AIR QUALITY IN CAMBRIDGESHIRE – IMPLICATIONS FOR POPULATION HEALTH

To:	**Health Committee**
Meeting Date:	**16 March 2017**
From:	**Director of Public Health**
Electoral division(s):	***All***
Forward Plan ref:	**Key decision:** **No**
Purpose:	**To bring to the attention of the Health Committee current concerns regarding air quality in Cambridgeshire and the opportunities locally to address poor air quality.**
Recommendation:	**The Health Committee is asked to:**

a) **note and comment on the current air quality issues in Cambridgeshire, local opportunities/initiatives to improve air quality and the NICE Draft National guidance**

b) **request that Director of Public Health draws this report to the attention of the Chairman/woman and Spokes for the Economy and Environment Committee and the Highways and Community Infrastructure Committee, with a recommendation that the Committees consider the potential impact on air quality as part of their decision making process.**

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1. BACKGROUND

1.1 What is air pollution?

1.2 A detailed description of air quality and its effects on human health can be found in the "Cambridgeshire Transport and Health Joint Strategic Needs Assessment 2015", but in summary air pollutants are generated by a mixture of natural and man-made processes and are released into the air. The distribution of these pollutants depends on the size of the particles and weather patterns, some pollutants being deposited locally and some affecting sites in other world regions. For example, in spring 2014 there were two peaks of air pollution in the East and South East of England caused by high levels of air pollution already existing in urban areas and exacerbated by Saharan dusts and pollutants from mainland Europe brought by easterly winds. These resulted in a significant increase in respiratory conditions presenting to health care services including NHS111, GP services, and emergency departments. It was estimated that the national excess consultations for wheeze or breathlessness was 1,200 GP consultations during the first episode and 2,300 excess consultations in the second.

1.3 In England, the most deprived wards tend to experience the highest concentrations of pollutants, although the least deprived wards also experience above average concentrations of pollutants. This can mainly be explained by the higher proportion of both deprived communities and very wealthy communities in urban areas and the levels of pollution due to road transport sources. (Appendix A contains a Fact Sheet On Particulate Matter)

2. MAIN ISSUES

2.1 Snapshot of air pollution in Cambridgeshire

2.1.1 Even though most annual average concentrations of air pollutants may not be over Air Quality Thresholds, there are levels of air pollution in Cambridgeshire that impact health.

- A Public Health England Report 'Estimating local mortality burdens associated with particulate air pollution' published in 2014, estimated that 5.5% of mortality (age 25+) in Cambridgeshire could be attributed to particulate air pollution. This is similar to the national average of 5.6% and equates to an estimated 257 deaths.
- Air pollution also impacts respiratory and cardiovascular hospital admissions and incidence of respiratory disease.
- "Hot spots" of pollution include urban areas and transport corridors such as the city centre and the A14.
- New housing developments in Cambridgeshire are sometimes sited near poor air quality areas.
- There are higher levels of nitrogen dioxide in the winter months and peaks of larger particulate matter in the spring, which may lead to seasonal health impact.
- Small particulates from traffic also contribute to indoor air pollution, where people spend most of their time and receive most of their exposure to air pollutants.

2.1.2 In Cambridge City and South Cambridgeshire the major roads and urban centres have the highest levels of pollution with specific issues at congested roads and junctions such as Milton Road, or where there is a lot of standing traffic and buses e.g. Drummer Street.

2.1.3 In Huntingdon air pollution is concentrated around the A14 and the ringroad, some central sections of St Neots are also affected e.g. the High Street, which is both canyon-like and congested.

2.1.4   In Fenland (Wisbech) an assessment of source apportionment showed that HGVs and single occupancy car trips make up a large proportion of the total pollution concentrations. This could be reduced by changing short car trips to walking and cycling, as both walking and cycling levels in Wisbech have been shown to be low.

2.2   National Issues

2.2.1   There has been a lot of interest in the national and local media recently from the issue of poor air quality in London to the car manufacturers' diesel emission test cheating.

2.2.2   Earlier policies to reduce air pollution from vehicles relied solely on improvements in diesel vehicle technology via EURO (EU) engine standards. These proved ineffective in real operation. Whilst the gains should have been substantial on paper, up to a 50% cut in emissions between EU2 and EU4 for buses, the reality was a very mixed picture with some in service EU2 buses out performing EU4.

2.2.3   Cambridge City Council's long-term field evidence backed-up by the Cambridge Real Emissions Project support this view, with only a 5% improvement in ambient air quality as a result of moving approximately 400 buses up to EURO standards with the majority of buses moving from EU2 to EU4 or EU5.

2.2.4   However, new low emission vehicles are either fully electric with no emissions at the point of use or hybrid vehicles which have significantly reduced emissions for periods of the drive cycle and may be capable of some zero emission running. Therefore, with new low emission vehicle technology there is the potential for real substantial cuts in emissions.

2.3   Draft NICE Guidance

2.3.1   The National Institute for health and Care Excellence have produce draft guidance for consultation on air pollution (Air Pollution: outdoor air quality and health December 2016), (A link to the guidance can be found at the end of this report).

2.3.2   The Guidance is for local authority staff working in:
- Transport
- Planning
- local air quality management
- public health, including environmental health
- Local government elected members

2.3.3   The guidance contains 6 recommendations grouped around the following themes:
- **Planning**
- **Clean air zones**
- **Reducing emissions from public sector transport services and vehicle fleets**
- **Smooth driving and speed reduction**
- **Cycle routes**
- **Awareness raising**

2.3.4   The main recommendations of relevance to the Council are as follows:

2.3.5 Planning
- Take air quality issues into account in the Local Plan for new developments e.g. include air pollution in strategic planning across local authority departments and different tiers of local government

- Provide an infrastructure to support low- and zero-emission travel e.g. provide cycling and walking routes and charge points for electric vehicles in residential areas and commercial developments.

2.3.6 Clean air zones
- Consider introducing clean air zones in areas outside those targeted by the national plan. It could include restrictions for polluting vehicles and/or action to encourage the use of less polluting ways to travel.
- Consider support for low- and zero-emission travel e.g:
    - encouraging walking and cycling
    - encourage uptake of low- and zero-emission vehicles, for instance, electric charging points or use of low- or zero-emission vehicles for deliveries to retail, office, residential or other sites in the zone
    - specifying emission standards for private hire and other licensed vehicles.
- Consider fuel-efficient driving initiatives such as:
    - bylaws and other action to support 'no vehicle idling' areas, particularly outside schools, hospitals and care homes
    - driver training to reduce emissions
    - actions to smooth traffic flow
    - Where traffic congestion is contributing to poor air quality, consider incorporating a congestion charging zone within the clean air zone.

2.3.7 Reducing emissions from public sector transport services and vehicle fleets
- Consider introducing fuel-efficient driving as part of any test carried out when appointing or re-appraising staff who drive as part of their work.
- Consider training staff drivers to reduce their vehicle emissions
- Consider making the minimisation of vehicle emissions a factor when making procurement decisions.

2.3.8 Smooth driving and speed reduction
- Consider using variable speed limits and average speed technology on the roadside to promote a smoother driving style and incorporating real-time information to tell drivers what the current optimum driving speed is.
- Where speed reduction is needed to reduce road danger and injuries take account of the potential adverse impact on air pollution.
- Consider 20-mph zones in residential areas characterised by stop–go traffic where this will reduce accelerations and decelerations.
- Where physical measures are needed to reduce speed, such as speed bumps, ensure they are designed to minimise sharp decelerations and consequent accelerations.
- Consider using signs that display a driver's current speed to reduce unnecessary accelerations.

2.3.9 Cycle routes
- Avoid siting cycle routes on highly polluted roads. Ideally use off-road routes or quiet streets.
- Where busy roads are used consider:
    - Providing as much space as possible between the cyclist and motorised vehicles.
    - Using dense foliage to screen cyclists from motor vehicles, without reducing street ventilation so that air pollution can disperse.
    - Reducing the time cyclists spend at busy sites, including some junctions, where this can be done without increasing the time that other groups spend exposed to poor air quality.

2.3.10 Awareness raising
- Consider providing information on air quality with weather forecasts and the pollen index. Provide this through local, national and social media.
- Consider providing the public with information on how:
  - health is affected by exposure to air pollutants
  - travel choices contribute to pollution and exposure to levels of local pollution
  - engine 'idling' affects air quality in the vehicle as well as outside
  - to minimise exposure by altering travel habits e.g. restricting time spent with an engine 'idling'.
- Make businesses aware that they can reduce road-traffic-related air pollution and improve fuel efficiency e.g. scheduling deliveries to minimise congestion, and encouraging employees to cycle to work
- For at risk groups:
  - Consider making healthcare professionals aware of the UK Daily Air Quality Index, and that they understand the health effects of long-term exposure to air pollution.
  - Healthcare professionals could raise awareness of poor outdoor air quality and advise high risk groups on how to minimise their exposure and its impact

2.4   District Council Duties – Annual Air Quality Status Reports and Air Quality Action Plans

2.4.1   The Environment Act 1995 provides that every local authority shall review the air quality within its area, both at the present time and the likely future air quality. It requires local authorities to designate an Air Quality Management Area (AQMA) where air quality objectives are not being achieved, or are not likely to be achieved. Once an area has been designated the local authority is required to develop an Action Plan detailing remedial measures to tackle the problem within the AQMA. In addition each District Council in Cambridgeshire is required to submit an Annual Status Report each year, it is also recommended that all local authorities should consider drawing up an Air Quality Strategy.

2.4.2   The Public Health Outcome Framework includes an indicator, based on the effect of $PM_{2.5}$ on mortality. This is intended to enable Directors of Public Health to prioritise action on air quality in their local area to help reduce the health burden from air pollution.

2.4.3   DEFRA expects the highest level of support from local authorities (e.g. Chief Executive and Council level) to ensure that all parts of a local authority are working effectively together. The public can be given further confidence that the work being taken forward to tackle air quality is supported at the highest level through engagement in and sign-off of Action Plans and annual reports by both the Chief Executive and also the heads of the main departments involved e.g. environmental health, planning, transport and public health.

2.4.4   To date the Director of Public Health has "signed off" the Annual Status Reports for Cambridge City Council and East Cambridgeshire District Council.

2.5   What are we already doing?
- The Public Health directorate are working with Cambridge City Council as part of their Air Quality Action Plan Steering Group.
- The Smart Cambridge programme (see 2.5.1 below)
- Promoting dialogue between the Clinical Commissioning Group and the City Deal Project.
- Health impacts of air quality are considered as part of the requirement for public health to sign off the significant implications section of relevant committee papers.

- The Cambridgeshire Local Transport Plan 2011-2031 aims to address existing transport problems while at the same time catering for the transport needs of new communities and improving air quality.

2.5.1 The Smart Cambridge programme
The University of Cambridge, Cambridge Environmental Research Consultants and Cambridge City Council are working on a project assessing low cost air quality sensors with the ambition of developing a real time air quality network across the city. The first phase of the project compared results from a network of nodes with an urban air quality model and results from the existing monitoring stations. Twenty sensors were deployed for a four month period (June-October, 2016) and focussed on three areas:
- the rapidly developing biomedical campus to the south of the city;
- a key transport corridor (Hills Rd) ;
- and a new development in north-west Cambridge adjacent to a busy motorway (M11).
The sensors measured CO, NO, NO_2, O_3, SO_2, PM_1, $PM_{2.5}$ and PM_{10} temperature and relative humidity at 1 minute intervals. The results of the test were positive with the sensors performing well.

2.5.2 The second phase of the project will look at whether we can use the sensors to establish source attribution by combing additional data such as traffic flow and meteorological data. This will also include cross referencing spikes in pollution with CCTV footage to see if we can attribute these spike to individual vehicles.

2.5.3 An important part of the project going forward will be looking at how we can use this data to give better real time AQ data to residents, change behaviours and design interventions within the city to improve Air Quality e.g. using real time data to text patients who are susceptible to poor air quality.

2.6 Opportunities
2.6.1 There are opportunities to include air quality as a priority/or consideration in the City Deal project and the transport deal as part of the Devolution Agreement for Cambridgeshire and Peterborough.

2.6.2 There is further scope to work with Huntingdonshire, Fenland, and South Cambridgeshire District Councils on their Annual Air Quality Status Reports and Air Quality Action Plans.

2.6.3 There is scope to develop a text alert system for patients who are susceptible to poor air quality (see 2.5.3 above).

2.6.4 The Council could explore where there are opportunities to implement the NICE Air Quality Guidance when it is formally adopted (due for publication June 2017)

2.6.5 The Transport and Health Joint Strategic Needs Assessment (JSNA) recommends a future focus on:
- Switching to a low emission passenger fleet and vehicles.
- Encouraging walking and cycling rather than car use.
- Further assessment of shorter-term measures to reduce person exposure, for example:
  - Text alerts to vulnerable people.
  - Monitoring of building filters.
  - Further use of health impact of air pollution during planning process for new developments.
  - Further understanding around the seasonal impact of air pollution and potential measures that could reduce this.

2.6.6   During the production of the JSNA several areas were highlighted by stakeholders from all districts as important areas of focus to continue the control and potential improvement of air quality in Cambridgeshire.

2.6.7   **Lower emissions from vehicles**. A significantly lower emission passenger transport fleet will be required to make air quality improvements in central Cambridge and beyond. This is dependent on accelerating and stimulating the shift to lower emission vehicles with continued traffic restraint.

2.6.8   Buses are the main source of air pollution from traffic, especially in the City Centre, so a significant reduction in emissions from the buses in operation is required. Buses are a large proportion of the fleet and they make repeat journeys. Renewing a small number of vehicles with cleaner technology will lead to more improvement than with any other category of vehicle.

2.6.9   Incentives for low emission vehicles for taxis. The District Councils are the Licensing Authority for taxis and can make a difference by tailoring Taxi Licensing Policy to incentivise low or zero emission vehicles.

2.6.10 **Switching car journeys to active transport**. Switching journeys from cars to walking, cycling and public transport not only has a large beneficial impact on the individual's health, but a wider benefit to the population health as there are corresponding decreases in overall air pollution levels.

3.   ALIGNMENT WITH CORPORATE PRIORITIES

3.1   Developing the local economy for the benefit of all
There are no significant implications for this priority.

3.2   Helping people live healthy and independent lives
The report above sets out the implications for this priority in **Section 1** of this report.

3.3   Supporting and protecting vulnerable people
The report above sets out the implications for this priority in **Section 1.3** of this report

4.   SIGNIFICANT IMPLICATIONS

4.1   **Resource Implications**
There are no significant implications within this category.

4.2   **Statutory, Risk and Legal Implications**
There are no significant implications within this category.

4.3   **Equality and Diversity Implications**
The report above sets out details of significant implications in Section 1.3 of this report

4.4   **Engagement and Consultation Implications**
There are no significant implications within this category.

4.5   **Localism and Local Member Involvement**
There are no significant implications within this category.

4.6 **Public Health Implications**
The report above sets out details of significant implications in Section 2 of this report

Implications	Officer Clearance
Have the resource implications been cleared by Finance?	Yes : 6/3/17 Name of Financial Officer: Clare Andrews
Has the impact on Statutory, Legal and Risk implications been cleared by LGSS Law?	Yes : 6/3/17 Name of Legal Officer: Fiona McMillan
Are there any Equality and Diversity implications?	No Name of Officer: Liz Robin
Have any engagement and communication implications been cleared by Communications?	Yes : 1/3/17 Name of Officer: Matthew Hall
Are there any Localism and Local Member involvement issues?	No Name of Officer: Liz Robin
Have any Public Health implications been cleared by Public Health	Yes Name of Officer: Liz Robin

Source Documents	Location
Draft NICE Guidance - Air pollution: outdoor air quality and health draft for consultation, December 2016	https://www.nice.org.uk/guidance/GID-PHG92/documents/draft-guideline
Transport and Health JSNA 2015	http://cambridgeshireinsight.org.uk/JSNA/Transport-and-Health-2014/15
DEFRA Local Air Quality Management Policy Guidance (PG16) 2016	https://consult.defra.gov.uk/communications/laqm_changes/supporting_documents/LAQM%20Policy%20Guidance%202016.pdf

Appendix A – Fact Sheet On Particulate Matter

Fact sheet on particulate matter: PM_{10} and $PM_{2.5}$

What are PM_{10} and $PM_{2.5}$?
Particulate matter is a mixture of solid particles and liquid droplets in the air. PM_{10} are particles of material that are 10 micrometres across or smaller, $PM_{2.5}$ are particles of material that are 2.5 micrometres across or smaller

Why PM_{10} and $PM_{2.5}$?
These have been chosen as these sizes are likely to be inhaled into the lungs. The smaller the particles the greater the potential impact because of their ability to penetrate deeper into the lung. Particulate matter affects both respiratory and cardiovascular diseases.

Sources of Particulate Matter
Particles in the air arise from a variety of natural and man-made sources and are classed as either primary or secondary sources.
Natural sources
- Sea Spray.
- Erosion of soil and rocks.

Man-made sources
- Combustion processes – both domestic combustion (wood/coal burners) and industrial (power generation).
- Transportation – primarily diesel emissions.
- Transportation – Non-exhaust emissions (attrition of road surfaces and wear and tear of tyres and brakes).
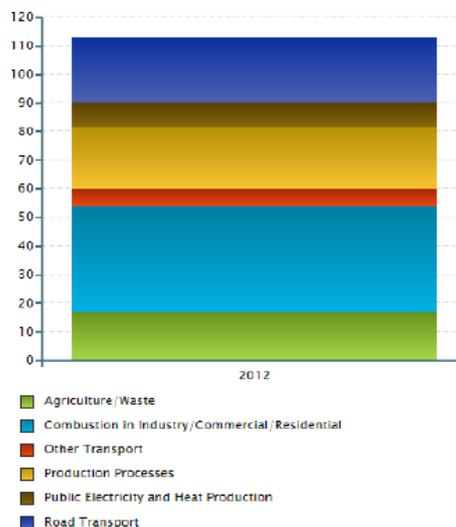- Industrial sources – construction, waste, aggregates (mining/quarrying), agricultural.

Primary
- Released directly into the air.

Secondary
- Formed in the atmosphere by the chemical reaction of gases, first combining to form less volatile compounds which in turn condense into particles.

For $PM_{2.5}$ not all sources are local as in some weather conditions, air polluted with $PM_{2.5}$ from the continent may circulate over the UK (long range transportation) especially the East and South East of England.

PM10 (Particulate Matter < 10µm) (kilotonne)

Legend:
- Agriculture/Waste
- Combustion in Industry/Commercial/Residential
- Other Transport
- Production Processes
- Public Electricity and Heat Production
- Road Transport

Source: National Atmospheric Emissions Inventory (2013)

Particulate matter in the UK
Emissions of particles have been dropping in the UK for the last 40+ years. It was estimated in 1970 there was 491 kilotonnes of particles emitted into the UK atmosphere whereas in 2012 114 kilotonnes of particulates were emitted into the UK atmosphere.

Air quality standards
PM_{10}: The United Kingdom has a standard of 40 microgrammes (µg) per cubic metre (m^3) of air as an annual average, with a 24 hour average of $50\mu g/m^3$ not to be exceeded more than 35 times a year (to be met by 31 December 2004).

$PM_{2.5}$: The United Kingdom has a target value of $25\mu g/m^3$ of air as an annual average to be reached by 2010, with an additional national exposure reduction target for 2020 based on the levels of $PM_{2.5}$ in 2010. Only areas with initial concentrations equal to or less than $8.5\mu g/m^3$ have no reduction target.

For UK, the average $PM_{2.5}$ level for the base year was $13\mu g/m^3$ resulting in a required 15% reduction necessary by 2020.

Particulate matter monitoring in Cambridgeshire:
Cambridge City:
- Gonville Place (PM_{10} and $PM_{2.5}$)
- Montague Road
- Parker Street
- Newmarket Road ($PM_{2.5}$ only)

South Cambridgeshire:
- Impington
- Orchard Park, Girton (PM_{10} and $PM_{2.5}$)
- Bar Hill (Decommissioned) (PM_{10} and $PM_{2.5}$)

Huntingdonshire District Council:
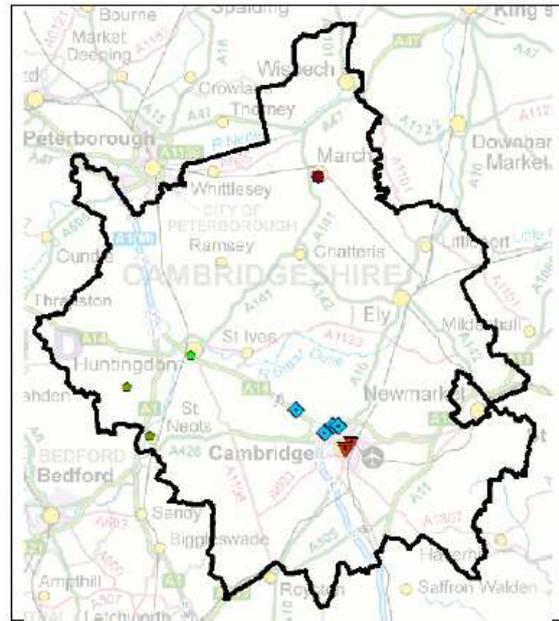- Pathfinder House
- Mobile (Decommissioned)

Fenland District Council:
- None

East Cambridgeshire District Council:
- None

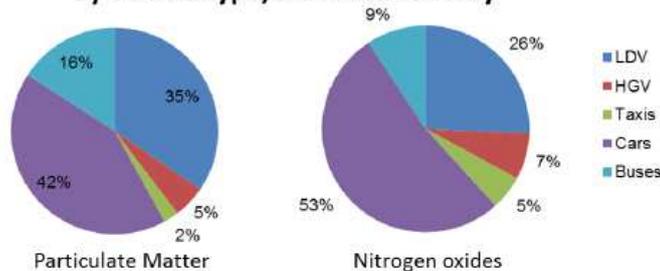*All monitors assess PM_{10} unless stated*

Source: Huntingdonshire County Council

Fact sheet on nitrogen dioxide (NO_2)

Nitrogen dioxide (NO_2) is primarily a secondary pollutant produced by the oxidation of nitric oxide (NO) by ground level ozone. Nitric oxide is produced by the reaction of nitrogen and oxygen in the combustion process. The major source of this pollutant in the UK is the combustion of fossil fuels, particularly by motor transport and non-nuclear power stations. It is estimated that some 75% of oxides of nitrogen are emitted from motor vehicle exhausts in urban areas. Of the transport sources, petrol combustion in cars is currently responsible for a greater proportion than diesel, though this relationship is changing with the progressive introduction of the catalytic converter into petrol vehicles.

Nitrogen dioxide is an irritant gas which has serious and, sometimes, fatal effects on health when inhaled in the very high concentrations associated with accidental exposures. Its properties as an oxidising agent can damage cell membranes and proteins. At relatively high concentrations it causes acute inflammation of the airways.

Air Quality Standards recommend a standard of $40\mu g/m^3$ as an annual average with an hourly mean of $200\mu g/m^3$ not to be exceeded more than 18 times a year (to be met by 31 December 2005). Nitrogen dioxide is measured continuously at the active monitoring sites in Cambridgeshire and monthly at the passive diffusion sites.

Examples of contributions of pollutants, by vehicle type, for Elizabeth Way

Particulate Matter: 16%, 35%, 42%, 5%, 2%

Nitrogen oxides: 9%, 26%, 7%, 5%, 53%

Legend: LDV, HGV, Taxis, Cars, Buses

Source: Cambridge City Council. LDV- light duty vehicle, HGV – Heavy goods vehicle