

# **What is Integrated Weed Management?**

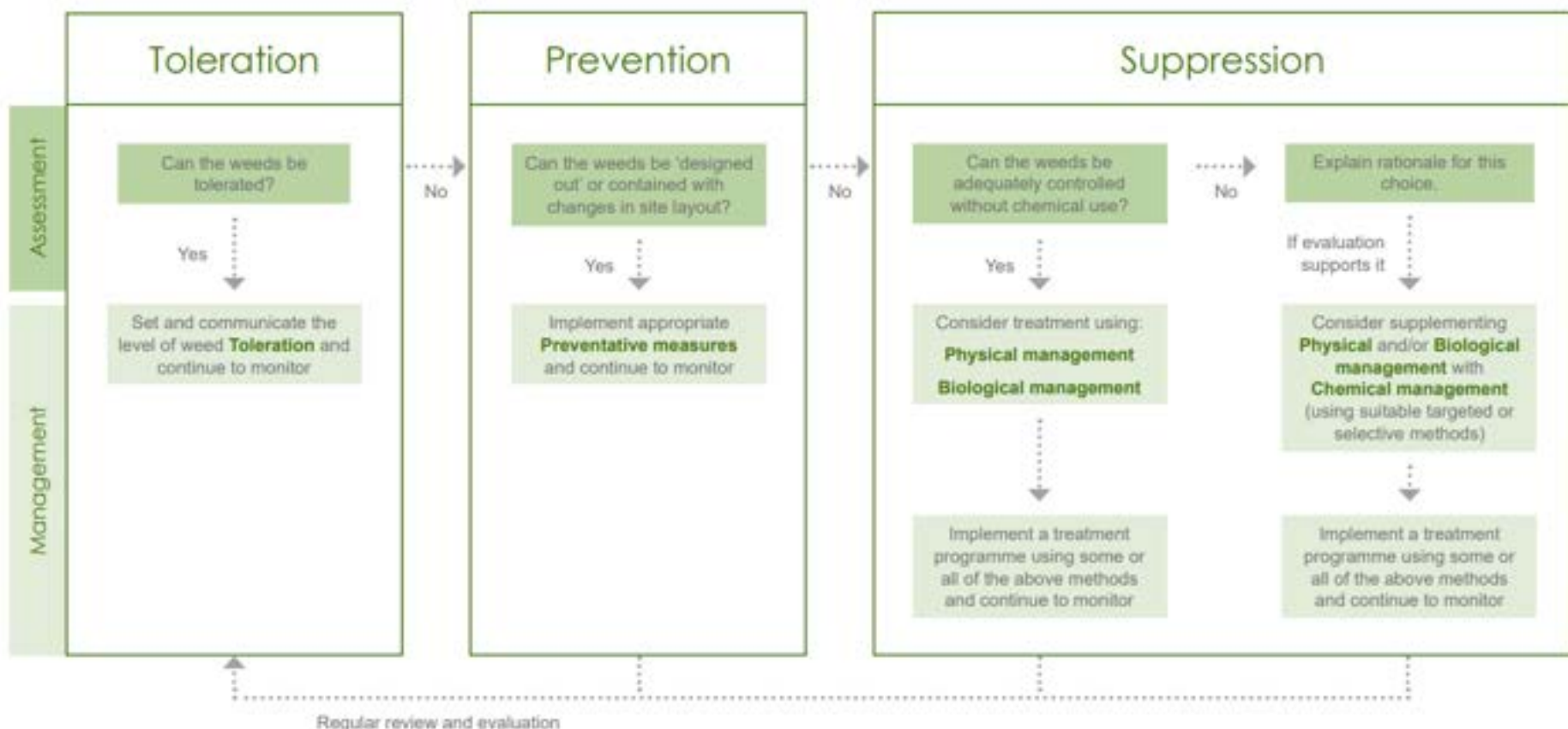
# What is Integrated Weed Management?



**INTEGRATED WEED  
MANAGEMENT**

**Kersten**  
SITE MAINTENANCE EQUIPMENT

The following flowchart sets out a structured decision-making process to support an integrated approach to weed management. It encourages users to first assess whether intervention is necessary and, if so, to prioritise preventative and non-chemical measures wherever possible. This stepwise process helps ensure that any weed management actions are proportionate, targeted, and environmentally responsible, and that regular re-evaluation remains central to the overall strategy.



## Appendix 7 – Statutory duty to keep land and highways clear of litter and refuse (including detritus)

Under section 89 of the [Environmental Protection Act 1990](#), certain landowners and occupiers have a legal duty to clear litter and refuse (including detritus and dog faeces) from relevant land and relevant highways to which the public has access, with or without payment.

Section 89(1) of the Act places a duty on certain bodies to ensure that their land (or land for which they are responsible) is, so far as is practicable, kept clear of litter and refuse. Section 89(2) places a further duty on the Secretary of State in respect of motorways and a few other similar public highways, and on local authorities in respect of all other publicly maintainable highways in their area, to ensure that the highway or road is, so far as is practicable, kept clean.

A [Code of Practice on Litter and Refuse](#) is issued under section 89 to provide practical guidance on the discharge of this duty. The Code provides a framework with a grading system to show the standard (Grade A) and a corresponding table showing the requirements to bring the relevant land and highways back to the standard within a certain time frame. The response times are dependent on the zone a specific area falls under, which is dependent on the intensity of use.

Practitioners should refer to the relevant Code of Practice on Litter and Refuse published by the appropriate authority in their country ([Defra in England](#), [the Scottish Government](#), [Welsh Government](#), or [DAERA in Northern Ireland](#)) to ensure compliance with local guidance and response standards.

Grade A



Road is free from detritus

Grade B



A slight presence of detritus on roads and gullies

Grade C



A significant presence of detritus on roads and gullies

Grade D





Road surfaces are obscured or at high risk of hazard caused by detritus




# Key Legislation in Highway Claims

## Legal Basis for Claims

 Highways Act

 Occupiers' Liability Act

## Council's Defense

 Highways Act - Section 58

- ✔ Reasonable system of inspection and maintenance
- ✔ System was properly implemented
- ✔ Defect not identified as dangerous or appropriate repair system followed

(e.g. pothole or uneven slab)

**Living streets 2023 report reveals that pedestrian falls could be costing English taxpayers as much as half a billion pounds a year.**

<https://www.livingstreets.org.uk/media/33ajm1zm/pedestrian-slips-trips-and-falls.pdf>

**Our Expectations have massively increased.**



Green Oasis Park  
- Certified Sustainable

# PREVENTATIVE VS. REACTIVE WEED MANAGEMENT: CAUSE VS. SYMPTOM

## PREVENTATIVE MANAGEMENT (Addressing the Cause)

- ✔ Focuses on creating conditions unfavorable for weed growth.



## REACTIVE MANAGEMENT (Treating the Symptom)

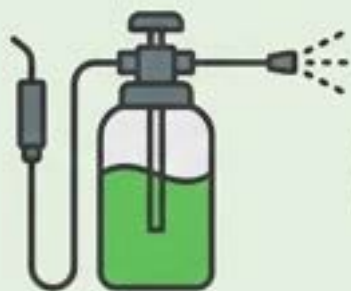
- ✘ Addresses weeds after they have appeared and become a problem.



# TIME COMPARISON FOR WEED CONTROL METHODS (PER 100 METRES)

Based on a recent study by Cambridge City Council

## CHEMICAL SPOT-SPRAYING



**3 to 5**  
MINUTES



**100**  
METRES

## MECHANICAL/MANUAL REMOVAL



**20 to 30**  
MINUTES



**100**  
METRES

Faster Method (Green) vs Slower Method (Blue)



## Case study

RUN THE BUSINESS



### Current method

2 x operatives 09:54 minutes = £3.32 of wages

- Using hand tools that can cause fatigue and injury

Total = £3.32

### Proposed method

The same task can be completed with 2 x operatives 05:07 minutes = £1.75 of wages.  
Machine running cost for 05:07 minutes = £0.56

Total = £2.31

**VS**

### outcome

Saving £1.01 over 10 meters or £162.50 per mile.  
In 81 miles the machine would have saved its initial outlay.

# Ecological "Core Habitat" Ranges for Weed Species by Soil Depth



## THE 25MM TIPPING POINT

> Plants don't grow at a single average depth; they have a 'Core Habitat' range. As the chart proves, the 11–25mm window is the ecological bridge. If we extract the soil and roots here, we win. If we allow the soil to build past 25mm, we cross a structural tipping point, unlocking the exact habitat required by heavy, asset-destroying species like Meadow Grass, Brambles, and Rhododendron.

# Bracknell IWM Trial — Design & Scope

*Bracknell Town Council / Kersten UK / Complete Weed Control — 2025/26*

**Sites** **6** Car parks, park-edge paths & kerbs, enclosed paved areas, residential footways

**Measurement points** **502** Species-depth pairs — 5 plots × 5 points per site

**Protocol** **3-point** (i) Vernier depth measurement (ii) Plant App species ID with photographic confirmation (iii) Post-extraction surface condition assessment

**Key finding** **H=125.3**  
**5** Kruskal-Wallis — species significantly stratified by depth ( $p = 6.03 \times 10^{-28}$ ,  $\epsilon^2 = 0.247$  — large effect)

**STAGE 1:  
PREVENTION**  
( $<10\text{mm}$ )  
Easy Sweep



**STAGE 2:  
THE OPPORTUNITY**  
( $11 - 25\text{mm}$ )  
URGENT Mechanical Reset



**STAGE 3:  
THE TRAP**  
( $11 - 25\text{mm}$  Aged)  
Missed Window



**STAGE 4:  
STRUCTURAL FAILURE**  
( $>25\text{mm}$ )  
Reconstruction Required





# The Kick Test — Root Anchorage Field Diagnostic

*A rapid, equipment-free field diagnostic for distinguishing Stage 2 from Stage 3*

## How it works:

- Apply lateral foot pressure (toe of boot) to the base of the weed stem
- The response tells you the root anchorage state before any equipment is deployed

### STAGE 2

**Whole mass moves with detritus**

→ *Window open — schedule mechanical extraction urgently*

### STAGE 3

**Mass breaks off at substrate level, root remains**

→ *Window closed — now managing structural defect. Extraction required but at higher cost*

### STAGE 4

**Snaps above surface — nothing removed**

→ *Structural failure. Root penetrating sub-base. Reconstruction planning required*

# Indicator Species — What the Plants Are Telling You

Three species statistically validated as stage proxies (Bracknell IWM Trial, 502 species-depth pairs):

## Moss (Bryophyta spp.)

$\chi^2 = 18.0, p < 0.001$

### Stage 1/2 indicator

Concentrated in shallow accumulation. Reliably rules out Stage 4. Primary pioneer coloniser.

## Oakleaf Fleabane (Erigeron quercifolius)

$\chi^2 = 7.8, p = 0.021$

### Stage 2 indicator

85% of observations in the 11–25mm band. Strongest single-species indicator that the intervention window is open. Combined with a passing Kick Test = Stage 2 confirmed.

## Bramble (Rubus fruticosus agg.)

$\chi^2 = 15.6, p < 0.001$

### Stage 3/4 indicator

70% of observations at Stage 4 depth. Never recorded at Stage 1. Woody roots exert lateral force on pavement joints. Presence = presumptive Stage 3 or 4 classification.

⚠ Dandelion and meadow grass showed no significant stage stratification — they cannot function as independent stage indicators

# The Cost of Inaction: Proactive vs. Reactive Intervention

## PROACTIVE INTERVENTION (Stages 1 & 2)

### STAGE 1 (Prevention Zone)



< £10/m<sup>2</sup>  
Sweep / reset

### STAGE 2 (Window OPEN)



< £10/m<sup>2</sup>  
URGENT extraction

## REACTIVE INTERVENTION (Stages 3 & 4)

### STAGE 3 (Window CLOSED)



£75-150/m<sup>2</sup>  
Structural defect

### STAGE 4 (Structural Failure)



£100-150+/m<sup>2</sup>  
Reconstruction

**PROTECT INFRASTRUCTURE:** Early intervention prevents structural damage and keeps costs low.

**COSTLY REPAIRS:** Reactive systems often miss early stages, leading to significant infrastructure damage and high repair costs.

# Four Independent Evidence Streams — The Audit Methodology

1

## Field Measurement

10 streets, 50 Vernier gauge measurements + Kick Test. Mean depths 23–48.6mm. 64% of network at Stage 3/4. Spearman  $r_s = 1.000$  on triple-layer streets.

2

## Complaint Data Analysis

10,868 complaints over 24 months. 121 triple-layer hotspot streets. 70.8% of weed complaints within 50m of a gully complaint. Z-score = 125.8 (Monte Carlo, 1,000 iterations).

3

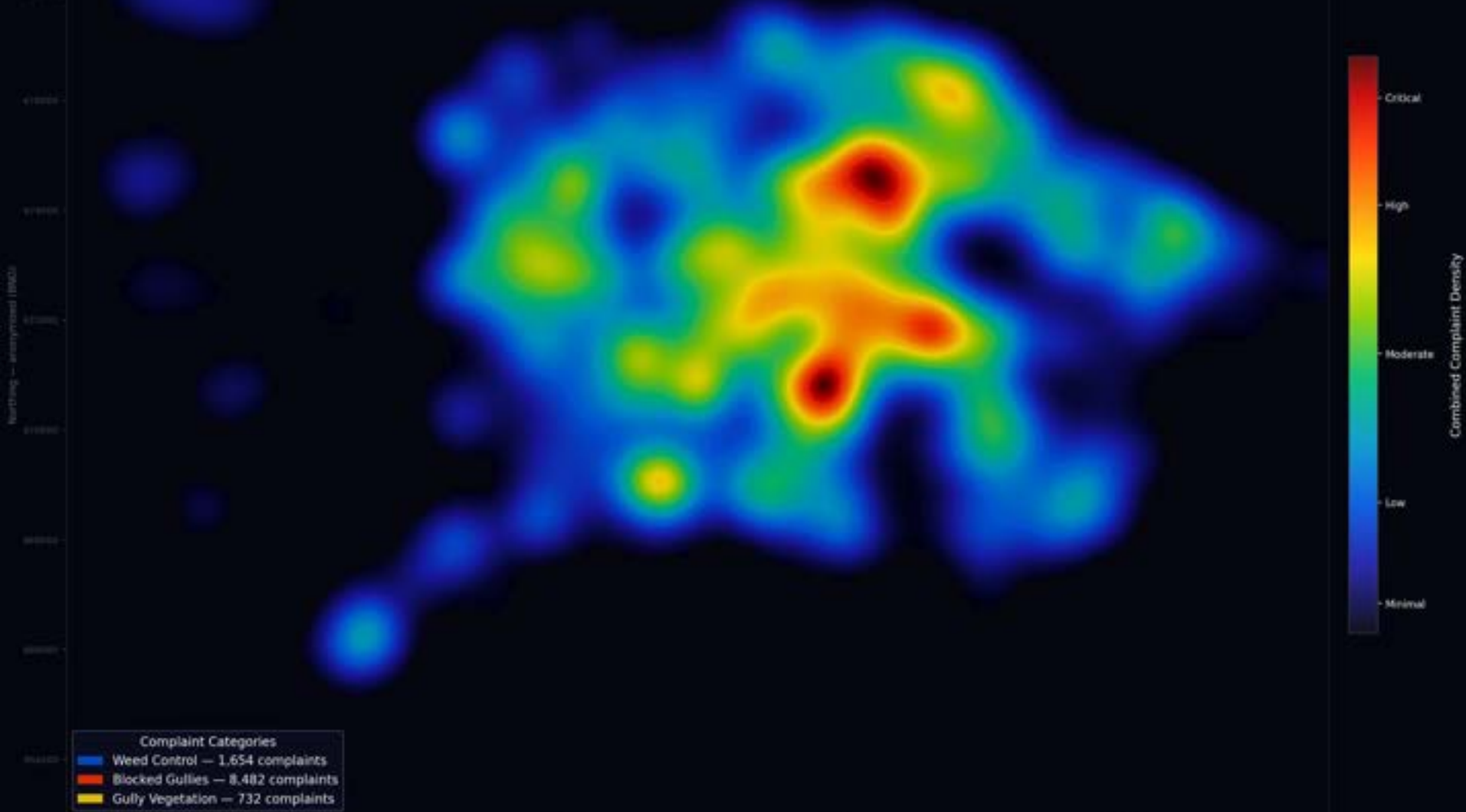
## Financial Modelling

Silt Debt: 20,448 tonnes = £2,044,800 deferred disposal liability. Year 1 priority programme: £719,100. Payback: 8.6 months (conservative).

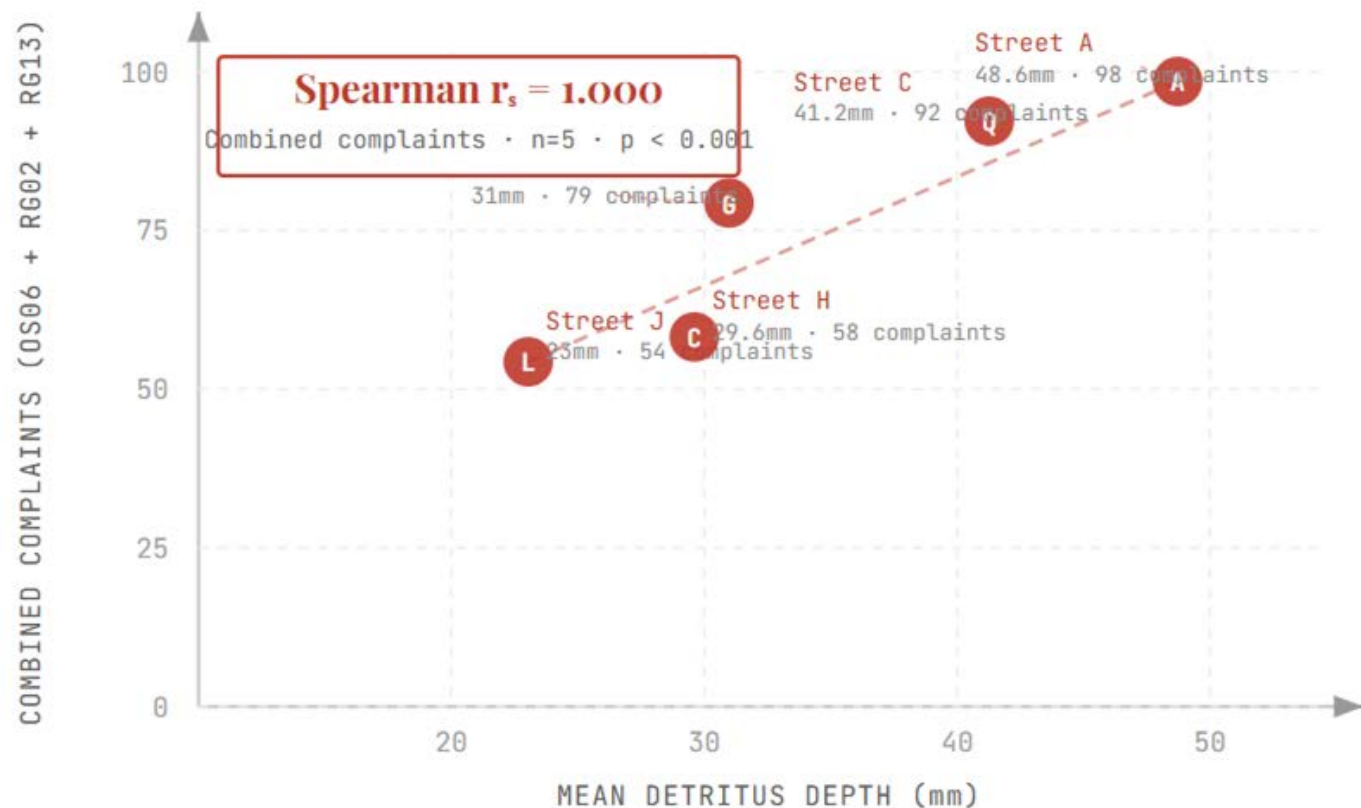
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## Legislative Review

Highways Act 1980, EPA 1990 Section 89, WMHI Code of Practice. Current approach creates systematic statutory exposure.

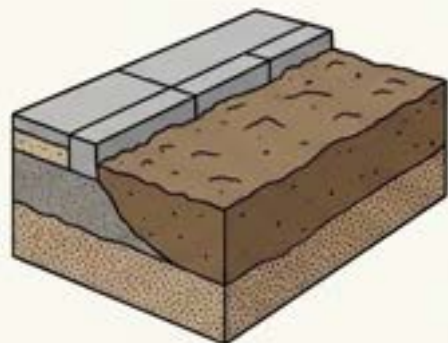


Five triple-layer hotspot streets. Spearman  $r_s = 1.000$  — perfect rank correspondence between a single day's field audit and 24 months of independent public reporting.



# The Vicious Cycle: Deeper Soil Drives Higher Maintenance Costs

## 1. DEEPER SOIL / DETRITUS



## 2. MORE ESTABLISHED WEEDS

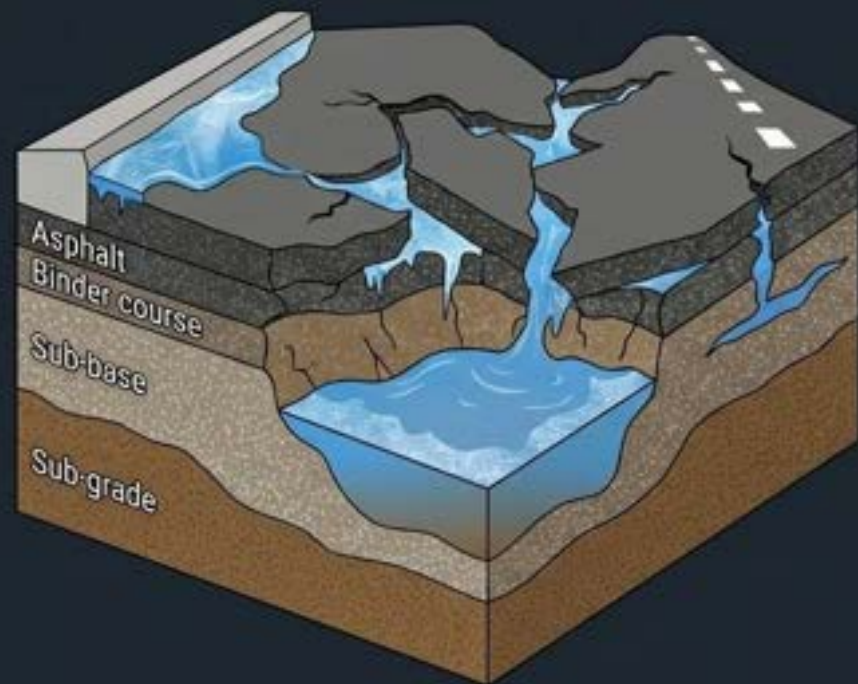


## 3. INCREASED GULLY COMPLAINTS



**Conclusion:** Increased detritus accumulation directly leads to structural damage and a higher volume of reactive maintenance requests.

# The Engineering Consensus: Edge Failure & Pothole Formation



## The Primary Catalyst Edge Deterioration

Transport Scotland pavement analysis identifies edge deterioration and cracking as the dominant defects on regional road networks, directly linked to trapped water and poor drainage.

## Sub-Surface Fragmentation Sub-Base Saturation

The Association of Directors of Environment, Economy, Planning & Transport (ADEPT) confirms that trapped water at the highway edge saturates the sub-grade. Once the sub-base is compromised, standard traffic loading guarantees structural failure.

## The Preventative Solution Mechanical Intervention (Stage 2)

Eliminating the soil and vegetation trap at the kerb edge prevents water ingress, preserving lateral support and stopping the freeze-thaw pothole cycle before it begins.





## Winning the Public: The Visibility of Mechanical Cleansing

The greatest fear of changing the weed management process, is public backlash over costs or messy streets. The Bracknell trial operators recorded spontaneous public interactions during mechanical visits, proving the exact opposite: Residents actively value visible, proactive street cleansing.

“

“It's great to see a new initiative, I hope it happens across the whole town. That's really good.”

– Resident, Winscombe (Paths)

”

“

“That's a good brush, good job, I hope it's successful!”

– Resident, Birch Hill (Car Park 2)

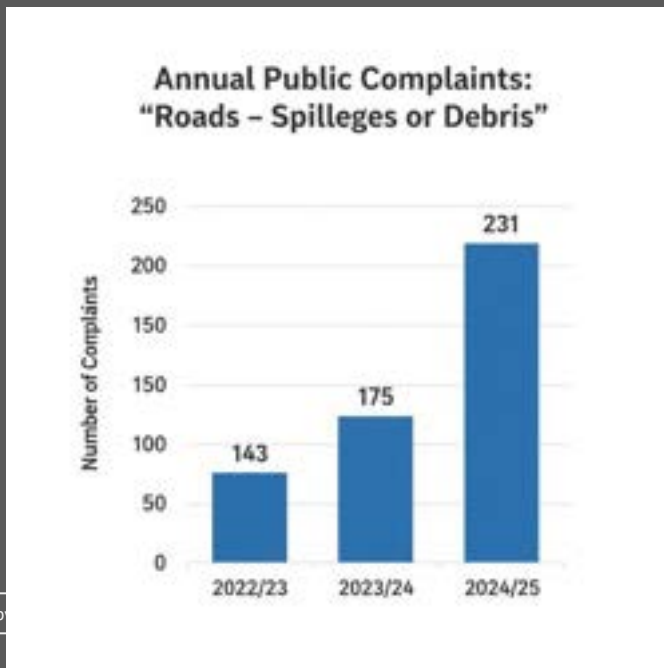
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### The Political Win:

“Spray Only” approaches leave dead, brown weeds and silt on the pavement, a constant visual reminder of a problem. Mechanical sweeping removes the visual blight instantly, replacing it with an immediate civic improvement that residents can physically see their council tax paying for.

# A-road in North Lincolnshire

After 25 + years of build up.



1 MILE OF PAVEMENT



100 TONNES OF  
SOIL REMOVED

Leisure Centre Pool is  
approximately 375  
cubic meters



Before weed  
brushing; 9.5  
tonnes dry  
weight of  
weeds



**Year 2 is only about 3  
cubic meters**



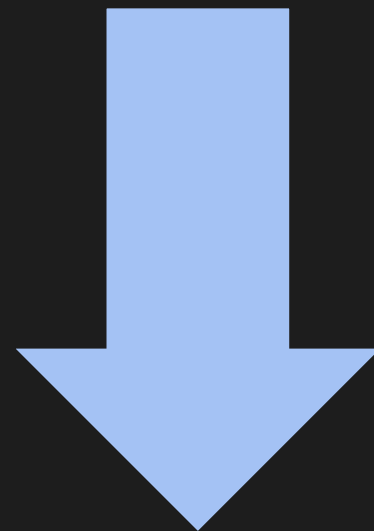
**Year 2;  
Treating just  
380kg dry  
weight of  
weeds**





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# AVERAGE SOIL DEPTH WILL REDUCE



Changing the types of weeds you  
need to treat.

What does it mean for us?





# MANAGING THE SURROUNDING VEGETATION

Reducing the detritus migrating from adjacent areas









rooteye®

Take control. Take care.

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# Any Questions?