Green Streets and healthy communities

Introduction:

The Mersey Forest Team worked closely with Mersey Travel to include green infrastructure in the Liverpool City Region Local Transport Plan.

Based on the Liverpool City Region Green Infrastructure Framework it showed how transport schemes to increase levels of active travel could benefit by the inclusion of green infrastructure elements.

The Merseyside Local Sustainable Transport Fund took up this agenda and supported over 35km of "green streets" delivered by The Mersey Forest Partnership, with £540k of project funding between 2013 and 2015. This project complemented the work by highways engineers across the city region, with a shared objective to increase the amount of active travel, particularly linking areas of employment to areas of higher levels of unemployment.

The programme included wide ranging community consultation and engagement as well as urban tree planting along routes to work.

Results

The green streets programme was thoroughly evaluated using an independent and statistically robust assessment to identify the impact of the programme on local communities. The local demographic profile in each location was used to guide the collection of responses so that the research best reflected the community where the green streets work took place.

Baseline and post project delivery evaluations were carried out by the same market research company, asking the same key questions at each point.

The baseline survey was completed in 2013, with follow up for Birkenhead in 2014 and the remaining areas in 2015.

Regarding health benefits, we have used the WHO HEAT model (http://www.heatwalkingcycling.org/index.php?pg=walking&act=introduction) to calculate the reduced mortality as a result of changes to levels of active travel, namely walking and cycling in the areas where the Green Streets project took place.

For walking, the evaluation showed a significant increase in walking to work over the period of the Green Streets programme. Improving health was one of the main reasons given for choosing to walk more often.

	2015	2013	Change	Number of people	Working population	Additional number of people walking
Everton	60	27.1	33%	10197.026	51%	5200
Speke	45.1	26.3	19%	3816.4	46%	1736
South Sefton	53.6	22.3	31%	17878.873	47%	8367
Kirkby	48	17.6	30%	6124.08	49%	3000
St Helens	30.8	27.1	4%	756.169	51%	386
Birkenhead	46.8	39.9	7%	621	45%	281
Total						**18973.**

We can use this data with the HEAT Model to calculate a range of health outcomes. We have suggested that 20% of the increase is directly attributable to the Green Streets programme. This is likely to be an underestimate.

HEAT estimate

Reduced mortality as a result of changes in walking behaviour

The average amount of walking per person per day has **increased** between your pre and post data.
This change results in an **decreased** in the average mortality risk for your population of walkers of: **6 %**

The number of individuals walking has **increased** between your pre and post data.
There are now **18,972 additional** individuals regularly walking, compared to the baseline.

You have chosen to assess the benefits of **20 %** of this change in reported levels of walking

Taking this into account, the number of deaths per year that are prevented by this change in walking is: **4.87**

Economic value of walking

Currency: GBP, rounded to 1000

:

The value of statistical life in your population is:	3,229,000
Based on a 5 year build up for benefits, a 1 year build up for uptake of walking, and an assessment period of 5 years	
the average annual benefit, averaged over 5 years is:	7,703,000
the total benefits accumulated over 5 years are:	38,516,000
the maximum annual benefit reached by this level of walking, per year, is:	15,721,000
This level of benefit is realised in year 7 when both health benefits and uptake of walking have reached the maximum levels.	
When future benefits are discounted by 5 % per year:	
the current value of the average annual benefit, averaged across 5 years is:	6,391,000
the current value of the total benefits accumulated over 5 years is:	31,956,000

Benefit–cost Ratio

The total costs of:	540,000
Should produce a total saving over 5 years of:	31,956,000
assuming 5 year build up of benefits, 1 years build up of uptake, and discounting of 5 % per year	
The benefit to cost ratio is therefore:	59.18:1

Please bear in mind that HEAT does not calculate risk reductions for individual persons but an average across the population under study. The results should not be misunderstood to represent individual risk reductions. Also note that the VSL not assign a value to the life of one particular person but refers to an average value of a "statistical life".

We also assessed the reported one year change in walking. This gave a lower overall increase in the numbers compared to the two year data provided above.

	2015	2013	Change	Number of people	Working population	Additional number of people walking
Everton	60	27.1	12%	3719.28	51%	1896.833
Speke	45.1	26.3	0%	0	46%	0
South Sefton	53.6	22.3	5%	2856.05	47%	1336.631
Kirkby	48	17.6	14%	2820.3	49%	1381.947
St Helens	30.8	27.1	2%	408.74	51%	208.8661
Birkenhead	46.8	39.9	7%	621	45%	281.934
Total						5106.211

Using this data, with all the other parameters remaining the same produces the following result from the HEAT Model.

HEAT estimate

Reduced mortality as a result of changes in walking behaviour

The average amount of walking per person per day has **increased** between your pre and post data.
This change results in an **decreased** in the average mortality risk for your population of walkers of: **6 %**

The number of individuals walking has **increased** between your pre and post data.
There are now **5,099 additional** individuals regularly walking, compared to the baseline.

You have chosen to assess the benefits of **20 %** of this change in reported levels of walking

Taking this into account, the number of deaths per year that are prevented by this change in walking is: **1.31**

Economic value of walking

Currency: GBP, rounded to 1000

:

The value of statistical life in your population is:	**3,229,000**
Based on a 5 year build up for benefits, a 1 year build up for uptake of walking, and an assessment period of 5 years	
the average annual benefit, averaged over 5 years is:	**2,070,000**
the total benefits accumulated over 5 years are:	**10,352,000**
the maximum annual benefit reached by this level of walking, per year, is:	**4,225,000**
This level of benefit is realised in year 7 when both health benefits and uptake of walking have reached the maximum levels.	
When future benefits are discounted by 5 % per year:	
the current value of the average annual benefit, averaged across 5 years is:	**1,718,000**
the current value of the total benefits accumulated over 5 years is:	**8,589,000**

Benefit–cost Ratio

The total costs of:	**540,000**
Should produce a total saving over 5 years of:	**8,589,000**
assuming 5 year build up of benefits, 1 years build up of uptake, and discounting of 5 % per year	
The benefit to cost ratio is therefore:	**15.91:1**

Please bear in mind that HEAT does not calculate risk reductions for individual persons but an average across the population under study. The results should not be misunderstood to represent individual risk reductions. Also note that the VSL not assign a value to the life of one particular person but refers to an average value of a "statistical life".

Evidence for the Direct Benefits of Green Streets Green Infrastructure Interventions:

Increased Levels of walking and Cycling: In regression analyses the presence of street trees is found to be a significant positive factor in the level of physical activities undertaken such as walking and cycling (Forsyth et al., 2008; Larsen et al., 2009; Lee, 2007). For example, in one of the studies bicycle traffic increased by more than 20% due to better street-scale design that included planted trees (Heath et al., 2006, S75).

Safer Routes for Pedestrians and Cyclists: A recent Department for Transport (DfT) study found that street trees can be as effective as speed cameras in slowing down traffic. A trial in Norfolk found that creating avenues of trees and hedges had a dramatic impact on motorists' behaviour. The experiment showed that overall there was a 20% drop in the number of motorists driving at 64 to 96km/h (40 to 60mph) and overall average speeds fell by 1.5%. -Strategic Planting Scheme in Norfolk. (Taking on the Rural Road Safety Challenge, DfT, 2010 - Annex 3)

Direct Health Benefits: Green Streets provide greener, pleasant, attractive and safer routes, and through strong community engagement activity will work to encourage communities to use these routes for active travel. The health benefits of walking and cycling are well documented. Regular walking and cycling can reduce people's risk from disease. Physical activity can make a huge contribution to maintaining health and wellbeing. In the UK around 36% of people die from cardiovascular disease (CVD) – the main forms are Coronary Heart Disease and stroke. Statistics show that inactive and unfit people have almost double the risk of dying from CHD compared with more active and fit people. (Source: www.travelactively.org.uk/pages/whyactive-travel/)

Reducing the Health Gap: Green spaces near our homes can cut the "health gap" between rich and poor. Even small areas of green public space in the heart of our cities can protect us from strokes and heart disease, by cutting stress and/or boosting exercise. A recent study published in The Lancet matched data about hundreds of thousands of deaths to green spaces in local areas. The research concluded that more greenery should be introduced to improve wellbeing. Across the country, there are "health inequalities" related to income and social deprivation, which generally reflect differences in lifestyle, diet, and, to some extent, access to medical care. This means that in general, people living in poorer areas are more likely to be unhealthy, and die earlier. However, the researchers found that living near parks, woodland or other green spaces helped reduce these inequalities, regardless of social class. (Effect of exposure to natural environment on health inequalities: an observational population; The Lancet, Mitchell, R. and Popham, F., 2008).

Mental health: The contact with nature that trees provide has been proven to act as an effective component of treatment of a number of mental health issues. Mental health issues that can be addressed through environmental exposure include the treatment of children with poor self-discipline, hyperactivity and ADHD, stress and anxiety across the population, elderly care and treatment of dementia. Interaction with nature generally increases a sense of health and mental well-being (Dr Bird, 2007, Natural Thinking, commissioned by the RSPB: investigating the links between natural environment, biodiversity and mental health).

Wind Shelter: The green infrastructure created as part of this scheme will provide shelter from winds at a local level by slowing or diverting currents. This can play a vital role in creating a pleasant and safer route for pedestrians and cyclists to use.

Noise absorption (Fang & Ling, 2002): This scheme will contribute to screening of noise, especially from major transport routes. Noise can be an issue that can lead to additional stress and poor health, Trees and other vegetation can play an important role in attenuating noise through reflecting and absorbing sound energy. (Coder, KD, 1996, Identified Benefits of Community Trees and Forests, University of Georgia Cooperative Extension Service - Forest Resources Publication FOR96-39; and Dwyer, JF, McPherson, EG, Schroeder, HW and Rowntree, R, 1992, Assessing the Benefits and Costs of the Urban Forest, [in] Journal of Arboriculture 18(5), pp 227 – 234).

Shading from sun (Huang et al. 2006, Parker, 1981): The green infrastructure planted as part of this scheme will contribute to shading of people, buildings, and surfaces from solar radiation to reduce temperatures and increase comfort levels. This function is provided by trees and taller plants and vegetation. Particularly found in urban areas to reduce the urban heat island, this function will become more critical as we have to adapt to a changing climate.

Evaporative cooling (Kramer & Kozlowaki, 1960): The green infrastructure created as part of this option will play a key role in keeping the area cooler. As plants transpire water is evaporated from their surfaces cooling their immediate locality. All types of green infrastructure can provide this function. Plants with a larger leaf area are likely to be better than those with a smaller leaf area, and tree species selected as part of this option will reflect this. The future climate is predicted to be warmer and the cooling role of trees is likely to play an even more important role over time. This will help to keep the route at a comfortable temperature for walkers and cyclists.

Trapping air pollutants (Hill, 1971, Beckett et al., 1998, Smith, 1990, Hewitt et al., 2005): The trees planted play a key role in the removal of pollutants, especially ozone, nitrogen dioxide and particles from the air, through uptake via leaf stomata and deposition on leaf surfaces. Once inside the leaf, gases diffuse into intercellular spaces and may be absorbed by water films to form acids or react with inner leaf surfaces. This function is usually associated with more urban areas, especially close to travel routes. Work by Lancaster University in the West Midlands identified ozone, nitrogen dioxide and PM10 particles as being the main pollutants that can be removed. The study estimates that doubling the number of trees in the West Midlands would reduce excess deaths due to particulate pollution by up to 140 per year. http://www.es.lancs.ac.uk/people/cnh/docs/UrbanTrees.htm