

## Appendix 5 Weed Maintenance Techniques Research

Glyphosate	
Description	<p>Blocks plants enzyme system resulting in total weed control.</p> <p>East Sussex weed control is undertaken once a year by spraying Glyphosate herbicide along footways and kerb channels where weeds exist using a diluted 95% water, 5% Glyphosate solution. We only spray where weeds are present.</p>
Research	<p><a href="#">York City Council</a> – 3 times a year.  <a href="#">West Sussex County Council</a> – 2 times a year.  <a href="#">Kent County Council</a> – 2 times a year.  <a href="#">Surrey County Council</a> – once a year. They don't mention glyphosate but state they use herbicides.  <a href="#">Hertfordshire County Council</a> – 2 times a year.  <a href="#">Nottinghamshire County Council</a> – 2 times a year. Note they use weed killer but do not state name.  <a href="#">Essex County Council</a> – 2 time a year. Note they spray but do not state with what.  <a href="#">Gloucestershire County Council</a> – 2 times a year. Also notes their aim to achieve a high standard of street cleaning and weed control to improve the appearance of the City.  <a href="#">Hampshire County Council</a> – 1 time a year.  <a href="#">Lancashire County Council</a> – use glyphosate, do not state how often.  <a href="#">Leicestershire County Council</a> – 2 times a year. Note they don't mention a name but state they spray.  <a href="#">Lincolnshire County Council</a> – 1 time a year.  <a href="#">Norfolk County Council</a> – reduced to 1 spray a year from 2023. Within the <a href="#">minutes of Cabinet</a> they noted <i>Reduced use of glyphosate was critical to this approach, however switching away from its use entirely would mean more labour intensive and mechanical methods which would increase carbon emissions.</i>  <a href="#">Staffordshire County Council</a> – 1 time a year.  <a href="#">Warwickshire County Council</a> – 'annual spraying programme'.  <a href="#">Worcestershire County Council</a> – 'generally twice a year'</p> <p><a href="#">Cardiff City Council 2021 trial</a> found from glyphosate, acetic acid and foam stream: Based on the cost, environmental, customer and quality criteria (efficacy and sustainability criteria) measured, the most effective and sustainable weed control method currently available for pavement weed control in the UK involves the use of glyphosate-based herbicide.</p> <p><a href="#">Nottinghamshire undertook</a> a trial in 2022 to reduce the number of sprays. From this trial they agreed to continue the <a href="#">single spray option into 2023</a>.</p>
Concerns	<p>Awaiting the <a href="#">EU to publish documents on their risk assessments</a>. For the EU its authorised up until the 15<sup>th</sup> December 2023. For the UK it is approved until at least 15<sup>th</sup> December 2025.</p>
Conclusion	<p>Glyphosate is approved in Great Britain until at least 15 December 2025.</p> <p>Cardiff's independent scientific report found 'The responsible glyphosate-based approach to weed control currently used by the council is the most sustainable method of weed control currently available in the UK'.</p> <p>Research shows that the majority of other County Councils who advise how they maintain weeds use a glyphosate technique.</p>

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Acetic Acid	
Description	<p>Acetic acid works by causing plant desiccation, which means that it causes plants to “dry out”.</p> <p>Acetic acid found on supermarket shelves (Vinegar) would be a 5% concentration. It is recommended a concentration between 20-30% is most effective to kill weeds.</p>
Research	<p><a href="#">York 2021 trial</a> Acetic Acid applied at 20% strength. Areas treated with acetic acid and Enclean (see nonanoic) showed less weed die back than glyphosate. Site visits with the external advisor in mid-May found several properties had large weeds growing where the pavement meets the property. The weeds had survived the treatment and continued to grow. Complaints from the test area were more frequent than non-test areas and visually the areas were weedier at the time of the second spray in July 2021.</p> <p><a href="#">Suffolk County Council use Acetic Acid</a> For the 2023 season an acetic acid weed treatment will be used. These products are natural and licensed for use as herbicides on hard surfaces.</p> <p><a href="#">Cardiff City Council 2021</a> trial (application 4 times a year) acetic acid delivered intermediate costs and environmental impacts with low customer satisfaction and quality. Larger product use than glyphosate. The larger acetic acid product application volume mainly relates to the fact this molecule is not specifically poisonous (herbicidal) to plants, does not work at low concentrations and does not move around all parts of the plant.</p>
Concerns	<p>Acetic acid is not recommended as this has additional health risks to both the applicant and the public. The recommended strength to kill weeds can also burn the skin. Consideration also needs to be given to animals such as dogs who may come into direct contact with it.</p> <p>Should not be sprayed around reactive metals such as aluminium, tin, iron as staining, mottling or other harm to the finishes or surfaces may occur.</p> <p>Greater costs and less effective per application.</p>
Conclusion	<p>Acetic acid visibly effects weeds quickly, especially in sunlight however generally only leads to top of the weed being killed and weeds returning quickly. It should not be sprayed around certain metals so consideration would need to be given to its use around vehicles, streetlamps, and other structures. In addition, there is an increased health risk, eye and skin irritation.</p>

Pelargonic Acid (Nonanoic acid)	
Description	<p>A contact acting total herbicide containing pelargonic acid which is derived from sustainable plant origins (Sunflower &amp; Oilseed Rape meal). Once applied the product causes dehydration in weeds within hours, degrades rapidly and has no residual herbicide activity.</p>
Research	<p><a href="#">Dudley BC trialled in 2022</a> using Katoun Gold on Grass Edges, Obstacles and Perimeters of parks/openspaces. Found no issues using.</p>
Concerns	<p>Pelargonic acid should not be used on hard surfaces as the product needs to enter the soil to degrade.</p> <p>The hard surface version of Enclean (nonanoic) is only for moss and algae deposits on pavements.</p> <p>The Health and Safety Executive (HSE) official guidance confirms that this product does not have approval for use on hard surfaces.</p>

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	States it has an adverse effect on bees within the documentation.
Conclusion	This product is not suitable for use on the highway.

Foam Stream	
Description	Made from natural plant oils and sugars. Foamstream is combined with hot water and applied to weeds using a lance. The foam insulates the hot water, ensuring the heat is not lost to the atmosphere. This ensures the heat covers the plant for long enough for it to kill or severely damage the plant.
Research	<p><a href="#">Dudley 2022 trial</a> found using the machine was not practical on main roads or in areas with high numbers of parked cars. Considerable time is lost needing to refill the machine with water. Two operatives are required to drive and operate the machine, with the treatment taking longer to apply than a conventional spray. The machine is diesel/petrol powered and requires vehicle mounting.</p> <p><a href="#">Pg 4 'North Yorkshire County Council</a> have tested hot foam in 2021. They found that foamsteam requires 2 to 3 treatments. Broadly they have found the treatments to be of success but they do not have any current plans to roll the provision out any further across the County. The main reason for this is that it is essentially a machine more suited to urban areas and NYCC do not believe the system to be suitable for more rural and disparate areas. Additionally, the set up costs for the trial have been high and with the move to Local Government Reorganisation they are not progressing any further.</p> <p><a href="#">Cardiff City Council 2021</a> trial (application 3 times a year) hot foam generated high costs and environmental impacts, but high customer satisfaction and quality. Large water use and large fuel use. Based only on labour costs, application of hot foam alone is therefore 31 times more expensive than glyphosate; however, it is notable that this estimated cost does not account for the greater equipment purchase costs associated with hot foam treatment compared with the application of both acetic acid and glyphosate Hot foam is therefore a carbon intensive control method.</p> <p>Hot foam required 629.64 litres of water per kilometre - 62 times more water than glyphosate, which required 13 litres per kilometre. Acetic acid required 8.44 litres per kilometre.</p> <p>Applying glyphosate used less fuel - just 0.18 litres of diesel per km treated, compared to 0.19 litres for acetic acid, and 12.33 litres of diesel, plus 2.13 litres of petrol for hot foam - that's 63 times more diesel and 100% more petrol than required for glyphosate.</p> <p><b>West Sussex County Council undertook a Foam Stream Trial in 2022 and</b> concluded that the time, chemical, water and fuel massively exceed the resources of using glyphosate. Highlighting concerns around carbon footprint and the speed that the perennial weeds return.</p>
Concerns	Much higher cost, have other environmental impacts, and are more difficult to use in a congested urban environment or rural area due to distance.
Conclusion	Consideration should be given to the increased water and fuel usage and whether that outweighs the other environmental benefits. Not efficient for use on the large highway network.

Flame Guns	
Description	Use of flames to destroy vegetative matter.

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Research	<a href="#">Nottinghamshire</a> considered various thermal weed control methods in their 2022 trial and none proved suitable.
Concerns	Use of flames around parked vehicles and highway infrastructure.
Conclusion	Due to the nature of the highway flame guns are not suitable to be used around areas with parked vehicles.

Volunteer	
Description	Using volunteers from the relevant street to undertake weed maintenance on the behalf of the County Council.
Research	<p><a href="#">Kent County Council</a> advises public on their website: <i>Pulling or hoeing weeds would save us using weedkiller. We recommend wearing gloves when touching any plant you are unfamiliar with, in case you have a reaction to the sap or prickles. Sweeping up after can help prevent further weeds growing.</i></p> <p><i>The weedkiller we use may remain in the plant system for 6 weeks or more, so you should not put treated weeds into your compost or into your green waste collection. We are unable to collect removed weeds or dirt from you, so you must carefully and safely dispose them yourself.</i></p> <p><i>Always make sure you can carry out any maintenance safely, wear personal protective equipment (PPE) and be aware of pedestrians, cyclists and drivers.</i></p> <p><a href="#">Wirral Council considered</a> volunteers but found: <i>One of the issues that arose was that the manual hand scraping method used by community groups generated a significant potential health and safety risk, with volunteers at the alternative method trials complaining of back pain after relatively short periods of weeding. There were also health and safety concerns identified relating to the risks associated with volunteers working near or on the highway. It is evident therefore that the use of volunteers to carry out weed control would not be viable to keep the 100,000km of roads and pavements free of weeds. However, involving community groups and volunteers in weed control in a supporting way is welcomed and should be promoted (with appropriate risk assessment and support from officers).</i></p> <p><b>Brighton and Hove</b> asked the public to tackle unwanted plants themselves. This was met with some backlash from residents and news outlets:</p> <p>The <a href="#">following article</a> from the Daily Mail highlights ‘fury’ of residents. Reading some of the 1100 comments from the article themes range from charging the council for their time, loosing tourism, taking pride in your local area, support and opposition for the continued use of glyphosate. This <a href="#">following article</a> from the Argus highlights the scheme as being ‘outrageous’, noting safety and the Councils statutory duty. Reading some of the 33 comments the themes range from who is responsible if someone is injured, that it is a service being paid for, support for glyphosate.</p> <p><a href="#">Lancaster City Council</a> has taken the decision to stop using Glyphosate and instead are asking residents to <i>help tackle the issue by working with others in their community to pull weeds by hand or using another method, such as boiling water.</i> However, it should be noted that they passed back responsibility of highways maintenance to Lancaster County Council who remains using Glyphosate.</p>
Concerns	Health and Safety issues and public perception.
Conclusion	Consideration needs to be given to the management needed of a scheme like this and who is responsible for safety.

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Weed Rippers	
Description	Mechanical pedestrian machines for physically removing weeds from hard surfaces.
Research	<p><a href="#">Dudley 2022 trial</a> used weed rippers which were considered effective where weeds are already established, but effective use requires two operatives.</p> <p><b>Brighton and Hove</b> are starting to utilise weed rippers and machines. Too early to provide feedback.</p>
Concerns	<p>Two staff members need to be able to alternate the device due to vibration, this can range from every 20 minutes to every hour depending on the device used. Brushes need to be replaced at a cost of around £89 - £150 depending on device. Cost of device also need to be considered.</p> <p>The device can cut weeds but doesn't remove roots and is a slow, physically demanding process.</p>
Conclusion	Additional staff needed for slower progress and technique which does not tackle the root of the plant.

Hoe and Hand/Manual	
Description	Manual techniques to remove weeds, using simple gardening tools.
Research	<p><a href="#">Dudley 2022 trial</a> found that whilst effective, this operation is more labour intense.</p> <p><a href="#">The London Borough of Hounslow</a> has switched from using Glyphosate to manual based approaches. The budget spent on glyphosate has been reused to employ more operatives to manually remove weeds as part of the two-weekly ward-based cleansing schedule. A dedicated team with strimmer's to support the ward-based teams. They advise that operatives take a little longer to effectively clear weeds on Hounslow's public highways. And manually removing weeds means they do grow back faster, so ongoing control is likely to be necessary.</p> <p>They target specific roads they received reports from the previous years for this year's programme. And then deal with any safety issues.</p>
Concerns	The number of staff needed to undertake a maintenance technique like this across a whole County.
Conclusion	Would be best utilised in addition to another technique.

No Planned Maintenance / Reactive	
Description	Weeds reported by the public maintained only.
Research	<p><a href="#">Norfolk County Councils Cabinet report</a> noted that they would be <i>re-evaluating where greater weediness can be tolerated on an annual basis is better practice than 'business as usual'</i>.</p> <p><a href="#">Nottinghamshire undertook</a> a trial in 2022 to spray on demand in certain areas. From this trial they agreed to continue the spray on demand <a href="#">option into 2023 for certain areas</a>.</p> <p>Brighton and Hove have received concern from leaving areas with weeds. The <a href="#">following article</a> from the Daily Mail highlights Elderly and disabled concerned about trips.</p>
Concerns	Accessibility for those with protected characteristics. Effect on the infrastructure if weeds are left. Negative public perception.

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Conclusion	Tolerance to weeds in streets could be tested further.
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Road Sweeping	
Description	Mechanical sweeper generally utilised for keeping public roads clean. Generally, the responsibility of District and Borough Councils.
Research	<a href="#">Gloucestershire</a> spraying is supported by sweeping in the more central areas advising that: <i>Roads which are swept frequently with a high build quality should only require minimal herbicide treatment.</i>
Concerns	Reliance upon District and Brough Council service.
Conclusion	There is a correlation between road sweeping and less weeds due to weeds not having the detritus to hold onto.

Integrated Pest Management (IPM) / Integrated Weed Management	
Description	Achieving weed maintenance by utilising a range of strategies.  The aim of IWM is to diversify weed management strategies to reduce the reliance on herbicides and promote the use of site-specific weed management and target applications to reduce herbicide impacts, where possible.
Research	<a href="#">Cardiff Report</a> (pg 6) provides information on IPM to use a range of weed controls: <ul style="list-style-type: none"> <li>• Cultural (preventative)</li> <li>• Physical (mechanical)</li> <li>• Biological (biocontrol or bioherbicides)</li> <li>• Chemical (herbicides, also known as plant protection products; PPPs)</li> <li>• Integrated Pest Management (IPM)</li> </ul>
Concerns	Decision on where to use which devices, scheduling issues and increased costs due to using a range of options. Different areas receiving a different service.
Conclusion	A standard base service should be provided to all residents across East Sussex to avoid the feeling of discrimination against certain areas.