

Curing Pothole Britain

Edition seven of the Pocket-book series



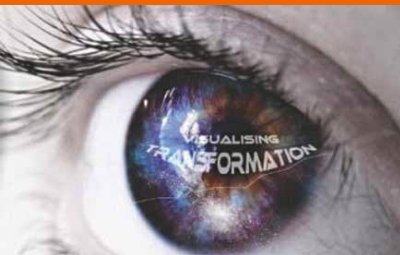
Dave Gaster & Mark Morrell (aka Mr. Pothole) 2023

A professional whole-system introduction to 'Lean and Systems Thinking' (L&ST) to eradicate the backlog of highway repairs.

Making roads safer reducing societal costs.

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Pocket-books are published by Support Services Direct as part of the Visualising Transformation series. Previous Books include: 'Quality or Politics', 'Visualising Transformation' and 'VT-Achieving More for Less'.

- Booklet One:** Potholes,
- Two:** Waste (Recycling and Cleansing)
- Three:** Fleet Management
- Four:** Passenger Transport
- Five:** Transformation
- Six:** Parking
- Also** 'Total Transport – from theory to practice'

They are available from www.supportservicesdirect.co.uk

CHAPTER 1: INTRODUCTION

The pocket-book series is designed to provide short, useful summaries for government and operational services, without over-simplifying the subject matter, enabling decision makers to improve services within their given powers.

Potholes are largely the responsibility of highways authorities, affecting everyone who uses carriageways (roads) and footways (paths). Poor roads impact on all levels of Government, plus the NHS (due to accidents) and the police.

This booklet is designed to solve the ever-worsening highway network and help achieve safer highways that reduce:

- Vehicle damage.
- Crashes, deaths and injuries.
- Wasted resources and carbon.

Further information to enable most development is provided in the supplement to 'VT- *Achieving More for Less*'.

Recommendations set out in the booklet include:

- ✓ Applying L&ST through the whole service area.
- ✓ Utilising spare capacity to apply for grants and seek better ways of working.
- ✓ Utilising all current resources.
- ✓ Using best materials, plant and methodologies.
- ✓ Cascading great ideas for other authorities.
- ✓ Embracing Artificial Intelligence (AI) for inspections and management.
- ✓ Developing true collaboration and cooperation.
- ✓ Introducing volunteers to inspect and enforce.
- ✓ Enabling win-win systemic changes, including laws.
- ✓ Giving drivers improved safety across Britain.

CHAPTER 2: FACTS, FIGURES AND MYTHS

The UK has around a £14 billion backlog¹ of carriageway repairs. There is around a £30bn backlog of all road repairs, costing the nation over £60bn a year,

The government has a £1.1 trillion budget, spending £46bn annually for transportation. We can save £14bn a year to begin with from Curing Pothole Britain.

It's quite clear that the term 'potholes' means many things to many people: Most see broken up carriageways with an array of defects and call them potholes, while "Well Managed Highways" unfortunately allows local authorities to define 'how big' a defect is, and how long it's left, before it's considered a risk under Section 58 of the Highways Act. Neighbouring authorities have very different standards, and this is something that must be revoked to save lives.

One authority may take six days to inspect a 10cm deep hole on a 60mph road after it has been reported, while the neighbouring authority may make it safe on the day it has been reported. This difference in reporting can be very dangerous for drivers!

Folk Law states: "most potholes form because of ice in the cracks in the carriageway surface", but that's simply not true. If the road were properly built, changed, and maintained, there would be no cracks within the first 25-40 years.

Potholes form due to highway failures; the root causes of failure are influenced by:

- ✓ **Design:** including assumptions when designed.
- ✓ **Construction:** using the right materials, at the right thicknesses, compacted in the right way, (for that part of the highway) in the right weather conditions.
- ✓ **Changes:** Traffic volumes and weights, surface features including white lines, rumble strips and roundabouts, being dug up and repaired.
- ✓ **Deterioration over time:** Sun, cold and water all reduce the strength of a structure over time. (Over 40+ years)

Five people die every day on our roads while 80 are seriously injured. The government states that each life lost costs Britain £2.25m, with each serious injury costing £225,000. That's over £17bn a year! Some injuries cause life-changing issues. RAS4001 states the cost of road crashes in 2022 was £43.2bn.

While there is an array of causes, highway network deterioration has been significant, not only from potholes, but also from flooding, ice, scree, trips, signs and lines + vegetation.

There are many costs either due to defects existing, or that have occurred, or to prevent them from being a liability. Virtually every reported national 'costs of accidents' we've seen in the papers shows just the costs of vehicle repairs.

If 'better questions' were asked, you'd also discover many personal injuries, frequently costing £10,000 to over £1m.

There is no appeal, no ombudsman, no need to prove information, and no requirement to have qualified inspectors!

CHAPTER 3: SUMMARY SOLUTION

The fundamental principle of '*Visualising Transformation*' is to increase productivity via efficiencies, enabling increased capacity to then deliver improved effectiveness.

This on its own will make highways safer and has been achieved many times, but never taken to anywhere near its ultimate capability to 'Cure pothole Britain'. (CPB).

One outcome from improved efficiency should be to develop grant seeking and bidding, gaining more central government funds to augment local needs, including healthier travel.

There are several fundamentals to address:

Improved information: Most organisations are 'Data rich and information poor'. These organisations need higher quality data, linked meaningfully into information, to create Knowledge to feed Tactics – D>I>K>T.

AI will create a massive position change, from information poor to knowledge rich within weeks, learning new tactical skills will be a pivotal moment in highways history.

Areas need increased localism to have the right management for the right purpose, using highway agencies for town councils to administer inspections, monitoring, enforcement and minor repairs.

There are seven million volunteers within Britain in areas such as social care, police, health, schools, clubs and sports, but virtually none in highways. Using local volunteers and charities for local purposes would free up existing resources to address other areas.

Improved town-based inspections are already adding details to AI inspections, creating roads totally 'fit for purpose'. We also focus on utility activity seeking to report any defects.

Better equipment which is properly used will help increase productivity while reducing rework.

Appropriate high-quality materials should be used locally to reduce costs and rework while reducing carbon footprints.

Total cooperation and collaboration between every party involved will enable better use of resources, deployed sensibly for win-win-win outcomes. The government may wish to reconsider their win-lose position on vehicle speeding fines for instance.

Enablement of town councillors to join up resources for win-win outcomes makes a town safer with better amenities.

Local decisions to increase outcome qualities around retirement homes, schools, hospitals, shopping centres, parks etc, encouraging greater footfall with active travel.

The rapid evolvement of AI is showing stunning possibilities within highways. In a matter of months the worst road in Britain will be identified within crowd share apps, similar to real time Sat-Nav congestion ahead redirection. This will overturn less frequent Section 58 inspections leaving authorities defenceless.

AI is being adopted by the RAC for highway monitoring, if National Highways use AI inspections on the SRN then unexpected road closures to fix potholes and most damage will soon become a thing of the past.

CHAPTER 4: CAUSES

In a mature town, around 55% of potholes form because the road had been previously dug up. Without these trenches it's probable that the roads would be okay.

There are hundreds of reasons why potholes form and can become a major problem. The cause-and-effect chart (C&E) below shows financial and operational linkages while Figure 9 shows issues.

The C&E chart is based on a method to collect many ideas quickly, then divide them up into manageable elements to address those issues. The chart shown was from an introductory workshop aimed at fast-tracking resolutions. That authority went on to halve the number of potholes, generally repairing them within 6 months.

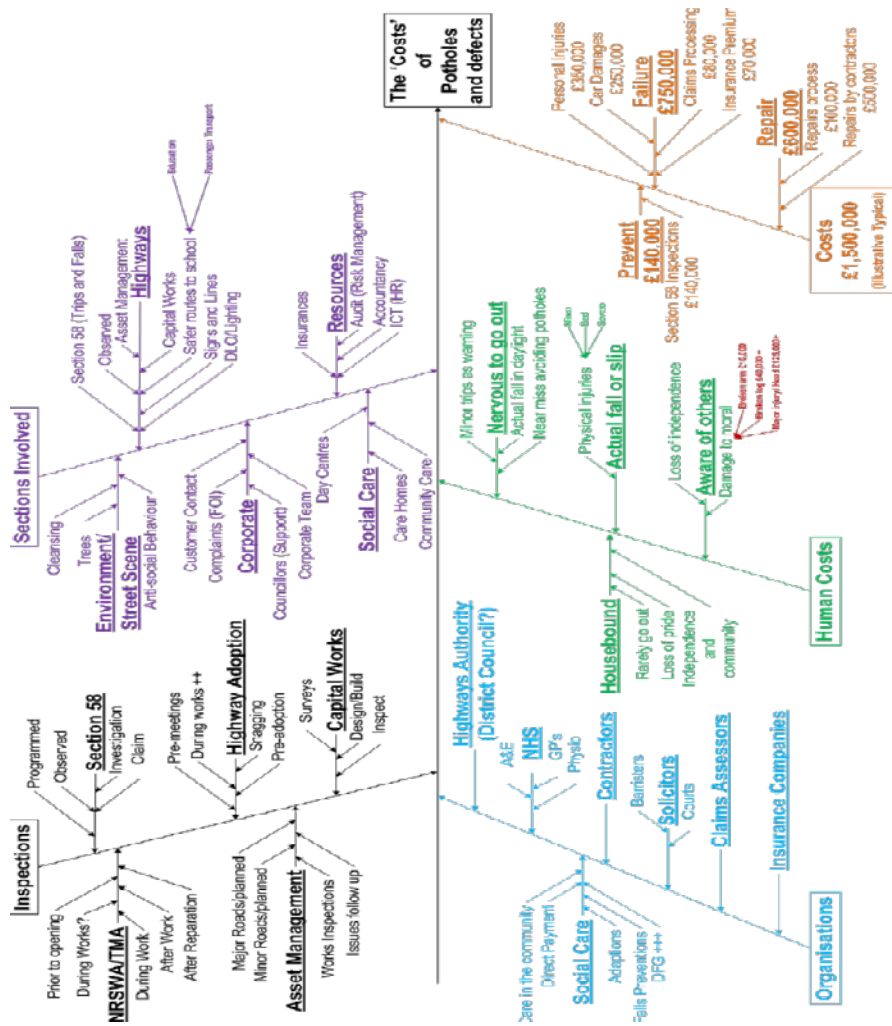


Figure 1. Cause and Effect Chart for Pothole costs

Authorities generally have two ways to repair potholed roads, either patch each hole one at a time or carry out a wide area repair. Many patch repairs fail after a short period, and need repairing again, whilst larger repairs are relatively expensive.

There are other ways, that not only deal with the immediate aspect, but also create a permanent hard-wearing repair.

In rural areas most potholes form due to the edges of the carriageway failing, from historic trenches, or the centre line joint, often worsened by road markings.

It's generally impossible to resolve all problems immediately. The more 'governance' within the system to control work, the greater the risk of significant personal injury claims.²



Figure 2. Picture of Kiely Multipatcher

This vehicle can fill in potholed surfaces and retexture wide areas of highways, and is ideal for rural roads, plus it is guaranteed for two years.

Potential work needs to be assessed and ranked: Is it a legal trip? Will it get worse quicker? May it cause accidents or injury? Has it failed before? Is it a fast-failing road?

Ranking is relatively easy via a Pareto Analysis, where 20% of the work may help save 80% of the costs. Take care to ask the right questions, as these charts display. Addressing most issues isn't the same as the best way to save cost.

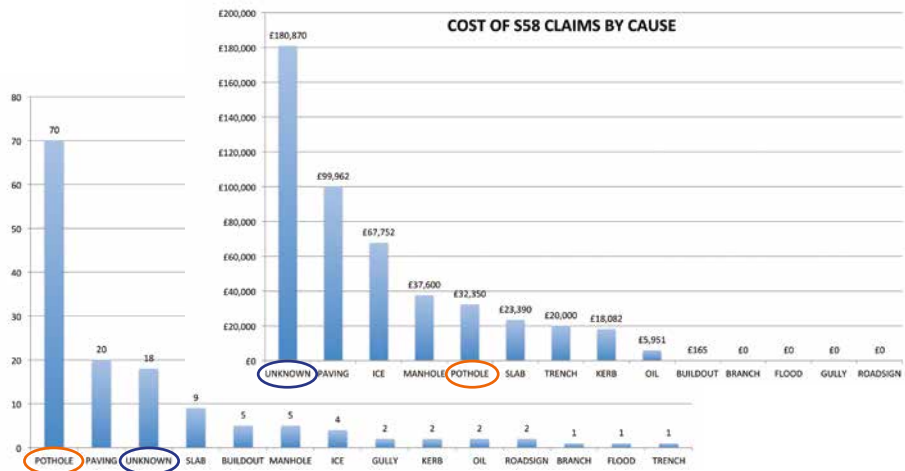


Figure 3. Pareto charts for S.58 claims volume & costs.

Potholes are not the only aspect in focus, in towns the biggest issues can be inappropriate hedges blocking paths, obstructing signs and streetlights. If gullies aren't regularly emptied their drains will block before meeting the sewers.

Without adequate management, informal crossovers will proliferate, adding to footway and kerb damage. Kerbs will fail over time, causing trip hazards for pedestrians.

CHAPTER 5: PREVENTION

Preventing potholes and highway defects is far easier than it may seem. Effectively there are many ways to stop the root causes of failure which include:

A. Design and construct highways professionally.

Highway designs can often be less than optimal, by under-estimating future traffic flows, not considering extra loadings at roundabouts/ crossroads, reducing kerb heights.

B. Ensure all highways are fit for purpose.

Construction has a wonderful array of wrongness- Too: thin, wet, cold, not compacted enough, wrong materials, etc

UK infrastructure is experiencing significant investment and expansion, with many housing estates being built. Those developers are interested in a) selling houses, b) making a profit, c) creating an estate with 'kerb appeal'. Building the roads is merely a necessity to achieve a to c.

Those roads are generally built-in sections, about 50 to 70m length at a time, and are invariably built up to 'base course' with the final wearing course added after all construction.

They are built too thin, too wet, too dry, under-compacted, without awareness of the impacts of flexible constructions between rigid ones. Kerbs are installed one day, and overrun the next day. Every estate being built now could be a financial burden to the council in a few years-time.

C. Ensure all changes to those highways are sound.

Changes can be quite subtle, things that make a road safer can make it fail quicker, for instance: Rumble strips and lateral white lines are designed to shake the car, but equal and opposite forces can increase highway damage.

Digging up the highway is regulated either via the New Roads and Street Works Act (NRSWA) or the more recent Traffic Management Act (TMA). In general; no one should dig up any part of the highway without permission.

There are short term economic and environmental benefits from digging out the sub-base then re-using those materials as fill. However, if those materials are not suitable or not compacted in these layers sufficiently, those trenches will fail considerably before 10 years, or at least 15 years before they should, passing costs and issues to the council.

The TMA properly applied is self-funding, you can manage all excavations and reinstatements, and pass on the costs of failures back on the utilities. Local authorities are prohibited from high volume inspections, however limitless volunteer inspections are permissible. Local people can cure local issues.

Section 58 inspections should serve two main purposes, they manage the need to repair to prevent accidents and claims.

Effectively every highway needs an appropriate inspection³ regime, preferably every year, keeping a record of defects, raising orders to repair, wherever a notifiable defect is present, or where a defect may deteriorate quickly.

These inspections can vary from 'course visual' from within a car as a passenger on rural roads, to walked both sides of the road, once a month in town centres. AI will transform these inspections, very much like an interactive Sat-Nav on phones.

Asset management inspections and awareness are a core aspect for managing the whole infrastructure which is worth billions in most authorities.

The highway network: carriageway, footways, verges and all assets (street lighting, signs, lines, furniture) are individually assessed and recorded, with segments (transects) of roads, say 10m long each being given a 1 to 10 ranking, from perfect to 'falling apart'.

Bringing all these 'silo based' separate functions together⁴ enables a sweet spot⁵ to optimise future work plans, typically via the Local Transport Plan (LTP), against awareness of what to do in the short term.

Silos, or subject matter experts, are great for discrete pieces of work, but generally hopeless at managing complexity. Most often, processes are designed as if everything is the same, 'A pothole is a pothole'. Chapter 7 shows how complexity can be addressed using some common sense.

Linking AI to highway databases and feeder systems will enable immediate, real-time awareness of highway conditions, failures, flooding and ice, in many visual ways, for deployment of resources to prevent crashes and injuries.

CHAPTER 6: SEASONALITY

The seasons impact highways in differing ways, for instance extreme cold spells will lead to more accidents and the surface break up of crazed pavements.

Surface dressing programmes are far more effective in the summer months, as these tend to produce longer days, better curing temperatures and fewer weather issues.

Major reconstruction works are also better carried out from April to October, as more work can be achieved per day in longer drier days.

The Local Transport Plan (LTP) should be designed in such a way as to optimise all designs and approvals in advance, so the most cost-effective work can happen at the right time, with all operational and tactical decisions in line.

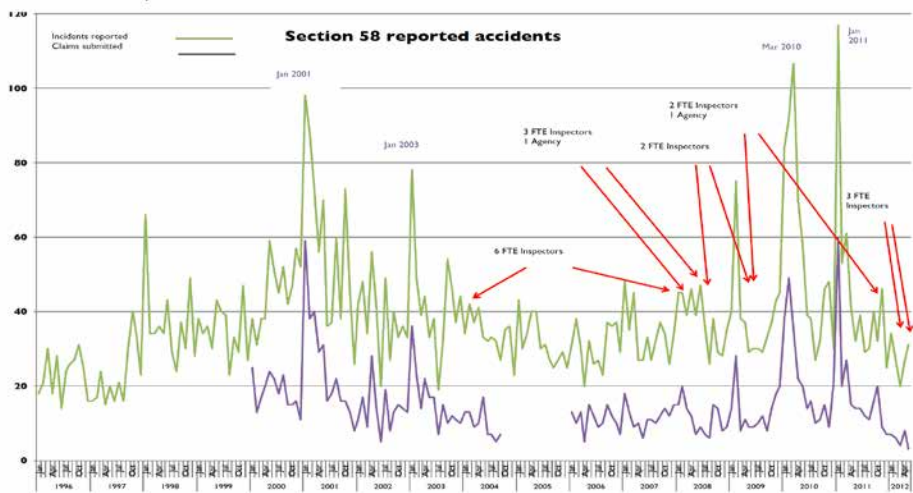


Figure 4. Record of monthly claims: Annotated run chart

NOTE: There were more claims made when there were fewer inspectors. The costs of claims were far higher.

CHAPTER 7: VOICE OF THE ASSET (VOTA)

VotA is not a 'normal' highway or a transformation term, thus needs a little introduction. In the same way that many customer services functions listen to their customers, it makes a great deal of sense to listen to your highway asset, which is likely to be worth billions.

If all inspection records were recorded in maps, they could be examined and understood better, that's why we use Geographical Information Systems (GIS) to support this.

GIS could also be used to record the construction method for the carriageways, which in broad terms can be one of three types: a) well-engineered asphalt (HRA) or (DBM) based, b) crushed stone with a thin asphalt surface, or c) reinforced concrete (perhaps with an asphalt overlay).

System b is used predominantly for rural roads and used to be common for urban estate roads. The design relies on the surface to keep water and surface pressures away from the stone below. Once it starts to fail, it deteriorates quickly.

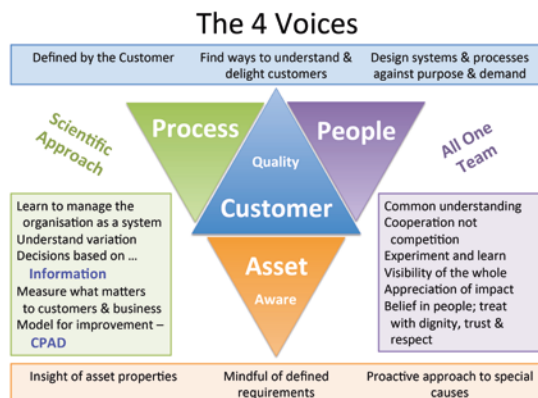
One of the beauties of GIS is that you can combine information layers, as overlays, thus its relatively easy to look at all system b construction areas against condition rankings of nine and 10 (very poor condition).

Utilising AI within highways will enable multiple illustrations to be generated.

While fast-failing roads may be less than 3% of the asset, it may lead to over 55% of reported potholes. Thus, VotA would suggest that its far more cost effective to treat those reports as 'urgent', to get them inspected and repaired immediately, as one timely repair may help prevent 18 other incidents in the next few days.

If all processes are designed: fully informed by people, customers, and the asset, then common sense will emerge.

Moving on from the >3% asset <55% issues aspect for roads, now let's add in some more common sense. Defects, hazards and risks arise due to all sorts of reasons across a highway network, including: severe frosts, heavy rain, storm force winds, road traffic collisions and fires plus spillages.



This closed loop starts from two actions (red lines): Improving information (using GIS based filing system) and increasing inspections. As a result of these, they virtually halved the number of potholes, often repairing them at half the size.

They were also allowed to go to the reported defect, and repair a cluster of defects that surrounded it, simply taking geo-located photos before and after. Complaints reduced, issues reduced, claims reduced, and money was saved.

This simple flowchart (Figure 7) shows how the two processes co- exist. For 97%+ of the highways areas the black method was followed, when a report occurred in the 3% 'highways of interest', the red route automatically cut in, simply by linking the CRM to GIS, with position determining action.

The cause-and-effect chart that follows is divided into five headers of: environment, people, equipment, process and materials.

This chart was built within a highways review workshop in well under an hour, simply by listing ideas on post-its, then assigning them to one of the five headings.

From there we devised better ways of working on high-level flow charts, realising that many changes to the process were within the delegated responsibilities of the officers present, which in turn enabled some early quick wins, to make work easier and cheaper to do, addressing efficiency and effectiveness at the same time.

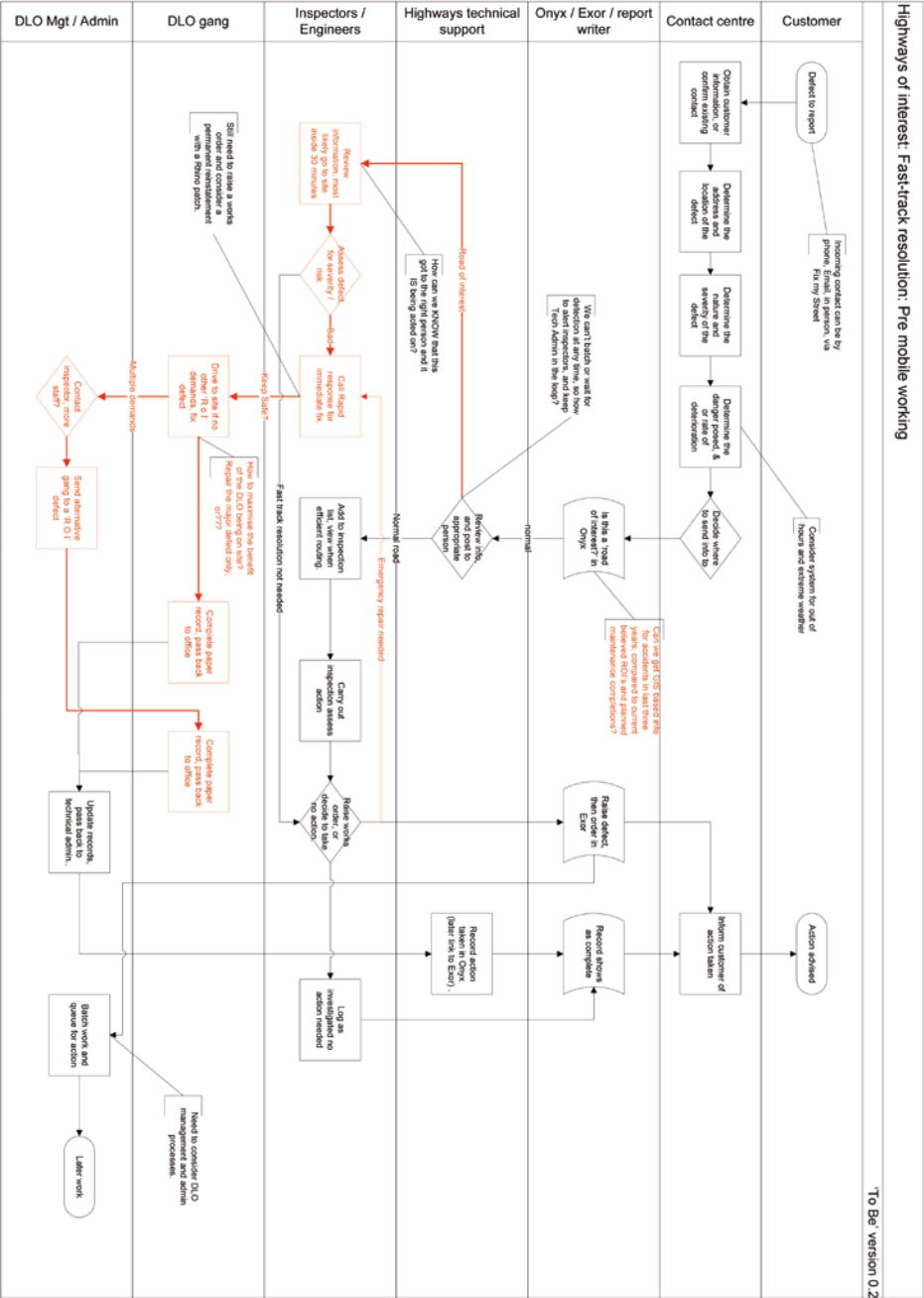
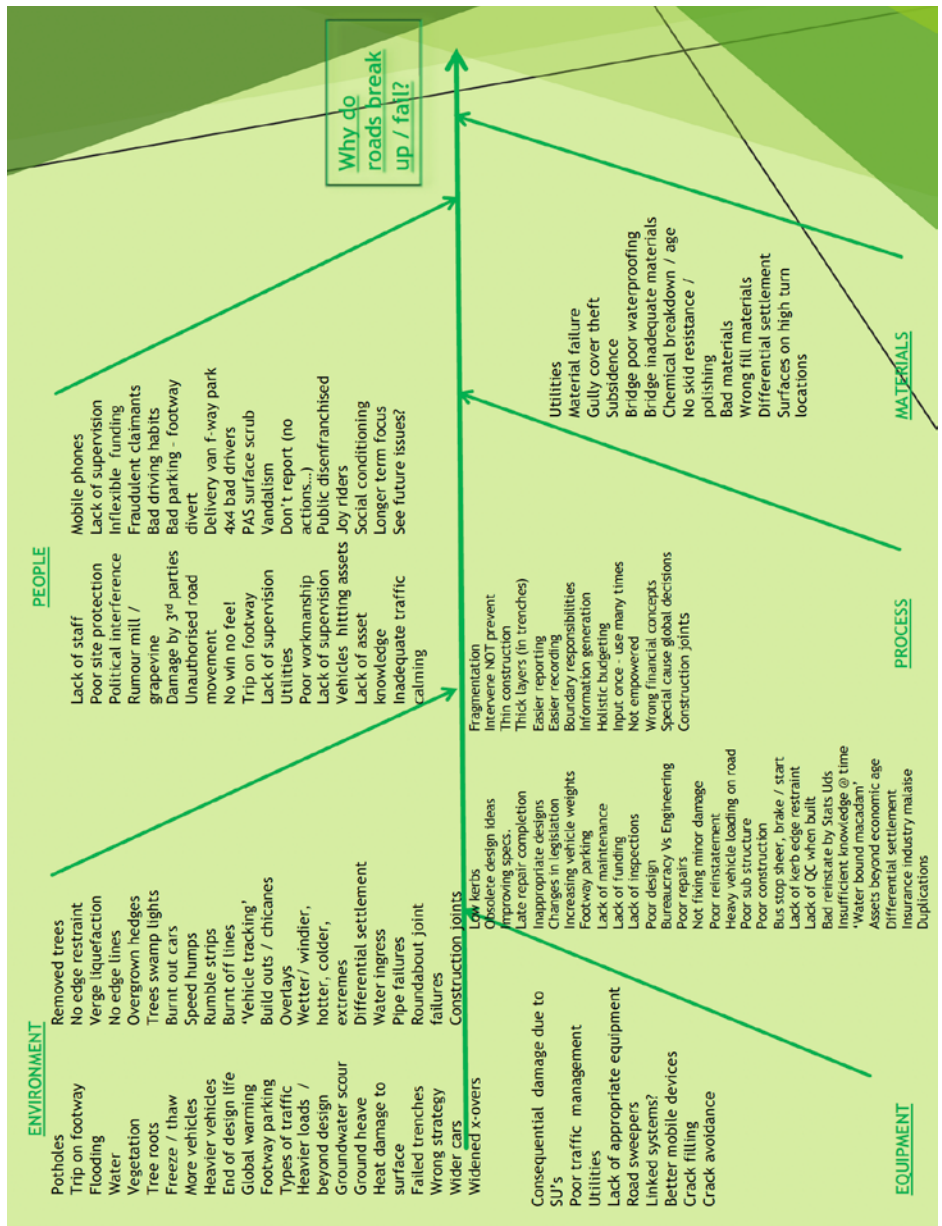


Figure 7. Highways of interest: Fast track resolution

Figure 8. (C&E chart) - causes of potholes and defects.



CHAPTER 8: COOPERATION AND COLLABORATION

Highways management is a complex balancing act. Across the UK, highways are getting less safe, so it's essential to better liaise with and empower others to make improvements.

Public sector principles make true partnering very difficult, even within a single authority, or just within the highways function, before ICT, HR, legal, procurement, audit and scrutiny are involved.

Contractors generally are allowed to apply 'lean' designs to their own work, with no ability to influence the council. Often two-thirds of their ability to add value is not permitted.

For a system to work well, it must be treated as totally joined up. Lots of efficient pieces in isolation, will never create an effective whole.

Within the lean and systems thinking community there's a general acceptance that 'everything's connected' and that win-win' is always preferable to win-lose.

In all cases the organisations should be managed on a win-win basis, seeking to add capacity, and reducing needless work.

Cooperation and collaboration (C&C) mustn't be thought of something to do only with the contractors either. What charities and volunteers are there? Think of your customers: Who are they? What would 'Good look like' for them?

Within your organisation, do you C&C with other sections and departments? Do you engage with them and enable them to add value? Do they understand what your work is, and do you understand how they can help you?

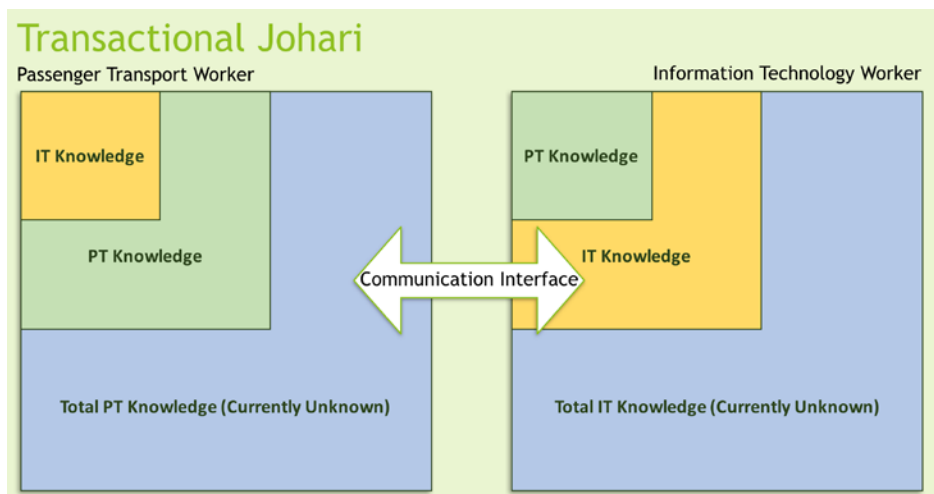


Figure 9 'Double Johari' of understanding.

A highways officer may know 50% of everything there is to know about highways but will not be aware of the other 50%. An ICT manager may be in the same position for ICT. However, their knowledge of the other's service area will be slight. So how can you maximise the benefit of ICT applications within highways, with so much unknown?

Without effective C&C there cannot possibly be an optimised support from IT, finance, HR, procurement, etc. There are too many people dealing with support services which can be an inevitable burden from work. Great people have the humility to engage, listen and learn.

Sixty per cent of work effort can go into: duplicating work done by others; repairing work which has errors in it; dealing with enquiries because of elapsed time; trying to find out where a piece of work is. C&C means you can do things only once and have time to add value!

Highways cannot become safer without involving the public, nowadays there's a huge amount of 'chatter' on social media, but how can an authority sift useful information from the chaff, or more importantly react appropriately when required? The Law Lords precedent *Crawley vs Barnsley*⁶ states that once aware of a dangerous issue, a highways authority **MUST** react to inspect / make safe immediately not just the 'next working day'.

Fix my street is virtually a universal reporting system in the UK, enabling anyone with a smart phone to report an issue in real time. However, many highways' organisations don't triage those reports until the next working day, (or in some cases, four working days) causing unneeded danger while the reporter gets a message stating 'under investigation' perhaps days before that investigation starts.

Do the following truly collaborate and cooperate for optimal highways safety?

✎ Other Highway authorities

✎ National Highways

✎ Parliament

✎ Police forces

✎ Developers

✎ Judiciary

✎ Parish councils

✎ Fire & Rescue services

✎ Contractors

✎ Consultants

✎ Suppliers

✎ Charities

✎ Volunteers

CHAPTER 9: REPAIR OPTIONS



a) Repairing one patch at a time: for 50% of the highways it may be the right thing to do. However, normal cold rolled asphalt within a busy street will pluck out within days. Either use hot rolled asphalt (HRA) or proprietary high asphalt repair mixes. The area shown below was in a poorly constructed cul-de-sac, later made into a through road and then a bus route. The patches were over-lain for three years prior to resurfacing.

b) Patch repairing a failing trench: virtually a waste of money, within weeks it will fail, as all the failing trench around it flexes with traffic movement. This trench had patches applied to the patches and was falling apart quickly. It had to be completely relaid.



c) Patch repairing a busy junction: often the turning forces are not designed for, so junctions fail earlier. If there is a weakness, many holes will form.

d) Patch repairing joints in HRA; once a joint starts to fail, that's a sure sign more will follow, the whole joint may need doing soon.

e) Patch repairing roundabout joints; a sure sign of under-design and poor construction. The whole joint will be exposed quickly.



- f) Patch repairing around gullies:**
Manholes and gullies often have breakouts around them, as this is a rigid construction within a flexible carriageway (most often).

This is a 'special cause' failure, normal asphalt repairs will generally fail again, stronger methods will get nearer to permanent.

- g) Patch repairing surface crazing:** this could be due to the construction during wet weather laying eight years ago. Within a relatively short time the whole area will need planing off and relaying. This is often seen on long dual carriageways, have you ever wondered why it's fine for miles, then poor for about 50m?
- h) Patch repairing a subsidence area:** like a trench, once the lower layers fail, the rest will follow. Often happens between rigid constructions and within historic trenches.



- i) Multiple services:** water meters will generally be fine when installed on their own, however as a cluster, they will have loose material in-between.
- j) Thermal repairs:** heating the existing surface then mixing in additional materials, long term repairs are created with low carbon footprints even within complex failure shapes.

- k) Pothole Pro:** JCB has been supported by Mark Morrell both with development and its uses. It develops very robust repairs to badly formed potholes, in a fraction of the time of conventional methods.
- l) Multipatcher:** was developed in Australia, addressing the majority of minor defects not suited to the Pothole Pro. A one-stop-shop for deep defects and surface dressing to resolve rural and minor road issues, with an interesting link to AI location technology from inspections.
- m) Mastic asphalt** is a hotmix material which can be spread into complex shapes such as around iron-work or within crocodile crazing with stone chips added for traction.
- n) Micro-asphalt** is an ideal low-technology surface dressing to regulate the final surface which extends the service life of carriageways and footways.
- o) Ultracrete:** produce high quality cement and asphalt- based materials, ideal for small, low technology repairs that may be addressed by volunteers.

CHAPTER 10: ENABLING, EMPOWERING, LETTING GO

Local government is generally 'centralist' keeping the power, decisions, and control within the parent authority, while complaining about central government doing the same thing.

The very tight budgetary reins are not going to slacken, so every effort to reduce costly activities such as traveling⁷ to work should be minimised. Enabling town councils to have limited highway agencies to inspect, carry out minor enforcement such as for hedges, and minor repairs within an agreed, safe framework makes a huge amount of sense.

There are seven million volunteers within Britain, giving free support to local charities and organisations at least twice a month, yet within highways which cannot manage their assets, volunteers are virtually forbidden. Aside from reporting individual defects the only normal voluntary work on highways is litter-picking.

Yet Cornwall County have had volunteer street wardens for years, carrying out near permanent repairs in towns and villages. Oxfordshire have flirted with repairing volunteers.

A small-scale trial started in Brackley, where both Mark and Dave Live. Between us we have had over 4,000 potholes repaired, whole roads resurfaced, hundreds of hedges cut, floods, sinkholes, blocked gullies, lighting and road markings improved. Some required a Section 56 notice to be issued. Even National Highways have involved us in local roundabout designs and resurfacing improvements.

Now that volunteers are used in Section 58 style surveys, on the first six main roads in Brackley over 200 reportable issues were discovered. This was made up of 101 potholes exceeding intervention criteria, 43 hedges covering over 25% of the footway, 22 streetlights within trees, 31 blocked gullies and 13 major coverings of scree on the roads.

If most town surveys were carried out via supervised volunteers, then the current inspectors could better survey the country lanes that cause most road deaths. Instead of a passenger travelling one way along a road only counting potholes and assessing road markings, both could be using E-Bikes or similar; to geo-locate and measure every major defect. Our trial of cycled inspections identified 10 major potholes, one 20cm deep in a two and a half mile ride, together with three other reportable issues, with many areas of highway edge white lines being totally obliterated.

HIGHWAYS INSPECTION - 558		Insp. Initials	DEG ROAD: Pavillons Way		Page No. 1	Date: 23/8/23	Weather: Fine - Dry						
	Location	Pothole WxLxD cm. Measure / Estimate	Report Y/N	Kerb trip cm.	Fwy trip cm.	Hedge H Tree T %age obstruct.	Street Light Tree / Other	Road lines 5 to 1	Illegal crossing?	Utility damage?	Road condition 10 to 1	Notes - Other issues or description? Gullies, Root trips %age severe, Floods, Road line details?	Count?
1	20 PW		Y			40% Tree		4			7	Many years untouched!	
2	Magd Meadows Junction		Y					2			4	2 Manholes failed	C
3	By shops & zebra		Y				Sign 70%	4			7	Zebra ahead!	
4	Marial Dare Junction		Y					3			7	6cm of scree	C
5	Opp 19		Y			55% Tree		4			6		
6	Opp Tudor Way		Y			60% Tree		3			3		
7	Sommerville Junction		Y			80% H		3			4	Wheelchairs blocked	
8	Sommerville Junction	60x40x4 Est	Y			45% H		3			3		C
9	Lathbury Junction		Y			50% H		4			5		
10	Lathbury Junction	170x20x4 Est	Y					2			3	Cycling bad risk	C
11	Humphries play park	8 defects marked for repairs	Y				100% Tree	3			2	Hump sign invisible	C
12	Zebra Crossing	3 x 2cm + trips	Y					2			2	2 marked for repairs	C
13	Banbury Road Roundabout		Y					3			3	4cm scree into junction	
14	Cartwright Junction		Y			70% H						Wheelchairs blocked	
15	Woods Road Junction	20m x 20cm						3			4	Edge failure - cycling risk	C
16	Cartwright 2	40x200x4	Y			40% H		4			5	Junction failed	C
17	44 PW	Centre line failure	Y			50% H & Tr							C
18	Opp Lathbury Junction	30m x 3cm	Y					1			3		C
19	Opp Lathbury Junction	3m x 60cm x 4 Est	Y					1			1	Road totally failed	C

Figure 11. Inspection of primary route by volunteers

Now add in the phenomenal opportunity that Artificial Intelligence (AI) brings to highway inspections.



Figure 12. Map & data from an AI driven inspection.

Latitude	Longitude	Score	Defects	Class	Name1
52.0372973	-1.1449545	3	Surface-Failure	Unclassified	Ellesmere Road
52.0296454	-1.1582508	3	Pothole-Minor	Unclassified	Banbury Road
52.0313704	-1.1449273	3	Surface-Failure	Classified	High Street
52.0381583	-1.1489527	3	Pothole-Minor	Unclassified	Pavillions Way
52.0375341	-1.1507324	3	Cracking, Pothole-Minor	Unclassified	Pavillions Way
52.0382118	-1.1484894	3	Cracking, Pothole-Minor	Unclassified	Pavillions Way
52.0323103	-1.1603938	3	Cracking, Alligator-Cracking	Unclassified	Pavillions Way
52.0292591	-1.1468313	3	Pothole-Minor	Classified	High Street
52.0372899	-1.1515643	3	Surface-Failure	Unclassified	Pavillions Way
52.0322749	-1.1440321	3	Pothole-Minor	Classified	High Street
52.0267801	-1.1529117	3	Gravelling, Pothole-Minor	Unclassified	Banbury Road
52.0342394	-1.1423815	3	Surface-Failure	Classified	High Street
52.0310006	-1.1568906	3	Surface-Failure	Unclassified	Hans Apel Drive
52.0273854	-1.1540281	3	Pothole-Minor	Unclassified	Banbury Road
52.0363656	-1.1541844	3	Pothole-Minor	Unclassified	Pavillions Way
52.0377845	-1.1480653	3	Pooling, Pothole-Minor	Unclassified	Bridgewater Road
52.0298573	-1.158644	3	Pothole-Minor	Unclassified	Banbury Road
52.0327501	-1.1435643	2	Joint-Failure, Cracking	Classified	High Street
52.0351987	-1.1556621	2	Cracking	Unclassified	Pavillions Way

Our first use of AI was simply driving round our hometown. Within the map green dots are minor defects, yellow slightly worse with red highlighting the worst. The spreadsheet abstract translates them into the type of issue to assist repairs decisions including the type of repair and urgency.

At present these driven inspections cannot see behind parked vehicles, down gullies, assess hedge incursion or streetlights obstructed by trees. Thus, a mixed inspection by volunteers, and E-bike professionals is anticipated, significantly improving the holistic knowledge of our highway network.

Once the use of charities and volunteers has settled in there are almost limitless opportunities, always working within a win-win-win framework.

Garden buddies Charity could be expanded to cut highways hedges and trees, monitor, and enforce private hedges including supported management options, green gyms, friends of the park, rural path enablement (to stop encroachment on farmers crops), links to foraging and food banks.

Minor road, footway and kerb repairs within 30mph area, for reportable potholes, satellite defects, trips, through to micro-asphalt around retirement homes, schools, shops, etc. Expand to supporting cycling groups before ride outs via cycle-based inspections, to make nominated rural roads safe, (perhaps carrying out repairs which the highway authority cannot achieve in time).

Alleyway over-hauls linking all volunteer groups together.

CHAPTER 11: WIDER VISION

This booklet covers Curing Pothole Britain (CPB) from an inspection, knowledge management, and repair point of view so far. The overall objective is 'Making Roads Safer' and a wider perspective is illustrated in Figure 12.



Figure 12. Reducing K&SI's

CPB clearly targets 'Safe Roads & Roadsides', then via collaboration and coordination will assist: safe speeds, post-crash response and safe road use. Safe vehicles will be impacted via better signs and lines for automotous vehicles.

Lean and systems thinking is anchored on continual improvement, enabling ever improving efficiencies and effectiveness. As the backlog of repairs significantly reduces, other aspects of safer roads will be addressed, such as reintroducing speed cameras, bringing in new generation AI based average speed cameras, using ANPR to significantly reduce illegal cars and drivers.



Figure 13. Police based road enforcement for safety.

Across all areas there is a societal tolerance for unsafe roads and road users. Potholes proliferate, road markings disappear, hedges encroach everywhere, lighting is poor.

We've never seen crash investigation statistics or reports mention the highway condition: potholes, delamination, scree, local flooding, obscured signs and lines etc.

Working with crash investigators we would enable them to assimilate increased awareness of multiple root causes regarding highway factors that could be rapidly reduced, not only at each crash site, but ultimately at each near miss, then eventually via AI based crowd sourced intelligence.

Most roads were built when there were fewer than 20 million vehicles, now there are 40 million and too many people drive very short distances.

When the police fully adopt AI for enforcement and inspections there will be a significant reduction in illegal vehicles and drivers, as real time information linked to the DVLA will show details for insurances and a lot more.

Police can feedback all road issues from normal patrolling then have a significant improvement in post-crash investigations, analysing far more quickly, including all salient road issues, with an ability to link for repairs in real-time. Disruptions will reduce while safety improves.

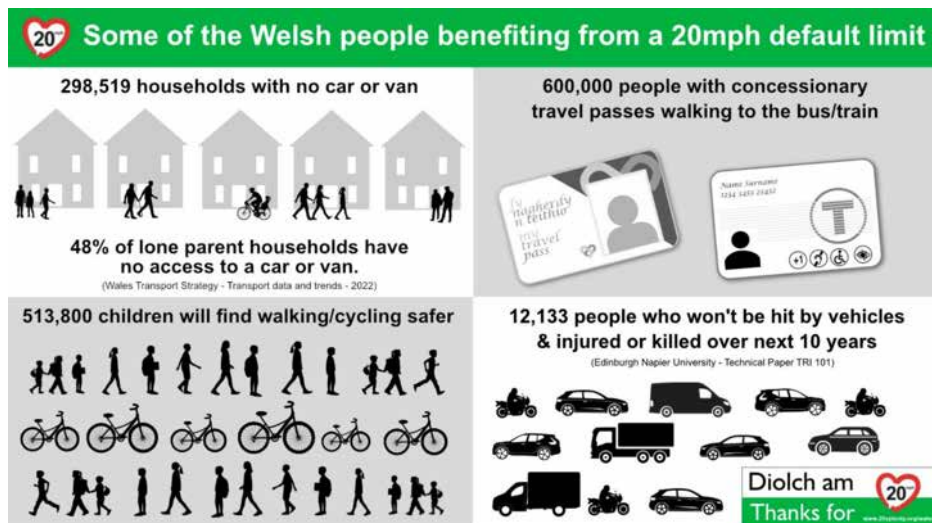


Figure 14. Some of the benefits of slower urban roads.

CHAPTER 12: CHARITIES AND VOLUNTEER SUPPORT

The continual improvement phases of Curing Pothole Britain (CPB) are intended to harvest some of the money saved to reinvest in charities and volunteers thereby ever-increasing the scope, localism, community engagement and in time the safer more inclusive societies that will follow.

At a government level, savings exceeding £14bn a year could soon be a reality, with an ability to for instance use £9bn for other purposes, investing £5bn in ever safer roads, creating greater savings each iteration.

The demands on the NHS will reduce, fewer ambulance needs, less rehabilitation, reducing delivery times for service vehicles as congestion eases, leading to fewer vans and lorries to achieve the same outcomes.

It is hoped that tens of millions will eventually be pouring into town councils, local and national charities plus volunteer groups as CPB develops massive savings in many authorities and organisations.

Imagine the future:

- Safer roads, less congestion, clearer shared spaces.
- Safer footways, enabling housebound people to get out again.
- Safer, smarter alleyways, free to use the whole year.
- Genuine 'Safe routes to school'.
- Safe spaces for healthy travel, walking and cycling.
- Significant opportunities to develop public transport to further ease congestion and pollution.

¹ Based on Local Government Association January 2023.

² See Chapter 5 Prevention

³ Appropriate is based on the highway type and usage, this should more frequent and more detailed for high footfall, high use highways.

⁴ Collaboration across all parties can be difficult due to HR structural designs. ⁵ See later chapter on 'Voice of the Asset'.

⁵ See Chapter 7 Voice of the Asset

⁶ If Crawley Vs Barnsley were universally applied, dozens of lives would be saved, hundreds would avoid life-changing injuries.

⁷ Travelling say 12 miles to a work-place takes time, causes carbon release, needs greater planning than being totally local. At the least unproductive time in the day, the more productive work is possible.

