

---

# The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

---

---

## Response to ExA Issue Specific Hearing question: NATS economic appraisal

---

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

*PINS Reference Number:* TR010015

*Document Reference:* NCC/EX/72

*Author:* Norfolk County Council

Version	Date	Status of Version
0	3 October 2014	Revision for submission

This page has been left intentionally blank

## Table of Contents

---

1.0	Methodology		
2.0	Description of NATS PT improvements		
3.0	NATS Costs		
4.0	Safety Analysis Results		
5.0	Economic Analysis Results		

*Q1.1 During the issue specific hearings the ExA asked the applicant to provide results of an assessment of the NDR in conjunction with the NATS Public Transport strategy.*

## **1. Methodology**

- 1.1.1 This appraisal assesses the highway-related elements of the NATS Implementation Plan (NATSIP) that includes NDR as well as improvements to core bus and Bus Rapid Transit (BRT) services. The NATSIP (as updated in November 2013) was submitted as Appendix S of NCC/EX/67. It should be noted that the public transport measures that are assumed to be implemented in this appraisal have not been subject to the development and optimisation work undertaken for the DCO scheme so there is a higher degree of uncertainty associated with their results.
- 1.1.2 The same transport model and forecast assumptions were used as applied to the appraisal of the DCO Scheme in the DCO submission and the Alternatives.
- 1.1.3 As with the DCO submission, the economic appraisal calculates TUBA benefits, wider economic benefits (using WITA) and journey time reliability benefits. The safety appraisal was based on COBA.
- 1.1.4 The costs of the NATS measures are shared between the public and private sector, as appropriate.
- 1.1.5 The following assumptions were made for the analysis:
- The Do Minimum is identical to that for the DCO Scheme submission.
  - The NATS test includes the NDR, core bus improvements, BRT services and the proposed city centre measures
  - All assignments were based on full JCS traffic as reference demand.
  - The NATS test was subject to variable demand modelling so the reference demand will be adjusted according to the forecast travel costs. This allows for trips switching between the modelled modes of transport.

## 2. Description of NATS PT improvements

- 2.1.1 The NATS PT strategy contains new Bus Rapid Transit (BRT) services and improvements to core bus routes. The strategy assumed that there is different PT provision in 2017 and 2032 that reflected the build out of development with JCS and thus more services operate in 2032 than in 2017. It should be noted that this is significantly different than the PT Option test (in NCC/EX/71) which assumed all services operated from 2017 so that the maximum impact could be assessed regardless of the economic viability. It should also be noted that the PT measures assessed in this appraisal assume the implementation of the NDR as part of the Do Something so the results cannot be directly compared to the PT Option test.
- 2.1.2 The NATS PT routes for 2017 and 2032 are shown separately in Figures 1 and 2 for the two different service levels and more information is given in Table 1 below. For core bus routes existing services are replaced with the higher frequency services of 10 minutes except on three services where the patronage levels only justify a 15 minute frequency. The BRT services are assumed to be entirely additional on Drayton High Road and Salhouse Road (from 2032) but other BRT services will serve P&R sites and therefore it is assumed that the existing P&R services at these locations would no longer be needed (for the PT Option the BRT services were assumed to be entirely additional to the existing P&R services). A new core orbital bus has also been added to operate with a frequency of every 10 minutes in 2032 via extended developer link roads between the Airport P&R and Postwick P&R, stopping at major development locations. Although not identified in the NATS Implementation Plan it would carry significant patronage with the future development and is therefore expected to be a reasonably likely future enhancement for orbital movement.

Figure 1: BRT and Core Bus Routes – 2017

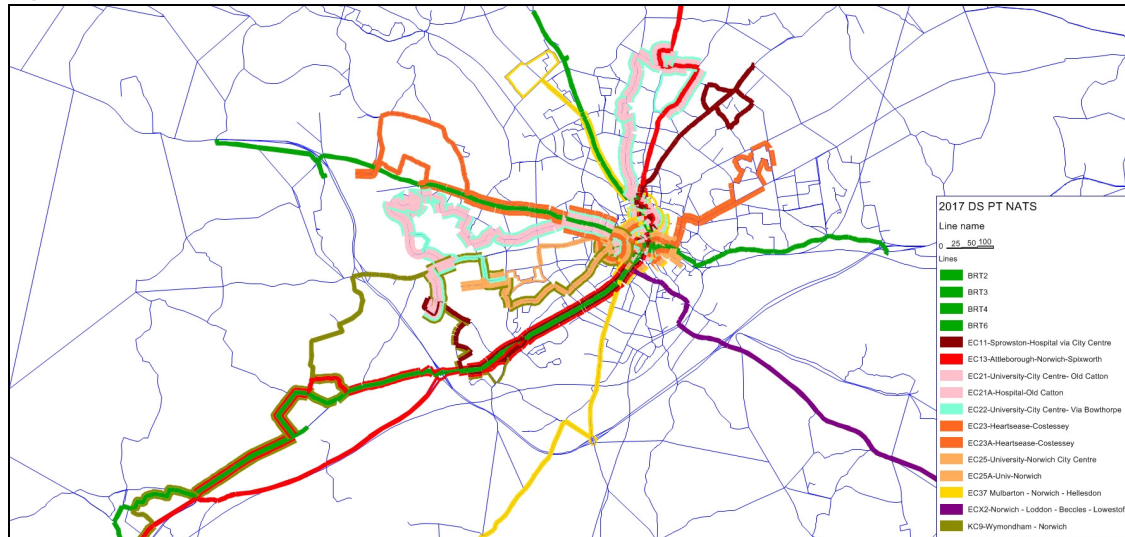


Figure 2: BRT and Core Bus Routes – 2032

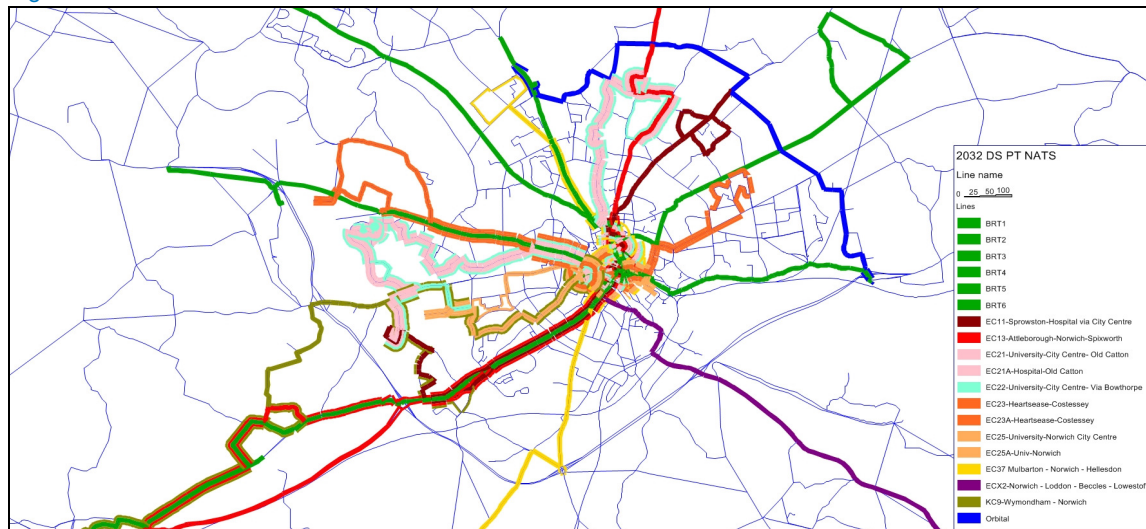


Table 1: Additional operational details of BRT and core buses

Service	Service description	Other information
BRT	BRT services via Thickthorn, Costessey, Airport and Postwick serve P&R sites and replace existing P&R bus services and will be in operation from 2017. Salhouse and Drayton High Road BRT are assumed to be implemented from 2032. See Figures 1 and 2 for more details.	10min frequency Number of buses_2017: 22 Number of buses_2032: 33 5min generalised time savings for soft measures

Service	Service description	Other information
Core buses including orbital bus	See Figures 1 and 2 for more details on core bus routes	10min frequency except for following services EC23/23A – 15min EC25/25A – 15min ECX2 – 15min Number of buses_2017: 22 Number of buses_2032: 22 3.8min generalised time savings for all services for soft measures

2.1.3 The developer link roads and junctions have been coded with proposed highway layouts set out in the developers planning application information.

2.1.4 Table 2 below summarises key modelling assumptions and appraisal required.

Table 2: Summary of Appraisal Requirements

Scenario	Modelling required	Appraisal carried out
DCO scheme with NATS PT	Coding DS PT and highway and PT networks and running through demand model for 2017 and 2032. Assume bus frequencies in table 1 throughout the day (0700-1900). No changes to fare structure. Assume generalised time savings of 5min and 3.8min for BRT and core buses respectively for soft measures (see Table 3 for more details).	Economic and safety appraisal.

2.1.5 PT quality improvements are represented using generalised cost savings, in accordance with latest WebTAG guidance. Table 3 below shows the assumed generalised time savings for quality improvements for BRT, Core and orbital buses. The individual savings are those recommended in WebTAG M3.2.

Table 3: Generalised Time Savings Assumed for Soft Quality Improvements

Soft Measure	WebTAG Savings* (mins)			Proposed Improvements?		Savings Assumed (mins)	
	Bus users	Car users	Overall	Core/Orbital bus	BRT	Core/Orbital bus	BRT
Audio Announcements	1.22			Yes	Yes	1.22	1.22
Climate Control	1.24			No	Yes	-	1.24
New Interchange Facilities	1.27			Yes	Yes	1.27	1.27
On-Screen Displays	1.90	0.89	1.29	Yes	Yes	1.29	1.29
Total savings						3.78	5.02

Notes: \*WebTAG M3.2 Table M3.2.1

### 3. NATS Costs

3.1.1 Scheme costs for NATS are given below in Table 4. Costs were adjusted as per Document Reference 5.7. The adjusted costs were used in the scenario testing.

3.1.2 BRT and core buses have a period of operation of 8 and 15 years respectively before replacement. The cost of buses accounts for the additional buses set out in table 1, their replacement, operational costs and maintenance costs over the 60 year appraisal period.

Table 4: Summary Costs of NATS PT strategy

Cost type	Cost (£m) in 2013Q1 prices	
	DCO Scheme	NATS PT strategy
<i>Investment costs</i>		
Construction	110.2	110.2
Land	22.0	22.0
Preparation	7.8	7.8
Supervision	1.3	1.3
Total investment Cost	141.3	141.3
<i>Other costs</i>		
Maintenance	27.8	27.8
Operation	15.9	15.9
Cost of PT (buses/operation/maintenance)*	-	500.9

Notes: These are initial costs before adjusting for construction price inflation and optimism bias

\*included under private sector in TUBA



## 4. Safety Analysis Results

4.1.1 Safety analysis results in Table 5 below indicate that there is a slight reduction in PIA savings compared to DCO hence this scenario has a lower accident savings compared to DCO.

Table 5: Accident Benefits of NATS PT strategy with NDR

60 Year Appraisal Period		Scenario	
		DCO	NATS PT strategy with NDR
Do Minimum			
Number of PIAs		70,984	70,984
Casualties	Fatal	1,890	1,890
	Serious	12,597	12,597
	Slight	91,490	91,490
Accident Costs		5,999,332	5,999,332
Do Something			
Number of PIAs		69,944	69,997
Casualties	Fatal	1,898	1,900
	Serious	12,488	12,499
	Slight	90,226	90,299
Accident Costs		5,958,113	5,963,146
Accident Benefits			
Number of PIA savings		1,041	987
Casualties	Fatal	-7	-10
	Serious	109	98
	Slight	1,263	1,191
Accident Savings		41,219	36,186

Notes: All monetary values are expressed in £000's in 2010 prices discounted to 2010

## 5. Economic Analysis Results

5.1.1 Table 6 below compares monetised costs and benefits including accident benefits of NATS against the DCO scheme.

Table 6: Analysis of Monetised Costs and Benefits – NATS PT strategy with NDR

Item	Accidents Included (£000)	
	DCO	NATS PT strategy with NDR
Accidents (not assessed by TUBA)	41,219	36,186
Greenhouse Gases*	-22,756	-27,964
Economic Efficiency: Consumer Users (Commuting)	51,164	113,632
Economic Efficiency: Consumer Users (Other)	380,623	879,290
Economic Efficiency: Business Users and Providers	267,797	5,683
Wider Public Finances (Indirect Taxation Revenues)	55,270	109,352
Present Value of Benefits (PVB)	773,317	1,116,179
Broad Transport Budget Present Value of Costs (PVC)	185,542	186,544
OVERALL IMPACTS		
Net Present Value (NPV)	587,775	929,635
Benefit to Cost Ratio (BCR)	4.168	5.983

Notes: All monetary values are expressed in in £000's in 2010 prices discounted to 2010

\*Greenhouse gas impacts were calculated using TUBA1.9.2 since there was a bug in TUBA 1.9.1

5.1.2 The results show that the Present Value of Benefits (PVB) is estimated to be £1,116m (inclusive of accident benefits), outweighing the £187m Present Value of Costs (PVC).

5.1.3 The Benefit Cost Ratio (BCR) of the scheme is 5.98 including accidents. Under the DfT's value for money criteria, this represents a Very High value for money category.

5.1.4 Table 7 below compares summary economic appraisal results including wider impacts and journey time reliability for NATS PT strategy with NDR against the DCO scheme.

**Table 7: Summary of Economic Appraisal including Wider Benefits – NATS PT strategy with NDR**

Item	Scenario also Including WEBs and JTR (£000)	
	DCO	NATS PT strategy with NDR
Present Value of Benefits (PVB)	989,063	1,328,744
Present Value of Costs (PVC)	185,542	186,544
Net Present Value (NPV)	803,521	1,142,200
Benefit to Cost Ratio (BCR)	5.331	7.123

Notes: All monetary values are in £000's and expressed in 2010 prices discounted to 2010

5.1.5 The BCR is improved further to 7.12 once journey time reliability benefits (£28m) and wider economic benefits (£184m) are included in the appraisal. These additional benefits have been derived from the highway model and amount to £212m (2010 prices discounted to 2010) and thus account for the impacts of the changes to the highway network, including NDR and the city centre measures. The inclusion of these benefits increases the BCR to a higher level within the Very High value for money category.

5.1.6 The breakdown of benefits are extracted from the Transport Economic Efficiency (TEE) table of TUBA and reported below in Table 8. This shows the benefits split between road and bus modes and also shows the private sector provider impacts separately from the business (user) impacts which are combined under Economic Efficiency: Business Users and Providers in the TUBA table Analysis of Monetised Costs and Benefits (Table 6).

**Table 8: Transport Economic Efficiency (TEE)**

Item	Benefit (£000s)		
	All Modes	Road	Bus
Consumer - Commuting user benefits			
Travel Time	134,820	61,371	73,450
Vehicle operating costs	-22,971	-22,971	0
User charges	1,782	3,681	-1,899
During Construction & Maintenance	0	0	0
<b>NET CONSUMER - COMMUTING BENEFITS</b>	<b>113,632</b>	<b>42,081</b>	<b>71,550</b>
Consumer - Other user benefits			
	All Modes	Road	Bus

Item	Benefit (£000s)				
	All Modes	Road	Bus		
Travel Time	833,213	299,914	533,298		
Vehicle operating costs	-131,303	-131,303	0		
User charges	177,380	196,018	-18,638		
During Construction & Maintenance	0	0	0		
<b>NET CONSUMER - OTHER BENEFITS</b>	<b>879,290</b>	<b>364,630</b>	<b>514,661</b>		
<b>Business Impacts</b>					
	All Modes	Road Personal	Road Freight	Bus Personal	Bus Freight
Travel Time	597,296	222,577	182,308	192,411	0
Vehicle operating costs	-21,749	-4,264	-17,485	0	0
User charges	2,231	2,684	0	-453	0
During Construction & Maintenance	0	0	0	0	0
<b>Sub Total</b>	<b>577,778</b>	<b>220,997</b>	<b>164,824</b>	<b>191,957</b>	<b>0</b>
<b>Private Sector Provider Impacts</b>					
Revenue	-384,531		-119,348		-265,183
Operating costs	-187,564		0		-187,564
Investment costs	0		0		0
Grant/subsidy	0		0		0
<b>Sub Total</b>	<b>-572,095</b>		<b>-119,348</b>		<b>-452,747</b>
<b>Other business Impacts</b>					
Developer contributions	0		0		0
<b>NET BUSINESS IMPACT</b>	<b>5,683</b>				
<b>TOTAL</b>					
Present Value of Transport Economic Efficiency Benefits (TEE)	998,605				

Notes: All monetary values are expressed in 2010 prices discounted to 2010

5.1.7 The economic appraisal shows that the progressive implementation of the PT strategy which forms part of the NATS IP together with the NDR will result in

further economic benefits in addition to those secured by the NDR itself and that the overall package would continue to have a positive BCR.

This page has been left intentionally blank