

CHARNWOOD BOROUGH COUNCIL

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# ANSTEY FLOOD ALLEVIATION SCHEME

PROJECT APPRAISAL REPORT

JULY 2003

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TECHNICAL SERVICES  
SOUTHFIELDS  
LOUGHBOROUGH  
LEICS  
LE11 2TN

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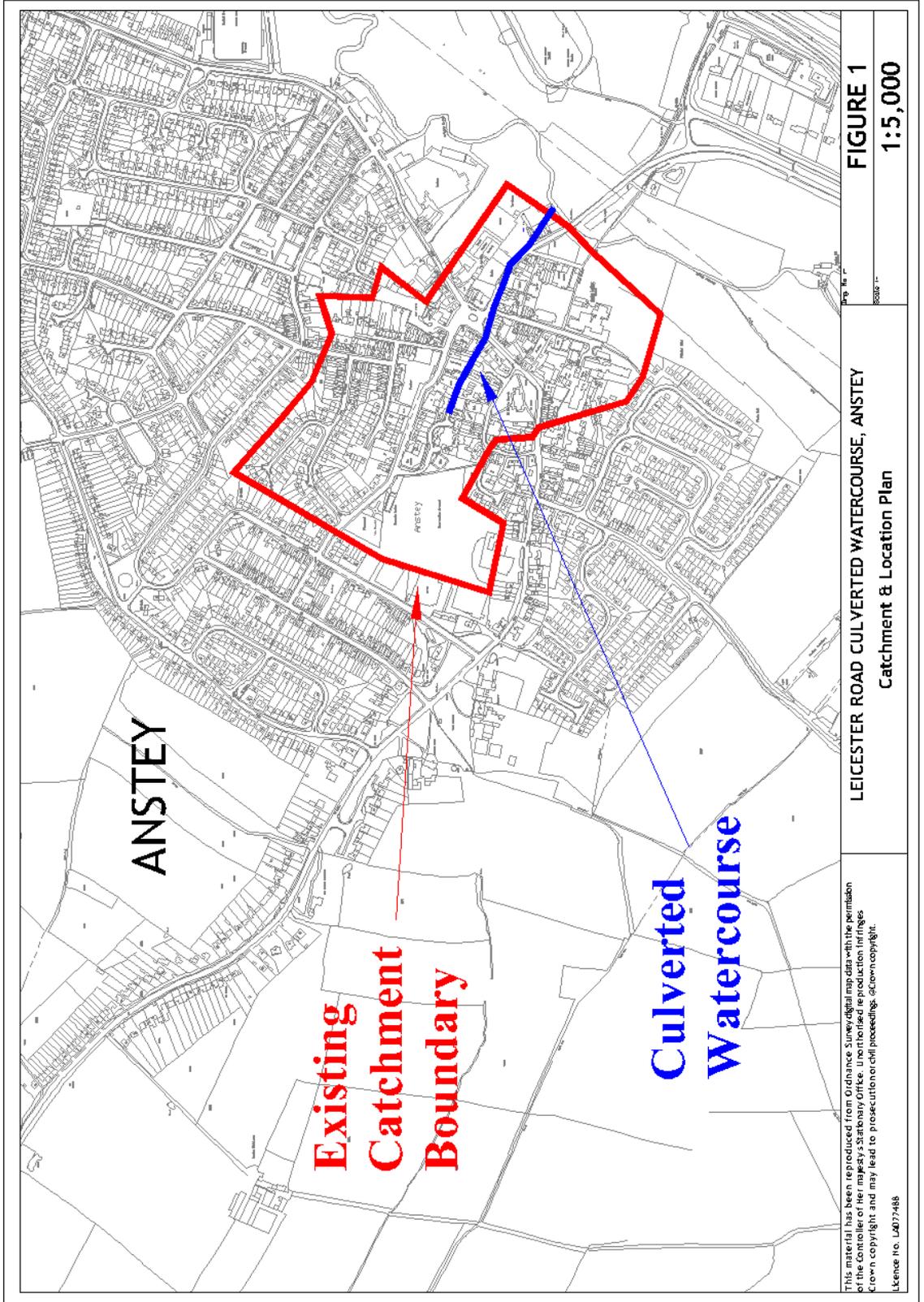
# 1. INTRODUCTION

## SUMMARY

The village of Anstey is located approximately 11km due south of Loughborough, on the outskirts of Leicester. The un-named watercourse rises north of the village centre, and drains a predominantly urban catchment of approximately 0.20 km<sup>2</sup> running through the centre of Anstey before discharging into the Rothley Brook adjacent to the Leicester Road Bridge. The section of watercourse in Leicester Road is culverted and constructed in parts of natural stonewalls with slate soffit slab. A location plan is provided as Figure 1.

## RESPONSIBILITIES

The watercourse is an “Ordinary Watercourse” as defined under the Land Drainage Act 1991. In 2001 it was designated a critical ordinary watercourse in consultation with the Environment Agency under the DEFRA High Level Targets. Although the Council is the Operating Authority (with powers under The Land Drainage Act 1991) it does not follow that either Charnwood Borough Council or Leicestershire County Council, who maintain the Leicester Road, ‘owns’ the culvert.



**FIGURE 1**  
**1:5,000**

**LEICESTER ROAD CULVERTED WATERCOURSE, ANSTEY**  
**Catchment & Location Plan**

Figure 1 – Catchment & Location Plan

## **2. THE PROBLEM**

A plan showing details of the culverted watercourse is provided as Figure 5 at the end of this section.

### **AREA UNDER CONSIDERATION**

The area of Anstey known as 'The Nook' (National Grid Ref. SK550086) is the commercial centre of Anstey. The scope of this report covers the culverted watercourse from the Nook along Leicester Road to its outfall into the Rothley Brook. Leicester Road is one of the main heavy goods vehicle routes into the Charnwood Forest area. Approximately 40 properties in and adjacent to The Nook are currently subject to intermittent flooding as a result of backing up from the blocked culvert.

### **PREVIOUS HISTORY**

Records indicate that the culverted section through Anstey from Hollow Road to Leicester Road was constructed in the late 1800's.

The Nook area was previously subjected to severe flooding until the late 1990's when a public sewerage rehabilitation scheme, carried out by Severn Trent Water, abandoned an unsatisfactory combined sewerage overflow in Cropston Road, which prematurely discharged to the Leicester Road culverted watercourse.

The culvert has a history of structural failure and has previously been repaired by both Charnwood Borough Council and Leicestershire County Council.

### **EXISTING CONSTRUCTION**

The construction of the watercourse varies from 600mm circular reinforced concrete pipes upstream of MH 4515 (Bradgate Road) to a 1000mm wide x 750mm high brick arch under Bradgate Road through to a 900mm wide x 600mm high rectangular section formed using random natural stone walls and slate slabs for the roof but indeterminate invert from Bradgate Road to its outfall into the Rothley Brook.

### **HYDRAULIC ASSESSMENT**

In the late 1960's a substantial part of the upper catchment of the Leicester Road watercourse was diverted via a new outfall to the Rothley Brook. This was carried out by Barrow upon Soar Rural District Council as part of a sewerage rehabilitation scheme. The effect was to reduce the catchment contributing to the existing Leicester Road culvert by approximately 85%. A Hydroworks model of the drainage network contributing to the watercourse has been constructed. Analysis of the results of simulations carried out on the model indicates that the current highway-flooding threshold (out of manholes) is in excess of a 1 in 10 yr return period. The culvert is considered to be hydraulically unacceptable.

### **STRUCTURAL ASSESSMENT**

Charnwood Borough Council carried out a CCTV survey of the culvert in 2002 in order to comply with the High Level Targets. Previous visual inspections had not indicated serious structural degradation, however, an initial CCTV inspection proved to be inconclusive over the stone walled length of culvert between Latimer Street and the outfall because of a high degree of siltation along with several collapses of the roof structure.

Based on this initial CCTV survey, the circular and arched lengths of culvert (upstream and immediately downstream of MH 4515) are considered in good condition, EA condition grades 1 & 2, and other than continual monitoring no remedial works are required. No works are proposed to the length of rectangular culvert between MH 9003 and 4515, although condition grade 3, other than close monitoring and routine maintenance.

Further high pressure jetting was followed by a second CCTV survey in 2003. Although the complete culvert could not be surveyed due to partial roof collapses, service pipe intrusions and poorly repaired sections there was sufficient information available to determine the condition grade for the section of watercourse between MH 9003 and the outfall. Typical photographs taken from the CCTV survey are included as figures 2-4 below, which clearly show the current state of the culvert. The condition of the culvert falls exactly in line with the EA definition of a condition grade 4/5. The culvert is considered to be structurally defective and in imminent danger of collapse.



*Figure 2-Typical Roof Collapse*



*Figure 3- Typical Partial Roof Collapse*



*Figure 4 -Complete Roof Collapse*

## **DO-NOTHING SCENARIO**

The culverted watercourse downstream of The Nook is predominantly in the public highway and complete structural failure with the resulting collapse of the highway would result in serious traffic congestion in Anstey and the surrounding area along with significant flooding of the commercial centre of Anstey. The assumption that a major collapse will occur during a period of prolonged heavy rainfall is realistic as this is when the culvert would be under stress from both internal and external forces.

## **AIMS AND OBJECTIVES**

The main aims and objectives for a flood alleviation scheme in Anstey may be summarised as follows: -

- 1) Increasing the asset life of the culverted watercourse.
- 2) Reduce the risk of flooding, caused by a collapse, to residential and commercial property in the Nook area.
- 3) Be acceptable technically, environmentally and economically.

These objectives can only be achieved by complete replacement of the section of watercourse between MH 9003 and MH 8450 using open-cut excavation methods.

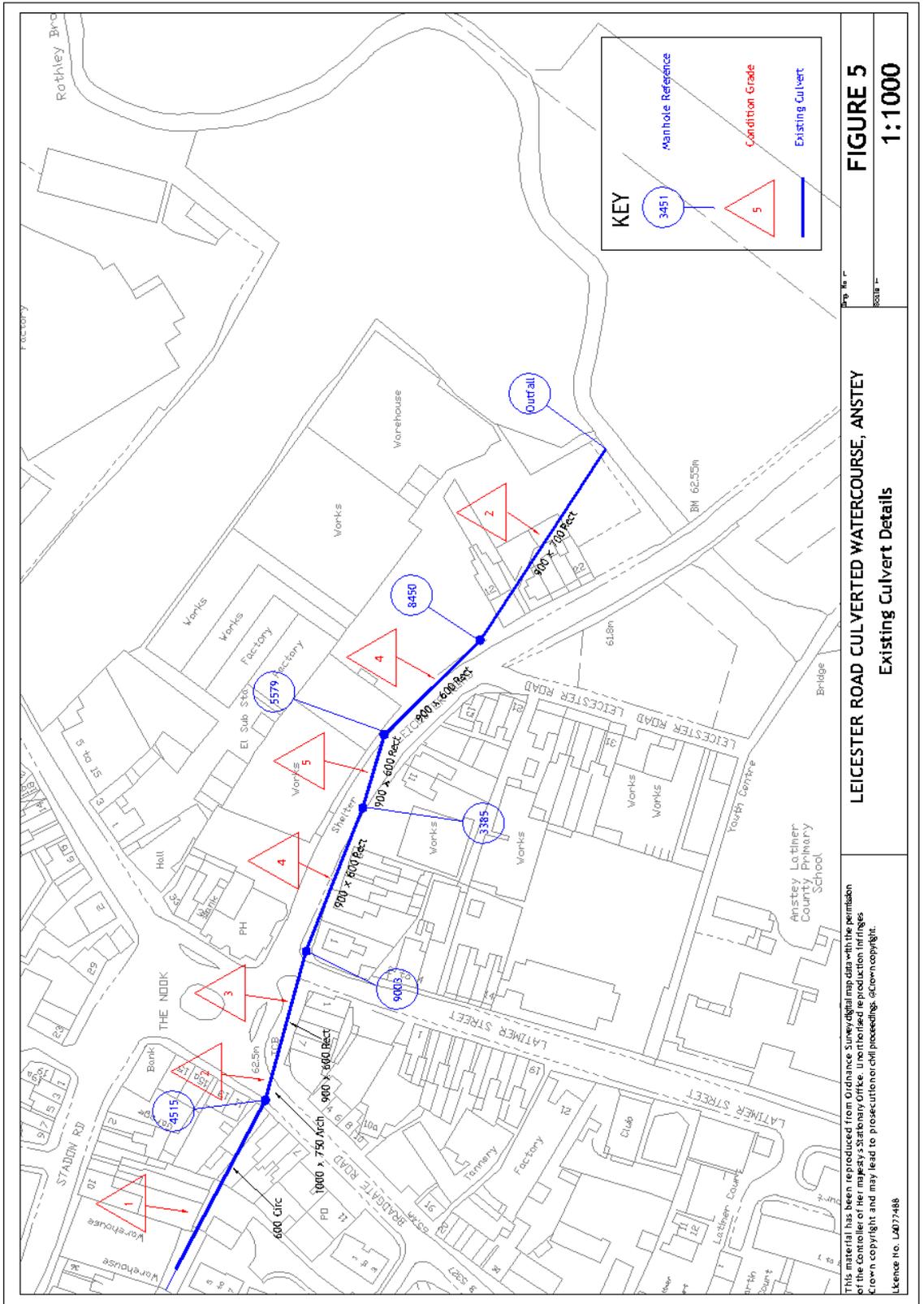


Figure 5-Existing Culvert Details

### **3. ALTERNATIVES CONSIDERED**

The following describes methods of preventing flooding caused by the structural failure of the culverted watercourse.

- Emergency repairs replacing collapsed sections on an ad-hoc basis.
- Planned replacement of the defective sections by on-line/off-line open cut excavation.

The culvert is beyond maintenance and therefore this is not considered a technical option.

#### **DO NOTHING - SCENARIO 1**

Under the “Do Nothing” scenario the culvert would collapse and The Nook would be flooded during every storm event creating stagnant conditions within the business heart of the village. The effect of this would be difficult to model in terms of either persistent or intermittent flood levels, but the collapsed culvert would not only eliminate access to and from Anstey on the Leicester Road but would ‘blight’ the properties closest to the point of collapse; The 6 residential properties nos. 3 to 13 Leicester Road, the flower shop at 1 Leicester Road, The Coach and Horses Public House on the corner of The Nook and Leicester Road and Bradgate Home Furnishings, between 9 and 11 Leicester Road.

This is considered an unacceptable Scenario for the retailers and residents of Anstey.

#### **AD-HOC REPAIRS**

This is not considered as a viable option as the disruption to both traffic and village life caused by an ad-hoc repair of a single collapse would be at least as great as Scenario 2 below.

#### **REPLACEMENT CULVERT - SCENARIO 2**

This Scenario would involve open-cut excavation within the highway. The culvert would be replaced with one of marginally increased capacity over the existing in order to improve the hydraulic performance. Removal of the partial collapses, the poorly repaired sections and the service pipe crossings along with the obvious improvement in roughness provided by a new culvert would not require a major increase in cross-sectional area. The flooding threshold return period is estimated to be in excess of 1 in 100 year.

This is considered the only acceptable Scenario by providing maximum benefits for the retailers and residents of Anstey.

## 4. COSTS

### DETAILED COSTS

The detailed costs of the alternative Scenarios (excluding any Council staff salary costs) are detailed in Table 2.

**Table 1 – Estimated Scenario Costs (£000's)**

Scenario Item	1 (DN)	2 (Replacement)
Feasibility	0	25
Design	0	15
Site Investigation	0	10
Maintenance (Annual jetting)	0	0
Construction	0	250
Site Supervision	0	12.5
Utility Diversions	0	32.5
Land Acquisition	0	0
<b>Total</b>	<b>0</b>	<b>345</b>

## **5. BENEFITS AND IMPACTS**

### **GENERAL**

The main objectives of a flood alleviation Scenario for Anstey may be summarised as follows:

1. Remove the risk of collapse and increase the asset life of the culverted watercourse
2. Reduce risk of flooding to people and property in the town centre.
3. Avoid increasing the risk of flooding elsewhere.
4. Be acceptable technically, environmentally and economically.

### **VALUATION OF BENEFITS**

J.B. Chatterton & Associates (JCA) was appointed by the Head of Technical Services of Charnwood Borough Council to undertake a benefit/cost appraisal, which is included in Appendix A.

### **ENVIRONMENTAL IMPACT**

There will be no impact on the Environment, as all the work will take place within the highway.

### **ARCHAEOLOGICAL IMPACT**

There will be no impact on the Archaeology of the area, as all the work will take place within the highway.

### **SUMMARY OF BENEFIT COST ANALYSIS**

The following is reproduced from the report produced by J B Chatterton: -

The value or benefit of replacing the decrepit culvert under Leicester Road, Anstey is avoiding the grave consequences of doing nothing and allowing the collapse without subsequent repair. These consequences are:

- ❑ Permanent traffic disruption and diversion away from Leicester Road. However, this very large value of £64 million (even without considering traffic growth) is capped at a modest £150,000, i.e. the cost to the Highways Agency not allowing this to happen.
- ❑ Permanent blight of the properties immediately adjacent to the imminent collapse, estimated at a discounted capital value in year 4 of £1.134 million.
- ❑ Very frequent flooding (possibly annual) of 12 retail premises in or adjacent to The Nook; whose damage value is capped at a discounted property value at year 4 of £1.568 million.

The following table summarises costs and damages:

Summary of Present Value of Damages (Do Nothing)		£k
	Property blight	1,134
	'Capped' property flooding	1,568
	'Capped' traffic diversion	150
	Total damages (approximates benefits)	2,852
Summary of Present Value of Costs		
	Construction in Year 0	345
	Future Maintenance: CCTV inspection and jetting every 5 years (@£1,200)	Circa £7,000
	Total costs	352
Benefit Cost ratio		8.1:1

The culvert is beyond maintenance, which is therefore not a technical option. Benefits of replacement are therefore colossal in comparison with the modest capital cost of reconstruction (£345,000). Even dramatic changes in the assumptions would not dent the robustness of the appraisal.

Permanent blockage of storm flows (confidently anticipated within the next five years) would cause frequent if not permanent stagnant conditions in the environs of The Nook. This has not been modelled but would almost certainly compare with the blight, property flooding and traffic disruption scenarios estimated here for the "Do Nothing" Scenario.

## DEFRA PRIORITY SCORING

The Defra scoring summary is as below:

Economics	15.14
People	2.70
Environment	0.0
Total	17.84

Although the economic score is high the prime beneficiaries are retail or road users so people scoring (i.e. residential properties) is low. The deprivation score is zero. The environmental score is zero. The overall score falls short of the 2003/04 threshold of 22, but is above the indicative threshold for 2004/5 of 15.

## 6. DETAILED DESCRIPTION OF PREFERRED SOLUTION

### PREFERRED SCENARIO

The preferred Scenario details are described below with reference to Figures 6 & 7.

### DESIGN CRITERIA

The estimated peak flood flows, derived using the Flood Estimation Handbook, are presented in Table 2.

*Table 2 - Estimated Peak Flows*

<b>Return Period (years)</b>	<b>75% Winter (l/s)</b>	<b>50% Summer (l/s)</b>
5	390	430
10	480	540
20	590	660
50	780	870
100	980	1090

### DEFENCE STANDARD

The Indicative standard of flood protection for Land Use Band B is between 1 in 25 years and 1 in 100 years. In order to significantly reduce the risk of flooding to people and property in the town, avoid increasing the risk of flooding elsewhere and be acceptable technically, environmentally and economically, the preferred option achieves the upper limit for protection of 1 in 100 years.

### TECHNICAL DETAILS

The proposal is to replace 120m of the existing 900mm x 600mm masonry/slate culvert with a reinforced concrete 1000mm x 650mm elliptical culvert along with the associated manholes. The elliptical culvert shape eliminates the need to provide an in-situ invert to achieve self-cleansing velocity. A plan showing details of the proposals is provided as Figure 7.

The works will necessitate the closure of Leicester Road for through traffic because of Health & Safety reasons. Since Leicester Road is one of the major access routes into the Charnwood Forest restricted traffic area careful planning and close liaison with all the relevant highway authorities/agencies will be necessary to minimise traffic congestion.

A comprehensive Sub-Sonic survey, completed in December 2002, to locate the underground services in Leicester Road indicates the need for major service diversions particularly considering the shallow depth of the existing culverted watercourse.

Despite the urgency required to renovate the structurally defective culvert, the extent of the negotiations required with the highway agencies, the statutory undertakers and local residents, it is unlikely that the works could commence before Summer 2004. Discussions continue between Charnwood Borough Council and Leicestershire County Council offices regarding a highway authority contribution towards the project and an acceptable traffic management scheme (see Appendix for copies of correspondence).

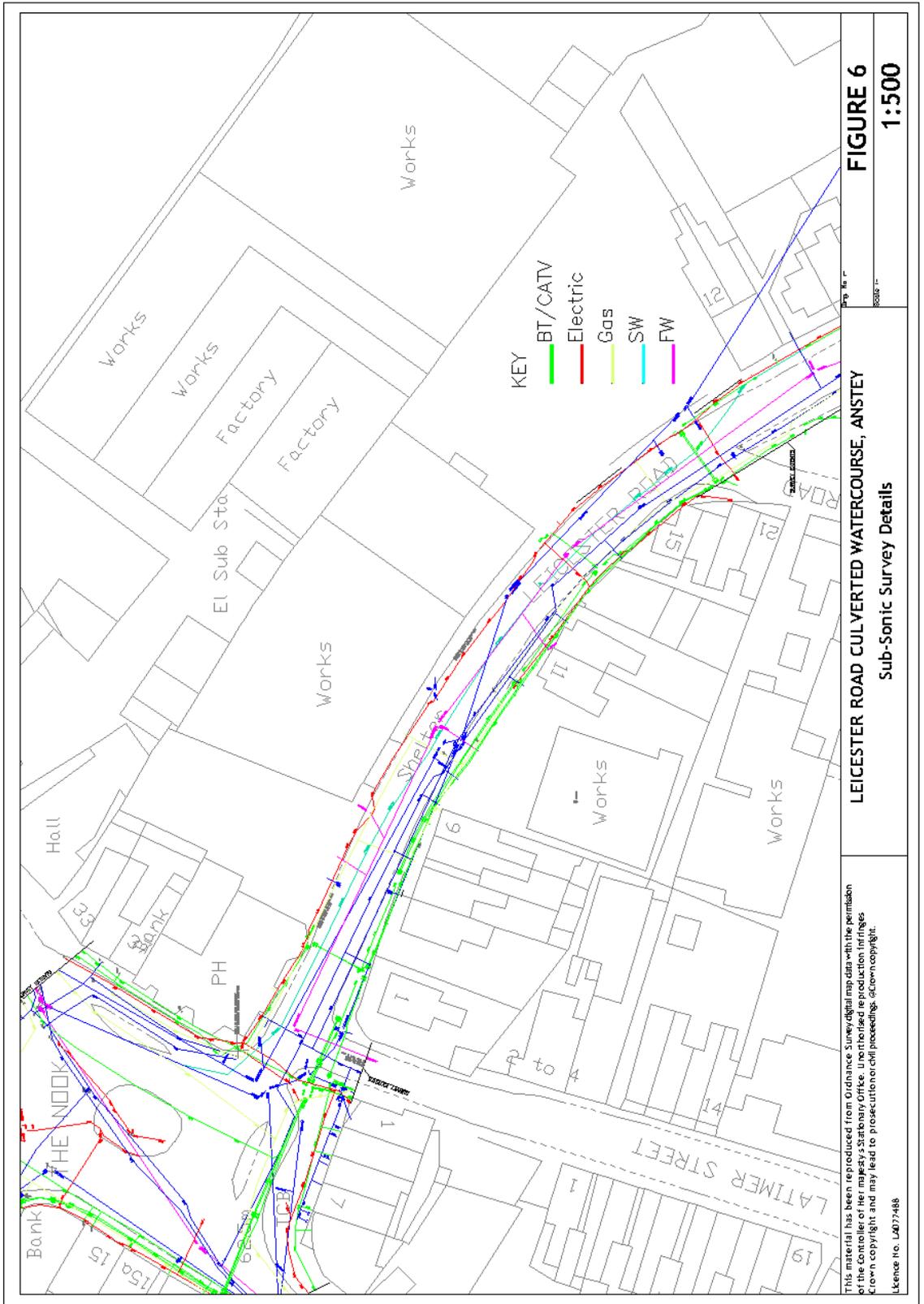
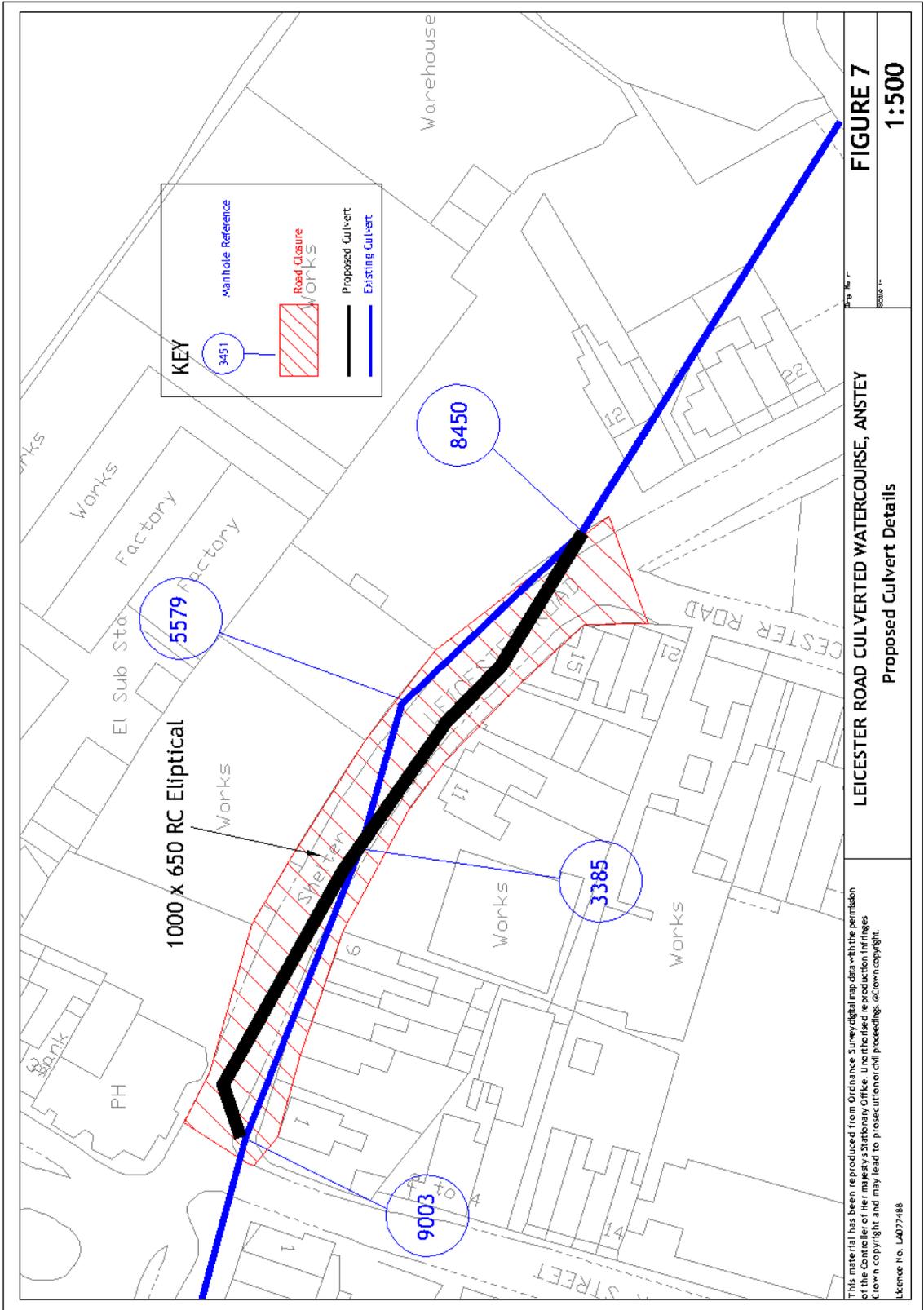


Figure 6- Subsonic Survey Details



**FIGURE 7**  
**1:500**

**LEICESTER ROAD CULVERTED WATERCOURSE, ANSTEY**  
**Proposed Culvert Details**

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Figure 7- Proposed Culvert Details

## **7. CONCLUSIONS & RECOMMENDATIONS**

### **CONCLUSION**

Works are required to reduce the risk of collapse and possibly subsequent flooding.

Leicestershire County Council, as the highway authority, would be responsible for any ad-hoc repairs due to a sudden collapse and should be approached to promote a jointly funded capital project.

The preferred option comprises replacement of the culverted watercourse by open cut excavation. This would bring the level of flood protection for the Leicester Road culverted watercourse up to greater than 1 in 100 years

### **RECOMMENDATION**

It is recommended that Scenario 2 be implemented at an estimated cost of £345,000 (including design and supervision).

# Appendix A

# Leicestershire County Council Correspondence

Mrs Karen Notman  
Divisional Engineer  
Leicestershire County Council  
Leicester Road  
Melton Mowbray  
LE13 0DA

Please Contact:	Dave Woolsey
Direct Line:	01509 634682
Our Ref.:	DMW/645.50
Corresp. Id.:	-
Your Ref.:	-
Date:	9 <sup>th</sup> April 2003

Dear Karen,

## Leicester Road Culverted Watercourse, Anstey

I refer to the meeting between my assistant Dave Woolsey and yourself on the 20<sup>th</sup> November 2002.

I have carried out an initial appraisal of the project and list the following points:

- The culvert was designated a culverted watercourse in consultation with Severn Trent Water, when the Borough Council was sewerage agent to the company, and the company would accept no liability even though it received sewerage discharges.
- It was later designated a critical ordinary watercourse in consultation with the Environment Agency under the DEFRA High Level Targets. Although the Borough Council is the Operating Authority (with powers under The Land Drainage Act 1991) it does not follow that either Council 'owns' the culvert.
- The culvert has a history of structural failure and has been repaired by both Leicestershire County and Charnwood Borough Council and further structural deterioration must be expected.
- The culverted watercourse is structurally defective and liable to cause collapse of the highway over the length shown on Figure 6. (See enclosed video still photographs, video available if necessary)
- The total project costs for the repair is estimated at approximately £350,000 but should be subject to a 45% DEFRA grant.
- I shall continue to investigate the possibility of a 'no dig' solution otherwise, for Health and Safety reasons, the works will require a full closure of Leicester Road for the duration of the culvert replacement. The closure is anticipated to be between Latimer Road and 15 Leicester Road for 6 weeks.
- Initial investigations indicate that some service diversions will be necessary. With close liaison with the relevant statutory undertakes it may be possible to incorporate these diversion works within the culvert replacement works closure, however, it is probable that additional road closures will be required for diversion works.
- The disruption could be mitigated by a contract start arranged to be at minimum traffic flows (i.e. School Holidays 2004), which would allow time for all necessary consultations and pre-planned service diversions.
- I would suggest the likely Traffic Diversion route would be via Groby Road/A50, however, there is no right turn for North bound A50 traffic into Groby Road at present.

- Because of the disruption likely I recommend close liaison with the NRSWA coordination group and in particular Anstey Parish Council, Local Residents and Business's.

Following our initial discussions with the DEFRA engineer it is anticipated that the Highway Authority will contribute towards the scheme and that any highway contribution would be deducted before DEFRA grant be calculated. The previous County Council contribution for Cossington was based on the replacement of structurally inadequate culverts in highways on a size for size basis, and not for hydraulic improvement. In this instance as some previous catchment transfer has been undertaken and significant increased capacity is not required, I therefore suggest a 50/50 split of the residual capital cost is appropriate (i.e. total project costs less DEFRA grant), as a collapse would result in potential flooding as well as highway danger and disruption. The County Council contribution would be £125,000 if the above were acceptable.

I would be grateful for your comments on all the above, especially regarding traffic management issues and any assistance you may be able to offer in that area.

I shall also be pleased if you will advise me on the extent and timing of the County Council's potential financial commitment to this project.

Yours sincerely,

Head of Technical Services

Cllr. C.E. Brock  
Cllr. F.J. Hurst  
Cllr. J.J. Sutherland  
Anstey Parish Council

# **J B Chatterton & Associates Benefit/Cost Assessment**

## **Anstey (The Nook) Flood Alleviation Scheme**

### **Benefit Assessment**

#### **1 PREAMBLE**

The culvert running from The Nook along Leicester road to outfall in Rothley Brook is structurally unsound and CCTV survey indicates that it is in imminent danger of collapse. Currently, some 40 no. properties in and adjacent to The Nook are subject to intermittent flooding as a result of backing up from the blocked culvert.

Under the “Do Nothing” scenario the culvert would collapse and The Nook would be flooded during every storm event creating stagnant conditions within the business heart of the village. The effect of this would be difficult to model in terms of either persistent or intermittent flood levels, but the collapsed culvert would not only eliminate access to and from Anstey on the Leicester Road but would ‘blight’ the properties closest to the point of collapse; The 6 residential properties nos. 3 to 13 Leicester Road, the flower shop at 1 Leicester Road, The Coach and Horses Public House on the corner of The Nook and Leicester Road and Bradgate Home Furnishings, between 9 and 11 Leicester Road.

Access to the properties would be totally restricted and re-sale of the properties would be impossible. The collapse is imminent, with the culvert (see fig 1) assessed as Condition Grade 5 with a residual life of between 1 to 5 years.<sup>1</sup> The condition of the culvert falls exactly in line with the EA definition of a condition grade 5 culvert:

*“Completely failed or derelict, requires complete reconstruction. Major urgent repairs or replacement needed without delay to avoid failure. Probably beyond repair. Extensive defect, > 50% of length or area affected.”*



**Fig 1 : Collapsed culvert under Leicester road**

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<sup>1</sup> Environment Agency: Sea and River Defence Surveys Condition Assessment Manual

## 2 BENEFIT ASSESSMENT ASSUMPTIONS

If left unchecked, i.e. “Do Nothing” which, to quote DEFRA Guidance (PAGN and PAG3), “however unrealistic (Do Nothing) it is a policy option that must be considered”, the 7 residential properties, the pub and the furnishings outlet would be totally blighted and lose their total market values. Additionally all traffic along Leicester Road would cease and alternative routes both to and from Anstey would have to be found.

To be conservative, property blight is assumed from year 4 with access restriction to through traffic along Leicester Road (initially for safety reasons, say, year 2) and by year 5 because of certain collapse of the road.

The property blight will equivalent to the discounted market value at year 4 and the traffic disruption will be the discounted annual resource cost of the diversion avoiding Leicester Road year on year from year 2 to year 49 .

### 2.1 PROPERTY BLIGHT

Terraced properties for LE7 postcode are valued as at summer/autumn 2002 ([www.proviser.com](http://www.proviser.com)) at £81,285 per property and on [www.upmystreet.co.uk](http://www.upmystreet.co.uk) at £96,246 for the same period. A mean value is taken of £88,766, say, £89,000. Four terraced houses (3,5,7,9) are therefore for this exercise valued collectively at £356,000.

The semi-detached houses 11 and 13 Leicester Road are valued using the same data sources at £116,056 (proviser) or £113,273 (upmystreet) or a rounded average of £115,000. The two are valued collectively at £230,000.

The Flower shop at no. 1 Leicester road is taken as a detached property with valuation at £191,431 (proviser) or £240,637 (upmystreet) or a rounded average of £216,000.

Without detailed valuation or access to rateable value data a “guesstimate” has been made of the market value for the Coach and Horses public House and the Bradgate Furnishings. This is put conservatively at £500,000 for both properties. The commercial valuations do not include loss of business and customer goodwill as it is assumed that these are not national resource costs as business can easily be transferred to similar establishments in the Anstey or wider Leicestershire area.

In Summary the property blight is estimated at:

Residential property	£586,000
Commercial property	£716,000
Total	£1,302,000

This equates to a present value of £1,134 (3.5% discount rate assuming blight is effective from year 4).

### 2.2 PERMANENT TRAFFIC DIVERSION

The collapse of the Leicester Road culvert would necessitate all south eastward bound through traffic to the A46 roundabout to divert via Anstey and onto the unclassified road to join the A50 and back along the A46 to the A5630 roundabout (see Fig 2). Northwestward bound traffic would attempt the reverse route. However, there is no legitimate turn right from the A50 dual carriageway to return traffic to Anstey. It is assumed however for simplicity that this right turn were possible. Alternative diversionary routing would involve many additional

kilometres. These diversions would be enforced permanently under the “Do Nothing” scenario from year 2 (when for health and safety reasons Leicester Road would be closed).

Traffic counts from Leicestershire County Council Highways department are available only for 9<sup>th</sup> October 1996. This manual count indicates the following two way 12 hour traffic flow at The Nook Leicester Road junction:

Vehicles	12 hour flow	24 hour flow (x 1.16)
Cars	9,170	10,637
PSV	165	191
HGV	216	251
LGV	471	546

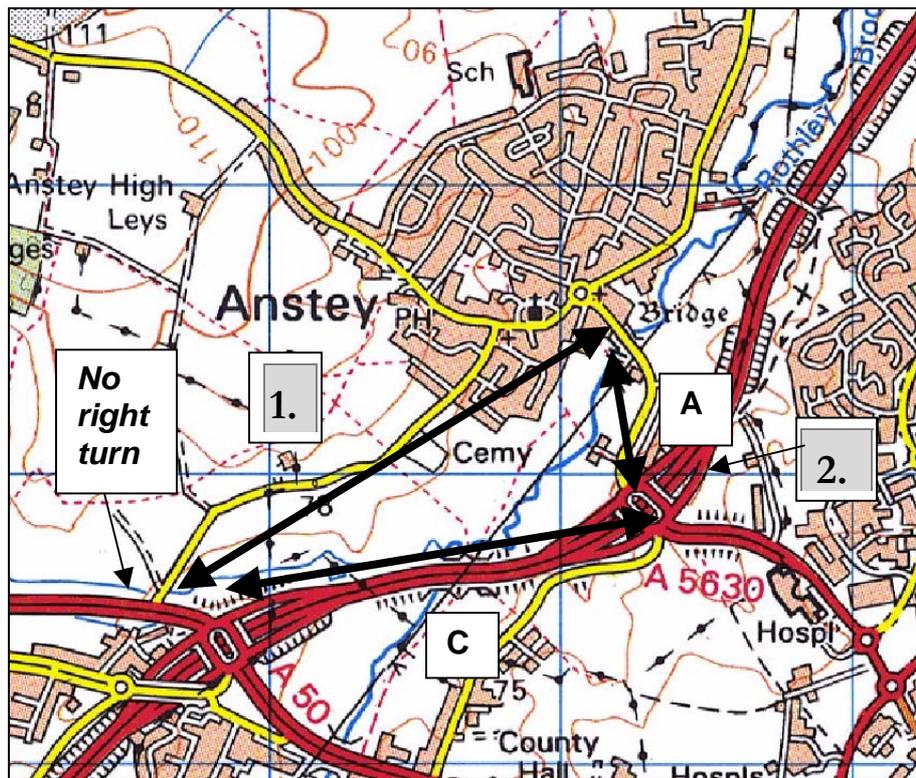


Fig 2: Diversion routes to and from Anstey (A normal route; B+C diversion route)

The diversion route suggested in Fig 2 is measured at 3.7 kilometres whilst the direct route is 0.82 kilometres (from the A46 junction to The Nook).

Travellers derive benefit from completing their journeys. Any delays to these journeys, as a result of a longer more circuitous route enforced by a closed road, has a resource cost in terms of additional time taken (the value of time) and vehicle operating costs. DTLR have developed formulae to evaluate these costs, but it must be remembered that only the marginal extra costs imposed by the diversion is counted rather than the costs of the whole journey. Additional costs are as follows:

Number of vehicles delayed \* additional cost per vehicle \* time that the diversion lasts

We have the number of vehicles (though they are not projected for future growth) and the diversion will last in perpetuity under the Do nothing scenario. The additional cost per vehicle is presented in the following summary table based on DTRL formulae and values (2000):

	<i>Vehicle speed (km/hour)</i>						
	<i>1</i>	<i>2</i>	<i>5</i>	<i>10</i>	<i>20</i>	<i>40</i>	
<i>Pence/km</i>							
<i>Average car</i>	942	472	191	97	50	27	
<i>Average LGV</i>	901	453	184	94	49	27	
<i>Average OGV</i>	944	477	197	104	57	33	
<i>PSV</i>	6573	3296	1330	674	346	183	

*Source: table 6.1 Flood Hazard Research Centre Multi-Coloured manual for appraising coastal defence and flood alleviation works.*

Assuming a free flow speed of 50 km/hour on the routes A and B and 80km/hour on route C and assuming that the normal traffic on the A46 (route C) is not inhibited (i.e. slowed down) by the diverted traffic then resource costs per 24 hour period on the three legs A,B,C are summarised as follows:

#### **Resource costs of traffic Diversion at Anstey (£/24 hours)**

	<b><i>Vehicles per 24 hours</i></b>	<b><i>Route A (50 km/hr)</i></b>	<b><i>Route B (50 km/hr)</i></b>	<b><i>Route C (80 km/hr)</i></b>
<b><i>Cars</i></b>	<b>10,637</b>	<b>1919</b>	<b>4329</b>	<b>2952</b>
<b><i>PSV</i></b>	<b>191</b>	<b>34</b>	<b>78</b>	<b>53</b>
<b><i>LGV</i></b>	<b>471</b>	<b>85</b>	<b>192</b>	<b>131</b>
<b><i>HGV</i></b>	<b>216</b>	<b>39</b>	<b>88</b>	<b>60</b>
<b><i>Normal costs</i></b>		<b>£2,077</b>	<b>per day</b>	
<b><i>Diversion costs</i></b>		<b>£7,882</b>	<b>per day</b>	
<b><i>Additional costs</i></b>		<b>£5,805</b>	<b>per day</b>	

*For expediency it is assumed that routes B and C are of similar lengths i.e. 1.85 km*

Thus annual disruption costs as a result of a permanent diversion would be £2,118,825 giving a present value of £64 millions assuming road closure by year 2 (assuming the variable discount rates reducing from 3.5% as directed by DEFRA following Treasury Green Book revisions earlier this year)

The above traffic disruption analysis is deemed to be valid under strict “Do Nothing” rules set out in FCDPAG3. However, in the result of a collapse necessitating diversion then, due to the high volume of traffic, the highways authority would replace the central section of culvert to avoid disruption. Thus under Do Nothing the value of this work by the Highways Department, estimated at £150,000 should be use as a ‘cap’ to the extreme value of traffic disruption.

## **PROPERTIES FLOODED IN “THE NOOK”**

Under the “Do Nothing” scenario some 8 retail properties including two banks on The Nook and 4 adjacent to The Nook on Bradgate Road (nos 1 to 7) would flood annually to depths averaging 0.1 metre. These properties have a total footprint area of 855 square metres. The Multi-Coloured Manual gives an indicative damage susceptibility of £61 per square metre for a 0.0m flood depth (i.e. just entering the premises) and £299 per square metre for a 0.25 metre flood depth. It is reasonable to take the mean of these figures (£180 per square metre) to

represent typical annual flood damage to each of these retail premises. [For this appraisal the banks too are assumed to be retail premises].

Thus an annual damage of £153,900 is assumed or £4.97 millions discounted over 100 years at the variable discounted rate (3.5% for the first 30 years and reducing to 3.5% by year 100). This represents an average of just over £414,000 per property or more than their capital value. Capping the damages at a conservative capital value of £150,000 with property write off by year 4<sup>2</sup> gives a present value of £1,567,800 (3.5% test discount rate)

### 3 CONCLUSIONS

The value or benefit of replacing the decrepit culvert under Leicester Road, Anstey is avoiding the grave consequences of doing nothing and allowing the collapse without subsequent repair. These consequences are:

Permanent traffic disruption and diversion away from Leicester Road. However, this very large value of £64 million (even without considering traffic growth) is capped at a modest £150,000, i.e. the cost to the Highways Agency not allowing this to happen.

Permanent blight of the properties immediately adjacent to the imminent collapse, estimated at a discounted capital value in year 4 of £1.134 million.

Very frequent flooding (possibly annual) of 12 retail premises in or adjacent to The Nook; whose damage value is capped at a discounted property value at year 4 of £1.568 million.

The following table summarises costs and damages:

Summary of Present Value of Damages (Do Nothing)		£k
	Property blight	1,134
	'Capped' property flooding	1,568
	'Capped' traffic diversion	150
	<i>Total damages (approximates benefits)</i>	2,852
Summary of Present Value of Costs		
	Construction in Year 0	345
	Future Maintenance: CCTV inspection and jetting every 5 years (@£1,200)	Circa £7,000
	<i>Total costs</i>	352
Benefit Cost ratio		8.1:1

The culvert is beyond maintenance, which is therefore not a technical option. Benefits of replacement are therefore colossal in comparison with the modest capital cost of reconstruction (£345,000). Even dramatic changes in the assumptions would not dent the robustness of the appraisal.

Permanent blockage of storm flows (confidently anticipated within the next five years) would cause frequent if not permanent stagnant conditions in the environs of The Nook. This has not been modelled but would almost certainly compare with the blight, property flooding and traffic disruption scenarios estimated here for the "Do Nothing" Scenario.

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<sup>2</sup> The effect of flooding blight on retail premises 'kicks in' far earlier than for residential premises as when leases expire the retailers quickly find more suitable accommodation.

## DEFRA PRIORITY SCORING

The Defra scoring summary is as below:

Economics	15.14
People	2.70
Environment	0.0
Total	17.84

Although the economic score is high the prime beneficiaries are retail or road users so people scoring (i.e. residential properties) is low. The deprivation score is zero. The environmental score is zero. The overall score falls short of the 2003/04 threshold of 22, but is above the indicative threshold for 2004/5 of 15.

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30<sup>th</sup> April 2003