TECHNICAL NOTE

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Confidentiality: Public

Subject: SD10 - Additional Modelling Information

Project: Great Yarmouth Third River Crossing

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OVERVIEW

This Technical Note has been prepared in response to clarification questions received from the Department for Transport (DfT) on 26th August 2020, relating to the Economic Appraisal undertaken for the Full Business Case (FBC) submission for Great Yarmouth Third River Crossing. A total of 37 clarification questions were received.

The clarification questions were divided into four areas of the appraisal process:

- LMVR – questions about the base model build process;
- Demand – questions about the variable demand modelling;
- Forecasting – questions about the demand forecasting process and model runs; and
- Appraisal – questions about the Economic Case, Economic Appraisal Report and other supporting documents of the FBC.

A follow up meeting was held with DfT on 8th September 2020. At this meeting it was discussed that responses to questions on LMVR, Demand and Forecasting were in many cases likely to require additional plots, tables, figures and explanatory text. Rather than update and reissue the existing reports it was agreed to issue a technical note compiling the responses.

The responses to the Appraisal clarification questions and the LMVR, Demand and Forecasting questions that did not require additional information were issued to DfT on 15th September 2020.

This technical note responds to each of the remaining clarification questions.

LMVR

Clarification #1

Please provide a map, or otherwise, showing where speed-flow curves have been used. If these have been used within the simulation area, please justify and convince that delays have not been double-counted, e.g. on the A47 through Great Yarmouth.

A plot showing location of speed flow curves is provided in Clarification #1 – Links with Speed flow Curves.

Speed flow curves have mostly been applied to the main A-roads (A47, A143 and A149). This approach is consistent with the coding employed in the original MM model. These include long links, many of them dual carriageway, where the interaction of vehicles between junctions could produce additional delay.

There are speed flow curves applied to Gapton Hall Road and Southtown Road to ensure realistic and habitual routing takes place relative to the A47.

Clarification #2

At key locations near the scheme there are MTCs but no ATCs. Please describe how these MTCs were checked/adjusted to ensure they are representative of two weeks' worth of data, i.e. not affected by short-term localised events.

There was a large number of MCCs commissioned for this project due to the need to construct an operational micro-simulation model. Section 5.4 of the LMVR details the rationalisation approach applied. In locations where the MCC was not adjacent to an ATC, determination of the how representative the data was and its quality depended upon:

- checking flow and profiles with nearby counts;
- information from the survey company and /or NCC relating to specific network issues; and
- local knowledge from NCC relating to traffic movements in the network.

Please provide the factors used to adjust the counts for monthly/yearly variations.

Normalisation factors for traffic counts have been calculated from the permanent traffic counter located on the A12 (now A47) between the A47 and A1243.

Counts have been normalised to the year 2016. The annual normalisation factors are given in Table 1 below.

Table 1 Annual Normalisation Factors to Year 2016

Year	Factor
2016	1
2015	1.006
2014	1.026
2013	1.046
2012	1.034

The counts have also been normalised to an average month within the year. The monthly normalisation factors are given in Table 2 below.

Table 2 Monthly Normalisation Factors

Month	Factor
Jan	1.092
Feb	1.026
Mar	1.008
Apr	1.000
May	0.990
Jun	0.971
Jul	0.952
Aug	0.960
Sep	0.972
Oct	0.982
Nov	1.013
Dec	1.061

The counts have been normalised to the average weekday. The daily (Tuesday to Thursday) normalisation factors are reported in Table 3 below.

Table 3 Daily Normalisation Factors

Day	Factor
Monday	1.040
Tuesday	1.016
Wednesday	0.994
Thursday	0.990
Friday	0.985

Please provide plots that show which counts have been used during calibration of the matrix and/or network, and which were reserved for independent validation.

A plot is provided in Clarification #2 – Calibration and Validation Sites.

Clarification #3

It's not clear whether the HE Coding Manual standards were applied to new/updated junction coding only, or the whole simulation area. Please confirm coding standards have been applied consistently across the entire simulation area (notwithstanding localised adjustments during calibration).

The wording of section 6.3 could be clearer. The Regional Traffic Models Network Coding Manual has been applied consistently across the simulation area.

Please also provide a table showing the source and currency (i.e. date) of signal data at each signalised junction within the area of influence of the scheme.

For the majority of signalised junctions the signal timings were extracted from SCOOT data for a neutral day in 2016. Phasing plans were supplied by NCC. The remaining junctions has signal timings and phasing plans provided by NCC.

A table summarised the signal data is provided in Clarification #3 – Signal Data.

Clarification #5

At the Breydon Bridge site the sample size of observed GVs (particularly HGVs) is very low and it was not deemed possible to blend with Traffic Master OD data. Given this bridge is close to the proposed third river crossing and serves local trips relative to the A47 Haven Bridge, please comment on the impact this weakness in the prior matrix may have on the scheme assessment.

The low sample size and unsuitability of the TMOD data for HGVs means that a reliance is placed on the existing 2008 matrices. If the prior matrix is over predicting the number of trips accessing to and from the town centre via Breydon Bridge then the influence of the new scheme could be overstated. Trips making this movement (i.e. town centre to / from the south) will be more likely to change route across the river. Select Link Analysis in the base year assignment provided in Clarification #5 – HGV SLA on Breydon Bridge show the number of HGVs making this movement are relatively small (AM 11%, IP 1% and PM 17%).

Please provide more information on the source and age of data in the 2008 matrix, and comment on any potential issues with using this as a source of data for more than half of the trips in the prior matrix.

The 2008 matrices were derived from the original 2003 Great Yarmouth model by combining growth factors and specific post 2003 development trips. Despite the age of the data, these matrices had previously been calibrated for Great Yarmouth using RSI survey data and as such were more representative of trip movements in Great Yarmouth than other sources, such as a pure synthetic matrix. These matrices were also shaped by elements of JTW and NTS information to deliver a “pseudo-synthetic” source. The approach was chosen to make best use of available information and to ensure delivery of analysis to NCC in the shortest possible time

The issue is if trip movements have changed significantly since 2008, then the impact of the scheme could be misrepresented. In the October 2018 response to previous DfT queries regarding the matrix build methodology the post ME matrix was compared to unused 2016 Roadside Interview Data. The conclusion was that at a sector level the comparison showed a reasonable representation of observed data in the final post ME matrices.

It would be useful to understand what proportion of trips that use the third river crossing are from observed data sources. Could this be analysed using select link analysis in an assignment of the prior matrix? If so please comment on the results and potential impact on the robustness of the scheme appraisal.

An indicative test has been carried out assigning the 2016 prior matrices onto the 2023 Do Something network. Select link analysis has been carried out on the Scheme to establish the number of observed movements. This is given in Table 4 below.

Table 4 Prior Matrix Composition on TRC

Data Type	AM Peak	IP	PM Peak
Obs	66%	64%	69%
Syn	25%	29%	26%
GV	9%	7%	5%

The results indicate that the number of observed trips crossing the TRC are broadly in line with that presented in the LMVR for the existing crossings. Around two thirds of the trips are observed. This gives confidence that the Scheme appraisal has been based upon observed movements.

Table 7.7 suggests that cross-river traffic is 60-70% observed in the prior matrix. With 2016 RSIs on both river crossing sites, why is it not closer to 100% observed (notwithstanding the low HGV sample size)? Please provide more details on the process of blending the observed and background matrices and how factors were derived.

We typically build matrices in a blended fashion to make best use of the inherent strengths of each dataset. Although it would have been possible to utilise the expanded RSI data to represent the cross river movements without synthetic, this approach was considered to contain some risk due to the requirement to expand the sample, particularly given some samples were already boosted with Trafficmaster data. Therefore, a blend of RSI and synthetic, with a strong emphasis towards RSI where possible as it is observed data, was considered the best approach overall.

The exact blending ratios of RSI and synthetic varied by sector principally to reflect confidence in the probability of this movement being plausibly captured by the RSIs. Factors were derived to make as much use of the RSI as possible without over-expanding the sample.

The blending factors applied at sector level are given in Clarification #5 – RSI Blending Factors.

Clarification #6

There is no evidence of the validation of trips in the matrix at specific sites. Are there any large trip generators in the study area, particularly near the scheme? If so please provide analysis that demonstrates the trips in the prior matrix of these sites is reasonable.

4 RSI sites were used in the matrix build. Trips were reviewed at matrix build stage by examining selected links of the prior demand and making visual comparison, based on local knowledge, of catchment area of each approach route. Formal comparison was not made as the RSI surveys provided, for the greater part, sample rates below 10%, considered to be too unreliable for direct comparison of disaggregate OD patterns. The higher sample rates were achieved on the peninsula sites where, Origin or Destination within the urban area is less dispersed. This means that although sectoral comparison would be possible, it would not be useful, due to the naturally limited distribution spread.

For these reasons amongst others the documented approach of blending other data sources with the RSI data was chosen to effectively bolster the sampling. This means that a direct comparison against originally collected data would not be advisable.

There are no individual large generators near the scheme, although, in combination, the multiplicity of light industrial units in the vicinity serve to provide the travel demand market for future diversion onto the proposed bridge.

A select link analysis of the prior matrix assignment has been undertaken at the RSI sites in interview direction on Breydon bridge and Haven bridge. The SLA plots are presented in Clarification #6 – Prior Matrix SLA at RSI Sites.

Clarification #7

The impact of matrix estimation, particularly at the cell level, is quite large with R2 values much lower than TAG targets. Does this point to a poor quality prior matrix? Perhaps an XAMAX=5.0 allowed the matrix to change more than necessary? Please provide an explanation and justification for the large changes. Are they in significant locations relative to the scheme? What is the potential impact this could have on the scheme assessment?

The impact of matrix estimation at the cell level would indicate, as stated in the LMVR, that the prior matrices are not sufficiently comprehensive. This was due to the time constraints under which the base model was constructed.

In the October 2018 response to previous DfT queries regarding the matrix build, a comparison between prior and post ME matrices was carried out, which specific attention paid to the impact on the Scheme itself. A sector to sector comparison was presented that showed the absolute and percentage changes brought on by matrix estimation. The only movement with significant change that would directly affect the Scheme was from Lowestoft and surrounds with a 38% reduction in AM, and an 81% reduction in PM. The largest percentage increases were within Lowestoft sector and from Lowestoft to external south.

An approximate economic cost was calculated based upon an average time saving between the DM and DS models for a zone pair that would use the TRC. Over a 60 year appraisal period the benefit is calculated to be -£1,493k (2010 prices discounted to 2010). The benefit is negative as matrix estimation reduces the number of trips likely to use the Scheme. As a comparison for FBC submission the core TUBA time saving benefits were £194,168k.

Clarification #8

Please provide the prior matrix validation performance (i.e. against screenlines) and comment on whether the validation is sufficient to proceed to matrix estimation.

The prior matrix screenline validation performance is provided in Clarification #8 – Prior Matrix Screenline Validation. The performance against flow criteria is AM 38%, IP 25% and PM 44%. Across the time periods there are no flow differences greater than 20% or GEH in excess of 10. Screenline 1, 2 and 7 are important relative to the Scheme, they have the majority of flow differences less than 10% and GEH less than 4.

Please confirm whether any screenlines were reserved for independent validation. If not, or just one as indicated in Figure 10.4, provide justification.

As indicated in Figure 10.4 only one screenline was reserved for independent validation. The justification for that decision relates to the relatively small and compact nature of the Great Yarmouth simulation area. A balance needed to be struck between improving the matrix through calibration and reserving a meaningful screenline for validation. The number of counts reserved for validation was 24% (57/234), number of screenlines reserved for validation was 12.5% (1/8).

Clarification #9

It's surprising how good the validation of the prior matrix is, given how much the prior is changed by ME. Please provide comments on this apparent discrepancy.

The validation of the prior matrix was good on flow criteria (74-76% across all time periods), but less so on GEH criteria (62-63% across all time periods). This would indicate that majority of the count sites are low flow in nature. Following ME the validation rises on flow criteria (94-97% across all time periods) and GEH (90-93%). However, it is worth examining the prior matrix screenline calibration results (see **#8** above) where the performance against flow criteria is AM 38%, IP 25% and PM 44%. Following ME there is only 1 of 48 screenlines that did not meet flow

validation criteria. Despite the relatively good prior matrix comparison with individual counts, the prior screenline performance would indicate that significant corrections in flow patterns were needed. This is reflected in the large changes produced by ME.

The simulation area is relatively small in terms of the number of zones, around half of the models 240 zones. Therefore the changes due to ME are amplified as there are a limited number of OD pairs that can be corrected to improve validation.

Figures 10-4 to 10-6 show modelled flow against observed flow. However they only seem to show a handful of the 177 calibration and 57 validation counts. And they do not provide an indication of whether the difference is significant compared to the total flow on each link. Please provide maps that clearly illustrate the validation performance against all relevant counts in the study area, by plotting difference and %difference, or GEH (if GEH show whether it's higher or lower than observed). Clearly indicate whether the count is an ATC or an MCC.

Plots have been produced showing the link calibration and validation GEH performance. The link is coloured Red for ATC and Yellow for MCC. Where the modelled flow is lower than observed flow the GEH value has been multiplied by -1. Plots are presented in Clarification #9 – Link Calibration and Validation.

Please also provide diagrams illustrating the validation against turn counts at key junctions within the area of influence.

Turning count validation has been provided for the following junctions:

- Harfreys roundabout;
- Southtown Road / William Adams Way / Beccles Road;
- Beccles Road / Church Road / Burgh Road / Sufflow Road; and
- Gapton roundabout.

The results are presented in Clarification #9 – Turning Count Validation.

Clarification #11

Figure 10.1-10.3 show flows on a selection of roads but does not allow an assessment to be made of traffic flows in the vicinity of the scheme. Please provide updated diagrams of modelled traffic flows using flow bandwidths with flows clearly labelled and higher quality background mapping. If necessary provide more than one zoom level so traffic flows in the vicinity of the scheme can be assessed.

Base year flow plots have been provided in Clarification #11 – Base Year Flow Plots.

DEMAND

Clarification #12

4.2.5 implies the base year PA and validated OD matrices are 100% compatible. Please provide the evidence to support this.

This is a test that the pivot assignment matrix that has been generated through the forecast system and PA conversion replicated the base year post ME OD matrices. “Fitting on factors” used to reconcile the calibrated changes ensure consistency between PA and validated OD.

Please provide the PT mode shares by purpose, to justify the use of fixed costs for PT in the model.

Average day 2016 TEMPRO trips ends by purpose and mode are presented in Table 5 and Table 6. PT share is shown to be less than 10%.

Table 5 Average Day 2016 TEMPRO OD Trip Ends for Great Yarmouth LA area

	Business	Business	Commute	Commute	Other	Other
	Origin	Destination	Origin	Destination	Origin	Destination
Walk	738	823	6,148	6,235	45,272	45,280
Cycle	127	127	1,665	1,636	3,612	3,645
Car	8,341	8,504	34,355	34,079	132,708	133,712
Bus	261	272	2,663	2,630	12,985	13,115
Rail	308	210	1021	874	1609	1531
TOTAL	9,775	9,936	45,852	45,454	196,186	197,283

Table 6 Average Day 2016 TEMPRO OD Trip Ends Proportions for Great Yarmouth LA area

	Business	Business	Commute	Commute	Other	Other
	Origin	Destination	Origin	Destination	Origin	Destination
Walk	8%	8%	13%	14%	23%	23%
Cycle	1%	1%	4%	4%	2%	2%
Car	85%	86%	75%	75%	68%	68%
Bus	3%	3%	6%	6%	7%	7%
Rail	3%	2%	2%	2%	1%	1%
TOTAL	100%	100%	100%	100%	100%	100%

Please explain how base PT trip matrices were obtained, for use in the pivot point model.

There are no PT trip matrices. A cost pivot is used. This is derived from highway trip costs and adjusted to estimate PT costs.

Please describe how the PT costs are updated for the forecast years. For example, what assumptions, implicit or explicit, are made about growth in PT times and fares?

As there is no PT model, fares are estimated to be 100p +10p/km. The fare is assumed to increase in line with VoT increase. PT times are taken from highway trip times and adjusted to estimate PT travel time.

Clarification #13

Please describe how the components of generalised cost for car (except car IVT) and PT have been calculated.

Section 5.2 of the Demand Report gives the Generalised Cost equation for cars.

$$GCost_{car} = Time_{Walk} * Weight_{Walk} + Time_{Car} + \frac{Dist_{Car} * VOC}{Occ * VoT} + \frac{Parking\ Cost}{Occ * VoT}$$

Where:

- Timewalk is total walking time from and to the car;
- Weightwalk is the weight to be applied to walking time;
- TimeCar is journey time spent in the car;
- VOC is the vehicle operating costs per kilometre of a journey of Dist km;
- DistCar is the travel distance by car;
- Occ is the number of people in the car (varied by purpose); and
- VOT is the value of time (varied by purpose).

For cars there is no parking model, so parking cost is zero, and as such walking time to and from the car is also zero.

Section 5.2 of the Demand Report gives the Generalised Cost equation for PT.

$$GCost_{PT} = Time_{Walk} * Weight_{Walk} + Time_{wait} * Weight_{wait} + Time_{PT} + \frac{Fare_{PT}}{VoT}$$

Where:

- $Time_{walk/wait}$ is total walking time from and to the service or waiting time;
- $Weight_{walk/wait}$ is the weight to be applied to walking/waiting time;
- TimePT is journey time spent in public transport service. For the purpose of the PT modelling, it is assumed that Time spent in the public transport is the same as travel time made by car;
- FarePT is the public transport fare. For the purpose of deriving the fixed costs for the PT model, Fare is assumed to increase over distance travel using the formula $Fare = Boarding\ charge + Fare\ per\ Km * Distance\ travelled$
- VOT is the value of time (varied by purpose).

The walk and wait time is assumed to be a total of 30mins per trip. TimePT is the Highway trip time multiplied by an IVT penalty of 1.2.

Clarification #14

4.3.2 states that car trips external to the area of influence are fixed. 2.3.2 says that Caister-on-Sea to the north, Acle to the west, and Lowestoft to the south are included, but the sector boundaries in Figure 1 extend beyond these towns. The simulation area (as shown in Figure 4.1 in the LMVR) covers Caister-on-Sea but does not extend to Acle or Lowestoft. Please clarify the area of influence that is subject to VDM response and the rationale to support this. If this area is wider than the simulation area, please provide the evidence that changes in costs outside the simulation area are good enough to support a VDM response

The response issued to DfT on 15/09/2020 stated that the area of influence subject to VDM response was equivalent to the simulation area. This is NOT correct.

The area of influence as described in 2.3.2 is correct. It includes areas of the model that are outside of the simulation area. A map of the VDM Area of Influence along with the Simulation Area is included in Clarification #14 – VDM Area of Influence.

Flow difference plots between Do Minimum and Do Something VDM outputs flows for 2038 are included in Clarification #14 – VDM Area of Influence. The difference in flow, and hence cost, is minimal in the area outside the simulation area.

FORECASTING

Clarification #17

Please provide the full uncertainty log (and map) that includes all developments considered. Please provide evidence of the information used to assign uncertainty status.

The developments included from the Uncertainty Log are detailed in Section 4 of the Forecasting Report. Tables 2-5 detail the individual and group developments modelled; Plate 4 shows their locations. The certainty applied to each development was derived from discussions in 2016, 2018 and 2020 with the planning department at both Norfolk County Council and Great Yarmouth Borough Council.

The full list of developments considered is given in Clarification #17 – Uncertainty Log.

Clarification #19

Please provide details of the demand/supply convergence.

All models converged with target highway GAP of 0.05% over a 24hr period. Results are given in Table 7 below.

Table 7 Demand / Supply convergence for Forecast Scenarios

Year	Scenario	Number of Loops	Highway GAP%
2023	DM	8	0.04282
2023	DS	8	0.04595
2038	DM	10	0.02814
2038	DS	10	0.02788
2051	DM	10	0.03863
2051	DS	10	0.03002

Clarification #20

Please provide a comparison between the total committed housing and jobs included in the uncertainty log and explicitly represented in the model and the total housing and jobs from NTEM planning data for the study area.

The explicitly modelled development totals for households and jobs have been compared to NTEM growth for Great Yarmouth local authority area. The results are presented in Table 8.

Table 8 Comparison of total households and jobs explicitly modelled with NTEM data.

	Developments Explicitly Modelled	**Developments Explicitly Modelled**	**TEMPro 7.2 for Great Yarmouth**	**TEMPro 7.2 for Great Yarmouth**
Growth from 2018 to	**2023**	**2038**	**2023**	**2038**
Households	2,063	4,163	2,732	11,198
Jobs	4,282	6,641	1,149	3,121

Please provide a clear summary of the matrix totals, including the development growth, background growth and level of TEMPRO constraint applied.

Matrix totals for base and forecast years are given in Clarification #20 – Matrix Totals.

Please provide adjusted TEMPRO growth factors.

Adjusted TEMPRO growth factors were not calculated directly, i.e. extracted from TEMPRO software with alternative planning assumptions applied, in the fixed demand forecast process. The matrices were constrained to NTEM levels, development trips were included, and all other growth was adjusted so the overall matrix total matched NTEM.

Clarification #21

Please provide plots of forecast traffic flows by time periods for the Do Minimum and Do something scenarios.

Forecast traffic flow plots including difference plots are included in Clarification #21 – Forecast Traffic Plots.

Please provide plots of network performance including junction delay plots and V/C plots, by time period for the Do Minimum and Do Something scenarios.

Junction delay plots are provided in Clarification #21 – Junction Delay Plots. The plots show average delay per vehicle in seconds. Only nodes where the junction delay exceeds 10 seconds have been plotted.

Junction V/C plots are provided in Clarification #21 – Junction V/C Plots. Only nodes where the junction V/C exceeds 70% have been plotted.

Please provide journey time route analysis for key corridors affected by the scheme by time period for the Do Minimum and Do Something scenarios.

Journey time data has been extracted for the following journey routes (as per Section 5.7 of the LMVR):

- Route 3 A47 – from Vauxhall roundabout to Beaufort Way; and
- Route 4 Gapton Hall Rd / Pasteur Road - from Mill Lane/Blackbird Close to Temple Road.

Route 3 and 4 highlight the impact that the scheme has on both local and strategic trips, as well as the impact on the river crossings. Journey time savings are shown in all scenarios, especially the PM. Results are included in Clarification #21 – Journey Time Data.

Please provide select link analysis of traffic using the scheme.

Select link analysis of traffic using the scheme has been plotted and is provided in Clarification #21 – Select Link Analysis.

Clarification #22

If the model includes very slow speeds or high junction delays please provide evidence of their plausibility.

Delay plots have been produced in response to Clarification #21. These are included in Clarification #21 – Junction Delay Plots. The highest delays occur on the A47 at Harfreys, Gapton and Vauxhall roundabouts, and on Pasteur Road / Haven Bridge. These delays are in keeping with current (base year) network observations.

Clarification #23

If the model includes any forecasts of flows above capacity, especially for the do-minimum, please provide an explanation of how these are accounted for in the modelling/appraisal.

Link V/C plots are included in Clarification #23 – Link V/C Plots. These show that in Do Minimum scenarios the link that is over capacity is Breydon Bridge. This is because the bridge is single carriageway and under 50mph speed limit. The Scheme does slightly reduce the V/C ratio of Breydon Bridge to at capacity or below capacity, however its impact on link V/C is greater on the rest of the network. The V/Cs reported in the Do Minimum seem plausible, the largest V/C on Breydon Bridge is 105% in 2051 DM.

Clarification #24

Please provide results from the sensitivity tests; high and low growth and OBR forecasts.

The following outputs have been extracted from the high and low growth fixed demand scenarios:

- Network statistics (as per Section 7.6 of the Forecasting Report); and
- Compressed demand matrices (as per Appendix F of the Forecasting Report).

These are included in Clarification #24 – Fixed Demand Model Outputs.

The following outputs have been extracted from the high and low growth variable demand scenarios:

- Flow changes (as per Section 8.2 of the Forecasting Report);
- Matrix changes (as per Section 8.3 and Appendix H of the Forecasting Report); and
- Network statistics (as per Section 8.4 of the Forecasting Report).

These are included in Clarification #24 – Variable Demand Model Outputs.

Clarification #25

Please provide details of the impact of the scheme on the SRN, including flow change and journey time impacts by time period.

Flow difference plots and journey time data have been produced in response to Clarification #21. Broadly speaking the Scheme reduces traffic on Breydon and Haven bridges, on A47 between Harfreys and Gapton roundabouts, on Gapton Hall Road, on Southtown Road and on South Quay. Journey times are reduced both NB and SB on the A47 between Beaufort Way and Vauxhall roundabout.

The Scheme increases traffic on Beccles Road, on South Denes Road and on the A47 southern arm of Harfreys roundabout.

CLARIFICATION #1 – LINKS WITH SPEED FLOW CURVES

CLARIFICATION #2 – CALIBRATION AND VALIDATION SITES

CLARIFICATION #3 – SIGNAL DATA

CLARIFICATION #5 – HGV SLA ON BREYDON BRIDGE

CLARIFICATION #5 – RSI BLENDING FACTORS

CLARIFICATION #6 – PRIOR MATRIX SLA AT RSI SITES

CLARIFICATION #8 – PRIOR MATRIX SCREENLINE VALIDATION

CLARIFICATION #9 – LINK CALIBRATION AND VALIDATION

CLARIFICATION #9 – TURNING COUNT VALIDATION

CLARIFICATION #11 – BASE YEAR FLOW PLOTS

CLARIFICATION #14 – VDM AREA OF INFLUENCE

CLARIFICATION #17 – UNCERTAINTY LOG

CLARIFICATION #20 – MATRIX TOTALS

CLARIFICATION #21 – FORECAST TRAFFIC PLOTS

CLARIFICATION #21 – JUNCTION DELAY PLOTS

CLARIFICATION #21 – JUNCTION V/C PLOTS

CLARIFICATION #21 – JOURNEY TIME DATA

CLARIFICATION #21 – SELECT LINK ANALYSIS

CLARIFICATION #23 – LINK V/C PLOTS

CLARIFICATION #24 – FIXED DEMAND MODEL OUTPUTS

CLARIFICATION #24 – VARIABLE DEMAND MODEL OUTPUTS