

## INTRODUCTION

This guideline is intended to provide a more detailed level of support and direction in the role and importance of data quality management and how to develop appropriate data processes and plans. Any relevant current industry guidance and case studies have been referenced, where they provide more detailed assistance.

## WHAT IS DATA QUALITY MANAGEMENT?

Data Quality Management (DQM) is part of a Quality Assurance (QA) regime. It is a set of systematic processes with the aim of collecting and maintaining data at an appropriate quality for its intended use(s).

The value of good data, and cost of bad data, is often underestimated. The goal is to have trusted quality data delivered and available in a timely manner.

Data quality management is about ensuring fitness for use. The processes associated with the collection and maintenance of data needs to consider this. Any costs associated with ensuring the quality of data need to be lower or provide greater benefit than if they didn't exist.

*Road Controlling Authorities (RCAs) should have an active Data Quality Management Plan.* This plan should detail the processes for managing the quality of data throughout its lifecycle. It should include all datasets related to the effective and efficient management of the network.

## DATA QUALITY MANAGEMENT PRINCIPLES

There are three principles underpinning data quality management:

<b>PEOPLE</b>	People are central to good data quality management, technology alone cannot achieve this
<b>PROCESS</b>	Key processes are needed for effective management
<b>CONTINUOUS IMPROVEMENT</b>	Both the quality of data, and the processes involved to achieve this should be continually improved

## KEY POINTS

### Data Quality Management:

- ✓ Is a systematic process of determining specified data requirements are being achieved.
- ✓ People are central to good data quality management
- ✓ Data screening, desktop auditing and field validation are the three main verification processes for good data quality management
- ✓ Road Controlling Authorities should have an active Data Quality Management Plan
- ✓ Asset data and information should be collected and managed in accordance with the data quality management plan
- ✓ Encompasses the data lifecycle from build to as-built
- ✓ Roles and responsibilities are defined to remove ambiguity and avoid gaps or duplication.
- ✓ The value of good data, and cost of bad data, is often underestimated

**Data Quality Management is a systematic process of determining specified requirements have been achieved.**

## WHY IS DATA QUALITY MANAGEMENT IMPORTANT?

Accurate, complete and timely information is vital to manage and maintain our networks. The data provides the evidence to support decision-making processes, business cases and activity management plans.

The role of DQM is to prevent errors, mistakes or omissions as part of collecting, managing and updating asset data. This applies to all aspects of data, including asset inventory, condition, demand, maintenance activity, etc.

When procuring services an essential part of the scope is specifying the minimum data quality requirements associated with the services to be delivered and ensuring these are delivered. What are the different approaches to verifying data quality?

Three main process types can be applied to asset data to verify data quality. Each of these has its benefit.

<b>Data screening</b>	This is a simple screening of the data to confirm that all required attribute fields are populated, or it falls within expected ranges. This process typically only checks the data meets defined business rules. It <b>will not</b> determine that the data accurately reflects the real-world asset(s).
<b>Desktop auditing</b>	This includes undertaking a specified sample review of the data checking things like the accuracy against source data, consistency with previous data, etc. With this typically being an audit of a sample of the data, it does not check all aspects. If issues are identified in the original sample, then it is good practice to increase the sample size to determine if the errors are representative of the wider dataset.
<b>Field validation</b>	This is a check that the recorded data represents the real-world asset. This process can check locational, dimensional and physical properties of the record are accurate. It cannot check records for assets that are not visible (i.e. pavement layers), or other attributes such as material source, application rate, etc.

Typically, all three of these processes are required as part of a robust Data Quality Management Plan.

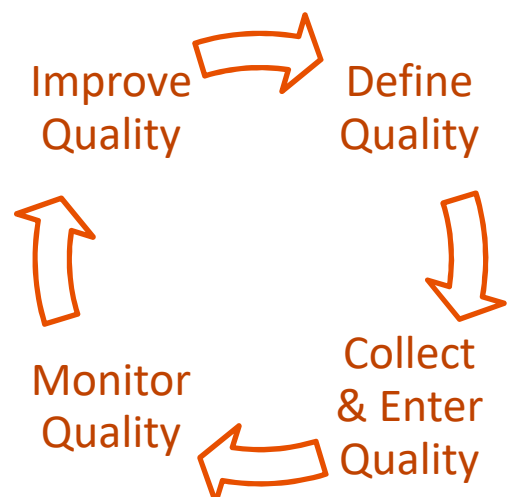
## WHAT ARE THE POTENTIAL IMPACTS OF POOR DATA QUALITY PROCESSES?

Poor data quality or a lack of understanding in data confidence is the potential outcome of poor data quality management processes. The consequence is the data collected and updated in the asset inventory database:

- Does not reflect the real-world asset (*Accuracy*)
- Is not to a sufficient level of detail for its intended use (*Completeness*)
- Is not available when needed (*Timeliness*)

This results in:

- Less effective decision-making
- Inefficient works programmes
- Inaccurate, incomplete or late reporting
- Not achieving Level of Service or Customer Outcomes
- A lack of evidence to support business cases and activity management plans
- A lack of understanding of investment outcomes/achievements
- Incorrect outputs from asset valuations including a calculated annual depreciation



## WHAT SHOULD A DATA QUALITY MANAGEMENT PLAN INCLUDE?

A RCA must collect and manage asset data and information following a robust data quality management plan. This plan should set the requirements and processes to confirm asset data updates and additions are at the appropriate level of quality.

The plan should cover all data collected and maintained, including:

- Network definition (Roads, carriageways, treatment lengths, etc.)
- Asset inventory
- Condition
- Maintenance activity
- Demand/use

A Data Quality Management Plan should include the following as a minimum (in no particular order):

- An explanation of the full process from activity to accepting the data in the asset database system
- A description of each data element to be collected and why
- The data to be collected and managed including minimum attribute requires
- The type, level and frequency of auditing/validation to be undertaken
- The level of accuracy required
- Roles and responsibilities
- Quality assurance to be conducted before accepting the data
- Dealing with non-conformance and poor-quality data which doesn't meet the requirements

The following are also of benefit:

- Level of training/competence required
- Key milestones

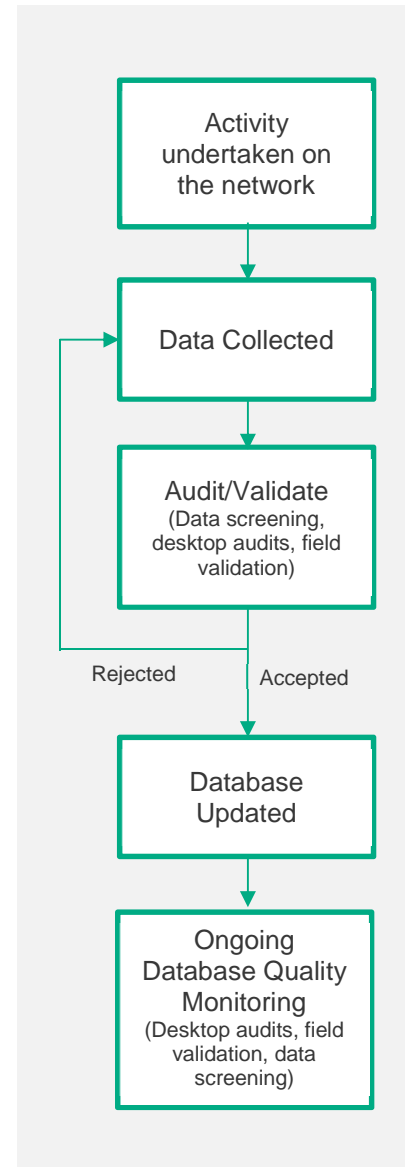
## ROLES AND RESPONSIBILITIES

The Data Quality Management Plan should include a section identifying the various roles involved in the processes, including their responsibilities. This section needs to clearly describe the key accountabilities of each role and where processes ownership sits. This is to avoid ambiguity resulting in duplication or missing activities/process steps.

## EXAMPLES OF DATA QUALITY MANAGEMENT

Below are examples of existing data quality processes and tools:

- RAMM – Road Condition Rating and Roughness Manual - 5% field audit of visual road condition rating survey
- SM050 – State Highway Database Operations Manual identifies training and competency requirement for personnel involved in asset data collection and management
- MyRoads inventory data collection app has the NZ Transport Agency's business rules built in



## CONCLUSION

Data quality management is a set of systematic processes with the aim of collecting and maintaining data at an appropriate quality for the intended use. Road Controlling Authorities should have and follow an active Data Quality Management Plan, related to the effective and efficient management of the network, that details the roles/responsibilities and processes for managing the quality of data throughout its lifecycle.

## REFERENCES

- [SM050 – State Highway Database Operations Manual](#)
- [RAMM – Road Condition Rating and Roughness Manual](#)
- [ISO 8000 - Data Quality](#)
- [MyRoads inventory data collection app](#)

REG is a collaborative project between Local Government and the NZ Transport Agency.

For more information, please contact:

**Road Efficiency Group**  
RoadEfficiencyGroup@nzta.govt.nz