

HUTCHISON PORTS (UK) LIMITED
BATHSIDE BAY DEVELOPMENT, HARWICH
TRAFFIC IMPACT ASSESSMENT – SENSITIVITY TESTS
MAY 2004

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Checker (Initials)	SPD
Project Director Approval	
Job Number	HSL00477
Report Status	Final
Revision Date	27.05.04

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1. INTRODUCTION

- 1.1 Hutchison Ports (UK) Limited (HPUK) seek planning permission for the provision of four additional maritime berths and associated handling facilities at Bathside Bay (BSB), Harwich.
- 1.2 A traffic impact assessment (TIA) for the proposed development is presented as a separate document. The "base case" TIA is based on a total throughput of 1.68 million twenty foot equivalent units (TEU) per year, derived from HPUK's capacity figure of 1200 TEU/quay m/year.
- 1.3 The Inspector's report for the Dibden Bay Container Terminal (DBCT) Public Inquiry found that a "figure of 1,400 TEU/quay m/year should be regarded for planning purposes as the upper level of what may be practically achievable".
- 1.4 In view of the Inspector's comments, the Highways Agency (HA) have requested that sensitivity tests be undertaken based on the 1400 TEU/quay m/year figure, which equates to a total development throughput of 1.96 million TEU per year. This report therefore presents assessments of the performance of the links and junctions in the BSB base case TIA study area using development-related traffic generation based on 1400 TEU/quay m/year.

Scope

- 1.5 The scope of this report is as follows:-
 - i) The similarities and differences between this report and the base case TIA are identified.
 - ii) The revised traffic generation used in the sensitivity tests is presented.
 - iii) Highway assessment traffic flows are estimated and the performance of the following junctions assessed in the assessment year with the proposed development in place:-
 - a) A120/Ingestre Street Roundabout, Harwich.
 - b) A120/Proposed Port Access Roundabout.
 - c) A120/Parkeston Bypass "Safeway" Roundabout.
 - d) A120/Parkeston Road/Station Road/Europa Way Roundabout.
 - e) A120/Church Hill/Main Road "Ramsey Bridge" Roundabout.
 - f) A120/Harwich Road Junction, Wix.
 - g) A120/Colchester Road Junction, Wix.

- h) A120/B1035 “Horsley Cross” Roundabout.
- i) A120/Little Bentley/Bentley Road Junction.
- j) A120/Park Road/Harwich Road Junction.
- k) A120/A133 Junction.
- l) A120/A1232/A12 Junction, Colchester.
- iv) A link capacity assessment is undertaken for the length of the A120 contained within the TIA study area and mitigation measures are proposed.
- v) The findings of the highway assessments are summarised.

Conclusions

1.6 This report concludes as follows:-

- i) Junctions at which the impact of the proposed development should be tested have been agreed with the HA and ECC. There are 12 such junctions.
- ii) Sensitivity tests of the performance of the junctions at these locations has been undertaken in the 2022 assessment year with the proposed development in place during the AM and PM highway peak hours.
- iii) At 8 of the study junctions no alteration to the highway will be necessary as a result of the proposed development.
- iv) At 4 of the study junctions means by which the highway impact of the proposed development may be addressed have been identified.
- vi) Sensitivity tests on the link capacity of the A120 contained within the base case TIA study area have been undertaken with the proposed development in place. Mitigation measures are necessary to address link capacity issues between the Ramsey Bridge roundabout and the existing dual carriageway section at Hare Green.

1.7 Subject to the adoption of the measures recommended in the base case TIA, and in this report, the development will have no materially detrimental impact on highway conditions.

2. EVALUATION OF THE SIMILARITIES AND DIFFERENCES BETWEEN THE BASE CASE TIA AND THE SENSITIVITY TESTS

2.1 The majority of inputs to the base case TIA remain unchanged in the sensitivity tests. This chapter summarises the similarities and highlights the changes that are made to the base case TIA inputs to derive the assessment flows used in the sensitivity tests.

Similarities

2.2 The trip distribution, traffic assignment, traffic growth and committed development inputs to the assessment flows will remain the same as those presented in the base case TIA. Relevant references to these inputs are summarised in the table below:-

References for Inputs that Remain Unchanged from the Base Case TIA

Input	Base Case TIA Reference
Trip Distribution	Chapter 3, Appendix G
Traffic Assignment	Chapter 3, Appendix H
Traffic Growth	Chapter 4, Appendix I
Committed Development	Chapter 5, Appendix J

Changes

2.3 The traffic generation associated with the proposed development will have the following components:-

- i) HGV traffic associated with the proposed dock.
- ii) Employee traffic associated with the proposed dock.
- iii) Traffic associated with the proposed logistics facility, the open storage and the proposed leisure facility at Gas House Creek.

2.4 The sensitivity tests presented in this report are based on a figure of 1400 TEU/quay m/year. Only HGV traffic associated with the proposed dock (point i) of the above list) is derived from this figure. The traffic generation associated with points ii) and iii) of the above list remains unchanged and is as presented in chapter 4 and Appendix F of the base case TIA.

2.5 The following chapter of this report presents the revised HGV traffic generation.

3. **HGV TRAFFIC GENERATION**

Container-Related HGV Traffic Associated with the Proposed Dock

- 3.1 Appendix A presents the method by which the container-related HGV traffic associated with the proposed dock is assessed. The method has the following key features:-
- i) HGV traffic will be limited by maximum possible throughput of the dock determined, for planning purposes, as 1400 TEU/quay m/year.
 - ii) The rate at which HGV traffic increases following the opening of the new facility is estimated to be proportional to that presented in the TIA, which was based on demand forecasts in the business model for the new facility developed by HPUK. As a sensitivity test, it is anticipated that the port will handle 1.96 million TEU in the 2022 assessment year based on a throughput of 1400 TEU/quay m/year and a quay length of 1.4km.
 - iii) The transshipment share (i.e. the proportion which transfers from one ship to another without leaving the dock) of containers handled by the dock is expected to be 24%.
 - iv) For robustness, the rail share of containers handled by the dock is expected to remain at the absolute level presented in the base case TIA, which equates to 287,280 TEU/year. This equates to a rail share of approximately 19.3% of the 76% non-transshipment share. The road share is therefore approximately 1.20 million TEU/year. Based on 265 working days per year, this is equivalent to 4537 TEU per day.
 - v) By applying the TEU to HGV ratio determined in the base case TIA of 1.245 TEU per HGV, the daily number of HGVs associated with the port development is 1823 HGVs per day in each direction.
 - vi) For the purposes of the junction assessments, allowance is made for variation in HGV flows throughout the year based on observations at the Port of Felixstowe. Base traffic flows on the A120(T) peak in August. Dock-related HGV flows are estimated to be 1557 HGVs per day in each direction during August. The peak for dock-related flows at the Port of Felixstowe occurs in October. However, the development-related HGVs have been estimated on the basis of the port operating at capacity. As such, there will be no peaks in the development-related HGVs used in this TIA. By factoring these HGVs to August levels, the TIA adopts a robust approach to HGV generation. The approach taken in this TIA with regard to traffic volumes therefore represents the worst case. Therefore, it is anticipated that any capacity issues identified in the subsequent analysis will only occur on limited occasions with typical HGV volumes being lower.

- 3.2 The Inspector's report for DBCT states that "it is not sufficient merely to meet demand by providing quay length capacity equivalent to demand. This is because it is vital to retain competition between ports in order to promote efficiency and keep prices competitive. This has wider benefits throughout the UK economy. In order to maintain competition between ports there must be a possibility of one shipping customer transferring all or some part of its business from one port to another. This in turn requires there to be a degree of available capacity within the system to enable this to happen." The report concludes that "it is generally accepted that if capacity utilisation rates rise above 90%, problems begin to emerge".
- 3.3 In view of the above, the actual throughput of the port is likely to be lower than that predicted by the 1400 TEU/quay m/year figure. The approach taken in these sensitivity tests with regard to HGV volumes represents the absolute worst case.

4. **HIGHWAY ASSESSMENTS**

- 4.1 The following chapters of this report consider the maximum changes in traffic flows likely to arise at the study locations as a result of the proposed development, the implications of those changes for highway users and, where necessary, proposed mitigation measures.
- 4.2 The base case TIA identified that the peak interaction between the port-related traffic and the baseline traffic occurs during the AM and PM highway peak hours. Assessments of the performance of links and junctions are therefore undertaken during these peak hours.

Assessment Flows

- 4.3 Appendix B presents assessments of future traffic flows at each study location in the hour of peak traffic flow.
- 4.4 The following chapters of this report present capacity assessments at each location during the AM and PM highway peak periods.

5. **A120/INGESTRE STREET ROUNDABOUT, HARWICH**

5.1 This junction is shown on Figure 3 of the base case TIA (presented in Appendix C). Appendix C also presents the assessment of the performance of this junction in the year 2022 with the proposed development in place. ARCADY5 software has been used in the assessment. The findings are summarised as follows:-

Highway Assessment Findings: A120/Ingestre Street Roundabout Year 2022 With Development

Approach	Results of Analysis			
	AM Peak		PM Peak	
	Max RFC	Max Queue	Max RFC	Max Queue
A120 (east)	0.125	0.1	0.206	0.3
Ingestre Street	0.040	0.0	0.023	0.0
A120 (west)	0.213	0.3	0.196	0.2
Site Access	0.005	0.0	0.005	0.0

(Note: Max RFC = maximum ratio of flow to capacity; Max Queue = maximum queue length (vehicles))

5.2 Predicted maximum RFC values for both the morning and evening peak periods are well below the 0.85 capacity threshold used to identify a roundabout junction that is operating at its practical capacity. The A120/Ingestre Street roundabout would therefore operate satisfactorily in the assessment year with the proposed development in place. No mitigation is therefore required at this location.

6. **A120/PROPOSED PORT ACCESS ROUNDABOUT**

6.1 This junction is shown on Figure 4 of the base case TIA (presented in Appendix D). Appendix D also presents the assessment of the performance of this junction in the year 2022 with the proposed development in place. ARCADY5 software has been used in the capacity assessment. The findings are summarised as follows:-

**Highway Assessment Findings: A120/Proposed Port Access Roundabout
Year 2022 With Development**

Approach	Results of Analysis			
	AM Peak		PM Peak	
	Max RFC	Max Queue	Max RFC	Max Queue
A120 (east)	0.145	0.2	0.196	0.2
Gated Access	0.004	0.0	0.002	0.0
A120 (west)	0.281	0.4	0.353	0.5
Proposed Access	0.088	0.1	0.113	0.1

6.2 The ARCADY5 results demonstrate that the A120/Port Access roundabout would operate satisfactorily during both peak periods for the assessment year of 2022 with the proposed development in place. It is therefore concluded that no mitigation is necessary at this location.

7. **A120/PARKESTON BYPASS “SAFEWAY” ROUNDABOUT**

7.1 This junction is shown on Figure 5 of the base case TIA (presented in Appendix E). Appendix E also presents the assessment of the performance of this junction in the year 2022 with the proposed development in place. ARCADY5 software has been used in the assessment. The findings are summarised as follows:-

Highway Assessment Findings: A120/Parkeston Bypass “Safeway” Roundabout Year 2022 With Development

Approach	Results of Analysis			
	AM Peak		PM Peak	
	Max RFC	Max Queue	Max RFC	Max Queue
A120 (east)	0.251	0.3	0.402	0.7
Gated Access	0.049	0.1	0.077	0.1
A120 (west)	0.589	1.4	0.735	2.7
Safeway/Bypass	0.242	0.3	0.483	0.9

7.2 The capacity assessment results for both AM and PM peak periods demonstrate that the RFCs of all junction approaches would be within capacity. The A120/Parkeston Bypass “Safeway” roundabout would be expected to operate satisfactorily in the assessment year with the proposed development in place. It is therefore concluded that no mitigation would be required at this location.

8. **A120/PARKESTON ROAD/STATION ROAD/EUROPA WAY ROUNDABOUT**

- 8.1 This junction is shown on Figure 5 of the base case TIA (presented in Appendix F). Appendix F also presents the assessment of the performance of this junction in the year 2022 with the proposed development in place. The A120 (east) approach to the junction is signal controlled and a pelican crossing is present on the A120 (east) exit from the roundabout.
- 8.2 The roundabout has been modelled using the following two methods:-
- i) ARCADY5 software is used to model the conventional roundabout approaches at this junction and LINSIG software is used to model the traffic signal-controlled approach. The signal-controlled arm of the junction is modelled within ARCADY as having sufficient capacity so as to not delay traffic entering the junction. The model therefore replicates conditions on the other 4 arms of the junction as if the signal-controlled arm is working within capacity. The circulatory stop line is modelled in LINSIG as two links and two lanes, with the traffic flows assigned to each link according to their origin/destination. In this way the uneven queuing that is likely to occur at this stop line is modelled. The A120 (east) approach is modelled as one link and two lanes, with the offside lane being modelled as a 1 pcu long flare. Although the flare on this lane could accommodate up to 4 pcu, the flare is modelled as accommodating 1 pcu to represent the actual demand on this lane.
 - ii) TRANSYT software is used to model the signalised node and Parkeston Road arm of the roundabout, in accordance with advice from TRL (copy of relevant TRL advice is presented in Appendix O). This is because the signalisation of the A120 East arm will have an effect on the capacity of the Parkeston Road arm of the roundabout. However, the A120(T), Station Road and Europa Way arms of the roundabout will be unaffected by the partial signalisation and hence the outputs from the ARCADY5 model used in section 8.2 i) above are applicable to these arms of the roundabout. The signalised node is modelled using the same method as used in the LINSIG model.

2022 With Development Case

- 8.3 The findings of the ARCADY analysis in the AM and PM peak periods are summarised as follows:-

**Highway Assessment Findings: A120/Parkeston Road Roundabout Year 2022
With Development: Assessment of Priority-Controlled Entries to the Junction**

Results of Analysis

Approach	AM Peak		PM Peak	
	Max RFC	Max Queue	Max RFC	Max Queue
A120 (east)	Signal Controlled			
Parkeston Road	0.640	1.8	0.480	0.9
A120 (west)	0.678	2.1	0.609	1.5
Station Road	0.213	0.3	0.350	0.5
Europa Way	0.028	0.0	0.057	0.1

8.4 The ARCADY5 assessment results for both AM and PM peak periods demonstrate that the RFCs of the non-signalised junction approaches would operate within capacity.

Signalised Node

8.5 The LINSIG assessment of the performance of the A120 (east) signal controlled entry to the roundabout finds as follows:-

**A120/Parkeston Road Junction: Signal Controlled A120 (East) Entry: 2022
With Development**

Approach	AM Peak (34s Cycle Time)		PM Peak (90s Cycle Time)	
	Degree of Saturation (%)	Max Queue (pcu)	Degree of Saturation (%)	Max Queue (pcu)
Roundabout Circulatory Offside Lane	17.2	1	27.6	2
Roundabout Circulatory Nearside Lane	53.6	2	100.7	19
A120 (East) Ahead/Left	89.4	8	104.1	34

- 8.6 The degree of saturation on the A120 (east) approach to the junction would exceed the 90% threshold, used to determine whether traffic signal controlled junctions are operating within capacity, for the assessment year of 2022 with the proposed development in place during the PM peak hour.
- 8.7 The TRANSYT assessment of the A120 east signalised node and the Parkeston Road arm finds as follows:-

A120/Parkeston Roundabout: TRANSYT Model of Signal Controlled A120 (East) Entry: 2022 With Development

Approach	AM Peak (38s Cycle Time)		PM Peak (90s Cycle Time)	
	Degree of Saturation (%)	Max Queue (pcu)	Degree of Saturation (%)	Max Queue (pcu)
Roundabout Circulatory Offside Lane	15	1	28	3
Roundabout Circulatory Nearside Lane	48	3	101	21
A120 East	90	12	104	69
Parkeston Road	76	7	57	1

- 8.8 The above table confirms that the both the A120 east approach and the roundabout circulatory would be operating above the 90% degree of saturation threshold during the PM peak hour with the proposed development in place.
- 8.9 Both the LINSIG and TRANSYT-based models confirm that the existing junction will operate overcapacity during the PM peak hour. Mitigation measures are therefore required. Since this junction is the first point of contact of development traffic with the trunk road network, the HA require that the junction should operate within capacity in the 2022 assessment year.

Proposed Improvement

- 8.10 The following improvements are therefore proposed at the Parkeston roundabout and are shown on Figure 6 of the base case TIA (presented in Appendix F):-

- i) Widening of the A120 between and Parkeston and “Safeway” roundabouts to accommodate a full 2-lane approach to the Parkeston Roundabout.
- ii) Changes to the lane markings on the A120 (East) approach to the Parkeston roundabout.
- iii) Widening of the A120 (west) exit to accommodate a two-lane exit.
- iv) Relocation of the stop line on the circulatory carriageway to increase the available stacking space.
- v) Relocation of the pelican crossing on the A120 (east) exit to increase the available stacking space for vehicles. This also increases the stagger distance between the pedestrian crossings on the A120 (east) eastbound exit and westbound approach from and to the junction and therefore increases the storage space for pedestrians on the splitter island.

8.11 Appendix F presents an assessment of the performance of the modified signalised node in the 2022 assessment year with the proposed development in place. The findings from the LINSIG assessment are as follows:-

A120/Parkeston Road Junction: Signal Controlled A120 (East) Entry: 2022 With Development: Proposed Improvement

Approach	AM Peak (27s Cycle Time)		PM Peak (31s Cycle Time)	
	Degree of Saturation (%)	Max Queue (pcu)	Degree of Saturation (%)	Max Queue (pcu)
Roundabout Circulatory Offside Lane	13.7	0	21.4	1
Roundabout Circulatory Nearside Lane	42.5	1	78.1	4
A120 (East)	71.1	5 (2 to 3 per lane)	88.3	10 (5 per lane)

8.12 The above table confirms that the signalised node of the Parkeston roundabout will operate satisfactorily with the proposed improvements in place with queues well within the available storage space on both the circulatory and the A120 (east) approaches.

8.13 The findings from the TRANSYT assessment are as follows:-

A120/Parkeston Roundabout: TRANSYT Model of Signal Controlled A120 (East) Entry: 2022 With Development

Approach	AM Peak (30s Cycle Time)		PM Peak (33s Cycle Time)	
	Degree of Saturation (%)	Max Queue (pcu)	Degree of Saturation (%)	Max Queue (pcu)
Roundabout Circulatory Offside Lane	12	1	18	1
Roundabout Circulatory Nearside Lane	38	2	66	4
A120 East	68	7 (3-4 per lane)	87	14 (7 per lane)
Parkeston Road	71	5	57	3

- 8.14 The above table confirms that the signalised node of the Parkeston roundabout will operate satisfactorily with the proposed improvements in place.
- 8.15 Both the LINSIG and TRANSYT-based analyses confirm that the Parkeston roundabout will operate satisfactorily with the proposed improvements in place, with all approaches operating within capacity and no queues exceeding the available storage lengths.

Pelican Crossing

- 8.16 Appendix F also presents a LINSIG assessment of the performance of the pelican crossing on the A120 (east) exit from the roundabout. The LINSIG assessment demonstrates that, so long as cycle times are above 62 seconds and 61 seconds in the AM and PM peaks, respectively, the queues at the pelican will, on average, not exceed 5pcu and will not therefore block back over Europa Way. Such cycle times can be ensured by setting the minimum green times for the traffic phase to 45 seconds and 44 seconds, respectively.
- 8.17 The equivalent cycle times in the no development case during the AM and PM peak hours are 37 seconds and 30 seconds, respectively. The maximum increase in delay for pedestrians will therefore be 31 seconds in the PM peak hour. The increase in delay in the AM peak hour will be 25 seconds. Such increases in delay only involve those pedestrians who arrive at the crossing at the end of the green man aspect. On most occasions, pedestrian delays will be shorter. The cycle times associated with the pelican crossing are greater than those associated with the signalised node, which could result in a build-up of pedestrians on the splitter island. However, the proposed improvements increase the stagger distance between the pedestrian crossings on the

A120 (east) eastbound and westbound arms of the junction and therefore increase the storage space for pedestrians on the splitter island.

Summary

- 8.17 In general the A120/Parkeston Road junction would operate satisfactorily during the morning and evening peak periods for the assessment year of 2022 in the with development case with the proposed improvements in place.

9. **A120/CHURCH HILL/MAIN ROAD “RAMSEY BRIDGE” ROUNDABOUT**

9.1 This junction is shown on Figure 7 of the base case TIA (presented in Appendix G of this report). Appendix G also presents the assessment of the performance of this junction in the year 2022 with the proposed development in place. ARCADY5 software has been used in the capacity assessment. The findings for the most demanding cases in the AM and PM peak periods are summarised as follows:-

Highway Assessment Findings: A120 Ramsey Bridge Roundabout Year 2022 With Development

Approach	Results of Analysis			
	AM Peak		PM Peak	
	Max RFC	Max Queue	Max RFC	Max Queue
A120 (east)	0.649	1.8	0.901	7.6
Church Hill	0.534	1.1	0.338	0.5
A120 (west)	0.725	2.6	1.104	73.8
Main Road	0.263	0.4	0.717	2.3

9.2 The junction demonstrates RFC values in excess of 0.85 in the assessment year on the A120 approaches in the PM peak. Modification of the junction is therefore proposed, as shown on Figure 8 in the base case TIA (presented in Appendix G of this report). An assessment of the performance of the modified roundabout in the 2022 assessment year with the proposed improvements in place is presented in Appendix G. The findings are as follows:-

Highway Assessment Findings: Modified A120 Ramsey Bridge Roundabout Year 2022 With Development

Approach	Results of Analysis			
	AM Peak		PM Peak	
	Max RFC	Max Queue	Max RFC	Max Queue
A120 (east)	0.438	0.8	0.598	1.5
Church Hill	0.660	1.9	0.419	0.7
A120 (west)	0.532	1.1	0.813	4.2
Main Road	0.222	0.3	0.677	2.0

9.3 The modified junction would operate satisfactorily in the assessment year with the proposed improvements in place.

10. A120/HARWICH ROAD JUNCTION, WIX

- 10.1 This junction is shown on Figure 9 of the base case TIA (presented in Appendix H of this report). Appendix H presents the assessment of the performance of this junction in the year 2022 with the proposed development in place. PICADY4 software has been used for this capacity assessment. The findings for the most demanding cases in the AM and PM peak periods are summarised as follows:-

Highway Assessment Findings: A120/Harwich Road, Wix Ghost Island Junction: Year 2022 With Development

Location	Results of Analysis			
	AM Peak		PM Peak	
	Max RFC	Max Queue	Max RFC	Max Queue
Left Turn onto A120	0.269	0.3	1.820	2.7
Right Turn onto A120	0.730	1.8	1.780	9.7
Right Turn into Harwich Road	0.077	0.1	0.071	0.1

- 10.2 RFC values of 1.820 and 1.780 are predicted for the Harwich Road approach to the junction during the evening peak period for the 2022 assessment including development traffic. This RFC exceeds the practical capacity threshold of 0.85 and therefore mitigation is required to improve capacity at this junction
- 10.3 Improvements are necessary at this junction as shown on Figure 10 of the base case TIA (presented in Appendix H of this report) and involve upgrading the junction from a ‘ghost-island’ priority junction to a junction incorporating single lane dualling. Single lane dualling enables vehicles turning right out of Harwich Road to safely wait for gaps in eastbound traffic in the central reserve rather than seek simultaneous gaps in both the westbound and eastbound traffic streams as is required for the ‘ghost-island’ layout.
- 10.4 Appendix H presents an assessment of the performance of the modified junction in the 2022 assessment year with the proposed development in place. The findings from the PICADY4 assessment are as follows:-

Highway Assessment Findings: A120/Harwich Road, Wix Junction with Single Lane Dualling: Year 2022 With Development

Approach	Results of Analysis			
	AM Peak		PM Peak	
	Max RFC	Max Queue	Max RFC	Max Queue
Left Turn into A120	0.154	0.2	0.055	0.1
Right Turn into A120	0.241	0.3	0.309	0.4
Right Turn into Harwich Road	0.070	0.1	0.670	0.1

- 10.5 The PICADY4 results demonstrate that the modified junction would operate satisfactorily in the assessment year with the proposed development in place.
- 10.6 Chapter 17 of this report identifies that link capacity improvements are required along this stretch of the A120. This junction will therefore be improved as part of the link capacity mitigation scheme.

11. **A120/COLCHESTER ROAD JUNCTION, WIX**

11.1 This junction is shown on Figure 11 of the base case TIA (presented in Appendix I of this report). Appendix I also presents the assessment of the performance of this junction in the year 2022 with the proposed development in place. PICADY4 software has been used in the assessment. The findings for the most demanding cases in the AM and PM peak periods are summarised as follows:-

Highway Assessment Findings: A120/Colchester Road, Wix Ghost Island Junction: Year 2022 With Development

Location	Results of Analysis			
	AM Peak		PM Peak	
	Max RFC	Max Queue	Max RFC	Max Queue
Left Turn from Colchester Road	0.267	0.4	0.133	0.1
Right Turn from Colchester Road	0.000	0.0	0.000	0.0
Right Turn into Colchester Road	0.141	0.1	0.248	0.3

11.2 With RFCs significantly lower than 0.85 for both the morning and evening peak periods the A120/Colchester Road junction is expected to operate within capacity for the 2022 with development scenario. No mitigation is therefore required in this location.

11.3 Chapter 17 of this report identifies that link capacity improvements are required along this stretch of the A120. This junction will therefore be modified a part of the link capacity mitigation scheme.

11.4 Appendix I therefore presents a PICADY4 assessment using typical geometric parameters for the junction with link capacity mitigation scheme in place. The results are summarised as follows:-

Highway Assessment Findings: A120/Colchester Road, Wix Ghost Island Junction: Typical Geometry with the Link Capacity Mitigation Measures in Place, Year 2022 With Development

Location	Results of Analysis			
	AM Peak		PM Peak	
	Max RFC	Max Queue	Max RFC	Max Queue
Left Turn from Colchester Road	0.269	0.4	0.133	0.1
Right Turn from Colchester Road	0.000	0.0	0.000	0.0
Right Turn into Colchester Road	0.132	0.2	0.232	0.3

- 11.5 The PICADY4 results demonstrate that the modified junction would operate satisfactorily in the assessment year with the proposed development in place and that a junction of this form would be appropriate, in capacity terms, with the proposed link capacity mitigation measures in place.

12. A120/B1035 “HORSLEY CROSS” ROUNDABOUT

- 12.1 This junction is shown on Figure 12 of the base case TIA (presented in Appendix J of this report). Appendix J also presents the assessment of the performance of this junction in the year 2022 with the proposed development in place. The standard ARCADY5 software is used in the assessment. The findings for the most demanding cases in the AM and PM peak periods are summarised as follows:-

Highway Assessment Findings: A120/B1035 “Horsley Cross ” Roundabout Year 2022 With Development

Approach	Results of Analysis			
	AM Peak Max RFC	Max Queue	PM Peak Max RFC	Max Queue
A120 (east)	0.732	2.7	0.574	1.3
B1035	0.551	1.2	0.383	9.2
A120 (west)	0.475	0.9	0.792	3.7
Clacton Road	0.395	0.6	0.842	4.6

- 12.2 The ARCADY5 results demonstrate that the A120/B1035 “Horsley Cross” roundabout would operate within capacity at the assessment year of 2022 with development traffic included. No mitigation is therefore required at this location.

13. **A120/LITTLE BENTLEY/BENTLEY ROAD JUNCTION**

13.1 This junction is shown on Figure 13 of the base case TIA (presented in Appendix K of this report). Appendix K also presents an assessment of the performance of this right-to-left staggered junction in the 2022 assessment year with the proposed development in place. PICADY4 software has been used in the capacity assessment for this junction. The findings are as follows:-

Highway Assessment Findings: A120/Little Bentley/Bentley Road Junction: Year 2022 With Development

Location	Results of Analysis			
	AM Peak		PM Peak	
	Max RFC	Max Queue	Max RFC	Max Queue
Right Turn from Little Bentley	0.210	0.3	0.183	0.2
Right Turn into Little Bentley	0.002	0.0	0.018	0.0
Left Turn from Little Bentley	0.029	0.0	0.020	0.0
Right Turn from Bentley Road	0.162	0.2	0.322	0.5
Right Turn into Bentley Road	0.027	0.0	0.032	0.0
Left Turn from Bentley Road	0.015	0.0	0.026	0.0

13.2 With RFCs well below 0.85 for both the morning and evening peak periods the A120/Little Bentley/Bentley Road junction is expected to operate within capacity for the 2022 with development scenario. No mitigation is therefore required in this location.

14. **A120/PARK ROAD/HARWICH ROAD JUNCTION**

14.1 This junction is shown on Figure 14 of the base case TIA (presented in Appendix L of this report). Appendix L also presents an assessment of the performance of this right-to-left staggered junction in the 2022 assessment year with the proposed development in place. PICADY4 software has been used in the assessment. The findings are as follows:-

Highway Assessment Findings: A120/Park Road/Harwich Road Junction: Year 2022 With Development

Location	Results of Analysis			
	AM Peak		PM Peak	
	Max RFC	Max Queue	Max RFC	Max Queue
Right-turn from Harwich Road	0.656	0.9	0.466	0.5
Left-turn from Harwich Road	0.446	0.0	0.143	0.2
Right Turn into Harwich Road	0.027	0.4	0.097	0.0
Right-turn from Park Road	0.009	0.0	0.017	0.0
Left-turn from Park Road	0.002	0.0	0.000	0.0
Right Turn into Park Road	0.005	0.0	0.003	0.0

14.2 With RFCs well below 0.85 for both the morning and evening peak periods the A120/Park Road/Harwich Road junction is expected to operate within capacity for the 2022 with development scenario. No mitigation is therefore required in this location.

15. **A120/A133 JUNCTION**

15.1 The grade separated limited move A120/A133 junction is shown on Figure 15 of the base case TIA (presented in Appendix M) of this report.

15.2 Appendix M also presents an assessment of the A120/A133 merge and diverge facilities at the junction using the method set out in National Design Standard TD 22/92 “Layout of Grade Separated Junctions”. The cases tested are the AM and PM with and without development cases for the assessment year of 2022. The findings are summarised as follows:-

A120/A133 Merge and Diverge Facilities, Year 2022

Facility	Period	Form of Facility (TD 22/92 merge/diverge type)		
		Without Development	With Development	Currently Available
Diverge	AM	Type A	Type A	Type A
	PM	Type B	Type B	Type A
Merge	AM	Type B/E	Type B/E	Type A
	PM	Type B	Type B	Type A

15.3 The traffic associated with the proposed development does not require any changes to be made to the merge and diverge facilities at the A120/A133 junction.

16. A120/A1232/A12 CROWN JUNCTION, COLCHESTER

16.1 This junction consists of:-

- i) A grade-separated roundabout (A120/A1232) beneath which the A120 mainline passes, and associated slip roads to and from the A120 mainline east and west of the roundabout (Figure 16 of the base case TIA and presented in Appendix N of this report). The HA have signalised the A120(E) approach to this junction. Scheme drawings for this improvement are presented in Appendix N.
- ii) A merge and a diverge at the junction of the A120 and the A12 to the west of the grade-separated roundabout (Figure 17 of the base case TIA and presented in Appendix N of this report).
- iii) A merge and a diverge at the junction of the A1232 and the A12 to the north of the grade-separated roundabout (Figure 18 of the base case TIA and presented in Appendix N of this report).

Modelling Methodology

16.2 Only one node on the roundabout is signal controlled. The following methods of capacity assessment are therefore adopted:-

- i) LINSIG software is used to model the signalised node. This approach is in accordance with the approach taken by Atkins on behalf of the HA who have reviewed the signalisation options for this roundabout. The priority controlled approaches to the roundabout have been modelled using ARCADY5. However, the signalisation results in an increase in capacity of the A120 east arm of the junction for given geometric parameters. This in turn releases more vehicles onto the circulatory carriageway and increases the circulatory flow past the other three arms. In order to represent this in the ARCADY5 model of the junction, the geometric parameters of the A120 east arm are adjusted so that this approach will have the same average capacity over the peak hour as that for the A120 east arm as determined by the LINSIG assessment. In this way, the effect of the signalisation of the A120 east arm on the rest of the junction can be modelled.
- ii) TRANSYT software is used to model the signalised node and the A1232 Ipswich Road and A120 (west) arms of the roundabout, in accordance with advice from TRL (copy of the relevant TRL advice is presented in Appendix F). This is because the partial signalisation of the A120 East arm will have an effect on the capacity of the A1232 arm of the roundabout. A significant proportion of traffic from the signalised A120 (east) arm is destined for the A12 (north) arm. The partial signalisation of the roundabout will therefore also have an effect on the capacity of the A120 (west). However, the A12 (north) arm of the roundabout will be unaffected by the partial signalisation and hence the output from the ARCADY5 model referred to in section 16.2 i) above is applicable to this arm of the roundabout.

2022 No Development Case

16.3 The results of the LINSIG assessment are presented below:-

LINSIG Results for the HA Signalisation of the A120 East Exit Slip Road – 2022 No Development Case

Link	Degree of Saturation (%)	Queue (pcu)
------	--------------------------	-------------

AM Peak – 120s Cycle Time

A120 East Exit Slip Road Nearside Lane	113.4	45
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A120 East Exit Slip Road Offside Lane	44.9	6
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Circulatory Nearside Lane	112.8	62
---------------------------	-------	----

Circulatory Offside Lane	96.2	24
--------------------------	------	----

PM Peak – 120s Cycle Time

A120 East Exit Slip Road Nearside Lane	58.8	7
--	------	---

A120 East Exit Slip Road Offside Lane	85.0	12
---------------------------------------	------	----

Circulatory Nearside Lane	85.6	15
---------------------------	------	----

Circulatory Offside Lane	35.6	6
--------------------------	------	---

16.4 The above table demonstrates that the degree of saturation values for three of the approach lanes to the signalised node exceed the normal threshold value of 90% during the AM peak hour. Furthermore, the queue on the nearside lane of the circulatory will exceed the queue stacking area and block back over the A120 east exit slip road. The signalised node would operate satisfactorily during the PM peak hour.

16.5 The results of the ARCADY5 assessment for the Crown junction in the 2022 no development case are as follows:-

**ARCADY Results for the Crown Junction – 2022 No Development Case
Results of ARCADY Analysis**

Arm	AM Peak		PM Peak	
	Max RFC	Max Queue	Max RFC	Max Queue
A120 East	N/A	N/A	N/A	N/A
A1232 Ipswich Road	1.944	489.0	1.098	105.2
A120 West	0.441	0.8	0.943	10.5
A12	0.898	8.0	1.188	111.4

16.6 The above table demonstrates that the maximum RFC values for all movements except from the A120 west arm during the AM peak exceed the normal threshold value of 0.85.

16.7 The results from the TRANSYT assessment are summarised as follows:-

TRANSYT Results for the HA Signalisation of the A120 East Exit Slip Road – 2022 No Development Case

Link	Degree of Saturation (%)	Queue (pcu)
-------------	---------------------------------	--------------------

AM Peak – 120s Cycle Time

A120 East Exit Slip Road Nearside Lane	158	172
A120 East Exit Slip Road Offside Lane	63	10
Circulatory Nearside Lane	93	40
Circulatory Offside Lane	80	26
B1232 Ipswich Road	113	167
A120 West	50	1

PM Peak – 79s Cycle Time

A120 East Exit Slip Road Nearside Lane	66	7
A120 East Exit Slip Road Offside Lane	88	12
Circulatory Nearside Lane	90	24
Circulatory Offside Lane	37	5
B1232 Ipswich Road	97	52
A120 West	86	7

- 16.8 The above table demonstrates that the degree of saturation values for two of the approach lanes to the signalised node exceed the normal threshold value of 90% during the AM peak hour. The signalised node would operate satisfactorily during the PM peak hour. The B1232 approach has a degree of saturation in excess of its practical capacity during the both peak hours.

- 16.9 Both the LINSIG and TRANSYT-based analyses confirm that the Crown junction will operate overcapacity during both the AM and PM peak hours without the proposed development in place.

2022 With Development Case

- 16.10 The findings of the LINSIG analysis for the HA signalisation in the 2022 with development case are as follows:-

LINSIG Results for the HA Signalisation of the A120 East Exit Slip Road – 2022 With Development Case

Link	Degree of Saturation (%)	Queue (pcu)
-------------	---------------------------------	--------------------

AM Local Peak – 120s Cycle Time

A120 East Exit Slip Road Nearside Lane	114.3	47
A120 East Exit Slip Road Offside Lane	45.3	6
Circulatory Nearside Lane	112.8	62
Circulatory Offside Lane	96.2	24

PM Local Peak – 120s Cycle Time

A120 East Exit Slip Road Nearside Lane	56.3	7
A120 East Exit Slip Road Offside Lane	91.0	15
Circulatory Nearside Lane	90.4	18
Circulatory Offside Lane	37.4	6

- 16.11 The above table demonstrates that the degree of saturation values for three of the approach lanes to the signalised node exceed the normal 90% threshold value during the AM peak hour. The degrees of saturation for the nearside lane of the circulatory carriageway and the offside lane of the A120 east exit slip also exceed this threshold value during the PM peak hour.

16.12 The results of the ARCADY5 assessment for the Crown junction in the 2022 with development case are as follows:-

ARCADY Results for the Crown Junction – 2022 With Development Case

Arm	Results of ARCADY Analysis			
	AM Peak		PM Peak	
	Max RFC	Max Queue	Max RFC	Max Queue
A120 East	N/A	N/A	N/A	N/A
A1232 Ipswich Road	2.069	515.0	1.162	157.4
A120 West	0.440	0.8	0.963	12.9
A12	0.915	9.8	1.221	134.1

16.13 The above table demonstrates that the maximum RFC values for all movements exceed the normal threshold value of 0.85 and that predicted queue lengths are significantly longer as a result of the proposed development.

16.14 The TRANSYT analysis is summarised as follows:-

**TRANSYT Results for the HA Signalisation of the A120 East Exit Slip
Road – 2022 With Development Case**

Link	Degree of Saturation (%)	Queue (pcu)
-------------	-------------------------------------	--------------------

AM Peak – 120s Cycle Time

A120 East Exit Slip Road Nearside Lane	158	170
A120 East Exit Slip Road Offside Lane	68	11
Circulatory Nearside Lane	93	40
Circulatory Offside Lane	80	26
B1232 Ipswich Road	115	192
A120 West	51	1

PM Peak – 120s Cycle Time

A120 East Exit Slip Road Nearside Lane	55	9
A120 East Exit Slip Road Offside Lane	89	19
Circulatory Nearside Lane	92	36
Circulatory Offside Lane	38	8
B1232 Ipswich Road	103	118
A120 West	92	16

- 16.15 The above table demonstrates that the degree of saturation values for two of the approach lanes to the signalised node exceeded the normal 90% threshold value during the AM peak hour. The signalised node operates satisfactorily during the PM peak hour. Capacity is also exceeded on the B1232 and A120 (west) arms of the roundabout and queues are significantly longer as a result of the proposed development.

16.16 Both the LINSIG and TRANSYT-based assessments confirm that the Crown junction will operate overcapacity in the 2022 assessment year with the proposed development in place. The proposed development will also give rise to significant increases in queue lengths when compared to the “no development” case.

Possible Improvements

16.17 An improvement has been sought that seeks to achieve at least nil-detriment in accordance with DTLR Circular 4/2001. Figure 19 of the base case TIA (presented in Appendix N of this report) identifies an improvement that comprises lane widening and road marking improvements, as follows:-

- i) A120 east - widening to 3 lanes;
- ii) Minor geometric changes to the A120 west approach;
- ii) A1232 south - widening to 3 lanes plus exit widening;
- iii) A1232 north - widening to 3 lanes.

16.18 The findings of the LINSIG analysis for the possible improvements shown on Figure 19 in the 2022 with development case are presented in the table below:-

**LINSIG Results for the Possible Improvements – 2022 With
Development Case**

Link	Degree of Saturation (%)	Queue (pcu)
-------------	---------------------------------	--------------------

AM Peak – 120s Cycle Time

A120 East Exit Slip Road Nearside Lane	37.3	4
A120 East Exit Slip Road Centre Lane	97.7	22
A120 East Exit Slip Road Offside Lane	54.1	7
Circulatory Nearside Lane	96.6	25
Circulatory Offside Lane	77.0	13

PM Peak – 120s Cycle Time

A120 East Exit Slip Road Nearside Lane	37.1	4
A120 East Exit Slip Road Centre Lane	18.8	3
A120 East Exit Slip Road Offside Lane	87.4	14
Circulatory Nearside Lane	88.7	17
Circulatory Offside Lane	34.5	6

- 16.19 By comparing the above table with that in paragraph 16.3, it can be seen that the proposed improvements will give rise to a significant betterment over the existing signalised node during the AM peak, operating with significantly shorter queues than in the no development case. During the PM peak hour, the proposed improvements will allow the junction to operate within capacity. The possible improvements also represent an improvement in performance of the signalised node when compared to the HA signalisation scheme and will therefore provide a net benefit.
- 16.20 The results of the ARCADY assessment for the possible improvements to the Crown junction shown on Figure 19 in the in the 2022 with development case are as follows:-

ARCADY Results for the Crown Junction – 2022 With Development Case

Arm	Results of ARCADY Analysis			
	AM Peak		PM Peak	
	Max RFC	Max Queue	Max RFC	Max Queue
A120 East	N/A	N/A	N/A	N/A
A1232 Ipswich Road	1.665	335.9	1.013	39.7
A120 West	0.392	0.6	0.863	5.5
A12	0.744	2.9	1.052	44.1

- 16.21 The above table demonstrates, overall, a significant betterment over the existing junction with approaches operating below the normal RFC threshold of 0.85 or with significantly shorter queues than in the no development case.
- 16.22 The findings of the TRANSYT assessment are as follows:-

TRANSYT Results for the Possible Improvements – 2022 With Development Case

Link	Degree of Saturation (%)	Queue (pcu)
AM Peak – 120s Cycle Time		
A120 East Exit Slip Road Nearside Lane	36	5
A120 East Exit Slip Centre Lane	94	24
A120 East Exit Slip Road Offside Lane	57	10
Circulatory	91	68 (34 per lane)
B1232 Ipswich Road	107	117
A120 West	43	0
PM Peak – 43s Cycle Time		
A120 East Exit Slip Road Nearside Lane	37	2
A120 East Exit Slip Centre Lane	19	1
A120 East Exit Slip Road Offside Lane	87	9
Circulatory	90	21 (10 to 11 per lane)
B1232 Ipswich Road	87	17
A120 West	73	5

16.23 By comparing the above table with that in section 16.7, it can be seen that the proposed improvements will give rise to a significant betterment over the existing signalised node and the B1232 Ipswich Road and A120 West arms, operating with significantly shorter queues than in the no development case. The possible improvements also represent an improvement in performance of the signalised node when compared to the HA signalisation scheme and will therefore provide a net benefit.

16.24 Both the LINSIG and TRANSYT-based analyses of the possible improvements to the Crown junction confirm that the possible improvements will give rise to a significant betterment over the “no development” case.

Merges and Diverges

16.25 Appendix N presents assessments of the following merges and diverges at the junction using the method set out in National Design Standard TD22/92. The cases tested are the worst hour 2022 assessment year flows with and without the proposed development. The merges and diverges tested are as follows:-

- i) A120 on- and off-slips east of the A120/A1232 rotary.
- ii) A120 on- and off-slips west of the A120/A1232 rotary.
- iii) A120 on- and off-slips at the A12 east of the rotary.
- iv) A1232 on- and off-slips at the A12 north of the rotary.

16.26 The finding is that no change to the merge and diverge facilities will be necessary as a result of the proposed development.

17 LINK CAPACITY

Theory

17.1 Departmental Advice Note TA 46/97 defines the congestion reference flow (CRF) of a link as an estimate of the annual average daily traffic (AADT) flow at which the carriageway is likely to be congested.

17.2 The CRF of a link is given by the following formula (TA 46/97):-

$$\text{CRF} = \text{CAP} \times N_L \times W_f \times (100/\text{PkF}) \times (100/\text{PkD}) \times (\text{AADT}/\text{AAWT})$$

where, CAP is the maximum hourly lane throughput, as defined in TA 46/97;

N_L is the number of lanes per direction;

W_f is a width factor;

PkF is the proportion of the total daily flow (2-way) that occurs in the peak hour;

PkD is the directional split (percentage) of the peak hour flow;

AADT is the annual average daily traffic flow on the link;

AAWT is the annual average weekday traffic flow on the link.

17.3 The ratio of AADT flow to CRF (RFC_{crf}) for a link can therefore be estimated if the AADT flow on that link is known. However, base AADT data is only available for the link between the Ramsey Bridge roundabout and Harwich Road junction at Wix. In order to eliminate errors caused by factoring peak hour counts to AADT flows, HSL derived the following relationship to estimate the RFC_{crf} for a link from flows during the busiest peak hour period:-

$$\text{RFC}_{\text{crf}} = F_1 / (\text{CAP} \times N_L \times W_f)$$

where F_1 is the peak hour flow in the busiest direction.

17.4 A technical note, “Derivation of Ratio of Flow to Congestion Reference Flow (CRF)”, which details the derivation of the above formula, is presented in Appendix X of the TIA.

Link Capacity Assessment

17.5 A spreadsheet was produced to estimate the RFC_{crf} for each link on the A120 between the proposed site access roundabout and the Crown junction in each year from 2003 to the 2031. Appendix X of the TIA presents printouts of the spreadsheet and a note titled “Link Capacity Spreadsheet Explanatory Note”, which explains the methodology and function of each page in the spreadsheet.

- 17.6 The detailed results of the link capacity assessment, with the sensitivity tests, are presented in Appendix O of this report. In the “no development” case, the AADT is not predicted to exceed CRF on any of the links considered.
- 17.7 The key results for the “with development” case are summarised as follows:-

RFC_{crf} for the A120 Between the Harwich Road Junction, Wix and the Crown Junction in the 2022 Assessment Year

Link	Standard	RFC_{crf} in 2022	Year in which AADT exceeds CRF
Crown junction to Hare Green junction	Dual carriageway	68.4%	Beyond 2022
Hare Green junction to Park Road junction	Dual carriageway	34.0%	Beyond 2022
Park Road junction to Little Bentley junction	Dual carriageway	35.8%	Beyond 2022
Park Road junction to Little Bentley junction	7.1m single carriageway	117.4%	2011
Little Bentley junction to Horsley Cross roundabout	Dual carriageway	34.6%	Beyond 2022
Little Bentley junction to Horsley Cross roundabout	7.6m single carriageway	104.1%	2017
Horsley Cross roundabout to Colchester Road junction, Wix	Dual carriageway	35.6%	Beyond 2022
Horsley Cross roundabout to Colchester Road junction, Wix	6.8m single carriageway	122.3%	2010
Colchester Road junction, Wix to Harwich Road junction, Wix	6.7m single carriageway	117.7%	2011
Harwich Road junction, Wix to Ramsey Bridge roundabout	Dual carriageway	35.8%	Beyond 2022
Harwich Road junction, Wix to Ramsey Bridge roundabout	6.9m single carriageway	122.7%	2010
Ramsey Bridge roundabout to Parkeston roundabout	Dual carriageway	25.5%	Beyond 2022
Ramsey Bridge roundabout to Parkeston roundabout	7.6m single carriageway	79.3%	Beyond 2022
Parkeston roundabout to Safeway roundabout	7.3m single carriageway	99.0%	Beyond 2022
Safeway roundabout to Port Access roundabout	7.3m single carriageway	56.0%	Beyond 2022

- 17.8 The above table confirms that the AADT will exceed CRF on a number of links to the west of the Ramsey Bridge roundabout in the 2022 assessment year. AADT will not exceed CRF to the east of the Ramsey Bridge roundabout in the 2022 assessment year.

Proposed Improvements

- 17.9 In order to mitigate the effect of the proposed development on link capacity on the A120, it is proposed to upgrade the above sections of the A120 as follows:-
- i) Park Road junction to Little Bentley junction – upgrade the existing substandard 7.1m wide single carriageway section to dual 2-lane carriageway (D2) standard, in order to maintain route continuity. However, a 10m wide single carriageway (WS2) would address the capacity issue on this link.
 - ii) In order to maintain route continuity on the section of the A120 between the Hare Green junction and the Horsley Cross roundabout, it is proposed to upgrade the existing single carriageway section between the Little Bentley junction and the Horsley Cross roundabout to 2-lane dual carriageway (D2) standard, even though the AADT will not exceed CRF on this link until after the 2022 assessment year.
 - iii) Horsley Cross roundabout to Colchester Road junction, Wix - upgrade the existing single carriageway to at least 10m wide single carriageway (WS2) standard.
 - iv) Colchester Road junction, Wix to Harwich Road junction, Wix - upgrade the existing single carriageway to at least WS2 standard.
 - v) Harwich Road junction, Wix to Ramsey Bridge Roundabout - upgrade the existing single carriageway to at least WS2 standard.
- 17.10 With the proposed improvements, the RFC_{crf} values on the over-capacity links upon which improvements are proposed, as summarised in sections 17.9 i) to v) above, in the 2022 assessment year are as follows:-

RFC_{crf} with Proposed A120 Improvements in 2022 Assessment Year

Link	Proposed Standard	RFC_{crf} in 2022 Assessment Year (%)
Park Road junction to Little Bentley junction	D2	35.8
Little Bentley junction to Horsley Cross roundabout	D2	34.6
Horsley Cross roundabout to Colchester Road junction, Wix	WS2	77.1
Colchester Road junction, Wix to Harwich Road junction, Wix	WS2	72.5
Harwich Road junction, Wix to Ramsey Bridge Roundabout	WS2	78.2

17.11 The above table confirms that, with the proposed improvements to the A120 in place, AADT will not exceed CRF in the 2022 assessment year.

18 HIGHWAY ASSESSMENT: SUMMARY

Junction Assessments

- 18.2 The performance of the study location junctions has been assessed on the basis of year 2022 estimated traffic flows with the proposed development in place and, where appropriate, additional cases without development.
- 18.3 The assessment cases considered are robust in the following respects:-
- i) Base flows are factored to highest month flows (August).
 - ii) All development-related HGV flows are assigned to the A120 west of the site.
 - iii) A robust figure for development-related HGV traffic generation is adopted.
- 18.4 Mitigation measures are considered to be necessary at the following locations:-
- i) A120/Parkeston Road/Station Road/Europa Way Roundabout. Measures are proposed at this junction as shown on Figure 6 to accommodate the additional traffic arising from the proposed development.
 - ii) A120/Church Hill/Main Road “Ramsey Bridge” roundabout. Measures are proposed at this junction as shown on Figure 8 to accommodate the additional traffic arising from the proposed development.
 - iii) A120/Harwich Road junction, Wix. Measures are proposed at this junction as shown on Figure 10 to accommodate the additional traffic arising from the proposed development.
 - iv) A120/A1232/A12 Crown junction. Measures are proposed at this junction as shown on Figure 19 to accommodate the additional traffic arising from the proposed development.

Link Capacity Assessments

- 18.5 The performance of the A120 links in the TIA study area has been assessed on the basis of year 2022 estimated traffic flows with the proposed development in place.
- 18.6 Mitigation measures are considered to be necessary on the following links:-
- i) Park Road junction to Little Bentley junction. Measures are proposed to upgrade the existing single carriageway section to 2-lane dual carriageway (D2) standard.
 - ii) Little Bentley junction to Horsley Cross roundabout. Measures are proposed to upgrade the existing single carriageway section to 2-lane dual carriageway (D2) standard.

- iii) Horsley Cross roundabout to Colchester Road junction, Wix. Measures are proposed to upgrade the existing single carriageway section to at least WS2 standard.
- iv) Colchester Road junction, Wix to Harwich Road junction, Wix. Measures are proposed to upgrade the existing single carriageway section to at least WS2 standard.
- v) Harwich Road junction, Wix to Ramsey Bridge Roundabout. Measures are proposed to upgrade the existing single carriageway section to at least WS2 standard.

19. SUMMARY AND CONCLUSIONS

- 19.1 Junctions at which the impact of the proposed development should be tested have been agreed with the HA and ECC. There are 12 such junctions.
- 19.2 Sensitivity tests of the performance of the junctions at these locations has been undertaken in the 2022 assessment year with the proposed development in place during the AM and PM highway peak hours.
- 19.3 At 8 of the study junctions no alteration to the highway will be necessary as a result of the proposed development.
- 19.4 At 4 of the study junctions means by which the highway impact of the proposed development may be addressed have been identified.
- 19.5 Sensitivity tests of the the link capacity of the A120 contained within the TIA study area have been undertaken with the proposed development in place. Mitigation measures are necessary to address link capacity issues between the Ramsey Bridge roundabout and the existing dual carriageway section at Hare Green.
- 19.6 Subject to the adoption of measures recommended in the TIA and in this report the development will have no materially detrimental impact on highway conditions.

HSL
27 May 2004

HUTCHISON PORTS (UK) LIMITED
BATHSIDE BAY DEVELOPMENT, HARWICH

APPENDICES TO
TRAFFIC IMPACT ASSESSMENT – SENSITIVITY TEST
MAY 2004

Originator (Initials)	AB
Checker (Initials)	SPD
Project Director Approval	
Job Number	HSL00477
Report Status	Final
Revision Date	27.05.04

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APPENDIX A
HGV TRAFFIC GENERATION
AND ASSIGNMENT

APPENDIX B
ASSESSMENT FLOWS

APPENDIX C

A120/INGESTRE STREET ROUNDABOUT, HARWICH

APPENDIX D

A120/PROPOSED PORT ACCESS ROUNDABOUT

APPENDIX E

A120/PARKESTON BYPASS “SAFEWAY” ROUNDABOUT

APPENDIX F

**A120/PARKESTON ROAD/STATION ROAD/EUROPA
WAY ROUNDABOUT**

APPENDIX G

**A120/CHURCH HILL/MAIN ROAD “RAMSEY
BRIDGE” ROUNDABOUT**

APPENDIX H

A120/HARWICH ROAD JUNCTION, WIX

APPENDIX I

A120/COLCHESTER ROAD JUNCTION, WIX

APPENDIX J

A120/B1035 "HORSLEY CROSS" ROUNDABOUT

APPENDIX K

A120/LITTLE BENTLEY/BENTLEY ROAD JUNCTION

APPENDIX L

A120/PARK ROAD/HARWICH ROAD JUNCTION

APPENDIX M

A120/A133 JUNCTION

APPENDIX N

A120/A1232/A12 JUNCTION, COLCHESTER

APPENDIX O
LINK CAPACITY