mapping for **change**

Noise Mapping Toolkit:

Introduction:

We are all familiar with the nuisance that noise represents. Loud noise from a party next door can keep you awake at night, and in a busy street you need to raise your voice during conversations.

But noise can be harmful for our health, too. Research has found that health risks associated with noise include pain or hearing impairment, sleep disturbance, irritation and stress. It can affect your relationships with other people and your performance at work or school. Noise can be anything from a mild nuisance to a major health hazard and may affect you at home, at school, at work or in public places.

Because of these ill effects, there are regulations that state what the permissible levels of ambient noise are. The European Noise Directive 2002/49/EC states that certain levels of noise are of concern and should be monitored regularly.

We have devised a simple survey method and toolkit that enables you to collect your own noise data. This can provide you with valuable evidence when conveying your situation in relation to noise pollution. If the problem affects others in the community, making it a collective survey can be very effective.

Noise measurements:

Noise is a loud sound, so the basic scientific units that are used to measure sounds are the pitch and the sound pressure. The pitch is measured in the number of vibration per second, and the unit that is used to mark vibration per second is Hertz (shortened to Hz).

The sound pressure (loudness) is measured in a unit called Decibel (shortened to dB). Sound of 20 dB is 10 times as loud as 10 dB. A-weighted decibels (dBA) are commonly used for a wide variety of measurements. The A-weighting scale used in dBA takes into account the increased sensitivity of the human ear at some frequencies. Exposure to noise has a varying impact upon us, specifically in terms of the level of annoyance, depending on the time of day, which is why there are several different sound measurement levels:

- L_{day}- The long-term average sound level (measured in dBA) over the 12 hour day period of 7 in the morning until 7 in the evening hours, determined over all the day periods of a year

- $L_{evening}$- The long-term average sound level (measured in dBA) over the 4 hour evening period from 7 in the evening to 11 at night, when it is assumed that most people go to sleep, determined over all the evening periods of a year

- Lnight- The long-term average sound level (measured in dBA) over the 8 hour night period from 11 at night to 7 in the morning , determined over all the night periods of a year

- Lden- Combines day, evening and night noise levels giving a single figure. A 5 dBA penalty is added to the Levening value and 10 dBA being added to the Lnight value, as noise is more disturbing during evening and night time.

Because the UK and EU regulations use the Lden and Lnight measures, you want to collect the data using these measurements. You should do the calculations of the average value from the data that will be collected over the survey period. This is why it is important to find a way to collect information throughout the day – so you will need some night owls to help! It is advisable to collect your noise data over a period of several weeks in order to provide a true reflection of the ambient noise level. If you are doing the survey as a collective effort (always advisable) people can rotate who is collecting data at any given time. It might be an idea to co-ordinate between people who live or work close to you to facilitate rotation. The main point is to ensure that you get a wide coverage in terms of the area and times, and that each location has more than two measurements taken.

DIY Noise measurements:

Survey Pack:

The basic survey pack consists of a map of the area, a blank survey sheet and a noise meter. A template survey can be downloaded and photocopied and used for your own study. Basic sound meters can be purchased from Maplins from around £55. The instructions provided below refer to the use of such meters. If you can't afford these and are still keen to do your survey then contact us and we may be able to share some spare meters with you. In fact, if you can't get access to a noise meter, you could do the entire survey without it, just focusing on how residents describe the noise in different areas. In our experience the local authority and regulatory agencies were very interested in this information.
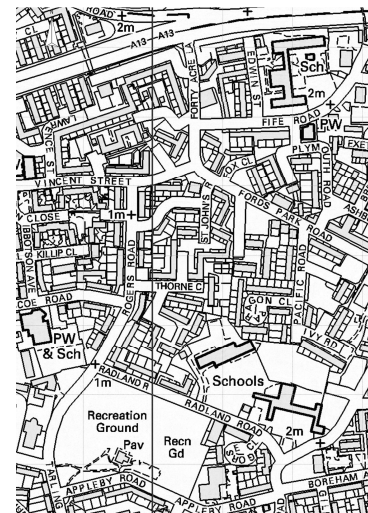
Sound Meter

Survey Sheet

Ordnance Survey Map

Types of maps and where to get them:

In general there are two types of maps that you may want to use when doing your survey. These are paper maps and digital, or computer-based, maps. They each are useful for different types of activities.

Paper maps

Paper maps can be found in a variety of places (see below). The paper maps will be used to mark the location noise measurements are taken for your noise mapping survey. The important thing to remember is that you're likely to be writing all over these maps when you collect your information, so don't spend a lot of money on them. Printing or photocopying maps will carry a small cost, but much less than buying expensive officially published maps.

Where to find paper maps

- A-Z maps are the most commonly used road maps in Britain. These can be photocopied (and pieced together if need be for a large area).

- You can usually access Ordnance Survey maps at your local library or your local authority planning department.

- You can try contacting the geography department of your nearest university; you may be surprised to find that they're usually willing to help.

- You can print maps off the internet (see digital maps section below).

A-Z maps are available at most bookstores
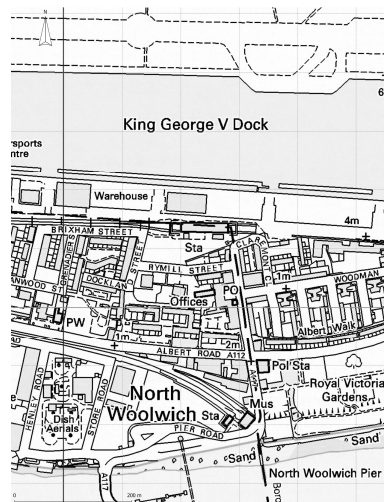
Ordnance Survey maps can be accessed through libraries or universities

Digital maps:

If you have access to the internet you can explore the variety of free maps available to you. Here we offer details on the most common and easy to use.

Google Maps

Google is probably the most commonly used online map. It offers road maps, as well as aerial photography for the whole world. The hybrid option allows you to view the road network and names in conjunction with aerial photography. You can search for locations based on name or postcode. Very easy to use.
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Example of map available from Google Maps (www.google.co.uk/maps)

Multimap
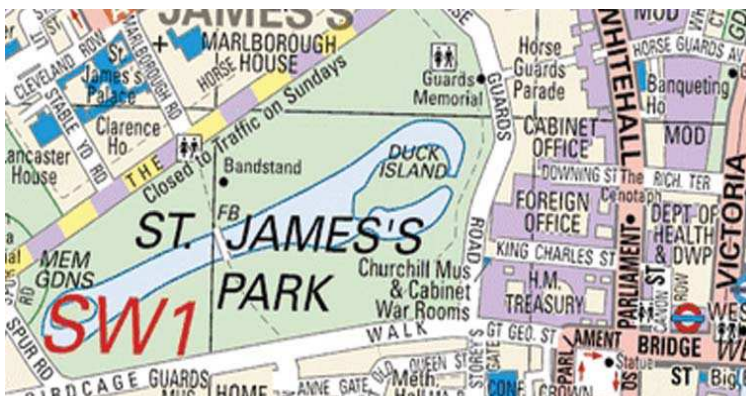
Example of maps available from Multimap (www.multimap.com)

Multimap is another popular source of online maps. These maps can be easier to use because they include more landmarks. Aerial photographs are also available. Postcode and place name searches are available too. Ordnance Survey maps (1:25,000) are now also available on multimap.

Open Street Map

Open Street Map is an open source online map, meaning that it isn't owned by anyone (like Google) and there are no copyright laws that apply. It is built by `individuals like you. The one caveat is that because it is a collaborative ongoing project, some areas have more complete information than others.

Example of maps available from Open Street Map (www.openstreetmap.org)

Community Maps
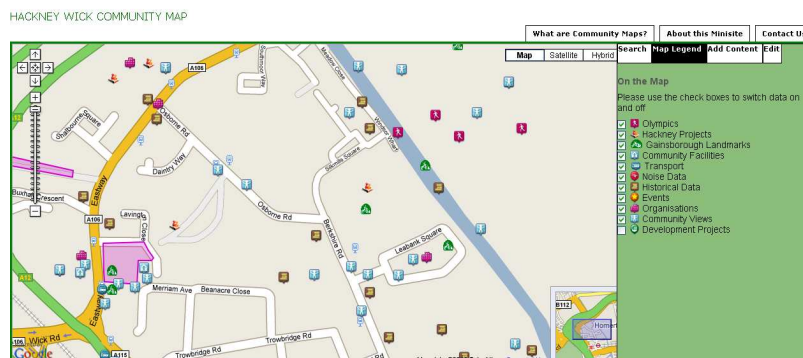
Example of maps from Community Maps (www.communitymaps.org.uk)

There are number of community maps that exist covering different areas. A community map is very much what it sounds like – it's a map created by members of a community or group.

The maps have a selection of themes that highlight the things each community are interested in or concerned about and is built from local knowledge. The topics that could be included in a map are virtually endless.

You can print sections from any of these online maps to get paper maps which you can use to collect information with. If the area you want to cover doesn't fit on the screen, you can print each view separately and then tape them together to make a usable map of a bigger area. Digital maps can be very effective means of organising and presenting your information.

The Survey

The noise survey was designed to collect information about both the level of the noise, and also people's reaction to the noise (i.e. how does the noise affect you, or make you feel). If you are considering doing a noise survey in your area it is very important not to leave out this second part. The idea is to select the days over which you want to take measurements and then carry these out in different locations. Taking a measurement is a very short process and will take no more than 3-4 minutes.

It is also important to remember when you conduct a noise survey that you are collecting information about the ambient or general noise in your area. This means all sources of noise will contribute (e.g. traffic, industry, airplanes, neighbours, etc). It is not possible with this type of survey to collect specific information on a single source of noise.

There are 4 key things that you need to record about the measurement – the time of day, the location, the perceived noise source and how the noise affects you. You will need many measurements – if you can carry out 5-6 measurements a day that will be ideal. If you are working with others you can afford to skip a day as someone else has probably carried out the measurements in your area.

It is important not to carry out the measurements only when there is a strong noise (such as an airplane overhead), but to get a good sample throughout the day – practically in every hour of the day - if there is a neighbour that is working at night or leaving early in the morning, try to include them in the measurements. It is also important to get measurements in different locations, not only from your home.

If you have a look at the Noise recording sheet you can see that there are a number of different elements that you should try to record, each of which are equally important.

- Date
- Time
- Location
- Noise level measurement
- Subjective response to the sound
- Take a photo facing the source of the sound

Date and Time

These two are obvious, but please remember that you need lots of night recordings as well as day in order to calculate the averages.

Location

Please mark the location where you took each recording with a separate indicator X1,X2,X3 etc. Try to spread out your records but ensure that some measurements are taken at the same location over the day.

Noise level measurement

- Make sure the battery is charged. If "BAT" appears on the display screen when switching power on the battery should be replaced with a new one.

- Set response to FAST (press F/S) button. This means that the sound meter will take a lot of readings every second

- Select A-weighting by pressing A/C button. dBA should be displayed in the window. A-weighting means that the measurement takes into account human sensitivity

- Usually you should select the Lo option which measures a range between 30-100 dB, if you think the noise levels may exceed this set to Hi (Lo is the default setting).

- Select "MAX" by pressing MAX/ HOLD button. "Max" will be displayed in the top corner of the screen. This will record the maximum noise level over a long period of time. The reading displayed will only change when the current noise level is exceeded by a louder noise.

Once you have chosen the appropriate settings to take your sound measurements, point the microphone at the suspected noise source. The sound pressure level will be displayed. Write down the dBA level for the 1st recording and press MAX/HOLD again to switch the MAX function off and start a new measurement. You are now ready to do the 2nd sound recording. Over a period of 3 minutes, you should record the MAX noise level displayed every minute, resulting in 3 readings. If using the sound meter in the presence of wind, please use some form of barrier to prevent picking up undesirable signals.

Subjective response to the sound

Recording the effect that noise has on your lives is a crucial element of the exercise. If you can prove that a large proportion of people all hate a particular source of noise than you have a very strong case for getting it stopped.

Please circle any words from the list of adjectives that describe the quality of the sound and your perception of it. The free space allows you to write a succinct sentence that sums up the sound and your response towards it. Feel free to add your own words.

Take a photo facing towards the source of the sound

Use a digital camera or your mobile phone to take a picture in the direction of the main source of the sound. This will make it much easier to identify patterns in what people are identifying. It will also make a brilliant way of documenting the process of your survey and you may want to use this if presenting your results to other third parties

Doing the survey without meters

Do everything the same, but just leave the spaces for the readings from the meter blank. Stand in a location for about three minutes and listen to what you hear – fill out how loud you think it is at that location (i.e. quiet, loud, extremely loud, etc), and how the noise makes you feel.

Analysing and presenting your results

Now that you've done all the work to gather your information, the next step is to organise and present it in a way that is the most useful. Some of this can be done easily using pen and paper. A more advanced step is to display your information using online maps such as Google Maps, and still more advanced step is analysis using software called Geographic Information Systems (GIS). You don't want to do more work than you need to, so think basic. Remember, the point is to display your results so that they communicate what you want to whom you want.

In general the idea is to gather everything you've collected and put it onto one shared map. You'll want to pay attention to the colours and symbols you use to represent your information. It might be that you decide to use different shades to reflect different sound levels, for example.

Paper-based analysis

This approach is the simplest. Get a large blank map of your study area (A0 prints can be obtained from photocopy shops for about £20). Go through all of the information you collected and begin copying it all onto the large blank map to summarise your results. Think about the best way to display this information. You can divide the area into grid squares (e.g. 100m2) then calculate the average noise readings taken within each grid square for different times during the day. You may wish to colour all the readings above a certain level (e.g. 60dBA) one colour, those between 55-60 another and so on.

Google Maps

You may decide you want to display some of your information in a digital format. This can be useful if you want to share your results with others who are outside of your immediate area, or if you want to include things like photographs in your map. The free online maps provided by Google offer you the chance to do this (www.google.co.uk/maps). Google maps let you place your own information over the top of their maps. Not only is this a good way to display your information, but because you can add/delete/edit entries easily (and without having to use a new paper map each time.) it can be a good way to organise your information before you are ready to produce your final display. Each item you enter onto a Google Map can store its own associated information (such as the full comment made in relation to a specific measurement, or a picture). The associated information is stored internally, and only appears when you click on the specific entry. So it can allow you to include more information than you could on a paper map.

Getting started in Google Maps is very simple. You just need an account, and a few basic instructions. Visit www.google.co.uk/maps and click on the "MyMaps" tab.

Community Maps

If there is already a community map that exists for the area (see www.communitymaps.org.uk) in which you wish to conduct your survey you can use it to record your noise measurements. There may already be a theme within the community map related to noise. If not, contact us and we can add a new 'noise' category to the map. You can add the location, time, date, noise level, a description and photo for each measurement taken.

Analysis that requires more help

What is GIS?

While there is a lot you can do without any special skills, some of the more advanced analysis and display can only be done with the help of Geographic Information Systems (GIS). GIS is a combination of computer software and methodologies that help people to store, analyse, manipulate and display spatial data. Spatial data is simply information that is associated with a certain location. All of the information you collect in your noise survey is spatial data.

What can you do with GIS?

Some of the more sophisticated tasks you might like to do with your information needs to be done in a GIS by someone who is trained. For example, with a GIS you can produce a thematic map. This is a map that displays objects based on a theme (i.e. colour-coded according to category. You can also perform more advanced analysis. This can be very powerful where you want to highlight the temporal noise variation in relation to a noisy business operation such as an airport or scrap yard. As mentioned above, you would still be able to present some information from a noise survey on paper or on Google Maps, but the most advanced level does require the use of GIS. You can contact us if you

would like assistance in producing a noise map using GIS or in conducting a larger scale noise survey.

Queries and further information

If you have questions about the noise data collection, contact Louise Francis:

Email: l.francis@mappingforchange.org.uk Tel: 020 7679 2296

Sources and further information:

If you are interesting to learn about noise in general, look at the following presentation from Washington University.

http://staff.washington.edu/rneitzel/2004NHCA_noise_meas.pdf

The main web page with information about the UK Noise regulations is available from the Department of Environment, Food and Rural Affairs

http://www.defra.gov.uk/environment/noise/index.htm

The EU directive is available from:

http://www.imagine-project.org/bestanden/2002-49-EC.pdf

Finally, there is some information about how to present noise information to the public:

http://www.defra.gov.uk/environment/noise/events/noisemap-workshop061005.htm

Credits:

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05/05/2009