3. Inventory and Data

3.1 Overview

Data management is fundamental to the overall asset management process. To apply an asset management approach there are three types of data that are required:

- **Inventory** – details of the number, location, size, type, age and make up of each asset.
- **Condition** – measurement and rating of the condition of the asset.
- **Use** – details of how the assets are used.

These records will enable Gloucestershire to:

- Monitor and report on the condition of the highway network.
- Assess the expected life of assets or their components.
- Assess current levels of service and develop future levels of service.
- Assess current and future performance indicators.
- Model future maintenance options and identify future investment strategies.
- Develop long-term forward work programmes and associated budget requirements.
- Carry out valuation assessments of each of the assets and calculate depreciation.

Effective asset management is not just about the assets to be managed, it is about the systems and business processes used to manage those assets. As such there is a need to examine processes, storage and usage of the data.

3.2 Networks

We maintain two digital networks to represent the Highway Networks.

- The Local Street Gazetteer
- The Pavement Management System (PMS) network

The Local Street Gazetteer (LSG) is made up of a network representing the centreline of all highways, including public rights of way. The smallest unit is an Elementary Street Unit. This network is used for registering and managing Streetworks, Traffic Management Act work, and as the basis for CONFIRM and the highways maintenance system (which is used in Gloucestershire for recording inventory and maintenance/works ordering).

The PMS network is used for inspecting and reporting the condition of the highway (from A-roads to unclassified roads). It differs from the LSG because it is defined by the physical characteristics of the highway rather than junctions and street names. (See Carriageways – condition, below).

We have networks which are made up of specific particular routes:

- Primary Gritting network
- Secondary Gritting network
- Resilience network
- Safety Inspection routes
- Traffic Sensitive routes
- Public Rights of Way network

Going forward there is the opportunity for us to add segregated high profile cycling and walking routes to the gritting schedule, for example the Gloucestershire Cycle Spine.

For further information on Gritting Networks please visit: Gritting | Highways.

The resilience network is, in the first instance, our minimum winter network, which would be where resources would be concentrated in the event of prolonged winter weather or a shortage of salt. For further information on the above, see chapter 10 and search for our Adverse Weather Plan, which is updated annually.

Safety inspection routes are used by highway inspection teams to identify safety defects and other issues that require action from the highway authority. The frequency at which the route is inspected is determined by the hierarchy of the individual road - see safety inspection policy for current definition.

Traffic sensitive routes are where works would cause unacceptable delays; usually only at particular times of day, such as key commuter routes, routes to schools, etc. or particular days of the week, such as Market day. We apply stricter controls to utility contractors and to our highway maintenance contractor in relation to the times of day works can be carried out on these routes.

The Public Right of Way Network has its own plan, which can be found here Rights of Way Improvement Plan.

Management Systems

We use several different management systems to hold and manage inventory and condition data. The following table is an extract from the County Council's Information Asset Register.

System	Contents and purpose	GCC contact	Hosted or local
CONFIRM/ FIXMY STREET	Works management; highway, PROW and drainage assets; Public enquiry management	Highways Asset & Business Manager	Hosted
MAYRISE	Streetlights inventory and condition; lit signs and bollards inventory & condition; zebra crossings	Street Lighting Manager	Hosted
Central Management System (CMS)	Monitors the operation of our street lighting network and reports failures.	Street Lighting Manager	Hosted
SYMOLOGY	Streetworks noticing & National Street Gazetteer maintenance	Network Manager	Hosted
WDM UKPMS	Pavement inventory conditions	Senior Asset Data Officer Highways Assets	Hosted
Drakewell C2	Traffic monitoring	Senior Asset Data Officer Highways Assets	Hosted
TRAMS	Traffic signals Inventory & condition	Network Manager	Hosted
List of Streets	Contains list of streets maintainable by GCC under the Highways Act	Asset Data Team Leader (Highways Records)	Local
AMX	Structures management system	Highways Infrastructure Lead	Hosted
ESRI	Drainage Management system	Term Maintenance Contractor	Hosted

3.3 Data management

The County Council's Data and Information policies set out how we will use, store and share data across our business, and this applies to the management of the Highways service as much as to any other part of the County Council.

Existing Assets
For existing assets, inventory and maintenance information should be held electronically, and accessible through a single system. It is important that information which is held is easily accessible for different users. Information needs to be available in both a "read-only" and an editable format.

Copies of drawings, photographs and reports should be compressed to minimise storage requirements and held in read only formats (.TIF, .JPG, .PDF) and accessible through Confirm, being electronically "attached" to the relevant asset – bridge, drainage system, etc.

Data Gaps
The individual asset data sections below highlight the current gaps in data, at the end of the chapter there is a summary of all the current data gaps, and our proposals and priorities for closing those gaps and collecting missing data.

Future-Proofing information
Each asset owner should have a process for reviewing, on an annual basis, the format and media used for information storage.

As-built information

All maintenance contracts, and new developments include a requirement to provide as built information. Where this is provided by external developers the form of submission of data is contained in the Manual for Gloucestershire Streets. Our maintenance contracts all include requirements to update existing records with as built data.

Data Summary
A summary of the County Council's Highways Assets and their current condition can be found at Appendix 3.

3.4 Asset Type: Carriageways

The carriageway asset makes up the largest proportion of the highway asset overall. It comprises all the elements that make up the 'fabric' of the road from the foundation to the surface construction. Surface water drainage is excluded as this is covered under the drainage asset information. The table below summarises the length of carriageways in Gloucestershire. The construction of carriageways varies considerably and relatively little is known about the original construction of many parts of the network.

Condition

Maintaining the carriageway network is a continuous process due to traffic, weather, and other factors. Understanding the network's condition guides maintenance programs and optimizes resource use.

The condition of principal and non-principal networks is assessed annually through SCANNER surveys. These traffic-speed, machine-based surveys measure various road condition parameters, which are processed in the pavement management system (PMS) to create a road condition indicator (RCI) for every 10-metre sub-section.

All local authorities report their A, B and C road condition to the Department for Transport annually. The latest (2024) Gloucestershire calculations are:

- Condition of Principal Roads (A) 1% (*1.3%)*
- Condition of Classified non-principal Roads (B & C) 4% *(3.8%)*

Reporting of Unclassified Roads ceased in 2022 and there are plans to reintroduce this measure in the near future.

3.5 Asset Type: Footways & Cycleways

The footway and cycleway assets are extensive. Footways categorised according to "Well Maintained Highways," are meticulously documented by GCC for high-traffic or strategically important routes.

While some footways and cycleways are adjacent to roads, there are also remote sections that are harder to quantify, with many locally referred to as Class 6 highways.

In addition to the publicly maintained, there are also footways which are privately owned. In these cases, GCC is not usually responsible for their maintenance, and they are excluded from the lifecycle planning process applied.

With the construction of the Gloucestershire Cycle Spine there will be a need to consider and document specific policies and life cycle plans for segregated routes/multi-user paths and these will be published in life with the completion of these routes.

Condition

Maintaining the condition of the footway and cycleway network is a continuous activity although their life tends to be longer than that of carriageways due to no traffic loading.

The condition of the footway and cycleway network are assessed primarily through highway safety inspections which are carried out on an annual, quarterly or monthly basis depending on the hierarchy of the asset item (see Appendix 1 for more detail). These identify safety defects on routes but can also provide a view on general condition.

Use

To assist with planning future maintenance, it is essential to be able to use maintenance history data in conjunction with the condition data.

Data Systems
Information about the footway asset, its attributes and condition are stored within the WDM Pavement Management System (PMS). Defect Information identified through safety inspections is held in Confirm.

Data Gaps
There is still work to do to improve the information held about the extent, surface type and condition of the entire footway and cycleway network. Condition of the top hierarchy of footways is now over 10 years old (although safety inspections are carried out on a frequent basis). Collection of this data is a costly exercise, and whilst footway maintenance funding remains relatively low, a cost benefit argument can't be made to spending funding on updating the inventory and condition gap.

3.6 Asset Type: Highway Structures

Asset Group: Bridges and Footbridges
GCC holds detailed and accurate information about bridges and footbridges. Because we have good information, we can split the Asset type into Groups and Sub-groups for lifecycle management purposes.

Data
Information about bridges and structures, their attributes and condition is stored within AMX. Some older reports and documents are held in the County's Modern Record Archive.

Use
To assist with planning future maintenance, it is essential to be able to use maintenance history data in conjunction with condition data. GCC records the maintenance history for bridges and structures in AMX. This will be able to be interrogated to find dates of past maintenance, including treatments, dates and costs. Inventory and condition information can be extracted from AMX to use the CIPFA Structures Toolkit, which provides both Gross and Depreciated Replacement Costs for Whole of Government Account submissions.

Data Gaps
There are data gaps relating to new structures and recently located or transferred structures. Systems like the Structures Toolkit sometimes require additional information to be collected/held. This can be addressed during the general inspection process.

Condition
Maintaining the condition of structures is an ongoing activity which requires continuous investment. Nevertheless, a clear understanding of the condition of structures (and the amount of residual life they have) can help to direct maintenance programmes.

The condition of bridges and structures is assessed through detailed visual inspections. All bridges are inspected visually at two-year intervals, with additional, more detailed inspections for many bridges being carried out generally at 6-year intervals. These more detailed inspections are called Principal or Engineer Inspections. Severity and extent of defects is noted, and this data is used to determine the bridge condition index for each individual bridge and groups of bridges. This also enables stock condition to be determined and trends to be identified.

Stock condition uses a bridge condition index (BCI) to calculate the 'average' and 'critical element' condition of each bridge. The BCI Average considers all the elements in the structure whereas the BCI Critical is based solely upon elements with a Very High Importance factor. Both BCI Average and BCI Critical are defined on a scale of 100 (best possible condition) to 0 (worst possible condition) with rating bands being used to simplify the scoring:

Bridge Condition Index Scores and Bands	
Very Good	>=90 to <=100
Good	>=80 to <90
Fair	>=65 to <80
Poor	>=40 to <65
Very Poor	<40

As well as the visual condition of bridges, their structural capacity is also assessed. Bridges which do not meet current loading requirements are generally managed in line with the Standards for Highways, specifically CS470 – Management of sub-standard highway structures, and we continue to monitor the loading capacity of all bridges using the structural review process required by CS452 - Structural Review and Assessment of Highway Structures.

All inspection and assessment data is held within AMX.

Asset Group: Culverts
The data for culverts is of a similar condition to that for bridges. Culverts below 1.0m span are considered part of the drainage network and not "structures". The group has been split into 2 sub-groups, short and long culverts, with the cut off between the two groups at 10m.

Data
Information about culverts, their attributes and condition is stored within AMX. Some older reports and documents are held in the County's Modern Record Archive.

Use
To assist with planning future maintenance, it is essential to be able to use maintenance history data in conjunction with condition data. GCC records the maintenance history for culverts in an electronic filing system, from which data is transferred into the AMX system. This will be able to be interrogated to find dates of past maintenance, including treatments, dates and costs. Inventory and condition information can be extracted from AMX for use in the CIPFA Structures Toolkit, which provides both Gross and Depreciated Replacement Costs for Whole of Government Account submissions.

Data Gaps
There are data gaps relating to new culverts and recently located or transferred structures.

Condition
The condition of culverts is assessed through detailed visual inspections using the same process as for bridges. All culverts are inspected visually at two-year intervals, severity and extent of defects is noted, and this data is used to determine the condition index for each individual culvert and groups of culverts. This also enables stock condition to be determined and trends to be identified. Many culverts are confined spaces or have reduced headroom, making access for inspection difficult. If we have specific concerns about condition, we can use CCTV or similar un-manned inspection processes. However, as culverts tend not to have separate, finite life, elements, and they can therefore be treated at a structure level, rather than by component.

Asset Group: Retaining Walls
Inventory data for retaining walls has not been held, or collected, at the same level as other highway structures. As a result, the current recorded stock consists of newer built walls (either built by the County Council, or by developers) and older walls where there has been some cause for concern.

Retaining walls which retain land above the highway are generally privately owned. Retaining walls which retain the highway are generally considered to be part of the maintainable highway.

The CIPFA Structures Toolkit splits retaining walls into below and above 3.0m retained height. National guidance also classes retaining walls below 1.35m as being part of the carriageway, not to be classed as highway structures. In Gloucestershire we have traditionally made the cut-off at 1.5m retained height.

Data
Information about retaining walls, their attributes and condition is stored within AMX. Electronic access to records, reports, drawings, photographs and maintenance information is available through AMX. Some older reports and documents are held in the County's Modern Record Archive.

Use
To assist with planning future maintenance, it is essential to be able to use maintenance history data in conjunction with condition data. GCC records the maintenance history for retaining walls in AMX. This will be able to be interrogated to find dates of past maintenance, including treatments, dates and costs. Inventory information can be extracted from AMX to use the CIPFA Structures Toolkit, which provides both Gross and Depreciated Replacement Costs for Whole of Government Account submissions.

Data Gaps
A full survey of retaining walls has never been undertaken. It is anticipated that only between 25-30% of retaining walls are recorded, and for those that are recorded the information held is patchy. We are continually working to investigate methods of collecting this information using geospatial modelling.

Condition
Retaining walls are not currently inspected on a proactive, planned basis: where specific walls are giving cause for concern, visual monitoring is undertaken at specified intervals.

Inspections generally follow reports of deterioration; reporting of defects tends to be narrative rather than measured and the CSS inspection method is not used. The CIPFA Structures Toolkit recognises that retaining walls tend not to have separate, finite life, elements, and they can therefore be treated at a structure level, rather than by component.

3.7 Asset Type: Highway Lighting
GCC holds detailed and accurate information about street lighting in line with the recommendations of the Code of Practice for Highway Lighting Management: Well Lit Highways. The council is responsible for over 60,000 streetlights and over 7,500 illuminated and non-illuminated signs/bollards. In addition, there is also street lighting which is privately owned. In these cases, GCC is not usually responsible for maintenance, and they are excluded from the lifecycle planning process applied. The street lighting stock grows as new developments and links are built and as there are improvements in the quality of lighting during capital schemes.

Condition
Poor quality of some street lighting is a key issue for people currently deterred from walking by fears about personal security. There has been a recent, and significant investment in street lighting in line (including the roll out of LED lamps) with the Council's Climate Change Strategy and Action Plan that reduces the council's emissions to net zero by 2030 and helps reduce Gloucestershire's emissions to net zero by 2045, with a net countywide carbon reduction ambition of 80% by 2030. However, this investment has been in lantern heads and we are behind schedule in replacing life expire column structures. Many illuminated signposts are also in poor condition due to limited investment and previous poor quality materials used.

Maintaining and improving the condition of the street lighting stock is a continuous activity. A clear understanding of the condition of the asset (and the amount of residual life it has) helps to direct future maintenance programmes to ensure that best use is made of resources.

Use
To assist with planning future maintenance, it is essential to be able to use maintenance history data in conjunction with the condition data. GCC records the majority of its cyclical and reactive maintenance work through historical records held in MAYRISE. This can be interrogated to find dates of past maintenance, including works details, dates, costs and current defects.

Data Systems
Information about the highway lighting asset, its attributes and condition is stored within the MAYRISE Street Lighting Management System.

Data Gaps
Whilst the highway lighting inventory is generally comprehensive, there are data gaps:

- Around the differences between manufacturer and commercial product names.,
- Some Private Underground Cable Networks – Locations and specifications (surveys are ongoing).
- Some Vehicle Activated Signs (VAS) - Locations and specifications (surveys are ongoing).
- Master switch points and controlled units. (This is ongoing, and information is collected as part of cyclic maintenance visit).
- The structural Condition of Columns and Posts – these are inspected annually at the time of cyclical maintenance (All information exists in an Excel spreadsheet but needs to be uploaded into MAYRISE).

3.8 Asset Type: Street Furniture

Street furniture assets include those items on the highway which may be in place for a safety, information or amenity purpose. This includes non-illuminated traffic signs, safety fencing and trees.

Condition
The condition of these assets is declining. This is due to budgetary constraints which mean that only basic cyclical works, and reactive response maintenance are carried out. Lining of roads is assessed through the routine safety inspection process.

Use
To assist with planning future maintenance, it is essential to be able to use maintenance history data in conjunction with the condition data. GCC records the majority of its cyclical and reactive maintenance work through historical records. This can be interrogated to find dates of past maintenance, including works details, dates, costs and current defects.

Data Systems
Inventory data for some of these assets is stored in CONFIRM, as well as some paper records being held for tree inspections. The digitisation of tree inspections is ongoing.

Data Gaps
Data gaps are primarily around the ability to keep this information up to date. There is a gap in data around road studs and markings.

3.9 Asset Type: Traffic Management Systems

Inventory held on GCC's traffic management systems is considered reasonable. Information is held on our Asset Management/Fault Management system (TRAMS) and is available to the Council and our Contractors. Information about zebra crossings, and vehicle actuated signs is held as part of the Highway Lighting record.

Condition
Condition is assessed using fault records from TRAMS, 6 monthly inspections and operational assessment. The Institute of Highway Engineers Guidance Note Traffic Control and Information Systems recommends and makes reference to good practice to be adopted for all traffic control systems. It covers all stages of the life cycle, from design and installation, through to maintenance and operation, to decommissioning.

Use
To assist with planning future maintenance, it is essential to be able to use historical data in conjunction with the condition data. GCC records most of its maintenance work through the TRAMS and its historical records of 6 monthly inspections.

Data Systems
All data is stored on a combination of spreadsheets and TRAMS.

Data Gaps
No serious gaps identified.

3.10 Asset Type: Drainage

The highway drainage network is extensive. GCC holds detailed information about a small proportion of this network, such as the location of gullies, which are visible and maintained in a cyclical programme; however, we hold less information about the historic built asset, as much of it is buried under the carriageway.

In addition to our network, there is also drainage which is privately owned. In these cases, GCC is not usually responsible for maintenance and they are excluded from the lifecycle planning process. Whilst GCC has responsibility for some roadside ditches, most of these ditches are not part of the highway asset. The drainage network grows as new developments and links are built.

Condition
What we do know is that the asset is deteriorating, therefore maintaining the drainage network has become increasingly crucial in light of the county's growing encounters with heavy rain and flooding. Having a clear understanding of the network's current condition and its remaining lifespan is essential for directing maintenance programs efficiently, ensuring the best use of available resources. This insight can also inform the county about the necessary investments to better prepare the network for the potential impacts of climate change.

When issues arise in the drainage network, CCTV footage of specific parts of the system is often obtained. This footage enhances our knowledge of the network and offers a clearer picture of the asset's condition at various locations.

Use
To assist with planning future maintenance, it is essential to be able to use maintenance history data in conjunction with the condition data. We record known asset data on ESRI to assist with future maintenance.

Data Systems
Information about the drainage asset and its attributes is stored on ESRI, and we also hold a limited searchable library of CCTV records. We can also access relevant gully enquiries on CONFIRM. Gully data is captured during cyclical maintenance and that data is used to update the records on ESRI.

Data Gaps
There is an ongoing programme of work to identify gullies which have been added to the drainage network through the release/adoption of new developments. There are also challenges identifying the extent, type, construction and condition of the historical drainage network. CCTV records are also received in paper format and require to be electronically scanned, rather than being held manually within the respective depots.

3.11 Ancillary Assets: Verges, Land and Trees

Ancillary assets include verges, highway land and trees. Exact figures are not available, but the estimated length of highway verge is around 3,000 kilometres. There are also around 28,000 trees which are adjacent to the highway.

Condition
The condition of the verges can be affected by the regularity of grass cutting and vegetation clearance regimes. Verges are subject to annual/seasonal grass cutting regimes where they form part of safety and visibility splays. Larger scale vegetation/tree clearance is undertaken on a needs-led basis in targeted areas with the exception of Ash Die Back, further details of which can be found at: https://www.gloucestershire.gov.uk/roads/road-maintenance/ash-dieback/. There are ongoing maintenance issues with the pruning of trees and we have a backlog of those impacting the performance of street lighting equipment.

Use
Verges exist and can be used to create a visibility splay, often at junctions, or are historical provisions which support the local flora and fauna.

Data Systems
Verge records are recorded as part of the grass cutting schedules and location of historic programmes for noxious weed treatment are kept in paper/spreadsheet lists.

Data Gaps
There remain some list/paper information which is in the process of being digitised.

3.12 Asset Type: Public Rights of Way (PROW)

PROW Assets are made up of Footpaths, Bridleways, Byways and Restricted Byways and ancillary assets with the routes such as bridges, steps, gates, surfaces and drainage. In total the length of the PROW network is over 5,600km.

Condition

The condition of our PROW assets can be affected by affected by frequency of use, access considerations and by seasonal variations. For example, a path regularly used by families, perhaps with pushchairs, to access the village school, will probably require a level, tarmacked surface, strimming of undergrowth if necessary, during the summer months, be free of stiles and require prompt response to any problems that arise. On the other hand, a footpath in a remote rural location is more likely to be visited by more experienced walkers who are competent map readers, able to climb stiles as well as cope with some undergrowth and, thus, maintenance standards may not need to be so high or dealt with so quickly.

Data Systems

PROW Assets and inspection records are recorded on CONFIRM.

Data Gaps

There remain some list/paper information which is in the process of being digitised/uploaded to CONFIRM.

3.13 Asset Type: Miscellaneous

There are several miscellaneous items associated with the highway which are included in the highway asset. We have Weigh Bridges, a winter weather system, which comprises a master station and 12 local weather recording stations across the highway network. We also have 4,800 grit bins, for the local storage of salt for application directly to the highway.