
		30	98.7	Pass	0.029	Pass	0.047	Pass
	PM Peak	63	98.2	Pass	0.032	Pass	0.045	Pass
		64	97.6	Pass	0.026	Pass	0.035	Pass
		65	98.4	Pass	0.024	Pass	0.033	Pass
		66	98.8	Pass	0.024	Pass	0.042	Pass

Table 14: Model Convergence Results - Alternative Scenario – 2036 Option 12

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2036 Option 12	AM Peak	54	98.1	Pass	0.014	Pass	0.042	Pass
		55	98.2	Pass	0.015	Pass	0.043	Pass
		56	98.3	Pass	0.014	Pass	0.045	Pass
		57	98.4	Pass	0.015	Pass	0.039	Pass
	Interpeak	22	98.6	Pass	0.044	Pass	0.038	Pass
		23	98.7	Pass	0.037	Pass	0.033	Pass
		24	98.9	Pass	0.041	Pass	0.049	Pass
		25	99.0	Pass	0.044	Pass	0.037	Pass
	PM Peak	45	97.8	Pass	0.032	Pass	0.050	Pass
		46	97.5	Fail	0.023	Pass	0.047	Pass
		47	97.6	Pass	0.027	Pass	0.041	Pass
		48	97.8	Pass	0.034	Pass	0.049	Pass

Table 15: Model Convergence Results - Alternative Scenario – 2036 Option 12A

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2036 Option 12A	AM Peak	56	98.0	Pass	0.017	Pass	0.045	Pass
		57	98.9	Pass	0.015	Pass	0.048	Pass
		58	98.7	Pass	0.016	Pass	0.044	Pass
		59	99.0	Pass	0.015	Pass	0.046	Pass
	Interpeak	26	98.3	Pass	0.035	Pass	0.046	Pass
		27	98.3	Pass	0.034	Pass	0.045	Pass
		28	98.5	Pass	0.036	Pass	0.040	Pass
		29	98.7	Pass	0.033	Pass	0.035	Pass
	PM Peak	42	98.3	Pass	0.036	Pass	0.048	Pass
		43	98.0	Pass	0.034	Pass	0.040	Pass
		44	98.1	Pass	0.032	Pass	0.049	Pass
		45	98.1	Pass	0.022	Pass	0.047	Pass

The convergence results for the Reference Case and the four options using the Alternative scenario for 2041 are shown in **Table 16** to **Table 20**.

Table 16: Model Convergence Results - Alternative Scenario - 2041 Reference Case

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2041 Reference Case	AM Peak	53	98.5	Pass	0.019	Pass	0.036	Pass
		54	98.5	Pass	0.016	Pass	0.047	Pass
		55	98.5	Pass	0.015	Pass	0.037	Pass
		56	98.6	Pass	0.020	Pass	0.049	Pass
	Interpeak	28	98.1	Pass	0.039	Pass	0.032	Pass
		29	98.2	Pass	0.035	Pass	0.037	Pass
		30	98.4	Pass	0.037	Pass	0.038	Pass
		31	98.6	Pass	0.026	Pass	0.036	Pass
	PM Peak	30	98.1	Pass	0.047	Pass	0.043	Pass
		31	98.2	Pass	0.041	Pass	0.047	Pass
		32	98.1	Pass	0.041	Pass	0.046	Pass
		33	98.4	Pass	0.034	Pass	0.047	Pass

Table 17: Model Convergence Results - Alternative Scenario - 2041 Option 4

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2041 Option 4	AM Peak	60	98.0	Pass	0.013	Pass	0.044	Pass
		61	98.5	Pass	0.013	Pass	0.043	Pass
		62	98.6	Pass	0.018	Pass	0.039	Pass
		63	98.7	Pass	0.017	Pass	0.046	Pass
	Interpeak	24	97.8	Pass	0.043	Pass	0.035	Pass
		25	98.3	Pass	0.037	Pass	0.038	Pass
		26	98.3	Pass	0.034	Pass	0.032	Pass
		27	98.2	Pass	0.032	Pass	0.043	Pass
	PM Peak	68	98.0	Pass	0.036	Pass	0.049	Pass
		69	98.2	Pass	0.033	Pass	0.047	Pass
		70	98.3	Pass	0.038	Pass	0.049	Pass
		71	97.7	Pass	0.026	Pass	0.049	Pass

Table 18: Model Convergence Results - Alternative Scenario – 2041 Option 10

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2041 Option 10	AM Peak	67	98.4	Pass	0.021	Pass	0.048	Pass
		68	98.3	Pass	0.022	Pass	0.043	Pass
		69	98.4	Pass	0.023	Pass	0.039	Pass
		70	98.8	Pass	0.021	Pass	0.043	Pass
	Interpeak	27	98.4	Pass	0.030	Pass	0.044	Pass
		28	98.9	Pass	0.041	Pass	0.040	Pass
		29	98.0	Pass	0.039	Pass	0.033	Pass
		30	99.0	Pass	0.033	Pass	0.034	Pass
	PM Peak	97	96.0	Fail	0.052	Pass	0.064	Pass
		98	97.0	Fail	0.038	Pass	0.277	Fail
		99	92.8	Fail	0.086	Pass	0.291	Fail
		100	93.7	Fail	0.065	Pass	0.236	Fail

Table 19: Model Convergence Results - Alternative Scenario – 2041 Option 12

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2041 Option 12	AM Peak	57	97.7	Pass	0.021	Pass	0.034	Pass
		58	98.1	Pass	0.026	Pass	0.042	Pass
		59	98.1	Pass	0.021	Pass	0.043	Pass
		60	98.1	Pass	0.019	Pass	0.031	Pass
	Interpeak	19	97.9	Pass	0.048	Pass	0.043	Pass
		20	97.7	Pass	0.039	Pass	0.046	Pass
		21	98.0	Pass	0.045	Pass	0.046	Pass
		22	97.9	Pass	0.042	Pass	0.040	Pass
	PM Peak	32	97.8	Pass	0.034	Pass	0.045	Pass
		33	97.9	Pass	0.031	Pass	0.045	Pass
		34	97.9	Pass	0.027	Pass	0.045	Pass
		35	98.0	Pass	0.034	Pass	0.046	Pass

Table 20: Model Convergence Results - Alternative Scenario – 2041 Option 12A

Year	Time Period	No. Iterations	% of Links with Flow Change <1%		Delta		%GAP	
			4 Consec. Runs >98%	Pass/Fail	<0.1%	Pass/Fail	<0.1%	Pass/Fail
2041 Option 12A	AM Peak	70	97.6	Pass	0.016	Pass	0.040	Pass
		71	98.4	Pass	0.014	Pass	0.044	Pass
		72	98.6	Pass	0.015	Pass	0.043	Pass
		73	98.7	Pass	0.015	Pass	0.050	Pass
	Interpeak	28	97.9	Pass	0.036	Pass	0.032	Pass
		29	98.3	Pass	0.034	Pass	0.045	Pass
		30	98.4	Pass	0.039	Pass	0.036	Pass
		31	98.6	Pass	0.027	Pass	0.036	Pass
	PM Peak	59	98.3	Pass	0.030	Pass	0.046	Pass
		60	98.5	Pass	0.027	Pass	0.044	Pass
		61	98.5	Pass	0.034	Pass	0.045	Pass
		62	98.4	Pass	0.034	Pass	0.047	Pass

APPENDIX

E-7 VOLUME TO CAPACITY RATIO (ALTERNATIVE)

Table 1: Volume to Capacity Ratio Results - Alternative Scenario - Reference Case

Alternative - Reference Case	2021 Ref			2031 Ref			2036 Ref			2041 Ref		
Road Name	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
Part of J5 Roundabout- Maidstone Rd to M2 onslip Westbound	120	120	120	128	128	128	133	133	133	133	133	133
A249 heading southbound to Roundabout	102	102	102	109	109	109	115	115	115	116	116	116
M2 Junction 5 Eastbound off slip	99	99	99	101	101	101	104	104	104	104	104	104
Oad Street close to Pett Lane Junction	92	92	92	109	109	109	114	114	114	113	113	113
Right turn waiting area, from Oad Street to A249 northbound (Within central reservation)	87	87	87	100	100	100	100	100	100	100	100	100
M2 Eastbound between J4 and J5	84	84	84	90	90	90	94	94	94	96	96	96
Freeflow link - M2 Eastbound to A249 northbound (Existing location)	92	92	92	93	93	93	95	95	95	96	96	96
M2 Westbound between J5 and J4	83	83	83	86	86	86	89	89	89	89	89	89
M2 Westbound at J5 onslip merge	80	80	80	83	83	83	86	86	86	86	86	86
M2 Eastbound after M2 Junction 5 merge	74	74	74	83	83	83	87	87	87	89	89	89
M2 Westbound prior to M2 Junction 5 diverge	76	76	76	84	84	84	87	87	87	88	88	88
M2 Eastbound merge at M2 Junction 5	71	71	71	80	80	80	84	84	84	86	86	86
A249 Northbound approach to M2 Junction 5 roundabout after freeflow to M2 Eastbound	69	69	69	86	86	86	91	91	91	96	96	96
A249 Northbound exit from M2 Junction 5 roundabout prior to M2 Eastbound Freeflow merge	70	70	70	79	79	79	83	83	83	86	86	86
M2 Eastbound offslip between freeflow link to A249 northbound and the M2 Junction 5 roundabout	51	51	51	97	97	97	103	103	103	108	108	108

Table 2: Volume to Capacity Ratio Results - Alternative Scenario - Option 4

Alternative - Option 4	2021 Option 4			2031 Option 4			2036 Option 4			2041 Option 4		
Road Name	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
New Oad Street connection to M2 Junction 5 Roundabout (To Roundabout)	103	90	99	111	107	109	117	109	110	127	109	111
Freeflow link between A249 Southbound and M2 J5 Eastbound	86	77	103	98	86	103	98	91	103	99	93	100
M2 Westbound onslip exit from the M2 Junction 5 roundabout	43	44	103	81	55	103	85	66	103	90	72	99
M2 J5 Westbound onslip	88	81	100	98	88	100	99	92	100	99	94	100
M2 Eastbound prior to diverge for M2 Junction 5	82	80	98	94	89	98	97	93	98	98	96	98
Freeflow link between M2 Eastbound and A249 Northbound	81	81	94	94	83	96	94	83	97	95	86	97
A249 northbound immediately after merge from M2 EB freeflow link	75	74	92	85	80	97	88	81	98	91	84	100
M2 Westbound immediately after the M2 Junction 5 onslip merge	89	71	84	98	77	85	99	80	87	100	83	88
M2 Eastbound to A249 northbound freeflow merge with A249	73	72	88	82	77	93	85	79	95	88	81	97
M2 Eastbound after M2 Junction 5	76	70	84	86	84	88	90	89	90	92	92	92
M2 Westbound onslip merge at M2 Junction 5	86	68	81	94	74	83	96	78	84	97	80	85
A249 northbound prior to M2 Eastbound to A249 northbound merge	58	57	83	72	65	92	78	68	96	82	71	99
M2 Eastbound merge at M2 Junction 5 onslip	73	68	81	83	81	85	86	86	87	88	89	89
M2 Eastbound Onslip at M2 Junction 5	75	66	76	87	83	86	90	88	88	92	91	91
M2 Westbound between the offslip and onslip at Junction 5	79	51	66	95	58	70	98	63	72	99	67	74
A249 Southbound prior to the diverge for the roundabout and freeflow	83	64	77	96	76	86	97	81	89	97	85	88
A249 Southbound approach to the M2 Junction 5 roundabout after the freeflow link	42	26	94	55	52	102	58	61	103	60	68	85
M2 Westbound approach to M2 Junction 5 offslip diverge	77	56	61	84	62	65	86	66	67	88	68	70
New Oad Street connection to M2 Junction 5 Roundabout (From Roundabout)	44	32	63	57	56	76	61	67	77	62	73	86

Table 3: Volume to Capacity Ratio Results - Alternative Scenario - Option 10

Alternative - Option 10	2021 Option 10			2031 Option 10			2036 Option 10			2041 Option 10		
Road Name	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
Oad Street / Maidstone Road combined link - approach to roundabout	112	106	113	115	114	115	115	115	114	115	115	114
A249 northbound entry immediately prior to the M2 Junction 5 roundabout	106	101	106	106	106	106	106	106	106	106	106	106
Oad Street link to Maidstone Road	37	41	44	106	106	129	122	113	128	133	122	129
A249 northbound exit sliproad to M2 Junction 5 - second diverge point	100	40	100	104	101	100	108	104	102	110	105	104
A249 southbound approach to M2 Junction 5 roundabout	99	80	95	104	98	105	105	101	104	105	104	105
M2 Eastbound prior to M2 Junction 5 offslip	83	81	99	95	90	99	99	94	99	99	97	99
A249 northbound exit sliproad to M2 Junction 5 - after M2 westbound freeflow	100	8	82	104	101	100	104	104	102	105	104	104
M2 westbound immediately after M2 Junction 5 merge	87	71	83	93	77	89	94	80	87	95	82	89
M2 westbound onslip from M2 Junction 5 roundabout	82	77	85	87	83	90	87	84	82	87	85	85
M2 westbound merge of A249 northbound freeflow	84	69	80	89	74	86	91	77	84	91	79	86
A249 northbound immediately after freeflow from M2 eastbound	75	73	91	86	79	94	89	82	96	92	84	96
M2 westbound merge from M2 Junction 5 roundabout	84	68	79	89	73	86	91	76	83	91	78	86
A249 northbound between the merges from the M2 Junction 5 roundabout and the freeflow link	67	64	90	83	72	97	87	76	100	92	79	101
M2 westbound exit from M2 Junction 5 roundabout	78	75	83	81	80	87	81	82	80	80	83	83
A249 northbound merge with freeflow link from M2 eastbound	72	71	88	83	76	91	86	79	93	89	81	93
M2 eastbound to A249 northbound freeflow link - immediately prior to the merge	69	68	87	82	75	94	86	78	98	89	80	100
M2 Eastbound after merge from M2 Junction 5	72	67	81	79	77	83	82	81	86	83	84	84
A249 southbound prior to diverge for M2 Junction 5 roundabout	85	66	75	92	78	85	95	81	83	95	84	84
M2 Eastbound to A249 Northbound freeflow	64	64	79	75	70	89	79	73	94	83	74	96
A249 southbound diverge for M2 junction 5 roundabout	83	64	73	90	76	83	93	79	81	93	82	82
M2 westbound offslip to M2 Junction 5 roundabout - prior to freeflow to A249 southbound	74	49	58	83	55	65	86	59	62	87	61	66
M2 Westbound prior to M2 Junction 5 diverge	77	57	61	83	62	66	86	66	68	88	67	71
Maidstone Road prior to the junction with the new Oad Street link	45	36	19	104	99	91	109	101	72	132	104	81
A249 Southbound diverge to M2 Junction 5 (ghost island lane 1)	62	40	50	69	56	101	100	59	62	101	62	62

Alternative - Option 10	2021 Option 10			2031 Option 10			2036 Option 10			2041 Option 10		
A249 Southbound diverge to M2 Junction 5 (ghost island lane 1)	62	40	50	69	56	101	100	59	62	101	62	62
A249 Southbound diverge to M2 Junction 5 (ghost island lane 2)	52	51	59	51	56	101	100	56	57	101	57	58
A249 Northbound diverge to M2 Junction 5 (ghost island lane 1)	29	13	37	30	31	43	30	33	43	100	34	44

Table 4: Volume to Capacity Ratio Results - Alternative Scenario - Option 12

Alternative - Option 12	2021 Option 12A			2031 Option 12A			2036 Option 12A			2041 Option 12A		
Road Name	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
New Oad Street connection to M2 Junction 5 Roundabout	96	44	61	107	75	102	107	84	103	107	86	104
M2 Westbound Offslip at M2 Junction 5	100	63	85	104	72	94	106	77	98	107	79	100
M2 Westbound immediately after the M2 Junction 5 onslip merge	86	69	83	97	79	85	100	81	86	101	84	88
M2 Westbound between the offslip and onslip at Junction 5	76	49	66	94	60	70	99	65	72	100	68	75
New Maidstone Road link to Oad Street	97	36	31	98	64	36	100	75	34	102	81	47
M2 J5 Eastbound onslip	83	77	98	96	92	99	99	96	99	100	98	100
M2 Junction 5 Circulatory Carriageway between the M2 Westbound slips	84	99	89	101	102	101	101	102	101	101	102	101
Freeflow link between A249 Southbound and M2 J5 Eastbound	79	75	97	94	91	99	98	95	99	102	97	103
M2 Eastbound prior to diverge for M2 Junction 5	83	79	98	94	88	98	98	92	98	98	95	98
M2 Westbound onslip merge at M2 Junction 5	83	67	80	94	76	82	97	79	84	97	81	85
Freeflow link between M2 Eastbound and A249 Northbound	85	81	99	97	89	96	98	93	97	99	95	98
A249 Northbound approach to M2 Junction 5 Roundabout after M2 Eastbound freeflow diverge	79	77	106	95	101	114	99	106	114	102	108	114
M2 Eastbound immediately after the M2 Junction 5 merge	76	70	84	84	83	84	88	87	85	89	90	84
A249 Southbound approach to the M2 Junction 5 roundabout before the freeflow link to M2 Westbound	76	58	70	89	65	75	92	68	78	96	69	80
A249 Southbound approach to M2 Junction 5	76	62	74	89	69	80	92	72	83	96	73	84
A249 Southbound approach to the M2 Junction 5 roundabout after the freeflow link to M2 Westbound	77	77	84	93	80	98	96	84	99	97	100	101
M2 Eastbound onslip exit from the M2 Junction 5 roundabout	31	30	88	71	62	95	88	74	95	102	84	103
M2 Eastbound merge at M2 Junction 5 onslip	73	68	81	81	80	81	85	84	82	86	87	81
M2 Eastbound Onslip at M2 Junction 5	75	66	77	83	80	76	86	85	78	88	87	79
A249 northbound immediately after merge from M2 EB freeflow link	76	76	89	84	83	85	87	84	87	89	86	86
M2 Eastbound to A249 northbound freeflow merge with A249	73	73	86	82	80	82	84	81	84	86	83	83
A249 Northbound approach to M2 Junction 5 after freeflow link to M2 Eastbound	59	54	66	66	60	113	67	61	114	69	61	116

Table 5: Volume to Capacity Ratio Results - Alternative Scenario - Option 12A

Alternative - Option 12A	2021 Option 12A			2031 Option 12A			2036 Option 12A			2041 Option 12A		
Road Name	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
Freeflow link between A249 Southbound and M2 J5 Eastbound	85	76	102	101	90	104	102	90	104	103	96	101
M2 Westbound onslip exit from the M2 Junction 5 roundabout	39	41	102	101	69	104	102	65	104	103	84	101
M2 Westbound immediately after the M2 Junction 5 onslip merge	89	71	84	99	79	86	100	80	87	101	84	88
M2 J5 Westbound onslip	87	80	100	100	92	100	100	91	100	100	97	100
M2 Westbound between the offslip and onslip at Junction 5	79	51	67	95	61	71	98	63	73	99	69	75
M2 Westbound onslip merge at M2 Junction 5	86	68	81	95	76	83	97	77	84	97	81	85
M2 Eastbound prior to diverge for M2 Junction 5	81	80	98	94	88	98	97	92	98	98	95	98
New Maidstone Road link to Oad Street	78	36	34	100	64	66	103	74	74	104	89	73
Freeflow link between M2 Eastbound and A249 Northbound	83	82	95	94	85	97	95	83	97	96	85	98
A249 Southbound approach to M2 Junction 5	80	63	76	93	75	86	97	79	88	98	83	85
M2 Eastbound after M2 Junction 5	76	70	83	86	84	89	90	89	91	92	92	92
M2 Eastbound Onslip at M2 Junction 5	76	66	76	87	83	87	91	88	89	93	91	91
M2 Eastbound merge at M2 Junction 5 onslip	74	68	80	83	81	86	87	86	88	89	89	89
A249 Southbound prior to freeflow link to M2 Westbound	76	60	72	88	71	91	92	75	92	92	79	80
A249 northbound immediately after merge from M2 EB freeflow link	76	74	91	87	81	96	90	84	98	93	85	100
M2 Westbound approach to M2 Junction 5 offslip diverge	77	56	60	83	62	64	85	65	67	87	67	69
M2 Eastbound to A249 northbound freeflow merge with A249	73	71	88	84	78	93	87	81	95	90	82	97
A249 Northbound following M2 Junction 5 roundabout	58	56	82	75	66	92	81	72	96	86	74	99
M2 Junction 5 circulatory carriageway between M2 Eastbound entry and A249 Northbound exit	41	55	63	56	79	79	61	86	81	66	93	88
New Oad Street Connection - From M2 Junction 5 Roundabout	35	26	56	54	49	76	60	63	78	63	70	87

APPENDIX

E-8 QUEUE LENGTHS (ALTERNATIVE)

Table 1: Queue Length Results (PCUs) - Alternative Scenario - Reference Case

Alternative - Reference Case	2021 Ref			2031 Ref			2036 Ref			2041 Ref		
Road Name	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
A249 heading southbound to Roundabout	61	61	61	221	221	221	375	375	375	402	402	402
M2 Junction 5 Eastbound off slip	0	0	0	20	20	20	77	77	77	74	74	74
Part of J5 Roundabout- Maidstone Rd to M2 onslip Westbound	31	31	31	41	41	41	48	48	48	50	50	50
Oad Street close to Pett Lane Junction	11	11	11	53	53	53	79	79	79	70	70	70
M2 Eastbound offslip between freeflow link to A249 northbound and the M2 Junction 5 roundabout	0	0	0	0	0	0	3	3	3	6	6	6

Table 2: Queue Length Results (PCUs) - Alternative Scenario - Option 4

Alternative - Option 4	2021 Option 4			2031 Option 4			2036 Option 4			2041 Option 4		
Road Name	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
Freeflow link between A249 Southbound and M2 J5 Westbound	0	0	30	0	0	33	0	0	33	0	0	0
New Oad Street connection to M2 Junction 5 Roundabout (To Roundabout)	13	0	0	38	29	42	56	35	43	88	35	45
M2 Westbound onslip exit from the M2 Junction 5 roundabout	0	0	20	0	0	18	0	0	15	0	0	0
M2 Westbound immediately after the M2 Junction 5 onslip merge	0	0	0	0	0	0	0	0	0	7	0	0
A249 northbound immediately after merge from M2 EB freeflow link	0	0	0	0	0	0	0	0	0	0	0	3
A249 Southbound approach to the M2 Junction 5 roundabout after the freeflow link	0	0	0	0	0	16	0	0	25	0	0	0
A249 Southbound approach to M2 Junction 5, prior to freeflow to M2 Westbound	0	0	0	0	0	49	0	0	51	0	0	0

Table 3: Queue Length Results (PCUs) - Alternative Scenario - Option 10

Alternative - Option 10	2021 Option 10			2031 Option 10			2036 Option 10			2041 Option 10		
Road Name	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
A249 northbound entry immediately prior to the M2 Junction 5 roundabout	49	7	49	49	49	49	49	49	49	49	49	49
Oad Street / Maidstone Road combined link - approach to roundabout	24	18	28	28	28	28	29	28	28	29	29	28
Oad Street link to Maidstone Road	0	0	0	17	17	64	46	34	67	52	52	70
A249 northbound exit sliproad to M2 Junction 5 - second diverge point	0	0	0	19	5	1	36	16	9	42	20	17
A249 southbound approach to M2 Junction 5 roundabout	0	0	0	86	0	108	108	21	74	108	74	93
A249 northbound exit sliproad to M2 Junction 5 - after M2 westbound freeflow	1	0	0	18	4	1	19	16	9	22	20	17
A249 northbound between the merges from the M2 Junction 5 roundabout and the freeflow link	0	0	0	0	0	0	0	0	8	0	0	29
Maidstone Road prior to the junction with the new Oad Street link	0	0	0	4	0	0	6	1	0	21	3	0
A249 Southbound diverge to M2 Junction 5 (ghost island lane 1)	0	0	0	0	0	10	2	0	0	8	0	0
A249 Southbound diverge to M2 Junction 5 (ghost island lane 2)	0	0	0	0	0	11	3	0	0	8	0	0

Table 4: Queue Length Results (PCUs) - Alternative Scenario - Option 12

Alternative - Option 12	2021 Option 12			2031 Option 12			2036 Option 12			2041 Option 12		
Road Name	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
A249 Northbound approach to M2 Junction 5 Roundabout after M2 Eastbound freeflow diverge	0	0	76	0	15	124	0	62	124	21	85	124
Freeflow link between A249 Southbound and M2 J5 Eastbound	0	0	0	0	0	0	0	0	0	40	0	56
M2 Eastbound onslip exit from the M2 Junction 5 roundabout	0	0	0	0	0	0	0	0	0	4	0	11
A249 Southbound approach to the M2 Junction 5 roundabout before the freeflow link to M2 Westbound	0	0	0	0	0	0	0	0	0	0	0	10
A249 Southbound approach to the M2 Junction 5 roundabout after the freeflow link to M2 Westbound	0	0	0	0	0	0	0	0	0	0	3	20
M2 Westbound immediately after the M2 Junction 5 onslip merge	0	0	0	0	0	0	0	0	0	36	0	0
M2 Westbound Offslip at M2 Junction 5	2	0	0	56	0	0	72	0	0	84	0	4
New Oad Street connection to M2 Junction 5 Roundabout	0	0	0	43	0	16	43	0	22	40	0	29
M2 Junction 5 Circulatory Carriageway between the M2 Westbound slips	0	0	0	18	20	18	18	20	19	18	20	19
A249 Northbound approach to M2 Junction 5 after freeflow link to M2 Eastbound	0	0	0	0	0	245	0	0	272	0	0	309
M2 Junction 5 circulatory carriageway between A249 southbound entry and M2 westbound exit	0	0	0	1	24	0	44	52	18	52	52	15

Table 5: Queue Length Results (PCUs) - Alternative Scenario - Option 12A

Alternative - Option 12A	2021 Option 12A			2031 Option 12A			2036 Option 12A			2041 Option 12A		
Road Name	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
Freeflow link between A249 Southbound and M2 J5 Eastbound	0	0	24	18	0	46	37	0	46	44	0	18
M2 Westbound onslip exit from the M2 Junction 5 roundabout	0	0	7	3	0	27	6	0	27	8	0	7
M2 Westbound immediately after the M2 Junction 5 onslip merge	0	0	0	0	0	0	2	0	0	24	0	0
M2 J5 Westbound onslip	0	0	0	0	0	0	0	0	0	2	0	0
New Maidstone Road link to Oad Street	0	0	0	0	0	0	4	0	0	7	0	0
A249 Southbound prior to freeflow link to M2 Westbound	0	0	0	0	0	44	0	0	39	0	0	0
M2 Junction 5 circulatory carriageway between A249 Southbound entry and M2 Westbound exit	0	0	0	0	0	4	0	0	0	0	0	0

APPENDIX

E-9 JOURNEY TIMES (ALTERNATIVE)

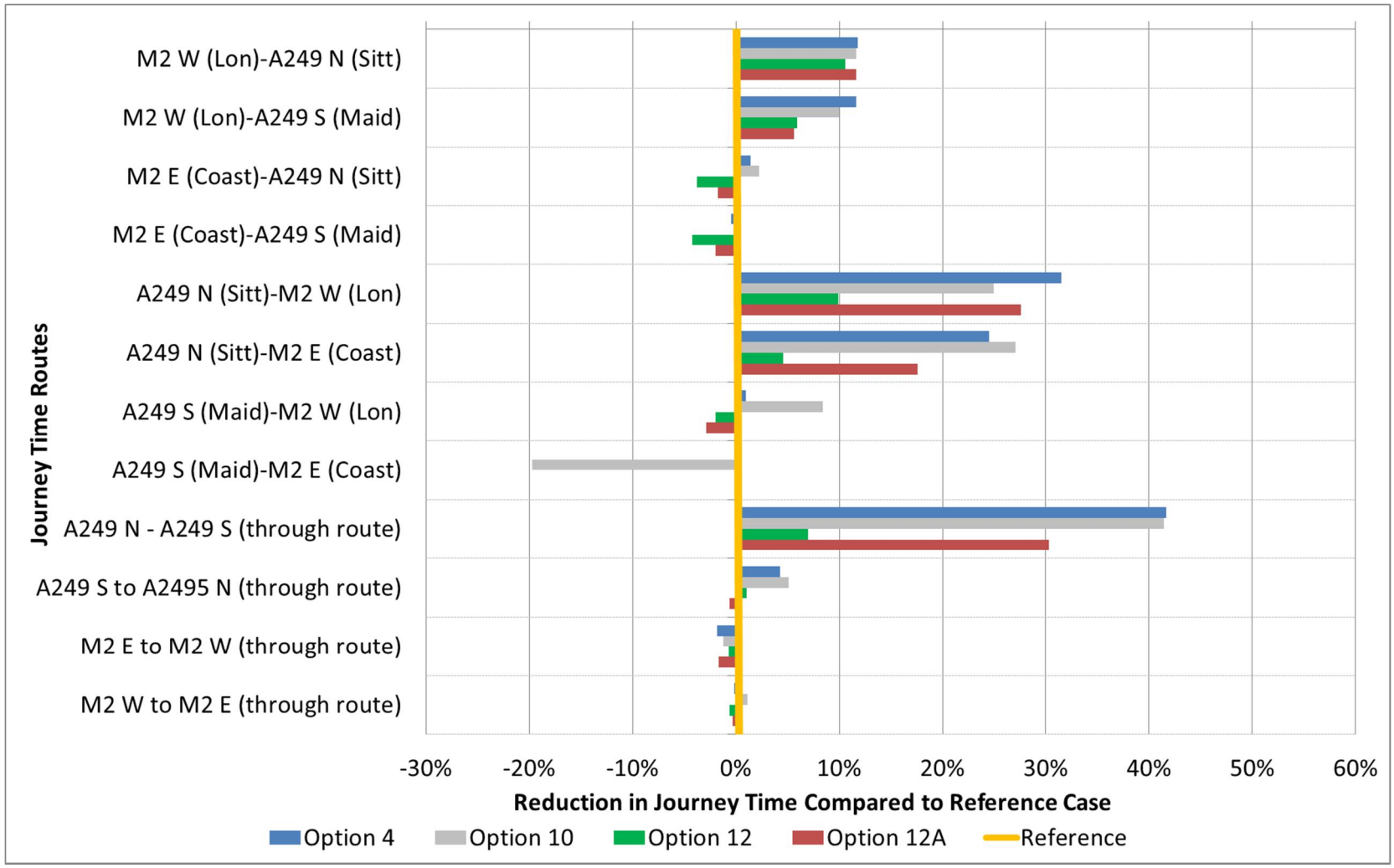


Figure 1: Journey Time Results - Alternative Scenario - 2021 - AM Peak

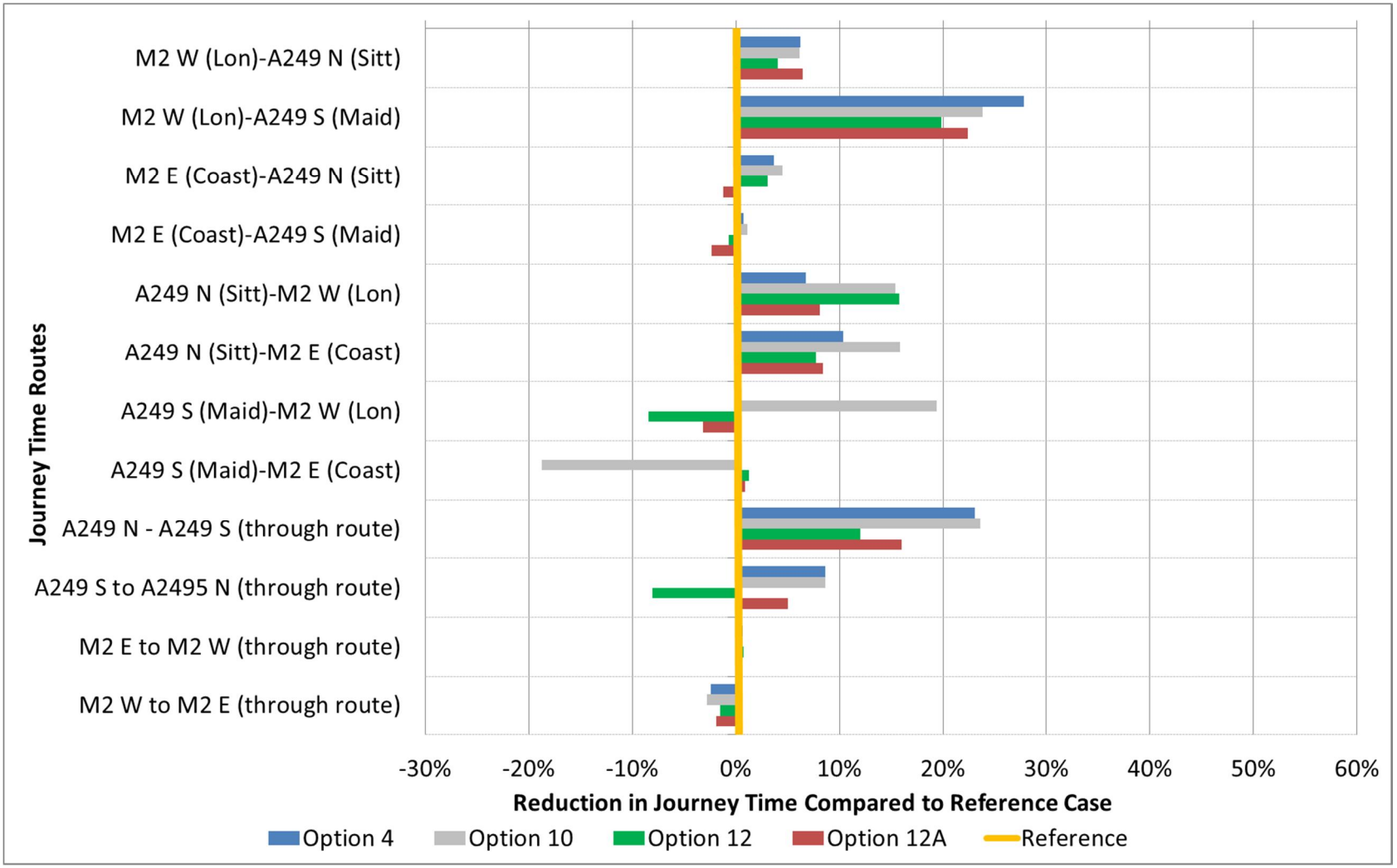


Figure 2: Journey Time Results - Alternative Scenario - 2021 - PM Peak

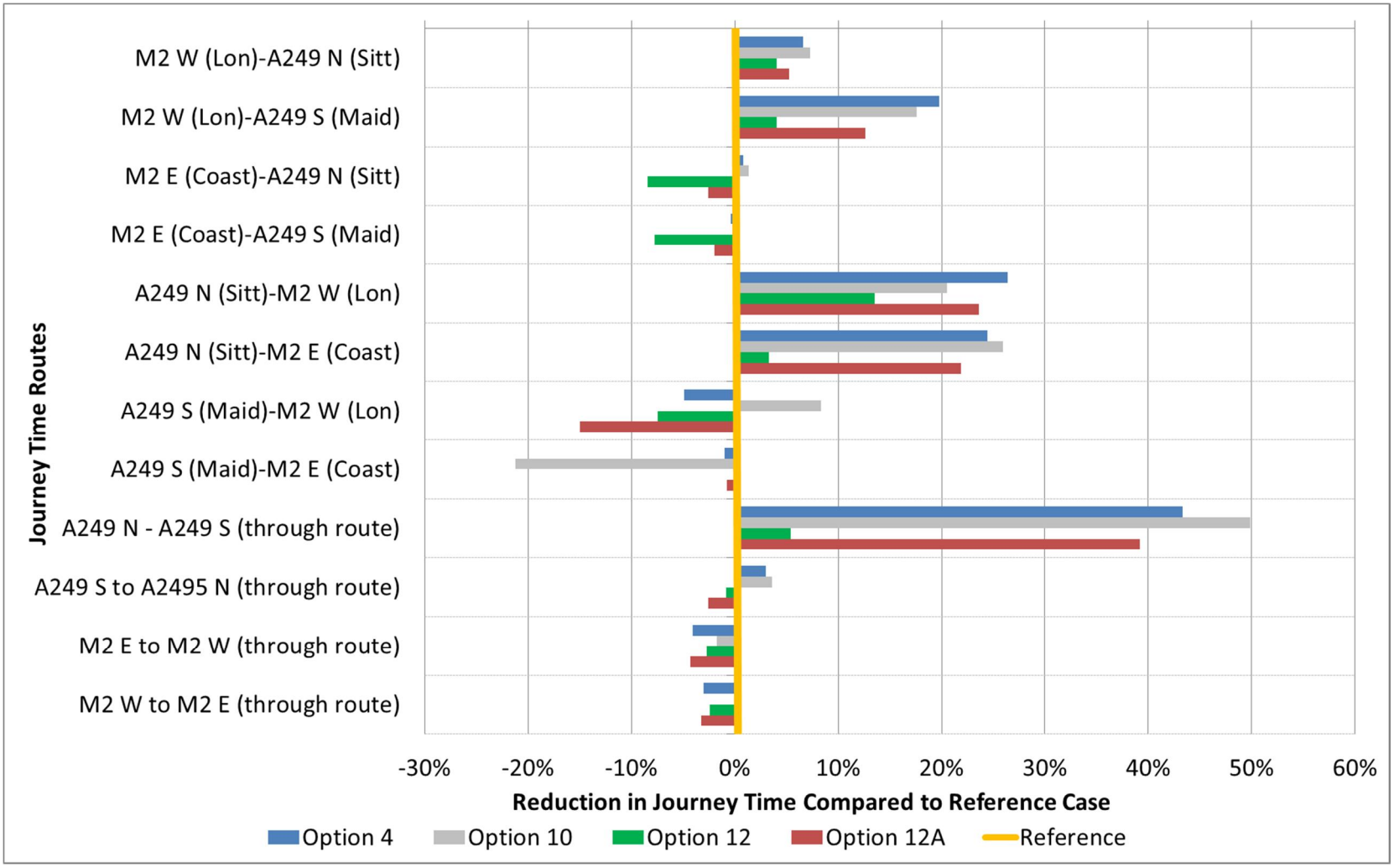


Figure 3: Journey Time Results - Alternative Scenario - 2031 - AM Peak

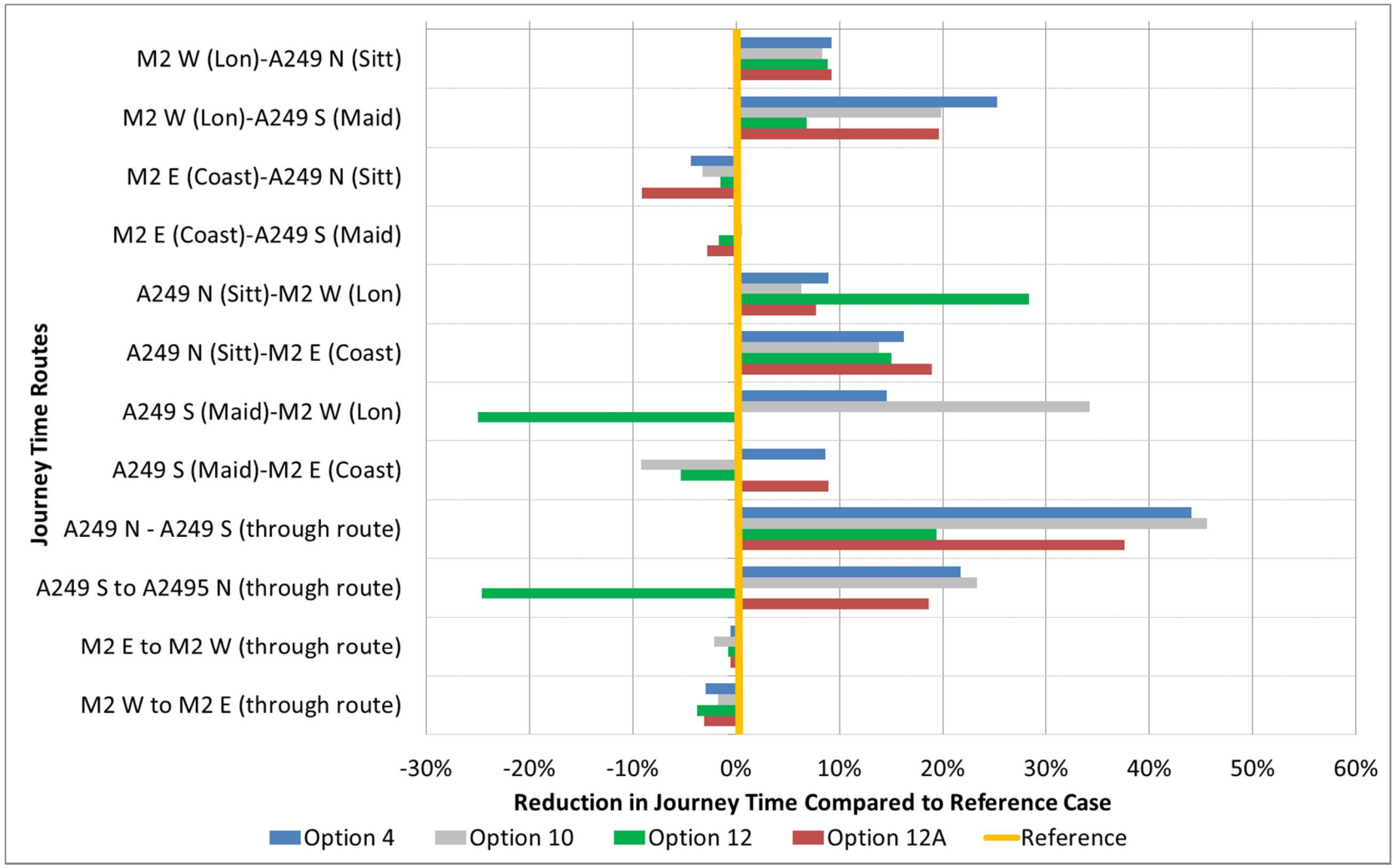


Figure 4: Journey Time Results - Alternative Scenario - 2031 - PM Peak

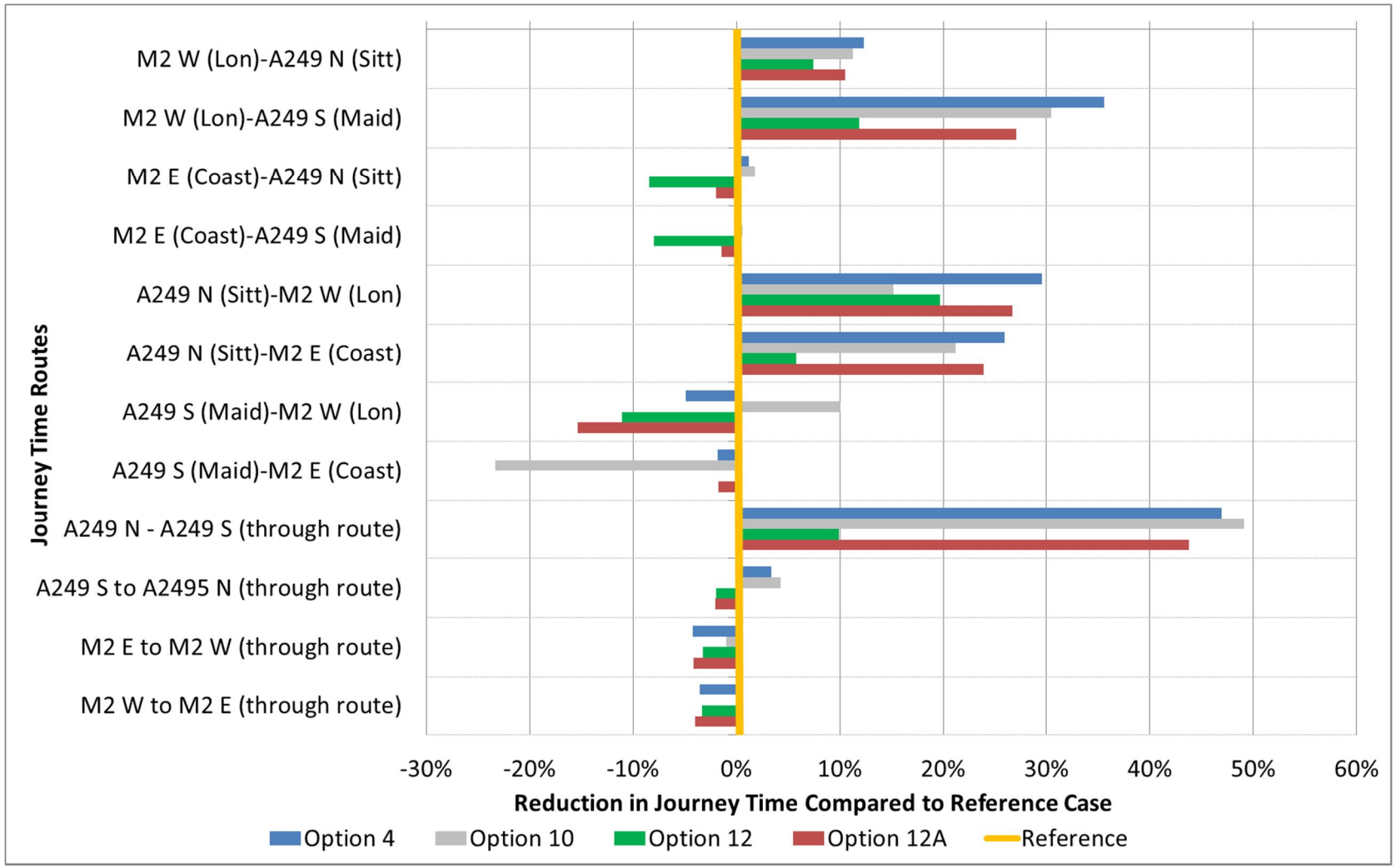


Figure 5: Journey Time Results - Alternative Scenario - 2036 - AM Peak

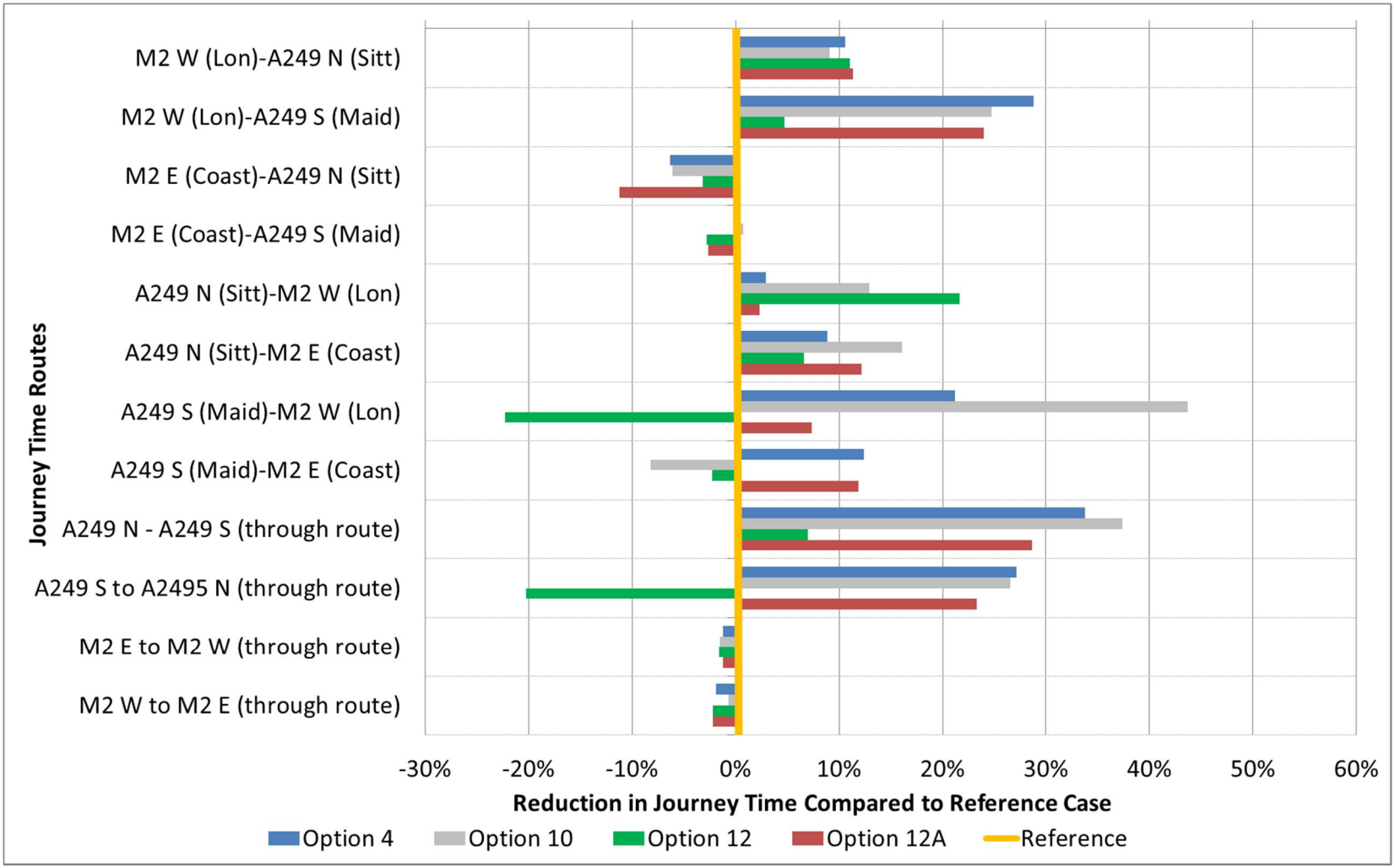


Figure 6: Journey Time Results - Alternative Scenario - 2036 - PM Peak

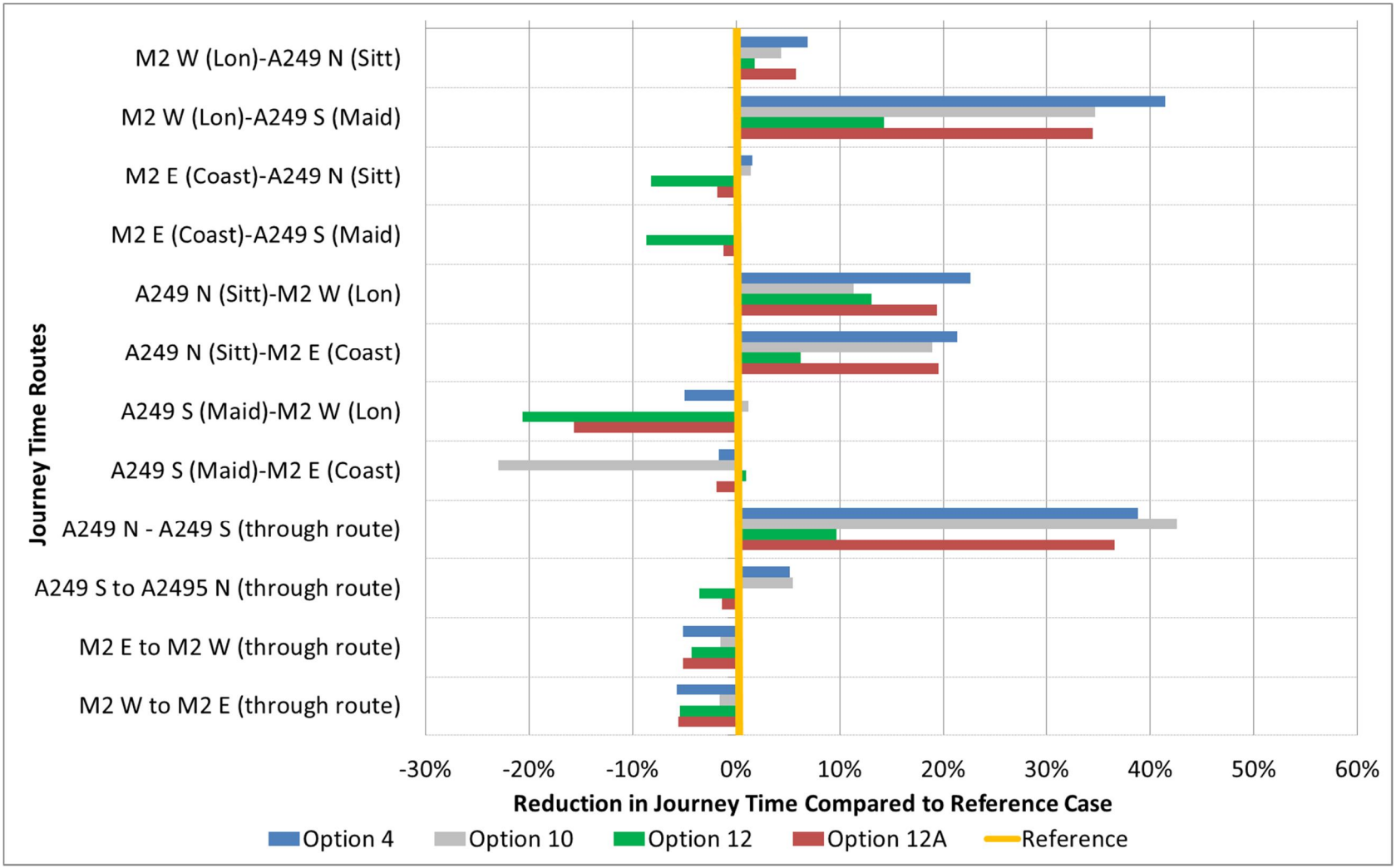


Figure 7: Journey Time Results - Alternative Scenario - 2041 - AM Peak

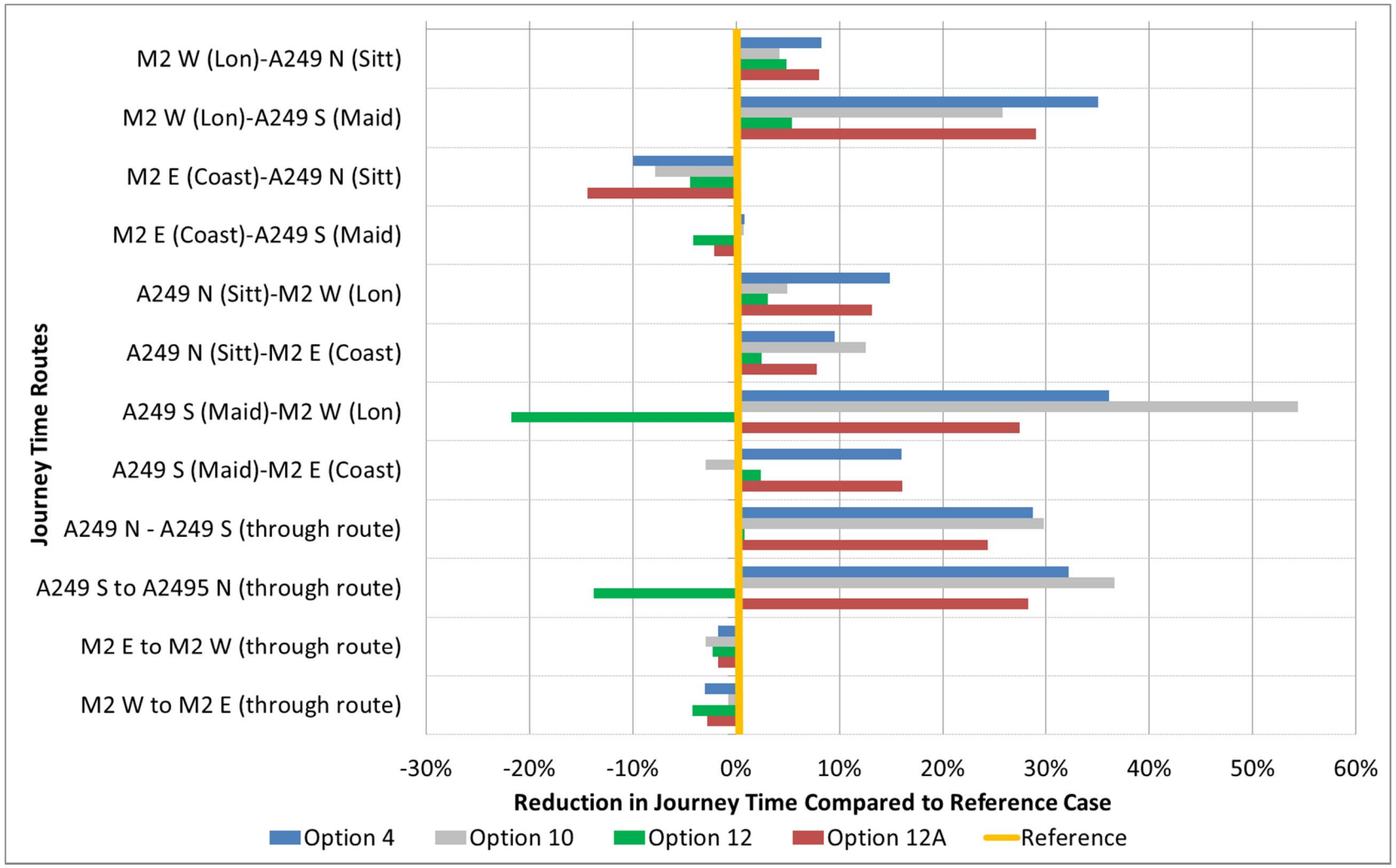


Figure 8: Journey Time Results - Alternative Scenario - 2041 - PM Peak

APPENDIX

E-11 PROFILE BENEFITS SPLIT BY TIME PERIOD AND TRIP TYPE

Table 1 to **Table 3** show the benefits for each scheme broken down by time period.

Table 1 – Benefits by Time Period – User Time – Core Scenario

Period	Year	Option 4	Option 10	Option 12	Option 12A
AM Peak	2021	£1,688,000	£1,686,000	£1,119,000	£1,560,000
	2041	£1,008,000	£625,000	£244,000	£905,000
	Total	£59,381,000	£42,857,000	£21,084,000	£53,753,000
Inter Peak	2021	£699,000	£1,641,000	£1,454,000	£331,000
	2041	£1,096,000	£473,000	£655,000	£700,000
	Total	£53,843,000	£35,874,000	£47,973,000	£33,295,000
PM Peak	2021	£709,000	£864,000	£638,000	£716,000
	2041	£1,143,000	£909,000	£377,000	£773,000
	Total	£55,946,000	£47,321,000	£22,298,000	£40,062,000

Table 2 – Benefits by Time Period – Vehicle Operating Costs (Fuel) – Core Scenario

Period	Year	Option 4	Option 10	Option 12	Option 12A
AM Peak	2021	£174,000	£316,000	£220,000	£209,000
	2041	£146,000	£128,000	£139,000	£167,000
	Total	£6,915,000	£7,512,000	£7,064,000	£7,990,000
Inter Peak	2021	£144,000	£380,000	£252,000	£174,000
	2041	£205,000	£212,000	£167,000	£202,000
	Total	£8,854,000	£11,142,000	£8,371,000	£8,991,000
PM Peak	2021	£140,000	£163,000	£141,000	£179,000
	2041	£130,000	£134,000	£101,000	£133,000
	Total	£6,038,000	£6,368,000	£4,934,000	£6,463,000

Table 3 – Benefits by Time Period – Vehicle Operating Costs (Non Fuel) – Core Scenario

Period	Year	Option 4	Option 10	Option 12	Option 12A
AM Peak	2021	-£22,000	£93,000	£84,000	£12,000
	2041	-£43,000	£11,000	£17,000	-£17,000
	Total	-£1,709,000	£1,200,000	£1,320,000	-£487,000
Inter Peak	2021	-£51,000	£71,000	-£3,000	£19,000
	2041	-£1,000	£51,000	£26,000	£17,000
	Total	-£459,000	£2,407,000	£892,000	£783,000
PM Peak	2021	-£1,000	£109,000	£57,000	£37,000
	2041	£24,000	£63,000	£29,000	£31,000
	Total	£859,000	£3,167,000	£1,501,000	£1,420,000

Table 4 to **Table 6** provide a summary of the benefits broken down by trip type.

Table 4 – Benefits by Trip Type – User Time – Core Scenario

Purpose	Year	Option 4	Option 10	Option 12	Option 12A
Business	2021	£1,395,000	£1,564,000	£1,124,000	£1,139,000
	2041	£1,652,000	£1,055,000	£610,000	£1,264,000
	Total	£84,386,000	£60,263,000	£36,899,000	£65,250,000
Commuting	2021	£1,152,000	£1,744,000	£1,253,000	£1,023,000
	2041	£1,008,000	£751,000	£363,000	£703,000
	Total	£54,346,000	£48,834,000	£27,496,000	£39,970,000
Other	2021	£548,000	£883,000	£834,000	£445,000
	2041	£586,000	£200,000	£303,000	£410,000
	Total	£30,438,000	£16,955,000	£20,958,000	£21,892,000

Table 5 – Benefits by Trip Type – Vehicle Operating Costs (Fuel) – Core Scenario

Purpose	Year	Option 4	Option 10	Option 12	Option 12A
Business	2021	£279,000	£465,000	£320,000	£319,000
	2041	£345,000	£366,000	£270,000	£357,000
	Total	£15,251,000	£17,702,000	£12,844,000	£16,051,000
Commuting	2021	£87,000	£165,000	£127,000	£105,000
	2041	£48,000	£42,000	£61,000	£60,000
	Total	£2,516,000	£2,914,000	£3,320,000	£3,087,000
Other	2021	£92,000	£229,000	£166,000	£139,000
	2041	£88,000	£67,000	£76,000	£85,000
	Total	£4,039,000	£4,406,000	£4,205,000	£4,305,000

Table 6 – Benefits by Trip Type – Vehicle Operating Costs (Non Fuel) – Core Scenario

Purpose	Year	Option 4	Option 10	Option 12	Option 12A
Business	2021	£349,000	£404,000	£302,000	£323,000
	2041	£262,000	£236,000	£153,000	£237,000
	Total	£12,302,000	£11,866,000	£8,023,000	£11,196,000
Commuting	2021	-£100,000	-£29,000	-£6,000	-£55,000
	2041	-£83,000	-£51,000	£7,000	-£44,000
	Total	-£3,812,000	-£2,045,000	£187,000	-£2,041,000
Other	2021	-£323,000	-£103,000	-£158,000	-£200,000
	2041	-£198,000	-£61,000	-£88,000	-£161,000
	Total	-£9,800,000	-£3,048,000	-£4,496,000	-£7,439,000

ALTERNATE SCENARIO

Table 7 to **Table 9** show the benefits for each scheme broken down by time period. The results are also presented using the standard TEE[1] tables in Appendix B of this report.

Table 7 – Benefits by Time Period – User Time – Alternate Scenario

Period	Year	Option 4	Option 10	Option 12	Option 12A
AM Peak	2021	£1,691,000	£1,457,000	£836,000	£1,446,000
	2041	£1,193,000	£779,000	-£660,000	£659,000
	Total	£67,398,000	£47,331,000	-£20,562,000	£42,083,000
Inter Peak	2021	£1,168,000	£691,000	£1,105,000	£702,000
	2041	£2,115,000	£1,392,000	£1,335,000	£1,777,000
	Total	£102,199,000	£66,504,000	£68,005,000	£83,237,000
PM Peak	2021	£810,000	£1,191,000	£643,000	£736,000
	2041	£848,000	£836,000	-£583,000	£692,000
	Total	£44,202,000	£47,285,000	-£19,036,000	£36,799,000

Table 8 – Benefits by Time Period – Vehicle Operating Costs (Fuel) – Alternate Scenario

Period	Year	Option 4	Option 10	Option 12	Option 12A
AM Peak	2021	£216,000	£343,000	£227,000	£244,000
	2041	£214,000	£160,000	£97,000	£189,000
	Total	£9,814,000	£8,968,000	£5,590,000	£9,154,000
Inter Peak	2021	£254,000	£419,000	£283,000	£270,000
	2041	£380,000	£295,000	£311,000	£395,000
	Total	£16,291,000	£14,634,000	£13,992,000	£16,990,000
PM Peak	2021	£196,000	£226,000	£181,000	£219,000
	2041	£111,000	£129,000	£10,000	£119,000
	Total	£5,842,000	£6,736,000	£1,933,000	£6,325,000

Table 9 – Benefits by Time Period – Vehicle Operating Costs (Non Fuel) – Alternate Scenario

Period	Year	Option 4	Option 10	Option 12	Option 12A
AM Peak	2021	-£58,000	£47,000	£52,000	-£27,000
	2041	-£104,000	-£40,000	-£10,000	-£112,000
	Total	-£4,206,000	-£1,019,000	£99,000	-£4,214,000
Inter Peak	2021	-£48,000	£68,000	£32,000	£1,000
	2041	-£235,000	-£98,000	-£59,000	-£213,000
	Total	-£8,779,000	-£2,918,000	-£1,837,000	-£7,578,000
PM Peak	2021	-£49,000	£100,000	£39,000	-£5,000
	2041	-£129,000	-£60,000	-£51,000	-£100,000
	Total	-£4,995,000	-£1,289,000	-£1,488,000	-£3,609,000

[1] TEE – Transport Economic Efficiency

Table 10 to **Table 12** provide a summary of the benefits broken down by trip type.

Table 10 – Benefits by Trip Type – User Time – Alternate Scenario

Purpose	Year	Option 4	Option 10	Option 12	Option 12A
Business	2021	£1,486,000	£1,210,000	£959,000	£1,162,000
	2041	£1,849,000	£1,266,000	£104,000	£1,428,000
	Total	£93,759,000	£65,991,000	£13,566,000	£72,517,000
Commuting	2021	£1,424,000	£1,515,000	£914,000	£1,152,000
	2041	£1,620,000	£1,245,000	-£168,000	£1,158,000
	Total	£83,276,000	£67,966,000	£1,398,000	£60,812,000
Other	2021	£758,000	£614,000	£712,000	£570,000
	2041	£687,000	£496,000	£156,000	£543,000
	Total	£36,761,000	£27,164,000	£13,438,000	£28,786,000

Table 11 – Benefits by Trip Type – Vehicle Operating Costs (Fuel) – Alternate Scenario

Purpose	Year	Option 4	Option 10	Option 12	Option 12A
Business	2021	£411,000	£628,000	£389,000	£444,000
	2041	£525,000	£411,000	£294,000	£533,000
	Total	£23,093,000	£20,883,000	£14,405,000	£23,683,000
Commuting	2021	£101,000	£128,000	£116,000	£115,000
	2041	£96,000	£92,000	£50,000	£82,000
	Total	£4,407,000	£4,476,000	£2,802,000	£3,995,000
Other	2021	£154,000	£232,000	£186,000	£174,000
	2041	£85,000	£81,000	£74,000	£90,000
	Total	£4,446,000	£4,979,000	£4,310,000	£4,791,000

Table 12 – Benefits by Trip Type – Vehicle Operating Costs (Non Fuel) – Alternate Scenario

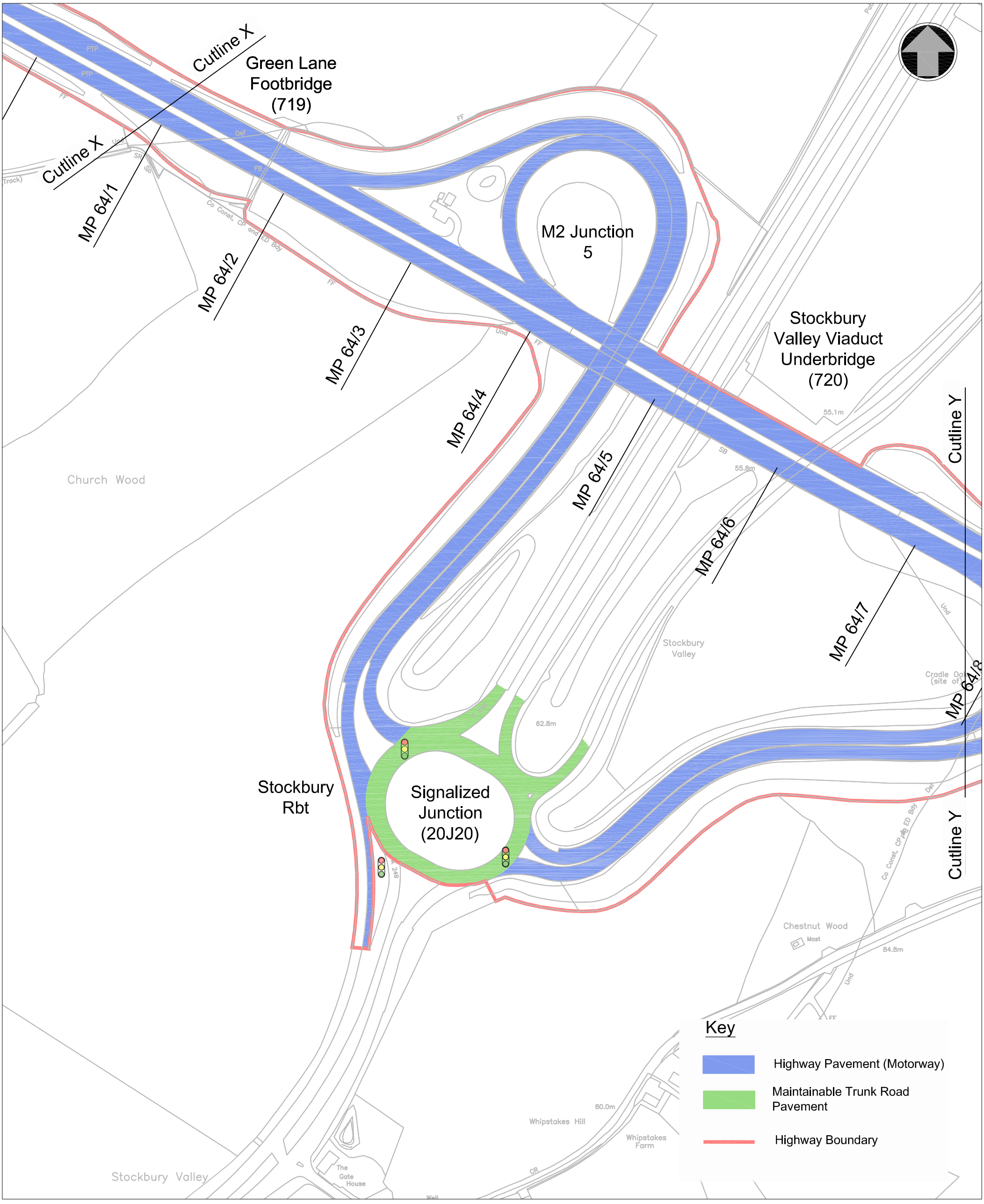
Purpose	Year	Option 4	Option 10	Option 12	Option 12A
Business	2021	£398,000	£417,000	£319,000	£360,000
	2041	£263,000	£229,000	£112,000	£234,000
	Total	£12,762,000	£11,715,000	£6,703,000	£11,394,000
Commuting	2021	-£151,000	-£83,000	-£17,000	-£99,000
	2041	-£195,000	-£125,000	£1,000	-£165,000
	Total	-£8,234,000	-£5,154,000	-£99,000	-£6,707,000
Other	2021	-£401,000	-£119,000	-£178,000	-£291,000
	2041	-£537,000	--£303,000	-£234,000	-£495,000
	Total	-£22,507,000	-£11,788,000	-£9,829,000	-£20,087,000

APPENDIX

F MAINTENANCE AREA MAP

Area 4
A2070
024

Balfour Beatty Mott MacDonald



Y:\CAD\HA Boundary Plans\M2\024.dwg

Created by K.Boughton on - 27/03/13
Checked by P.Mayes on - 25/04/13
Approved by K.Saradinova on - 30/04/13

APPENDIX

G NOT USED

APPENDIX

H NOT USED

APPENDIX

I NOT USED

APPENDIX

J POST-CONSULTATION ASSESSMENT APPENDIX

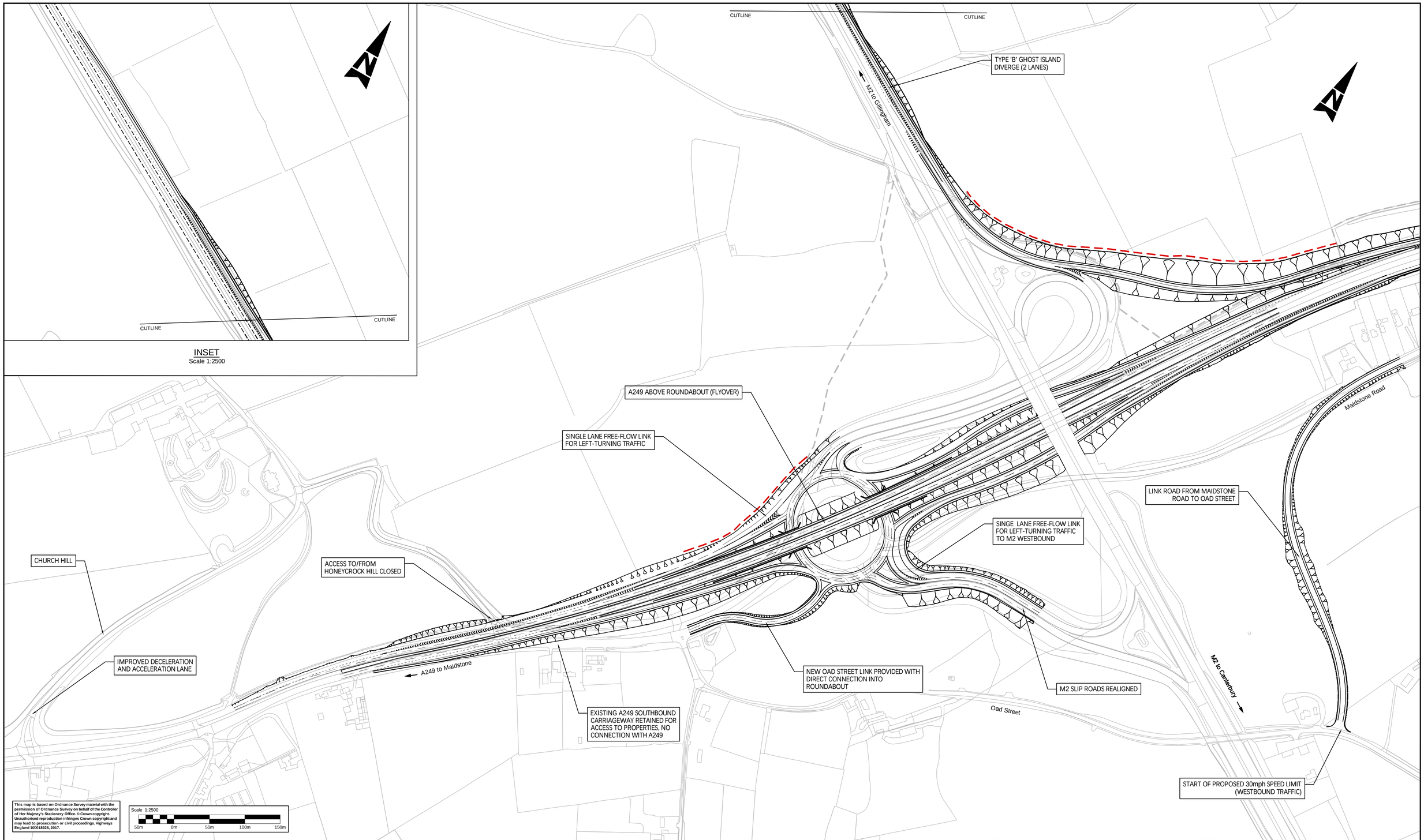
APPENDIX

J-1 *GENERAL ARRANGEMENTS (REVISED LOCAL ROADS – NOVEMBER 2017)*

DO NOT SCALE

Millimetres 0 10 100

INSET
Scale 1:2500



Scale 1:2500
50m 0m 50m 100m 150m

LEGEND:

EXISTING PUBLIC FOOTPATH

PROPOSED FOOTPATH

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P02	17/11/2017	LOCAL ROAD REVISION	MB	AS	GH
P01	15/11/2017	ISSUED FOR CLIENT REVIEW	MB	AS	GH

Drawing Status: SUITABLE FOR STAGE APPROVAL
Suitability: S3

wsp
4th Floor, 6 Devonshire Square, London, EC2M 4YE, UK
T+ 44 (0) 207 337 1700, F+ 44 (0) 207 337 1701
wsp.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME
M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT
GENERAL ARRANGEMENT
OPTION 4

Scale	Drawn	Checked	Approved	Authorised
1:2500	WE	AS	GH	---
Original Size	Date	Date	Date	Date
A1	14/11/17	14/11/17	14/11/17	---

Drawing Number
Project | Originator | Volume | Location | Type | Role | Number
HE551521 - WSP - HGN - M2J5 - DR - D - 0042

Project Ref. No.: 5145771
Revision: P02

\\uk.wspgroup.com\central data\Projects\70015xxx\70015210 - M2 J5 PCF Stage 2\E Models and Drawings\Highways\Option drawings\Option 4\HE551521-WSP-HGN-M2J5-DR-D-0042.dwg: Plotted by: bullowsm Date: Nov 23, 2017 - 12:10pm

DO NOT SCALE

Millimetres 0 10 100

THE M2 EASTBOUND DIVERGE LOOP AS 2 RUNNING LANES

2 LANE LINK ROAD FROM STOCKBURY ROUNDABOUT TO A249 NORTHBOUND

SINGLE LANE FREE FLOW LINK FOR LEFT TURNING TRAFFIC TO A249 NORTHBOUND

SINGE LANE FREE-FLOW LINK FOR LEFT-TURNING TRAFFIC TO M2 EASTBOUND

REALIGNED A249 DUAL CARRIAGEWAY

A249

2 LANE DIVERGE FROM A249 SOUTHBOUND

EXISTING ACCESS TO STOCKBURY ROUNDABOUT CLOSED

NEW MAIDSTONE ROAD LINK

SINGE LANE FREE-FLOW LINK FOR LEFT-TURNING TRAFFIC TO M2 WESTBOUND

CHURCH HILL

ACESS TO/FROM HONEYCROOK HILL CLOSED

NEW OAD STREET LINK PROVIDED WITH DIRECT CONNECTION INTO ROUNDABOUT

M2 SLIP ROAD REALIGNED

IMPROVED DECELERATION AND ACCELERATION LANE

EXISTING A249 SOUTHBOUND CARRIAGEWAY RETAINED FOR ACCESS TO PROPERTIES, NO CONNECTION WITH A249

Scale 1:2500

50m 0m 50m 100m 150m

LEGEND:

EXISTING PUBLIC FOOTPATH

PROPOSED FOOTPATH

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P01	17/11/2017	ISSUED FOR CLIENT REVIEW	MB	AS	GH

Drawing Status: SUITABLE FOR STAGE APPROVAL

Suitability: S3

wsp
4th Floor, 6 Devonshire Square, London, EC2M 4YE, UK
T+ 44 (0) 207 337 1700, F+ 44 (0) 207 337 1701
wsp.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT GENERAL ARRANGEMENT OPTION 4H1

Scale	Drawn	Checked	Approved	Authorised
1:2500	WE	AS	GH	---
Original Size	**Date**	**Date**	**Date**	**Date**
A1	16/11/17	16/11/17	16/11/17	---

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
HE551521 - WSP - HGN - M2J5 - DR - D - 0150

Project Ref. No.: 5145771

Revision: P01

\\uk.wspgroup.com\central data\Projects\70015xxx\70015210 - M2 J5 PCF Stage 2\E Models and Drawings\Highways\Option drawings\Option 4H1\02_Drawings_in_Preparation\HE551521-WSP-HGN-M2J5-DR-D-0150.dwg: Plotted by: bullowsm Date: Nov 22, 2017 - 12:19pm

DO NOT SCALE

Millimetres 100 10 0

INSET
Scale 1:2500

2 LANE SLIP ROAD

EXISTING PUBLIC FOOTPATH ZR71

SINGLE LANE LINK ROAD

EXISTING FOOTBRIDGE REBUILT TO ACCOMMODATE SLIP ROAD WIDENING ON M2 SOUTHBOUND CARRIAGEWAY

A249 To Sittingbourne

M2 to Gillingham

EXISTING PUBLIC FOOTPATH KH8T

TRAFFIC SIGNAL CONTROLLED THROUGH ROUTE FOR A259

TRAFFIC SIGNAL CONTROLLED THROUGH ROUTE FOR A259

FREE-FLOW LINK FOR LEFT-TURNING TRAFFIC

LINK ROAD FROM MAIDSTONE ROAD TO OAD STREET

PUBLIC FOOTPATH

M2 SLIP ROADS ALIGNED

LINK ROAD TO OAD STREET

M2 to Canterbury

A249 to Maidstone

Oad Street

REALIGNED A249 DUAL CARRIAGEWAY

Scale 1:2500
50m 0m 50m 100m 150m

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	By	Chk'd	App'd
P02	17/11/2017	LOCAL ROAD REVISION	MEC	EM	PG
P01	15/11/2017	ISSUED FOR CLIENT REVIEW	MEC	EM	PG

Drawing Status: SUITABLE FOR STAGE APPROVAL
Suitability: S3

wsp
4th Floor, 6 Devonshire Square, London, EC2M 4YE, UK
T+ 44 (0) 207 337 1700, F+ 44 (0) 207 337 1701
wsp.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME
M2 J5 IMPROVEMENTS

Drawing Title: HIGHWAYS DESIGN LAYOUT
GENERAL ARRANGMENT
OPTION 12A

Scale	Drawn	Checked	Approved	Authorised
1:2500	KAM	EM	PG	-
Original Size	Date	Date	Date	Date
A1	14/11/17	14/11/17	14/11/17	-

Drawing Number: Project HE551521 | Originator WSP | Volume HGN | Location M2J5 | Type DR | Role D | Number 0130
Project Ref. No.: HE551521
Revision: P02

APPENDIX

J-2 REVISED OPTION ESTIMATE (NOVEMBER 2017)

highways england

FORM 300

PROCUREMENT & COMMERCIAL DIRECTORATE	ESTIMATE RELEASE FORM		
COMMERCIAL DIVISION	Date of This Estimate Release	15 December 2017	
COST PLANNING GROUP	Date of Previous Estimate	18 October 2017	
	Is this a Multi Option Scheme?	Yes	
	No. of Options: (If Applicable)	3	

Scheme Details

Project Name	M2 Junction 5 Improvement: Option 4 revision 2	Options Phase PIN	551521
Project Manager	Vicky Ye	Developments Phase PIN	0
Type of Estimate Requested	Options	Construction Phase PIN	0
Estimate Identification Number:	800		

ESTIMATE APPROVAL

CESS ADJUSTMENT

	(£) VALUE: MINIMUM	PROJECT TEAM COST	MAXIMUM
BASE ESTIMATE (Jan-16)	41,715,107	61,017,620	95,625,083
UNSCHEDULED ITEMS	1,878,474	2,952,647	4,120,828
RISK ADJUSTMENT:	3,112,510	10,967,671	24,709,956
Contractor/Delivery Partner Risk	-	-	-
Employer / SSSR (incl. Project Risk Managed Centrally)	3,112,510	10,967,671	24,709,956
UNCERTAINTY ALLOWANCE:	-	408,205	732,480
CESS SUBTOTAL :	**46,706,092**	**75,346,144**	**125,188,348**

The Estimate is based on the detailed stage dates:

Stage DATES	Start	Finish
Pre PCF	17/06/15	31/10/15
Stage 1	01/11/15	30/11/16
Stage 2	01/12/16	30/01/18
Stage 3	31/01/18	29/12/18
Stage 4	30/12/18	29/02/20
Stage 5	30/12/18	29/02/20
Stage 6	01/03/20	10/12/21
OTT (Open to Traffic)		11/12/21

Original PRODUCTION and Peer Review ACTIONS by — G. Zelazo (signature) — Sign

COST ENGINEER — Grzegorz Zelazo — Print

DATE — 30/11/17

RANGE ESTIMATE ADJUSTMENT

	(£) VALUE: P10	ML	P90
RANGE NARROWING:	13,912,690	-	- 18,634,171
INFLATION ADJUSTMENT:	3,522,292	15,351,748	34,202,367
PORTFOLIO RISK ADJUSTMENT:	5,433,398	7,494,997	9,546,128
RET ADJUSTMENT SUBTOTAL:	22,868,380	22,846,745	25,114,325
RANGE ESTIMATE OUT-TURN	**69,574,472**	**98,192,889**	**150,302,672**

Confirmation that all technical, arithmetical, transfer, file storage and distribution checks have been successfully completed.

Peer Reviewer (Cost Engineer) Signed: (signature) Name: Lee Askew Date: 30/11/17

Confirmation that the estimate has been produced in accordance with the MP Cost Estimation Manual and any other relevant guidance.

Estimating Manager Signed: Name: Bal Barard Date:

Confirmation estimate reflects information provided and will be reported consistently (SGAR's, IDC, Other Governance)

Project Manager Signed: Name: Vicky Ye Date:

Confirmation for estimate release.

Head of Cost Planning Signed: Name: Mark Rowley Date:

COMMENTS

Delivery Route for Scheme: ECI

1) Scheme has been estimated as a standalone output. No specific consideration has been given to the economy or diseconomy of including this scheme within a regional programme;
2) Updated SGAR Dates have been provided by the Project Team;
3) Historic cost has been provided by the Project Manager;
4) The estimate includes a most likely contractor fee percentage of 9%, with a minimum and maximum range of 6% and 12% respectively;
5) Update to STAT's Estimates has been provided by the Project Team;
6) The Lands Costs: Project team provided an updated DVS draft report @ Q3,2017, the cost engineer has simulated the HAL inflation and Risk profile, as agreed with Project Manager;
7) The FTE's for Options, Development, Stage 6 & Stage 7 have been provided and agreed upon by the Project Team, Stage 2 cost is based on the Task Order provided by Project Team;
8) Risk register provided by Project Team (25/08/2017) was qualitatively and quantitatively assessed &
9) Project Team have provided an Efficiency register, however, this is not yet reportable.

SUMMARY FOR BUDGETARY PURPOSES

	Stage 1 Budget	Stage 2 Budget	Stage 3 Budget	Stage 4 Budget	Stage 5 Budget	Stage 6-7 Budget	Lands Total	Portfolio Risk	Totals
Scheme Min	£0.684M	£1.226M	£1.862M	£1.181M	£2.980M	£53.544M	£2.664M	£5.433M	£69.574M
Scheme Project Team Cost	£0.684M	£1.491M	£2.500M	£1.624M	£4.006M	£77.255M	£3.137M	£7.495M	£98.193M
Scheme Max	£0.684M	£1.897M	£3.614M	£2.363M	£5.882M	£119.937M	£6.380M	£9.546M	£150.303M

highways england

FORM 300

PROCUREMENT & COMMERCIAL DIRECTORATE	ESTIMATE RELEASE FORM	
COMMERCIAL DIVISION	Date of This Estimate Release	15 December 2017
COST PLANNING GROUP	Date of Previous Estimate	18 October 2017
	Is this a Multi Option Scheme?	Yes
	No. of Options: (If Applicable)	3

Scheme Details

Project Name	M2 Junction 5 Improvement: Option 4H1	Options Phase PIN	551521
Project Manager	Vicky Ye	Developments Phase PIN	0
Type of Estimate Requested	Options	Construction Phase PIN	0
Estimate Identification Number:	800		

ESTIMATE APPROVAL

CESS ADJUSTMENT

	(£) VALUE: MINIMUM	PROJECT TEAM COST	MAXIMUM
BASE ESTIMATE (Jan-16)	37,294,642	54,066,019	83,981,331
UNSCHEDULED ITEMS	1,671,689	2,628,087	3,668,495
RISK ADJUSTMENT:	2,882,899	9,796,640	22,248,162
Contractor/Delivery Partner Risk	-	-	-
Employer / SSSR (incl. Project Risk Managed Centrally)	2,882,899	9,796,640	22,248,162
UNCERTAINTY ALLOWANCE:	-	404,390	725,760
CESS SUBTOTAL :	**41,849,229**	**66,895,136**	**110,623,748**

The Estimate is based on the detailed stage dates:

Stage DATES	Start	Finish
Pre PCF	17/06/15	31/10/15
Stage 1	01/11/15	30/11/16
Stage 2	01/12/16	30/01/18
Stage 3	31/01/18	29/12/18
Stage 4	30/12/18	29/02/20
Stage 5	30/12/18	29/02/20
Stage 6	01/03/20	10/12/21
OTT (Open to Traffic)		11/12/21

Original PRODUCTION and Peer Review ACTIONS by

COST ENGINEER — G. Zelazo — Sign

Grzegorz Zelazo — Print

DATE 30/11/17

RANGE ESTIMATE ADJUSTMENT

	(£) VALUE: P10	ML	P90
RANGE NARROWING:	12,191,652	-	- 16,336,079
INFLATION ADJUSTMENT:	3,173,295	13,603,327	30,305,157
PORTFOLIO RISK ADJUSTMENT:	4,775,876	6,594,096	8,403,085
RET ADJUSTMENT SUBTOTAL:	20,140,822	20,197,424	22,372,164
RANGE ESTIMATE OUT-TURN	**61,990,052**	**87,092,560**	**132,995,912**

Confirmation that all technical, arithmetical, transfer, file storage and distribution checks have been successfully completed.

Peer Reviewer (Cost Engineer) Signed: [signature] Name: Lee Askew Date: 30/11/17

Confirmation that the estimate has been produced in accordance with the MP Cost Estimation Manual and any other relevant guidance.

Estimating Manager Signed: Name: Bal Barard Date:

Confirmation estimate reflects information provided and will be reported consistently (SGAR's, IDC, Other Governance).

Project Manager Signed: Name: Vicky Ye Date:

Confirmation for estimate release.

Head of Cost Planning Signed: Name: Mark Rowley Date:

COMMENTS

Delivery Route for Scheme: ECI

1) Scheme has been estimated as a standalone output. No specific consideration has been given to the economy or diseconomy of including this scheme within a regional programme;
2) Updated SGAR Dates have been provided by the Project Team;
3) Historic cost has been provided by the Project Manager;
4) The estimate includes a most likely contractor fee percentage of 9%, with a minimum and maximum range of 6% and 12% respectively;
5) Update to STAT's Estimates has been provided by the Project Team;
6) The Lands Costs: Project team provided an updated DVS draft report @ Q3,2017, the cost engineer has simulated the HAL inflation and Risk profile, as agreed with Project Manager;
7) The FTE's for Options, Development, Stage 6 & Stage 7 have been provided and agreed upon by the Project Team, Stage 2 cost is based on the Task Order provided by Project Team;
8) Risk register provided by Project Team (25/08/2017) was qualitatively and quantitatively assessed &
9) Project Team have provided an Efficiency register, however, this is not yet reportable.

SUMMARY FOR BUDGETARY PURPOSES

	Stage 1 Budget	Stage 2 Budget	Stage 3 Budget	Stage 4 Budget	Stage 5 Budget	Stage 6-7 Budget	Lands Total	Portfolio Risk	Totals
Scheme Min	£0.684M	£1.226M	£1.866M	£1.184M	£2.322M	£47.779M	£2.154M	£4.776M	£61.990M
Scheme Project Team Cost	£0.684M	£1.491M	£2.496M	£1.621M	£3.147M	£68.501M	£2.557M	£6.594M	£87.093M
Scheme Max	£0.684M	£1.897M	£3.611M	£2.361M	£4.625M	£106.268M	£5.147M	£8.403M	£132.996M

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FORM 300

PROCUREMENT & COMMERCIAL DIRECTORATE	ESTIMATE RELEASE FORM	
COMMERCIAL DIVISION	Date of This Estimate Release	15 December 2017
COST PLANNING GROUP	Date of Previous Estimate	18 October 2017
	Is this a Multi Option Scheme?	Yes
	No. of Options: (if Applicable)	3

Scheme Details

Project Name	M2 Junction 5 Improvement: Option 12A revision 2	Options Phase PIN	551521
Project Manager	Vicky Ye	Developments Phase PIN	0
Type of Estimate Requested	Options	Construction Phase PIN	0
Estimate Identification Number:	800		

ESTIMATE APPROVAL

CESS ADJUSTMENT

	(£) VALUE: MINIMUM	PROJECT TEAM COST	MAXIMUM
BASE ESTIMATE (Jan-16)	25,792,363	37,552,120	60,866,740
UNSCHEDULED ITEMS	1,106,619	1,739,114	2,426,762
RISK ADJUSTMENT:	2,317,349	7,121,733	16,408,953
Contractor/Delivery Partner Risk	-	-	-
Employer / SSSR (incl. Project Risk Managed Centrally)	2,317,349	7,121,733	16,408,953
UNCERTAINTY ALLOWANCE:	4,975	427,062	756,729
CESS SUBTOTAL :	29,221,306	46,840,029	80,459,185

The Estimate is based on the detailed stage dates:

Stage DATES	Start	Finish
Pre PCF	17/06/15	31/10/15
Stage 1	01/11/15	30/11/16
Stage 2	01/12/16	30/01/18
Stage 3	31/01/18	29/12/18
Stage 4	30/12/18	29/02/20
Stage 5	30/12/18	29/02/20
Stage 6	01/03/20	30/08/21
OTT (Open to Traffic)		01/09/21

Original PRODUCTION and Peer Review ACTIONS by		
	G. Zelazo	Sign
COST ENGINEER	Grzegorz Zelazo	Print
DATE	30/11/17	

RANGE ESTIMATE ADJUSTMENT

	(£) VALUE: P10	ML	P90
RANGE NARROWING:	8,744,892	-	- 12,341,977
INFLATION ADJUSTMENT:	1,974,598	8,972,017	20,406,760
PORTFOLIO RISK ADJUSTMENT:	3,342,801	4,624,923	5,900,535
RET ADJUSTMENT SUBTOTAL:	14,062,291	13,596,939	13,965,318
RANGE ESTIMATE OUT-TURN	43,283,597	60,436,968	94,424,503

Confirmation that all technical, arithmetical, transfer, file storage and distribution checks have been successfully completed.

Peer Reviewer (Cost Engineer) Signed: [signature] Name: Lee Askew Date: 3/11/17

Confirmation that the estimate has been produced in accordance with the MP Cost Estimation Manual and any other relevant guidance.

Estimating Manager Signed: Name: Bal Barard Date:

Confirmation estimate reflects information provided and will be reported consistently (SGAR's, IDC, Other Governance).

Project Manager Signed: Name: Vicky Ye Date:

Confirmation for estimate release.

Head of Cost Planning Signed: Name: Mark Rowley Date:

COMMENTS

Delivery Route for Scheme: ECI

1) Scheme has been estimated as a standalone output. No specific consideration has been given to the economy or diseconomy of including this scheme within a regional programme;
2) Updated SGAR Dates have been provided by the Project Team;
3) Historic cost has been provided by the Project Manager;
4) The estimate includes a most likely contractor fee percentage of 9%, with a minimum and maximum range of 6% and 12% respectively;
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7) The FTE's for Options, Development, Stage 6 & Stage 7 have been provided and agreed upon by the Project Team, Stage 2 cost is based on the Task Order provided by Project Team;
8) Risk register provided by Project Team (25/08/2017) was qualitatively and quantitatively assessed; &
9) Project Team have provided an Efficiency register, however, this is not yet reportable.

SUMMARY FOR BUDGETARY PURPOSES

	Stage 1 Budget	Stage 2 Budget	Stage 3 Budget	Stage 4 Budget	Stage 5 Budget	Stage 6-7 Budget	Lands Total	Portfolio Risk	Totals
Scheme Min	£0.684M	£1.226M	£1.424M	£0.644M	£1.543M	£32.043M	£2.377M	£3.343M	£43.284M
Scheme Project Team Cost	£0.684M	£1.491M	£1.977M	£0.868M	£2.078M	£45.913M	£2.801M	£4.625M	£60.437M
Scheme Max	£0.684M	£1.897M	£2.846M	£1.239M	£3.056M	£73.285M	£5.516M	£5.901M	£94.425M

APPENDIX

K APPRAISAL SUMMARY TABLES

Appraisal Summary Table

Date produced:	Jan-18

Contact:	
Name	
Organisation	
Role	Promoter/Official

Name of scheme:	M2 Junction 5 Improvements Scheme (Option 4H1)
Description of scheme:	Option 4H1 would involve the augmentation of the existing Stockbury Roundabout with a flyover on the A249 mainline to provide a new grade-separated junction. Stockbury Roundabout would remain at-grade and would be enlarged to accommodate connections to the roundabout. The A249 mainline would flyover the proposed Stockbury Roundabout on embankments, with two bridges over the roundabout. Additional free-flow links would be provided for the A249 southbound to M2 westbound and A249 northbound to M2 eastbound movements. A new link road would be provided between Stockbury Roundabout and Oad Street, with the new link road connecting into Oad Street near the existing junction of Oad Street and the A249. The existing Oad Street and A249 junction would be closed. The Maidstone Road access direct to Stockbury Roundabout would be closed, with Maidstone Road re-routed to connect with Oad Street to the north of the M2.

Impacts		Summary of key impacts	Assessment			
			Quantitative	Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers		Value of journey time changes(£) / Net journey time changes (£): 0 to 2min / 2 to 5min / > 5min			
	Reliability impact on Business users					
	Regeneration					
	Wider Impacts					
Environmental	Noise	Option 4H1 would result in no areas experiencing a major adverse impact in the long term. However a moderate adverse impact is likely to occur at properties on Maidstone Road east of the A249. At the same time results show that there could be a beneficial impact, reduction in noise levels, at properties south of the A249, west of the junction. Impacts during the long term will be mainly negligible. The appraisal is based on traffic data from core variable demand traffic modelling.	28 households are expected to experience increased daytime noise in the forecast year with 14 households expected to experience a reduction.	N/A	£48,207	
	Air Quality	Overall there is a negative impact on local air quality and regional NOx emissions. There are no pollution climate mapping links exceeding the limit value. The scheme does not result in any limit value exceedances or worsen any existing exceedances. Uncertainties include: no forecast of traffic growth beyond 2041, beyond this no change has been assumed; no forecast emission factors after 2030. From 2030 it has been assumed that 2030 emission factors apply up to 2080. The appraisal is based on traffic data from variable demand traffic modelling.	Assessment Score PM10: + 129 NO2: + 347 Emissions NOx: + 347 tonnes	N/A	NPV of change in PM10 concentration: - £522,434 NPV of change in NOx emissions: - £170,048 Total NPV of change in air quality: - £692,481	Not undertaken at Stage 2
	Greenhouse gases	The appraisal reflects a net increase in vehicle kilometres travelled over the modelled road network. Uncertainties include: no forecast of traffic growth beyond 2041, beyond this no change has been assumed; no forecast emission factors after 2030. From 2030 it has been assumed that 2030 emission factors apply up to 2080. There is no account of CO2 emissions from power generating sources for electric vehicles. The appraisal is based on traffic data from variable demand traffic modelling.	Change in non-traded carbon over 60y (CO2e): 335,515 Change in traded carbon over 60y (CO2e):	N/A	NPV - £15,256,058	
	Landscape	The grade separated junction at the western end of the scheme will introduce a new discernible element within the landscape, in combination with associated link roads. However, given their association to the existing highway infrastructure within the area, these are similar in nature to existing features, reducing the magnitude of impact significantly. During the construction phase there will be locally significant impacts as a result of vegetation clearance and increases in construction related infrastructure. However long-term changes in pattern, land cover and character will be largely mitigated through proposed screen and integration planting. Residual impacts will be associated with direct changes to landform along the road corridor including 1:2 embankments approaching the junction. These in turn will result in an overall Slight Adverse	N/A	Slight Adverse		
	Townscape	Townscape is not considered to be of relevance to Option 4H1.				
	Historic Environment	There is the potential for a moderate adverse effect on the above ground assets in relation to the impact upon setting. There is a moderate adverse impact on the below ground remains due to the potential impact on the World War I trenches and any unknown buried assets which may be affected by Option 4H1.	N/A	Moderate Adverse		
	Biodiversity	Option 4H1 will not directly affect Ancient Woodland, but could indirectly affect Church Wood and Chestnut Wood as a result of deteriorations in air quality during the construction phase. This resource has limited options for substitutability and the overall impact on the woodland is considered to be of a Moderate Adverse magnitude. There will be a small loss of semi-natural broadleaved woodland and broadleaved plantation woodland, which are identified within the Kent Biodiversity Action Plan as having a target of no net loss. Woodland is also an important aspect of the Kent Downs Area of Outstanding Natural Beauty Management Plan, therefore sufficient mitigation measures, including replacement planting, should be incorporated into scheme design to maintain the level of woodland that is currently present. Option 4H1 will not result in loss of hedgerows. This option is also likely to adversely impact on protected and notable species, and although it is not possible to fully quantify the impacts on protected species at this stage or to determine the appropriate mitigation required, given the habitats present within the scheme boundary, it is likely that regionally significant impacts of a Moderate Adverse magnitude may	N/A	Moderate Adverse		
	Water Environment	The greatest risks to groundwater quality are associated with deep excavations and cuttings. The implementation of a Construction Environmental Management Plan will significantly reduce the risk of adverse impact during construction. However, the risks cannot be fully avoided during construction. At this stage, the depth to the principal aquifer is uncertain and, therefore, a minor risk to groundwater quality remains until inclusion of appropriate treatment systems is confirmed. A dry ditch was identified along Maidstone Road to the north of the M2 and a pond was identified adjacent to the A249. Neither of these are considered to have significant value in terms of water supply, aesthetics, recreation, cultural heritage or value to the economy. Surface water flooding was identified south of the M2. Therefore, consideration will need to be given to maintaining overland flow paths and mitigating potential impacts to adjacent receptors. Special consideration should also be given to roads located in cutting as they will be at increased risk of flooding from overland flows. Appropriate drainage will be required because the works will increase the rate and volume of surface water runoff associated with an increase in impermeable surfacing. It is assumed that appropriate attenuation will be provided to mitigate the potential impact on the risk	N/A	Large Adverse		
Social	Commuting and Other users		Value of journey time changes(£) / Net journey time changes (£): 0 to 2min / 2 to 5min / > 5min			
	Reliability impact on Commuting and Other users					
	Physical activity					
	Journey quality					
	Accidents					
	Security					
	Access to services					
	Affordability					
	Severance					
	Option and non-use values					
Public Account	Cost to Broad Transport Budget					
	Indirect Tax Revenues					

Appraisal Summary Table

Date produced:	Jan-18

Contact:	
Name	
Organisation	
Role	Promoter/Official

Name of scheme:	M2 Junction 5 Improvements Scheme (Revised Option 12A)
Description of scheme:	Revised Option 12A would involve the upgrade of the existing roundabout at the M2 Junction 5 to a partially signalised roundabout with through lanes for the A249 main carriageway. The M2 eastbound slip road would be widened to two lanes with a new free-flow link to the northbound A249 and the footbridge over the slip road will be replaced with a longer spanning footbridge. Additional free-flowing links would be provided from the A249 southbound to the M2 westbound and the A249 northbound to M2 eastbound. The existing connection from Maidstone Road to the roundabout and the junction of Oad Street and the A249 to the south of the M2 Junction 5 would both be closed. A new link road would be provided between Stockbury Roundabout and Oad Street, with the new link road connecting into Oad Street near the existing junction of Oad Street and the A249. Maidstone Road would be re-routed to connect with Oad Street to the north of the M2.

Impacts		Summary of key impacts	Assessment			
			Quantitative	Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers		Value of journey time changes(£) / Net journey time changes (£): 0 to 2min | 2 to 5min | > 5min			
	Reliability impact on Business users					
	Regeneration					
	Wider Impacts					
Environmental	Noise	Option 12A would result in no areas experiencing a major adverse impact in the long term. However a moderate adverse impact is likely to occur at one property on Maidstone Road east of the A249. Impacts during the long term will be mainly negligible. The appraisal is based on traffic data from core variable demand traffic modelling.	22 households are expected to experience increased daytime noise in the forecast year with 23 households expected to experience a reduction.	N/A	£32,997	
	Air Quality	There is a negative impact on local air quality and regional NOx emissions. There are no pollution climate mapping links exceeding the limit value. Revised Option 12A does not result in any limit value exceedances or worsen any existing exceedances. Uncertainties include: no forecast of traffic growth beyond 2041, beyond this no change has been assumed; no forecast emission factors after 2030. From 2030 it has been assumed that 2030 emission factors apply up to 2080. The appraisal is based on traffic data from variable demand traffic modelling.	Assessment Score PM10: + 88 NO2: + 287 Emissions NOx: + 362 tonnes	N/A	NPV of change in PM10 concentration: -£273,175 NPV of change in NOx emissions: -£179,275 Total NPV of change in air quality: - £452,450	Not undertaken at Stage 2
	Greenhouse gases	The appraisal reflects a net increase in vehicle kilometres travelled over the modelled road network. Uncertainties include: no forecast of traffic growth beyond 2041, beyond this no change has been assumed; no forecast emission factors after 2030. From 2030 it has been assumed that 2030 emission factors apply up to 2080. There is no account of CO2 emissions from power generating sources for electric vehicles. The appraisal is based on traffic data from variable demand traffic modelling.	Change in non-traded carbon over 60y (CO2e): 325,216 Change in traded carbon over 60y (CO2e): 0	N/A	NPV - £14,761,532	
	Landscape	Revised Option 12A will form a visually unobtrusive alteration to the landscape by Design Year 15, due to the proposed option being mainly built at grade. Where earthworks are present these are shallow in nature and thus are not at a scale to be out of sort with that of the wider landscape setting. During the construction phase there will be locally significant impacts as a result of earthworks, vegetation clearance and increases in construction related infrastructure. Long-term changes in pattern, land cover and character will be largely mitigated through landscaping and screen planting, resulting in impacts of a Slight Adverse impact on these landscape features at a local level, and negligible adverse in nature within the wider landscape setting.	N/A	Negligable Adverse		
	Townscape	Townscape is not considered to be of relevance to Option 4H1.	N/A			
	Historic Environment	There is the potential for a moderate adverse effect on the above ground assets in relation to the impact upon setting. There is a moderate adverse effect on the below ground remains due to the potential impact on the World War I trenches and any unknown buried assets which may be affected by Revised Option 12A.	N/A	Moderate Adverse		
	Biodiversity	Revised Option 12A will not directly effect the Ancient Woodland within Chestnut Wood or Church Wood, with no habitat losses from these areas of Ancient Woodland required; however it could potentially indirectly effect Church Wood and Chestnut Wood as a result of deteriorations in air quality during the construction phase. This resource has limited options for substitutability and the overall impact on the woodland is considered to be of a Moderate Adverse magnitude. There will be a small loss of semi-natural broadleaved woodland and broadleaved plantation woodland, which are identified within the Kent Biodiversity Action Plan as having a target of no net loss. Woodland is also an important aspect of the Kent Downs Area of Outstanding Natural Beauty Management Plan, therefore sufficient mitigation measures, including replacement planting, should be incorporated into scheme design to maintain the level of woodland that is currently present. Revised Option 12A will not result in the loss of hedgerows. Revised Option 12A is also likely to adversely impact on protected and notable species, and although it is not possible to fully quantify the impacts on protected species at this stage or to determine the appropriate mitigation required, given the habitats present within the scheme boundary, it is likely that regionally significant impacts of a Moderate Adverse magnitude may occur.	N/A	Moderate Adverse		
	Water Environment	The greatest risks to groundwater quality are associated with deep excavations and cuttings and, therefore, special consideration should be given to these areas. The implementation of a Construction Environmental Management Plan will significantly reduce the risk of adverse impact during construction. However, the risks cannot be fully avoided during construction. At this stage, the depth to the principal aquifer is uncertain and, therefore, a minor risk to groundwater quality remains until inclusion of appropriate treatment systems is confirmed. A dry ditch was identified along Maidstone Road to the north of the M2 and a pond was identified adjacent to the A249. Neither of these are considered to have significant value in terms of water supply, aesthetics, recreation, cultural heritage or value to the economy. Surface water flooding was identified south of the M2. The improvements proposed to Stockbury Roundabout and the western end of the new single carriageway link from Maidstone Road are partially located in the area indicated to be at risk of flooding from surface water. Consideration should be given to maintaining overland flow paths and mitigating potential impacts to adjacent receptors. The majority of the new roads/improvements are proposed to be constructed in cuttings. Therefore, an appropriate drainage system will need to be provided to mitigate potential impact of surface water flooding on the route and its users. No significant increase in the rate and volume of surface water runoff generated from the M2 Junction 5 is envisaged. However, appropriate attenuation is likely to be provided if required to mitigate the potential impact on flood risk.	N/A	Moderate Adverse		
Social	Commuting and Other users		Value of journey time changes(£) / Net journey time changes (£): 0 to 2min | 2 to 5min | > 5min			
	Reliability impact on Commuting and Other users					
	Physical activity					
	Journey quality					
	Accidents					
	Security					
	Access to services					
	Affordability					
	Severance					
	Option and non-use values					
Public Account	Cost to Broad Transport Budget					
	Indirect Tax Revenues					