

Alternative Road Surfaces for Noise Reduction – Discussion Paper

Proposals put forward by the Local Councils Association

September 2022

1.0 - Introduction

The LCA strongly believes that the five primary elements which cause noise pollution in our localities are:

- Catering and nightlife industry
- Construction sites
- Traffic noise
- Air traffic noise
- Animals

These are all unwanted sounds in our environment that affect the quality of life of our residents. They affect the health and well-being of humans and all other living organisms.

Noise pollution can cause health problems for people and wildlife on land and at sea.

Horizon, the EU research and Innovation Magazine, states that noise pollution is one of city life's most significant health risks. Unfortunately, the risk is often overlooked despite being linked to an increased risk of early death, according to research conducted by scientists.

So, in this regard, we fully support the initiative of having a discussion paper, which is being launched by ERA to discuss Environmental traffic noise pollution.



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2.0 - Traffic Noise

It is being noted that the type of vehicles, road surfaces, tires, surrounding terrain, wind, and obstacles all contribute to different noise pollution levels in our localities.

Factors contributing to additional noise pollution are numerous but those which are perceived as a nuisance to households and communities tend to extend beyond rolling noise and road-tyre interactions

2.1 – Traffic Flow/calming measures

Traffic flow measures are continuously implemented to improve traffic flow, safety, and/or improve a neighborhood's environment. These may include noise considerations, and they are not the primary issue when establishing traffic calming, home zones, and similar initiatives which may reduce the traffic counts on streets and in areas with dwellings or 'highrise'. In some cases, the response of those living along the road may be that the noise situation has deteriorated when various traffic flow measures are implemented.

Traffic flow measures should be assessed regarding their impact on noise levels and their effect on the degradation or annoyance experienced by those living along the road. Although noise regulation and abatement are based on noise levels for practical reasons, the overall target should be to reduce the annoyance, sleep disturbance, and adverse health effects that the noise may cause. These effects should therefore be considered in any scheme.

Measures aimed at reducing the traffic volume are one way of reducing noise. This may be effective on minor roads if traffic can be moved through impeding traffic. The road may be closed completely, or such traffic may be discouraged through humps, raised zebras, rumble strips or other traffic calming measures. Humps should preferably be round-top or in the form of narrow speed cushions.

On major roads, reductions in traffic volumes are rarely feasible solutions to noise problems. Building a by-pass around a town or area or through parking information systems may be possible if circulating vehicles seeking parking constitute a large percentage of the traffic. Noise from heavy vehicles may be reduced by moving them to less vulnerable roads and areas or through a Local Council's logistics initiatives. The following case study highlights this challenge.

Stop-and-go driving increases noise emissions because accelerating vehicles make more noise than vehicles driving at a steady pace. Several surveys have shown that roundabouts make less noise than intersections with or without signalization. This is largely because more cars can pass without reaching a complete standstill.



2.1 - Additional Noise Factors – a case study

Factors contributing to additional noise pollution are numerous but those which are perceived as a nuisance to households and communities tend to extend beyond rolling noise and road-tire interactions, though this should be considered as well.

2.1.1 - a. Case Study

Brick paving was implemented along the city centre of Mqabba - Karmenu Ciantar Street (in front of St. Mary's Church and Santa Katarina Chapel) whereby concerns amongst the Local Council are already on the rise. The main concern revolves around construction trucks from nearby quarries and facilities commuting through the centre, which contributes to sagging and unevenness. It is thus crucial to include access restriction by tonnage or vehicle type, as well as enforcement to hinder any sagging and preserve the restored sites. This cannot be stressed enough.

With regards to noise reduction from streets, surfacing materials are only one facade. Whilst it is ideal to have implementation standards/guidelines, the selection in materials should not only pertain to noise reduction, but must also consider several aspects. E.g. pedestrian safety, multi-modal mobility, initial and running costs including operations and maintenance etc.

2.1.2 - b. Minimum Requirements

There is a synonymous concern with current asphalt practices that replicates itself under brick paved surface i.e. the paving base material, that if implemented incorrectly still results in warping or sagging. Standardisation of practices when implementing the base layer is key to the foundation of any street surface.

Real-life scenarios may imply worsened noise levels should the foundations result in surface defects and irregularities. This would render null any initiative to reduce noise levels via street surfaces.

Additionally, the choice and longevity of binding and bedding materials (joints, grouts) ties closely to the conditions under which they're applied and in use – mainly from a thermal standpoint.

2.2 - Concerns on Brick Pavers

Is there a local comparative assessment that highlights the financial variation between asphalt paving and brick paving that considers both (a) initial costs and (b) operations and maintenance costs locally?

Sand cement is referred to as a grout material (given rock size and air pockets), however is thermal expansion and contraction factored into the rationale of the grout material?

The workmanship guidance and requirements should preferably highlight the benefits and drawbacks of brick pavers holistically [if any] to the Maltese market and industry.



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The guidance document should preferably highlight the beneficial aspects holistically to Local Councils (and not just from a rolling noise perspective), as well as the benefits and drawbacks of upgrading, accessing, and maintaining such paving vis-à-vis the conventional asphalt being used.

Lastly, policy and guidelines development would preferably take place alongside educative approaches that target the local industry.

3.0 - Accessibility and Mobility Concerns and Recommendations

Whilst welcoming the benefits of bricked surfaces the aim of this comment is to welcome hybrid streets that accommodate all street and square/plaza stakeholders. Excluding lava bricks, cobbled surfaces may prove difficult to welcome cycling pathways, pedestrian crosswalks, and ease of accessibility (or more so 'walkability') for elderly communities. Combining such surfaces with a few years of degradation may imply greater hazard risks.

With which, as highlighted above, comes the concern of proper workmanship (knowledge base, market availability) when having a mix of two or more surface types along the same area.

In addition, junctions and streets leading to these paved areas may welcome elevated pedestrian crossings (*flush with current pavements*) as a means of: (a) slowing down vehicles to reduce noise levels; and (b) cater for pedestrians that need not step off of the pavement and onto the asphalt.

Additionally, road-tyre interaction noise can be majorly reduced from tyres as recognised by the discussion paper. European regulation imposes labelling rules that grade rolling resistance, breaking on wet surfaces and external noise of the tyre model. The possibility of disincentivising the introduction of poor performing tyres into the local market should be discussed conjointly.

All these factors should be considered, not just the type of asphalt (or any other material) to be used.

4.0 - Other Considerations

Other eco-friendly materials for dust control, erosion control and soil stability should also be considered in rural areas, rather than using asphalt. This should be considered for constructing new rural roads, upgrading of unpaved roads, cycling tracks and pedestrian paths. Such material can be used with both existing aggregate or with natural hauled-in aggregate. Such polymers produce effective dust control. Such products are UV resistant, reduce noise pollution, air pollution, are elastic and can also endure sudden changes in climate.



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For more information see video on the link below;

<https://www.ipmitalia.it/en/green-paving-line-en-old/>

We would also like to push the idea to embark on a system where the CO₂ footprint for the production of road surfacing is significantly lower than the CO₂ footprint of a surface made of concrete. There are several figures available in the net. If I take an environmentally friendly surface, the total CO₂ emissions reached is approx... 6 kg CO₂/ m², a standard concrete paver is at about 50 kg CO₂ /m².

Furthermore, encouraged systems should be completely permeable to keep the natural function in the ground (sponge effect, biodiversity, etc.) and also to provide stormwater prevention.

Another point is that solutions exist where apart from the above, the product is made of recycled Plastic – thus one will be recycling plastic too.

5.0 - Heat Island effect

We are primarily concerned about the Heat Island effect such surfaces may cause. Heat Islands form as vegetation is replaced by asphalt and concrete for roads, buildings, and other structures necessary to accommodate growing populations. This is because these surfaces absorb rather than reflect the sun's heat. This causes temperatures to rise. Displacing trees and vegetation minimize the natural cooling effects of shading. In this regard, humidity should also be factored in.

We are bringing to your attention a simple test carried out under various bus shelters along the island that showed that where certain asphalt was introduced, the temperature in a 3-meter radius of these bus shelters has risen by 3-5 degrees Celsius in the past three years.

Combating UHI effects consequently contributes to runoff, safety, and visibility. UHI hotspots lead to severe LST temperatures, particularly in the summer period. Hence, identifying the need for more open green pockets to mitigating this urban heat. That being said, street surfaces without the complementary greenery and hybridisation in land use, would render any sole road surface interventions limited.

6.0 - Pavements and walkways

Pavement surfaces should also be considered when drafting the policy as these are the footpaths people walk on to move within our localities.

Working towards alternative modes of transport rather than private vehicles should also be considered.



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Cool alternative pavements, which include a range of established and emerging technologies, are being explored by various communities as part of their heat island reduction efforts. These materials reflect more solar energy, enhance water evaporation, or have been otherwise modified to remain cooler than conventional pavements. Thus encouraging more people to use less their private cars.

In addition to reducing the heat islands effect, the benefits of cool pavements include:

- *Reduced stormwater runoff and improved water quality*
- *Lower tire noise*
- *Enhanced safety because roadway pavements can improve by reducing water spray from moving vehicles and increasing traction through better water drainage.*
- *Better night-time visibility because reflective pavements or walkways can enhance visibility at night, reducing lighting requirements and saving both money and energy.*
- *Improved local comfort as cool pavements in places such as; parking lots or other areas where people socialize or children play can provide a more comfortable environment.*

The only drawback would be when calculating the cost factor. Cities that want to use the cool pavements concept as part of a heat island mitigation program will find it hard to estimate the net costs or benefits based only on temperature reduction. The most significant overall value may result when one factor in the multiple benefits, such as improved stormwater management, water quality, and safety are factored into the evaluation of a paving approach.

7.0 - Other Concerns and Suggestions

- One has to keep in mind the difference in decibels such implementation will bring. For example, 3-5 decibels will not be noticeable or meaningful enough to the average person to justify the increased time and cost of laying such road surfaces, so we don't think such small changes will be meaningful for residents
- Unless there is strong enforcement regarding the maximum weight of vehicles accessing roads made of alternative material, there is likely to be damage to the surface that could make it uneven and potentially result in the creation of more noise (thanks to loose, uneven and broken bricks)
- To that end, we can assume that without accompanying enforcement these roads would require additional ongoing maintenance for them to consistently fulfil the noise reducing purpose for which they were laid



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- In our opinion there are more effective and easier to implement methods to reduce the noise created by traffic in urban areas in Malta such as: Regulating tyres; compulsory inclusion of trees, grass, plants and soils in all urban road/infrastructure projects; traffic calm that prioritises active mobility modes in urban residential areas (less cars and more walking/cycling); some European cities also use water features to create white noise to mask the sounds of traffic. Is there an ERA reporting regarding measures like these too? We think it is likely we need to rely on a combination of all/some of them.
- We are curious about the other environmental impacts alternative road surfaces may have, especially regarding the Urban Heat Island Effect, as explained above. If alternative road surfaces could reduce the glare of the sun and the heat absorbed and released by transport infrastructure in addition to reducing noise, We think it would have a much stronger case. Especially considering the challenges identified in the paper.

8.0 - Conclusion

What we believe is of utmost importance when selecting one surface from another or before drafting such a policy is the fact that Paved surfaces contribute considerably to the temperature of cities because they cover a substantial fraction of urban surfaces.

On behalf of the Executive, Regional and Local Authorities I would like to thank the Environment and Resources Authority for considering the Local Government as a major stakeholder in this consultation process.

Mario Fava
President