

# **GO Skegness**

Economic Appraisal Report

April 2014

Lincolnshire County Council

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# 1 Introduction

## 1.1 Overview

This report details the economic appraisal of the GO Skegness package of smarter travel measures and supports the Local Sustainable Transport Fund (LSTF) Application. This report describes the approach used to appraise the GO Skegness package of measures, the sources of data used as part of the economic assessment and sets out the resulting Benefit to Cost Ratio.

The GO Skegness programme aims to address the area's two main challenges, the local economy and local deprivation and will deliver an inter-connected package of measures to unlock growth in the visitor economy and tackle local deprivation.

The project capitalises on recent successes including the LSTF funded Access LN6 Programme in Lincoln and ERDF funded improvements to the rail station. It will address local problems and benefit the local economy by improving and broadening the visitor experience, and encouraging healthy active lifestyles for all.

GO Skegness will reduce congestion and journey times during the summer peak; actively enhance and promote walking, cycling and public transport to increase sustainable mode travel; support access to work and services; and improve health and well-being. The packages which build on significant local support focus on making travel by non car modes easy, straightforward, cost effective and even fun to encourage people to leave the car at home.

The economic appraisal of the GO Skegness measures follows guidance set out by the Department for Transport (DfT) and specifically follows the approach set out in the following Transport Analysis Guidance documents:

- TAG Unit A1.1: Cost-Benefit Analysis (Jan 2014);
- TAG Unit A1.2: Scheme Costs (Jan 2014);
- TAG Unit A4.1: Social Impact Appraisal (Jan 2014);
- TAG Unit A5.1: Active Mode Appraisal (Jan 2014); and
- TAG Unit A5.4: Marginal External Costs.

### 1.1.1 *Structure of the Report*

The remainder of this report is structured as follows:

- Section 2 sets out the key assumptions used in this appraisal;
- Section 3 describes the sources of data used within the appraisal and the methodology used to derive the baseline statistics;

- Section 4 describes the journey ambience benefits that are forecast to result from the GO Skegness package;
- Section 5 sets out the health benefits that are forecast to result from the scheme;
- Section 6 describes the absenteeism benefits that are expected to generated by the scheme;
- Section 7 sets out the accident benefits;
- Section 8 sets out the journey time benefits for bus users;
- Section 9 describes the marginal external cost benefits for the study area; and
- Section 10 presents the overall costs and benefits of the scheme including the final Benefit to Cost Ratio (BCR).

## 2 Key Assumptions

### 2.1 Overview

The following section provides a brief overview of the assumptions and procedures followed in deriving the benefits of the measures included as part of the GO Skegness programme. As the GO Skegness programme focuses on promoting and encouraging travel by more sustainable travel modes, the economic assessment primarily follows the guidance set out in the TAG Unit A5.1 Active Mode Appraisal.

In line with the guidance the key elements of the appraisal are as follows:

Table 2-1 – Elements of the GO Skegness Economic Appraisal

Indicator	Used to appraise
Cycling and walking users	Journey quality
New individuals cycling or walking	Physical activity Journey quality
New and existing bus users	Journey time
Car kilometres saved	Accidents Greenhouse gas emissions, air quality and noise Indirect tax revenue Travel time (decongestion)
Cycle commuter trips generated	Absenteeism
Scheme Costs	Capital and Revenue cost elements of the package, including optimism bias assumptions.

#### 2.1.1 GO Skegness Overview & Study Area

The GO Skegness programme focuses on the wider Skegness coastal strip, stretching from Gibraltar Point south of Skegness Town Centre as far north as Chapel St Leonards, including the coastal village of Ingoldmells.

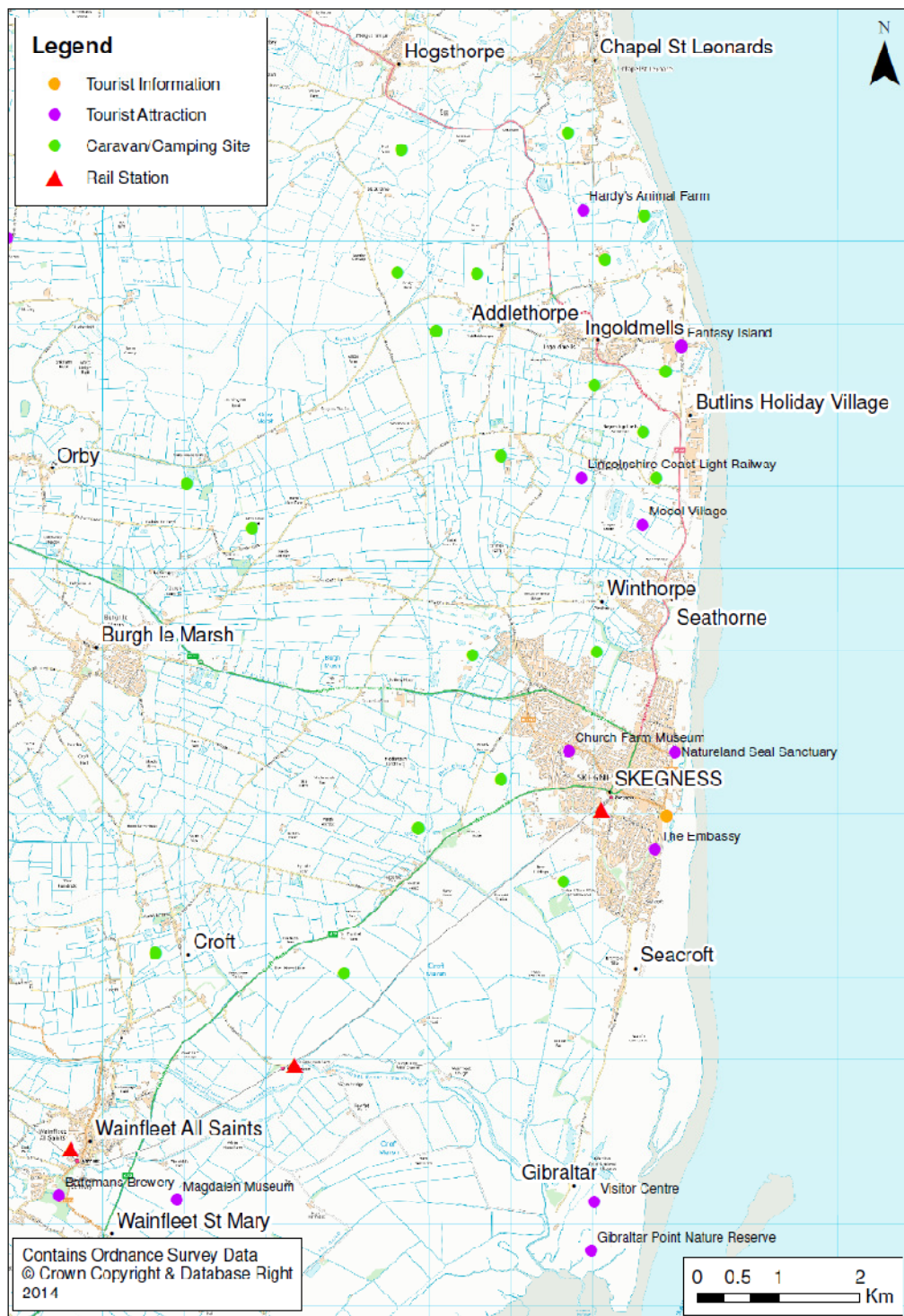
The study area used as the basis for this appraisal is shown in Figure 2-1 and a description of the package of measures that form the basis of this bid and are the subject of this appraisal, are set out in Table 2-2 below:

Table 2-2 –GO Skegness Package of Measures

Bid element	Key Areas	Summary of Measures
Package 1 - Supporting the Visitor Economy	Enhance Gateways	<i>Free Wi-Fi, new/improved information benefiting connections to other modes. Work with rail and coach operators to improve service arrangements. Improved information/marketing for Interconnect services, seasonal Park &amp; Ride, improved parking information (inc. temporary VMS) and a review of signalised junction timings.</i>
	Improve Public	<i>Targeted walking environment improvements, customer</i>

Bid element	Key Areas	Summary of Measures
	Transport Experience	<i>service and information training for PT staff and luggage transfer service. Signalisation of two key junctions, improvements to existing bus priority junctions, removal of corridor pinch points, roll out of RTP1 and the introduction of GO Skegness travel card.</i>
	Providing Better Travel Information	<i>Digital - visit Skegness App, central web portal, information totems, videos and animations, run a competition aimed at identifying data gaps. Static - network maps, large way finding map, travel guide, travel shop, training of Tourist Information staff and tourist route markings trail. Review of existing signage and way finding.</i>
	Encourage Active Holidays	<i>New cycle routes - Skegness to Gibraltar Point, Skegness to Ingoldmells and Skegness to Chapel St. Leonards. Town centre walking and cycling improvements, bike hire, bike taxis/rickshaws and cycle parking.</i>
Package 2 - Supporting Local Communities	Encourage Active Lifestyles	<i>Cycle infrastructure outlined in Package 1, Review existing and create new map of cycle routes, bike hire, cycle training, bike maintenance and support for funding grants, community sports events and health schemes.</i>
	Improve Access to Work and Services	<i>Support access to employment including free travel support/information and free/discounted tickets for travel to interviews/new jobs. Support and develop Cycle to Work, Wheels to Work, car share and taxi share scheme, establish sustainable community transport scheme, support delivery of electric vehicles and charging points and community focused travel information.</i>
Package 3 - Travel Advisors	Travel Advisors	<i>Range of Travel Advisors to support measures delivered within Packages 1 and 2.</i>
Package 4 - Promotion, Marketing and Engagement	Targeted Marketing Campaign	<i>Targeted marketing campaign and development of marketing strategy.</i>
Package 5 - Long-term Planning	Future Strategy	<i>Support to ten year strategy, including extension of Business Improvement District Development manager post.</i>
Staff		<i>A range of posts including Project Manager, Communications and Marketing Officer, Delivery Officer and Active Travel Officers.</i>

Figure 2-1 – GO Skegness Economic Appraisal Study Area





## 2.2 Scheme Costs

A robust cost estimate has been prepared for the measures described in Table 2-2. They are based on Q3 2013 prices and the base costs are set out in Table 2-3.

Table 2-3 –GO Skegness Scheme Cost Estimate (Base Costs)

Bid Element	Measure	Base Costs
<b>Package 1 – Supporting the Visitor Economy</b>	Enhance Gateways	£338,000
	Improve Public Transport Experience	£1,541,000
	Providing Better Travel Information	£281,500
	Encourage Active Holidays	£1,387,500
<b>Package 2 – Supporting Local Communities</b>	Encourage Active Lifestyle	£1,080,500
	Improve Access to Work and Services	£76,000
<b>Package 3 – Travel Advisors</b>	Travel Advisors	£22,500
<b>Package 4 – Promotion, Marketing and Engagement</b>	Targeted Marketing Campaign	£98,500
<b>Package 5 – Long-term Planning</b>	Future Strategy	£98,500
<b>Staff</b>		£116,500
<b>Total Base Costs</b>		<b>£5,040,500</b>

### 2.2.1 Quantified Risk Assessment & Optimism Bias

The impact of inflation and optimism bias has been assessed and accounted for within this appraisal. As described above, the base costs have been calculated on Q3 2013 prices, in line with TAG Unit A1.2 the impact of inflation has been calculated (see Table 2-4).

To ensure that a robust scheme cost is used as part of the economic appraisal, optimism bias has been applied to adjust the estimate identified above. The approach set out in TAG Unit A1.2 identifies that based on the current development stage of the scheme an optimism bias of 44% may be appropriate for the GO Skegness programme. However, given Lincolnshire County Councils expertise at delivering packages of sustainable transport improvements, such as the successful Access LN6 project in Lincoln, a lower factor is considered more appropriate. As such, an optimism bias of 15% has been applied to the scheme – equivalent to schemes at the conditional approval / works commitment stage.

Table 2-4 –Impact of Inflation and Optimism Bias

Cost Estimate Uplift	Package Costs
Optimism Bias	15%
Base Costs + Inflation + Optimism Bias	£6,687,100
Base Costs + Inflation	£5,814,900
Base Costs	£5,040,500

A risk assessment and risk register has been generated for the GO Skegness programme, the outputs of which are described in Section B8 of the GO Skegness LSTF Bid. A full quantified risk assessment is not considered proportionate for this scheme due to the scale of the programme and has not been included as part of the scheme costs. Any risks inherent within the cost estimate are considered to have been captured by the inclusion of optimism bias.

## 2.3 Key Assumptions

### 2.3.1 Assessment Periods

The key assessment dates used within this appraisal are set out below:

- Base Year: 2012
- Scheme Opening Year: 2016
- Assessment period: 30 years (2016 – 2046)

The GO Skegness integrated package of both infrastructure and behavioural change focused measures to support low carbon growth and encourage sustainable travel will ensure that the benefits of the scheme are maintained over the long-term, as such, an appraisal period of 30 years is justified.

### 2.3.2 Key Assumptions

The key assumptions for cyclists and bus users within this appraisal are set out in Table 2-5 below.

Table 2-5 – Key Assumptions

Mode	Input Data	Without Scheme	With Scheme	Source/Comments
Cyclists	Cycling Demand	2012 (Base)	+30%	Based on increases identified within comparative studies an assumed uplift in base demand of 30% is both achievable and conservative, thus the target should in fact be greater.  Demand estimate based on cycle count from monitoring and applied across study area using Census data.

Mode	Input Data	Without Scheme	With Scheme	Source/Comments
	Average Cycling Speed (kph)	14kph	14kph	Average DfT Cycle Speed of 20kph deducted to 14kph to allow for local circumstances.
	Average Cycling Distance (km)	5.1km	5.1km	National Travel Survey Table nts0306 Figure for the year 2012: 3.2miles = 5.1km
	Average Cycling Time	22mins	22mins	Based on cycling for 5.1km at 14kph. N.B. NTS figure is 23mins
Bus users	Bus Demand	2012 (Base)	+20%	Based on increases identified within comparative studies an assumed uplift in base demand of 15% is both achievable and conservative, thus the target should in fact be greater.  Demand estimates have been produced based on local operator monitoring data. Note: The assessment focuses on the peak summer period for bus use only.
	Average trip distance	6.5km	6.5km	Based on Skegness to Ingoldmells route. NTS data indicates an average trip length of 8.4km.

## 3 Demand Estimates

### 3.1 Overview

The following section briefly describes the process used to derive the baseline cycling and bus user statistics for the appraisal of the GO Skegness package of measures.

### 3.2 Cyclists

The following information was collated for the study area:

- Baseline population within study area
- The number of people in full time employment within the study area
- The journey to work mode split for the study area
- The cycling trip demand per day
- The cycling trip demand for journeys to work per year
- The cycling trip demand per year

These have been used to forecast the likely change in demand for cycling resulting from the implementation of the GO Skegness programme.

#### 3.2.1 Baseline Population & Journey to Work Data

The baseline population and journey to work data was taken from the Office of National Statistics (ONS) 2011 Census Data. The following datasets covering the study area were extracted at Lower Super Output Area (LSOA) level:

- Total population;
- Total population aged 16-74;
- Total aged 16-74 in employment;
- Total aged 16-74 not in employment; and
- The total number of people travelling to work by bicycle

The outputs are set out in Table 3-1.

Table 3-1 – 2011 Census Neighbourhood Statistics: Method of Travel to Work, 2011

2011 Census Lower SOA	Total population	All aged 16 to 74	16 to 74 in employment	16-74 not in employment	Travel to work by bicycle	Bicycle Travel to work mode share %
East Lindsey 010A	1,517	1,165	464	701	6	1.3%
East Lindsey 010B	1,556	1,183	587	596	16	2.7%
East Lindsey 010C	1,601	1,167	441	726	8	1.8%
East Lindsey 010D	2,392	1,905	966	939	19	2.0%
East Lindsey 012A	1,598	1,157	607	550	52	8.6%
East Lindsey 012B	2,226	1,640	797	843	49	6.1%
East Lindsey 012C	1,755	1,303	594	709	31	5.2%

2011 Census Lower SOA	Total population	All aged 16 to 74	16 to 74 in employment	16-74 not in employment	Travel to work by bicycle	Bicycle Travel to work mode share %
East Lindsey 012D	1,700	1,247	725	522	30	4.1%
East Lindsey 013A	1,141	838	497	341	9	1.8%
East Lindsey 014A	1,431	1,073	601	472	28	4.7%
East Lindsey 014B	1,741	1,341	727	614	20	2.8%
East Lindsey 014C	1,207	847	513	334	33	6.4%
East Lindsey 014D	1,482	1,110	627	483	38	6.1%
East Lindsey 015A	1,770	1,245	576	669	40	6.9%
East Lindsey 015B	1,668	1,185	564	621	42	7.4%
East Lindsey 015C	1,512	1,050	747	303	41	5.5%
East Lindsey 015D	1,489	1,030	475	555	32	6.7%
East Lindsey 017A	1,171	863	520	343	12	2.3%
East Lindsey 017D	1,190	800	371	429	17	4.6%

### 3.2.2 Estimation of Cycling Demand

An estimate of the baseline cycling trip demand across the study area has been derived using automated cycle count data (where available) and the cycle mode share for each LSOA within the study area. The cycle count data is taken from three DfT count sites located in the study area, as outlined below:

- A52 Roman Bank, north of Wall's Lane (Grid Reference 557060, 367000);
- A158 Burgh Road, west of A52 Roman Bank (Grid Reference 556000, 364240); and
- A52 Wainfleet Road, west of A52 Roman Bank (Grid Reference 556000, 363330).

The cycle count data (for 2012) gives an average of 132 single cycle trips per day. This figure has then been adjusted using 2011 Census Method of Travel to Work data from the 2011 Census Neighbourhood Statistics for the LSOAs relevant to the study area to reflect the difference in proportion of working residents travelling to work by bicycle. The following formula was used to adjust cycle count data to provide an estimate of the likely cycle trip demand per day within the study area for 2012:

- $132 * \text{Cycle to work mode share (LSOA for the study area)} / \text{Cycle to Work Mode Share (LSOA for the Count Data Sites)}$

The trip demand per day was then factored up to provide an annual trip demand for travel to work journeys and for total annual demand for all journeys. The demand estimates for the study area are set out in Table 3-2:

Table 3-2 – GO Skegness Trip Demand Summary 2011

2011 Census Lower SOA	Trip Demand (day)	Trip Demand (Yr, work)	Trip Demand (Yr)
East Lindsey 010A	33	8524	11704
East Lindsey 010B	69	17968	24671
East Lindsey 010C	46	11958	16419
East Lindsey 010D	50	12965	17803
East Lindsey 012A	217	56471	77539
East Lindsey 012B	156	40527	55647
East Lindsey 012C	132	34402	47237
East Lindsey 012D	105	27277	37453
East Lindsey 013A	46	11937	16391
East Lindsey 014A	118	30711	42169
East Lindsey 014B	70	18135	24900
East Lindsey 014C	163	42404	58224
East Lindsey 014D	154	39951	54856
East Lindsey 015A	176	45777	62856
East Lindsey 015B	189	49089	67403
East Lindsey 015C	139	36181	49679
East Lindsey 015D	171	44409	60977
East Lindsey 017A	59	15212	20887
East Lindsey 017D	116	30206	41475

### 3.2.3 Forecast Cycling Demand

The demand estimates for cycling across the study area are summarised in Table 3-3 below. They set out the demand for 2012 (based on the cycle data and calculation described above), and the estimates for the scheme opening year.

Table 3-3 – Demand Estimate Cycling Trips

2012 Base	Demand	Calculation
Cycle Trips (Base)	2,208	Cycling Trip demand per day for study area
Number of Cyclists (Base)	1,214	Based on TAG Unit A5.1. The number of individual users is based on the assumption that 90% of trips are part of a return journey using the same route, to avoid double counting in the calculation of the number of individuals affected: Individual users = Base trips * 90% / 2 + Base trips * 10%
Scheme Opening Year Estimate	Demand	Calculation
Cycling Trips - Without scheme	2,208	Assuming no growth
Cycling Trips - With scheme	2,871	Assumes a 30% increase in cycling after 1 year

Usage difference (trips)	662	With scheme trips – Without scheme trips
Number of cyclists - Without scheme	1,214	Assuming no growth
Number of cyclists - With scheme	1,579	Assumes a 30% increase in cycling after 1 year
Usage difference (Number of cyclists)	364	With scheme individuals – Without scheme individuals

### 3.3 Bus Users

The principal bus operator in study area, Stagecoach, provided 2012 bus trip data for the services operating along the key A52 corridor in the study area, running between Skegness and Ingoldmells. Data for June, July and August was extracted from the information provided by Stagecoach, as this represents the peak summer tourism season in the study area.

The bus trip data for the three month period was divided by the total number of days in June, July and August in order to generate an estimate of the number bus trips per day.

#### 3.3.1 Forecast Bus User Demand

The demand estimates for bus users within the study area are summarised in Table 3-4 below. They set out the demand for 2012 (based on the Stagecoach data and the calculation described above), and the estimates for the scheme opening year. Once again, these estimates are based on the three month peak summer season only.

Table 3-4 – Demand Estimates Bus User Trips

2012 Base	Demand	Calculation
Bus Trips (Base)	35,755	Summer peak bus user demand per day for study area
Number of bus users (Base)	19,665	Based on TAG Unit A5.1. The number of individual users is based on the assumption that 90% of trips are part of a return journey using the same route, to avoid double counting in the calculation of the number of individuals affected: $\text{Individual users} = \text{Base trips} * 90\% / 2 + \text{Base trips} * 10\%$
Scheme Opening Year Estimate (2016)	Demand	Calculation
Bus trips - Without scheme	35,755	Assuming no growth
Bus trips - With scheme	42,906	Assumes a 20% increase in bus use after 1 year
Usage difference (trips)	7,151	With scheme trips – Without scheme trips
Number of bus users - Without scheme	19,665	Assuming no growth
Number of bus users - With scheme	23,598	Assumes a 30% increase in bus use after 1 year
Usage difference (Number of bus users)	3,933	With scheme individuals – Without scheme individuals

## 4 Journey Ambience

### 4.1 Overview

This section provides an overview of the journey quality benefits that are forecast to result from the GO Skegness programme. They specifically relate to the impact of the additional cycling infrastructure that forms an integral part of the measures included within the bid.

TAG Unit A5.1 states that journey quality is an important consideration in scheme appraisal for cyclists (and walkers). It includes fear of potential accidents and therefore the majority of concerns are about safety (e.g. segregated cycle tracks greatly improve journey quality over cycling on a road with traffic).

It is important to note that journey quality benefits are subject to the ‘rule of half’, current users of a route will experience the full benefit of any improvements to quality but the benefits for new cyclists (and walkers) should be divided by two.

### 4.2 Assumptions

#### 4.2.1 Types of Project and Associated Ambience Rates

The calculation of benefits follows the guidance set out in TAG Unit A5.1 and uses the data contained in the TAG data book to quantify the impact of additional cycle facilities. Table 4-1 below outlines published research figures as a guide to the potential maxima for an improvement. The values in the table give an approximate monetary benefit of the introduction of cycling schemes and include not only infrastructural changes, but facilities as well. These monetary values include all aspects of quality, including environmental quality, comfort and convenience and perceived improvements to safety.

*Table 4-1 – Summary of Value of Journey Ambience Benefit of different type of cycle facility relative to no facilities (2010 values and prices) – TAG Data book A4.1.6*

Scheme type	Value (p/min)	Source
Off-road segregated cycle track	7.03	Hopkinson & Wardman (1996)
On-road segregated cycle lane	2.99	Hopkinson & Wardman (1996)
On-road non-segregated cycle lane	2.97	Wardman et al. (1997)
Wider lane	1.81	Hopkinson & Wardman (1996)
Shared bus lane	0.77	Hopkinson & Wardman (1996)
	<b>Value (p)</b>	
Secure cycle parking facilities	98.14	Wardman et al. (2007)
Changing and shower facilities	20.82	Wardman et al. (2007)

#### 4.2.2 Methodology

The calculation of journey ambience benefits assessed the impacts on new and existing users. Table 4-2 summarises the assumptions and sources of evidence



used in the calculation of Journey Ambience benefits for cyclists based on the GO Skegness package of measures.

Table 4-2 – Journey Ambience Benefits – Summary of assumptions and sources of evidence

Scheme Element	Variable	Assumption
-	Without scheme number of cyclists (Existing)	1214
	With scheme number of cyclists	1579
	New cyclists as a result of scheme	365
Route 1 – Skegness to Gibraltar Point (2.6miles)	Calculated cycle journey time (Based on NTS average cycle speed of 14kmph)	18 mins
	Proportion of Existing users making use of route	15%
	Proportion of New users making use of route	30%
Route 2 – Skegness to Ingoldmells (2.6 miles)	Calculated cycle journey time (Based on NTS average cycle speed of 14kmph)	18 mins
	Proportion of Existing users making use of route	20%
	Proportion of New users making use of route	30%
Route 3 – Skegness to Chapel St Leonards (6 miles)	Calculated cycle journey time (Based on NTS average cycle speed of 14kmph)	45 mins
	Proportion of Existing users making use of route	15%
	Proportion of New users making use of route	30%
New cycle parking facilities	Proportion of Existing users making use of facility	10%
	Proportion of New users making use of facility	15%
New showers facilities	Proportion of New and Existing users making use of facility	5%

Table 4-3 outlines the value of journey ambience adopted for each section of cycle route, parking and shower facilities, the benefits per cyclist and the numbers of existing and new cyclists. The ‘Benefits per cyclist’ is calculated by:

Value (p/min) \* Average trip time

Existing and new user numbers are calculated based on the demand and proportions for each route, outlined in Table 4-3.

Table 4-3 – Journey Ambience Benefits – Summary of assumptions and sources of evidence

Scheme Element	Value p/min	Benefit per cyclist (p)	Existing users	New users
Route 1 - Skegness to Gibraltar Point	7.03	126.54	121	73
Route 2 - Skegness to Ingoldmells	7.03	126.54	182	73
Route 3 - Skegness to Chapel St. Leonards	7.03	316.35	121	73
Parking facilities	98.14	98.14	121	36
Showers facilities	20.82	20.82	61	12

### 4.3 Journey Ambience Results

The forecast Journey Ambience benefits are detailed in Table 4-4 and show an annual benefit (in 2010 prices) of £412,332. The forecast benefits over the 30 year appraisal period (in 2010 prices) are forecast to total £8,351,602.

Table 4-4 – Summary of Journey Ambience Benefits (2010 Prices)

Scheme Element	Existing user benefit	New user benefit	Annual benefit
Route 1 – Skegness to Gibraltar Point	£230.51	£69.15	£77,914
Route 2 – Skegness to Ingoldmells	£307.35	£69.15	£97,892
Route 3 – Skegness to Chapel St. Leonards	£576.29	£172.89	£194,785
Parking facilities	£119.19	£26.82	£37,961
Showers facilities	£12.64	£1.90	£3,780
<b>Total</b>			<b>£412,332</b>
<b>Present Value of Ambience Benefits over 30 year appraisal period</b>			<b>£8,351,602</b>

## 5 Health Benefits

### 5.1 Overview

TAG Unit A5.1 states that physical activity impacts typically form a significant proportion of benefits for active mode schemes. The method for calculating these impacts is taken from 'Quantifying the health effects of cycling and walking' (World Health Organisation (WHO), 2007) and its accompanying model, the Health Economic Assessment Tool (HEAT). As outlined in the following sections, the method requires estimates of the number of new cyclists as a result of the scheme; the time per day they will spend active; and mortality rates applicable to the group affected by the scheme.

### 5.2 Assumptions

As described above, the assessment utilised the HEAT tool to calculate and forecast the health benefits that may result from the scheme. The assessment follows the guidance set out within TAG Unit A5.1 and HEAT; Table 5-1 details the assumptions input into HEAT.

Table 5-1 – HEAT Assumptions

Variable	Assumption
Average Cycle Trip Duration (NTS)	22 mins
HEAT Average number of days per year people cycle	124 days
Without scheme number of cyclists	1214
With scheme number of cyclists	1579
Proportion of new cycling attributable to the GO Skegness measures	60%
Cycle casualties (HEAT default value for the United Kingdom)	248.97 deaths per 100,000 persons per year
Value of a Fatality (TAG Unit A5.1)	£1,643,572

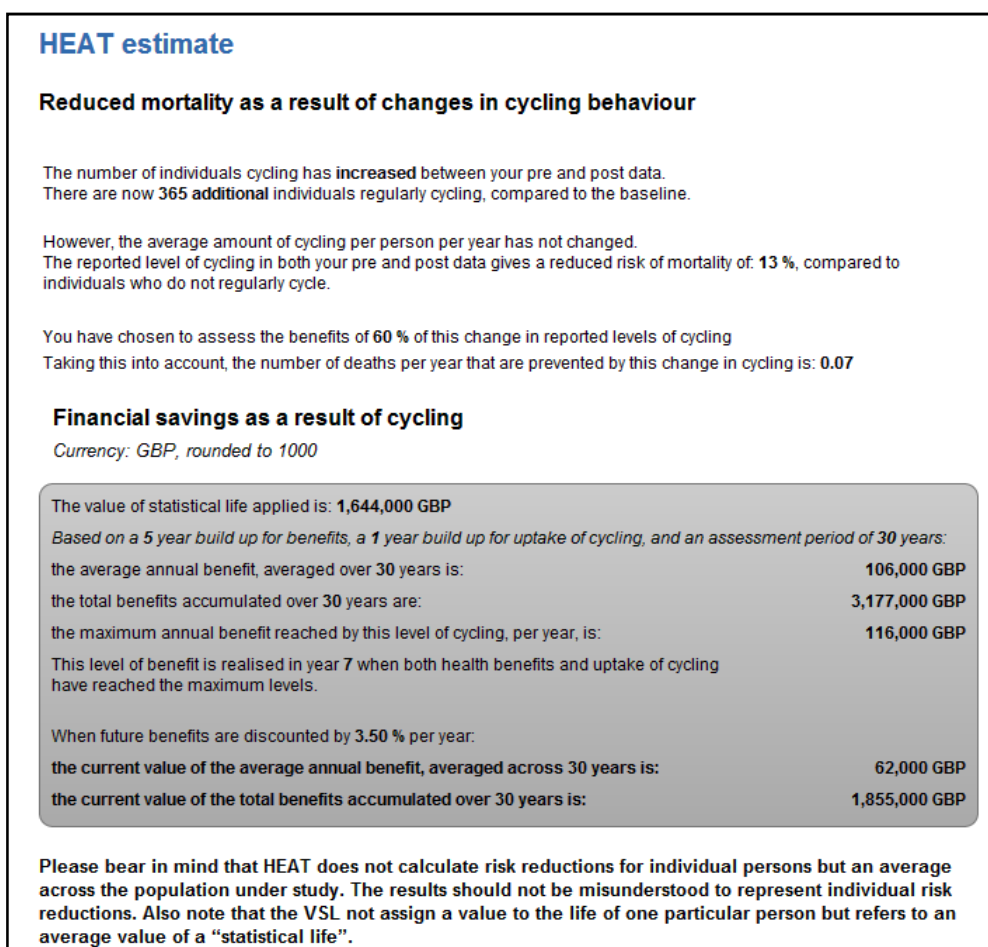
### 5.3 Results

The forecast Health Benefits, based on the HEAT assessment are detailed in Figure 5-1 and the health (physical activity) benefits summarised in Table 5-2 below.

Table 5-2 – Summary of monetised health benefits (2010 prices)

HEAT Benefits Summary	Benefits
Average Cycle Trip Duration (NTS)	£106,000
HEAT Average number of days per year people cycle	£2,146,983

Figure 5-1 – Heat Model Outputs



## 6 Absenteeism Benefits

### 6.1 Overview

This section describes the assumptions and methodology used to assess the impact of the GO Skegness scheme on a reduction in absenteeism. The calculation of benefits follows the guidance set out in TAG Unit A4.1.

TAG Unit A5.1 outlines that improved health from increased physical activity (including cycling) can also lead to reductions in short term absence from work. The method requires estimates of the number of new walkers and cyclists who are commuting; the time per day they will spend active; and average absenteeism rates and labour costs.

### 6.2 Assumptions and Sources of Evidence

The benefits have been calculated using the assumptions set out in Table 6-1.

Table 6-1 – Absenteeism Benefits Assumptions

Variable	Assumption
Average annual absenteeism rate per person (CIPD Absence Management Report, 2012)	7.7
Minutes of activity required to achieve a 6% reduction in short term sick leave. (WHO, 2003)	30 mins
The expected reduction in absenteeism due to increased physical activity (TAG Unit A4.1)	6%
Median gross annual earnings for full-time employees (2013 ONS report)	£27,000
Average cycle duration for study area	22 mins
Estimated number of new cyclists as a result of the GO Skegness package of measures	365
Proportion of new cyclists who are commuters	60%

### 6.3 Methodology

The methodology for calculating the benefits resulting from a reduction in absenteeism benefits is set out below in Table 6-2.

Table 6-2 – Calculation of Absenteeism Benefits

Variable	Calculation	Value
Reduction in sick days per affected individual	Average annual absenteeism rate * expected reduction in absenteeism	0.462
Average salary cost per working day	Median gross annual earning * 2 (to account for overheads) / 260 (average number of working days in a year)	£207.69
Benefits per affected individual	Average salary cost per working day * reduction in sick days	£95.95
Value of reduction in absenteeism per new cyclist per annum	(Benefits per affected individual * % of New Cyclists commuters) * (Average cycle journey	£42.22

Variable	Calculation	Value
	time / 30 mins activity)	
Absenteeism benefits per annum	Value of reduction in absenteeism per new cyclist per annum * estimated increase in cyclists	£15,382

## 6.4 Results

The forecast Absenteeism annual benefit is summarised in Table 6-3 below.

*Table 6-3 – Absenteeism Benefits Summary (2010 prices)*

Absenteeism Benefits summary	Benefits
Absenteeism Benefits per annum	£15,382
Present Value of Absenteeism Benefits over 30 Year Appraisal Period	£311,558

# 7 Accident Benefits

## 7.1 Overview

This section describes the assumptions and methodology used to assess the impact of the GO Skegness scheme on Accident Benefits. The calculation of benefits follows the guidance set out in TAG Unit A4.1.

TAG Unit A5.1 outlines that accident analysis should take account of changes in accidents involving pedestrians and cyclists, resulting from changes in walking and cycling and the infrastructure used, and the impact of mode switch on accidents involving other road users.

## 7.2 Assumptions and Base Data

Table 7-1 summarises the assumptions and sources of evidence used in the calculation of accident benefits for pedestrians and cyclists based on the GO Skegness package of measures.

Table 7-1 – Accidents Assumptions

Variable	Assumption
Study area pedestrian accidents over last 5 years (LCC data)	19
Study area cyclists accidents over last 5 years (LCC data)	7
Estimate of proportion of reduction in pedestrian and cyclist accidents	-20%
Average value of accident prevention per pedestrian road casualty (TAG data book A4.1.2)	£79,057
Average value of accident prevention per cyclist road casualty (TAG data book A4.1.2)	£53,149
Accident elasticity parameter - based on 30% increase (TAG Unit A4.1)	7.57%

\*Note that whilst this is based on an estimate, a sensitivity test has been undertaken to assess the impact of a lower accident reduction percentage. A 10% saving will deliver a positive overall BCR of 2.1.

## 7.3 Accident Benefits Calculation

The methodology for calculating the benefits resulting from a reduction in accidents is set out below in Table 7-2.

Table 7-2 – Calculation of Accident Benefits

Variable	Calculation	Value
Without scheme annual pedestrian accidents	Study area accidents over 5 years / 5	3.8
Without scheme annual cyclist accidents	Study area accidents over 5 years / 5	1.4
Pedestrian accidents saved per year	Average annual pedestrian accidents *estimate of proportion of reduction in accidents	0.76
Cyclist accidents saved per year	Average annual cyclist accidents *estimate of proportion of reduction in accidents	0.28
With scheme pedestrian accident level	Without scheme pedestrian accidents – pedestrian accidents saved	3.04

Variable	Calculation	Value
With scheme cyclist accident level	Without scheme cyclist accidents – cyclist accidents saved	1.12
Forecast additional pedestrian accidents	With scheme pedestrian accident level * accident elasticity parameter	0.23
Forecast additional cyclist accidents	With scheme cyclist accident level * accident elasticity parameter	0.08
Forecast pedestrian accidents	With scheme pedestrian accident level + Forecast additional pedestrian accidents	3.27
Forecast cyclist accidents	With scheme cyclist accident level + Forecast additional cyclist accidents	1.20
Pedestrian accident benefits	(Without scheme annual pedestrian accidents – Forecast pedestrian accidents) * Value of accident prevention per pedestrian road casualty	£41,901
Cyclist accident benefits	(Without scheme annual cyclist accidents – Forecast pedestrian accidents) * Value of accident prevention per cyclist road casualty	£10,378

## 7.4 Results

The forecast accident benefits are detailed in Table 7-3 below.

*Table 7-3 – Summary of Accident Benefits (2010 Prices)*

Accident Benefits Summary	Benefits
Pedestrian Accidents	£41,901
Cyclist Accidents	£10,378
<b>Total</b>	<b>£52,279</b>
<b>Present Value of Accident Benefits over 30 year appraisal period</b>	<b>£1,058,892</b>



## 8 Journey Time Benefits

### 8.1 Overview

This section describes the assumptions and methodology used to assess the impact of the GO Skegness scheme on Journey Time (JT) Benefits.

### 8.2 Assumptions

Table 8-1 summarises the assumptions and sources of evidence used in the calculation of JT benefits for bus users based on the GO Skegness package of measures.

*Table 8-1 – Journey Time (JT) Benefits – Summary of assumptions and sources of evidence*

Variable	Assumption
Average bus JT in summer peak period (operator data)	95 mins
Average bus JT outside the summer peak period (operator data)	49 mins
Assumed reduction in additional bus JT	35%
Non-working Value of Time (VoT) (TAG data book A1.3.1)	£6.04
Existing bus users	19,655
New bus users as a result of GO Skegness	3,933
Proportion of bus users experiencing delay	50%

### 8.3 Methodology

The methodology for calculating the benefits resulting from a reduction in journey time for bus users is set out below in Table 8-2.

*Table 8-2 – Calculation of Journey Time Benefits*

Variable	Calculation	Value
Additional bus JT	Summer peak JT – outside summer peak JT	46 mins
Reduction in bus JT (mins)	Additional bus JT * assumed reduction in additional bus JT	16.1 mins
Reduction in bus JT (Hrs)	Reduction in bus JT (mins) / 60	0.27 Hrs
With scheme summer peak JT	Summer peak JT – Reduction in bus JT	79 mins
Existing users benefiting from GO Skegness	Existing bus users * Proportion of bus users experiencing delay	9,833
New users benefiting from GO Skegness	New bus users * Proportion of bus users experiencing delay	1,967
Benefit for existing users	Reduction in bus JT (Hrs) * Non-working VoT * Existing users benefiting from GO Skegness	£15,948
Benefit for new users	Reduction in bus JT (Hrs) * Non-working VoT * Existing users benefiting from GO Skegness	£1,595

## 8.4 Results

The forecast journey time benefits are detailed in Table 8-3 below.

*Table 8-3 – Summary of Journey Time Benefits (2010 Prices)*

<b>Accident Benefits Summary</b>	<b>Benefits</b>
Journey Time benefits per annum	£17,543
Present Value of Journey Time Benefits over 30 year appraisal period	£355,317

# 9 Marginal External Cost Benefits

## 9.1 Overview

This section describes the calculation of Marginal External Cost (MEC) benefits for the GO Skegness programme. TAG Unit A5.4 – Marginal External Cost states that road decongestion benefits will arise where significant traffic reductions occur in moderate to congested conditions. Fully specified multi-modal models can provide robust estimates of decongestion benefits. However, the primary method for estimating decongestion benefits in the absence of a multi-modal model (as is the case for the GO Skegness project) is based on marginal external costs (MEC).

The use of road vehicles incurs both private costs borne by the individual traveller (such as fuel costs and personal travel time) and external costs borne by others. For car use, these external costs include congestion, air pollution, noise, and infrastructure and accident costs. The MEC method is based on the change in these external costs arising from an additional (or removed) vehicle (or vehicle km) on the network.

## 9.2 Assumptions

MEC analysis for the GO Skegness package of measures has focused on the reduction in car kilometres as a result of the combination of cycling and bus user measures. TAG Unit A5.4 outlines four steps taken to assess MEC's, these are:

- Step 1 – Estimate the change in car kilometres;
- Step 2 – Analyse the characteristics of the car journeys removed;
- Step 3 – Calculate marginal external costs for modelled years; and
- Step 4 – Discount costs over the appraisal period

As per the guidance, Table 9-1 sets out the assumptions that have been used to estimate the reduction in car kilometres as a result of the GO Skegness package of measures.

Table 9-1 – MEC's – Summary of assumptions used for reduction in car kilometres calculation

Mode	Description of Assumption / Evidence	Value
Cyclists	Average trip length for cyclists (based on NTS data)	5.1
	Without scheme number of cyclists	1214
	With scheme number of cyclists	1579
	Without scheme cyclist km length (5.1 * 1214)	6194
	With scheme cyclist km length (5.1 * 1579)	8052
	Change in cycling km (8052 – 6194)	1858
	Proportion of cyclists that could have used a car but chose not to (based on travel plan experience and DfT Door to Door strategy)	30%
	Assumed change in average journey lengths	0%
	Car Km's saved	-557

Mode	Description of Assumption / Evidence	Value
	Car Km's saved per year (Car Km's saved * working days per year)	-144,933
Bus users	Average trip length for bus (based on Skegness to Ingoldmells route)	6.5
	Without scheme number of bus passengers	19665
	With scheme number of bus passengers	23598
	Without scheme bus passenger km length (6.5 * 19665)	127823
	With scheme bus passenger km length (6.5 * 23598)	153388
	Change in bus passenger km (153388 – 127823)	25565
	Proportion of bus users that could have used a car but chose not to (based on travel plan experience and DfT Door to Door strategy)	30%
	Assumed change in average journey lengths	0%
	Car Km's saved	-7,669
	Car Km's saved per year (Car Km's saved * working days per year)	-705,585

The total reduction in car kilometres as a result of both cycle and bus measures within the GO Skegness package is 850,518.

The second step of the analysis requires an understanding of the characteristics of the car journeys removed from the network. TAG Unit A5.4 recommends using proportions from TAG data book A5.4.1 – Traffic by region, congestion band, area type and road type. These are summarised in Table 9-2 below.

Table 9-2 – Proportion of traffic by road type for the East Midlands (TAG Data Book A5.4.1)

Year	A Road	Other Road
2010	17.50%	18.20%
2015	17.50%	17.90%
2020	17.50%	17.40%
2025	17.30%	18.00%
2030	17.10%	18.00%
2035	17.00%	17.40%

### 9.3 Marginal External Cost Benefits Calculation

As described above, steps one and two provide the change in car kilometres by road type, area type and congestion level for the opening year and future years. As per step three of the process these have been combined with the marginal external costs given in the TAG data book, to estimate the decongestion benefits in the opening and future years. Table 9-3 details the outcome of this process.

Table 9-3 –Weighted average marginal external costs for the East Midlands (pence per km)

MEC Impact	2010	2015	2020	2025	2030	2035	2040	2045
Decongestion	4.3	4.6	5.6	6.8	8.0	9.5	9.5	9.5
Infrastructure	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Accidents	1.1	1.1	1.2	1.3	1.5	1.6	1.6	1.6
Local Air Quality	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Noise	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Greenhouse Gases	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3
Indirect taxation	-1.8	-1.8	-1.6	-1.4	-1.2	-1.2	-1.2	-1.2

\*data for 2040 2045 & 2050 is assumed to be the same as for 2035

## 9.4 Results

The forecast MEC benefits are summarised in Table 9-4 below.

Table 9-4 –MEC Benefits Summary (2010 prices)

MEC Impact	Benefits per annum	Present Value of MEC Benefits over 30 Year Appraisal Period
Decongestion	£40,367	£320,529
Infrastructure	£300	£2,140
Accidents	£9,781	£66,610
Local Air Quality	£0	£0
Noise	£600	£4,322
Greenhouse Gases	£2,490	£14,409
Indirect taxation	-£14,738	-£79,510

## 10 Analysis of Monetised Costs and Benefits

### 10.1 Overview

Table 10-1 summarises the Present Value of Benefits (PVB) and Present Value of Costs (PVC) based on the appraisal of the economic impacts outlined in the preceding sections of this report. The table shows a PVB of £12,552,853 (Appendix A details how this is calculated for each benefit) over the 30 year appraisal period and a PVC of £5,680,817.

Table 10-1 – Analysis of Monetised Costs & Benefits (2010 Prices)

Costs & Benefits	Benefits (£)
Journey Quality (ambience)	£8,351,602
Physical Activity (health)	£2,146,983
Accidents (includes accident benefits for active modes + accident benefits derived from MEC)	£1,125,502
Absenteeism	£311,558
Economic Efficiency (decongestion)	£320,529
Environmental Impacts (Noise, Air Quality, Greenhouse Gases)	£18,731
Journey time savings	£355,317
Wider public finances	-£79,510
Infrastructure	£2,140
<b>Present Value of Benefits (PVB)</b>	<b>£12,552,853</b>
<b>Broad Transport Budget</b>	
Investment Costs	£5,680,817
<b>Present Value of Costs (PVC)</b>	<b>£5,680,817</b>
<b>Overall Impacts</b>	
<b>Net Present Value (NPV)</b>	<b>£6,872,035</b>
<b>Benefit to Cost Ratio (BCR)</b>	<b>2.2</b>

### 10.2 Value for Money

The Net Present Value for the GO Skegness package of measures is £6,872,035 and the Benefit to Cost (BCR) ratio is 2.2.

It should be noted that if the analysis considers only the £1,000,000m of LSTF funding being bid for, the BCR for the GO Skegness package of measures would be in excess of 12.

## Appendix A – Present Value of Benefits

Year	GDP	Growth	Discount	Factor	Accident Benefits	Journey Quality Benefits	Activity (Health) Benefits	Absenteeism Benefits	Journey Time Benefits	MEC Benefits						
					Discounted to 2010 (£) per year	Discounted to 2010 (£) per year	Discounted to 2010 (£) per year	Discounted to 2010 (£) per year	Discounted to 2010 (£) per year	Congestion	Infrastructure	Accident	Air Quality	Noise	GHG	Indirect Tax
					Discounted to 2010 (£) per year	Discounted to 2010 (£) per year	Discounted to 2010 (£) per year	Discounted to 2010 (£) per year	Discounted to 2010 (£) per year	Discounted to 2010 (£) per year	Discounted to 2010 (£) per year	Discounted to 2010 (£) per year	Discounted to 2010 (£) per year	Discounted to 2010 (£) per year	Discounted to 2010 (£) per year	Discounted to 2010 (£) per year
2010		1.00	3.50%	1.00	0	0	0	0	£0	£0	£0	£0	£0	£0	£0	£0
2011	0.62	1.01	3.50%	0.97	0	0	0	0	£0	£0	£0	£0	£0	£0	£0	£0
2012	0.67	1.00	3.50%	0.93	0	0	0	0	£0	£0	£0	£0	£0	£0	£0	£0
2013	0.40	1.00	3.50%	0.90	0	0	0	0	£0	£0	£0	£0	£0	£0	£0	£0
2014	0.72	1.00	3.50%	0.87	0	0	0	0	£0	£0	£0	£0	£0	£0	£0	£0
2015	1.23	1.02	3.50%	0.84	0	0	0	0	£0	£0	£0	£0	£0	£0	£0	£0
2016	1.63	1.03	3.50%	0.81	£42,529	£335,432	£86,231	£12,513	£14,271	£32,838	£244	£7,957	£0	£488	£2,026	£-11,990
2017	1.75	1.05	3.50%	0.79	£43,132	£340,186	£87,453	£12,691	£14,473	£29,720	£212	£7,024	£0	£424	£1,713	£-10,200
2018	1.76	1.07	3.50%	0.76	£42,408	£334,473	£85,985	£12,478	£14,230	£26,897	£184	£6,201	£0	£367	£1,448	£-8,678
2019	1.80	1.09	3.50%	0.73	£41,712	£328,987	£84,574	£12,273	£13,997	£24,342	£159	£5,474	£0	£318	£1,224	£-7,383
2020	1.81	1.11	3.50%	0.71	£41,032	£323,623	£83,195	£12,073	£13,768	£22,030	£138	£4,832	£0	£276	£1,035	£-6,281
2021	1.43	1.12	3.50%	0.68	£40,210	£317,139	£81,528	£11,831	£13,493	£19,946	£120	£4,269	£0	£260	£900	£-5,293
2022	1.44	1.14	3.50%	0.66	£39,408	£310,816	£79,903	£11,595	£13,224	£18,058	£104	£3,772	£0	£245	£782	£-4,461
2023	1.45	1.16	3.50%	0.64	£38,626	£304,649	£78,317	£11,365	£12,961	£16,349	£91	£3,332	£0	£231	£680	£-3,759
2024	1.51	1.17	3.50%	0.62	£37,882	£298,781	£76,809	£11,146	£12,712	£14,802	£79	£2,944	£0	£218	£591	£-3,168
2025	1.62	1.19	3.50%	0.60	£37,193	£293,343	£75,411	£10,943	£12,480	£13,401	£68	£2,601	£0	£205	£514	£-2,670
2026	1.62	1.21	3.50%	0.58	£36,516	£288,003	£74,038	£10,744	£12,253	£12,031	£68	£2,305	£0	£178	£440	£-2,283
2027	1.63	1.23	3.50%	0.56	£35,854	£282,788	£72,698	£10,549	£12,031	£10,800	£68	£2,042	£0	£155	£377	£-1,951
2028	1.64	1.25	3.50%	0.54	£35,209	£277,695	£71,388	£10,359	£11,815	£9,695	£68	£1,810	£0	£135	£323	£-1,668
2029	1.71	1.27	3.50%	0.52	£34,599	£272,884	£70,151	£10,180	£11,610	£8,704	£68	£1,604	£0	£117	£276	£-1,426
2030	1.72	1.29	3.50%	0.50	£34,003	£268,182	£68,943	£10,005	£11,410	£7,813	£68	£1,421	£0	£102	£237	£-1,219
2031	1.62	1.32	3.50%	0.49	£33,384	£263,305	£67,689	£9,823	£11,202	£7,037	£59	£1,257	£0	£88	£221	£-1,053
2032	1.63	1.34	3.50%	0.47	£32,780	£258,541	£66,464	£9,645	£11,000	£6,337	£51	£1,112	£0	£77	£206	£-909
2033	1.64	1.36	3.50%	0.45	£32,190	£253,889	£65,268	£9,471	£10,802	£5,707	£44	£983	£0	£67	£192	£-785
2034	1.91	1.38	3.50%	0.44	£31,696	£249,990	£64,266	£9,326	£10,636	£5,139	£39	£870	£0	£58	£179	£-678
2035	2.02	1.41	3.50%	0.42	£31,242	£246,406	£63,345	£9,192	£10,483	£4,628	£33	£769	£0	£50	£167	£-586
2036	2.02	1.44	3.50%	0.41	£30,795	£242,887	£62,440	£9,061	£10,334	£4,025	£29	£669	£0	£44	£146	£-509
2037	2.03	1.47	3.50%	0.40	£30,358	£239,437	£61,553	£8,932	£10,187	£3,500	£25	£582	£0	£38	£127	£-443
2038	2.03	1.50	3.50%	0.38	£29,927	£236,036	£60,679	£8,805	£10,042	£3,043	£22	£506	£0	£33	£110	£-385

2039	2.03	1.53	3.50%	0.37	£29,502	£232,684	£59,817	£8,680	£9,899	£2,646	£19	£440	£0	£29	£96	-£335
2040	2.13	1.56	3.50%	0.36	£29,111	£229,603	£59,025	£8,565	£9,768	£2,301	£17	£382	£0	£25	£83	-£291
2041	2.13	1.60	3.50%	0.34	£28,726	£226,563	£58,244	£8,452	£9,639	£2,001	£14	£333	£0	£22	£72	-£253
2042	2.14	1.63	3.50%	0.33	£28,349	£223,592	£57,480	£8,341	£9,513	£1,740	£13	£289	£0	£19	£63	-£220
2043	2.14	1.67	3.50%	0.32	£27,977	£220,661	£56,726	£8,232	£9,388	£1,513	£11	£251	£0	£16	£55	-£191
2044	2.14	1.70	3.00%	0.31	£27,745	£218,825	£56,254	£8,163	£9,310	£1,322	£10	£220	£0	£14	£48	-£167
2045	2.14	1.74	3.00%	0.30	£27,514	£217,004	£55,786	£8,095	£9,232	£1,155	£8	£192	£0	£13	£42	-£146
2046	2.14	1.77	3.00%	0.29	£27,285	£215,198	£55,322	£8,028	£9,156	£1,009	£7	£168	£0	£11	£37	-£128
<b>Sum</b>					<b>£1,058,892</b>	<b>£8,351,602</b>	<b>£2,146,983</b>	<b>£311,558</b>	<b>£355,317</b>	<b>£320,529</b>	<b>£2,140</b>	<b>£66,610</b>	<b>£0</b>	<b>£4,322</b>	<b>£14,409</b>	<b>-£79,510</b>

**£12,552,853**