

A Water Industry Guide for the Management of Asset Data using uniclass

by
BIM4Water and WSAA



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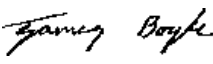
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Document Control

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Foreword

Digitalisation is underpinned by managing data in a way that enables people to make better decisions faster.

To reach higher levels of digital maturity organisations must adopt and implement foundational principles to support good data management. If an organisation wants to share data effectively, these principles must be standardised in some way.

Moving forward on our learnings from the Centre for Digital Built Britain and the National Digital Twin programme, the work presented in this document highlights how BIM4Water and WSAA have led the water sector in the efforts to standardise classification with hierarchies that support industry-specific asset identification.

It is an exemplary piece of work, and something the water sector should welcome wholeheartedly. In fact, this is a benchmark of good practice that other sectors should also take forward.

I look forward to seeing it being adopted across the water industry here in the UK and in Australia and New Zealand – opening the opportunity for sector-wide data sharing in the future.



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1.Introduction

Becoming a digital utility is an ambition of water businesses internationally. A fundamental building block to enable the digital utility is a clear and consistent asset terminology and classification system. This will aid the identification and management of asset data to support sharing and collaboration of information and with suppliers. Supporting the implementation of initiatives such as Digital Twins and Better Information Management (BIM) in 3, 4 and 5D for the water sector.

How many times in any organisation has the reader come across different names and parameters to describe the same asset? Whilst this problem is recognised by water companies there has not been a “unifying tool” available to assist in resolving this issue. This guidance document addresses that gap!

This Guide assists water businesses to quickly and easily apply the most relevant Uniclass codes for their own organisation. Uniclass was initially developed for the building and construction industry and has become an international classification hierarchy for assets. The Guide provides practical examples of how to use Uniclass. It highlights the benefits to an organisation operating in the water industry and describes how to avoid the need to undertake wholesale changes to the asset management system. The benefits include:

- Clarity and efficiency for the supply chain in tendering for capital and maintenance works within the water sector.
- Enabling the use of a common terminology to describe and define assets within the water industry.
- More effective collaboration with other organisations on big data and artificial intelligence initiatives to improve customer outcomes.
- Providing a building block for digital twins and supporting Open Data.

This Guide enables each water business to map their asset classification hierarchy to the Uniclass system to facilitate the benefits highlighted above. The approach allows a business to implement the Uniclass classification without disrupting existing business processes, reports and system integrations.

2. Overview

2.1. Purpose

This Guide sets out an approach for adopting the Uniclass method of identifying and managing asset data in the water sector, providing communities with water and wastewater services. The guide provides practical examples of how to use the methodology and highlights the benefits to an organisation operating in the water industry.

2.2. Background for BIM4Water and WSAA

BIM4Water is a cross sector group from the UK water industry dedicated to leading and supporting organisations in the digital transformation of the water sector.

BIM4Water forms part of the wider UK BIM Alliance communities and is closely linked with British Water. Within BIM4Water there are eight task groups including the Water Industry Classification Hierarchy and Standardisation group (WICHS).

The Water Services Association of Australia (WSAA) is the main industry body representing the urban water industry in Australia and New Zealand. Its members provide water and sewerage services to over 24 million customers and many of Australia's largest industrial and commercial enterprises.

Recognising the benefits of a standard approach to managing asset data, as an excellent example of international collaboration, BIM4Water and WSAA started working together on a standard method for asset hierarchy classification in 2021.

2.3. Scope

The scope of this guidance document is:

- To provide a concise guide to implementing the Uniclass classification scheme for water sector assets.
- The target audience for this guide are:
 - Water sector employees providing water (recycled and potable) and wastewater (combined wastewater, surface water and drainage) services.
 - Asset management experts and those involved in the naming and identification of water business assets.
 - Suppliers, consultants, and contractors working in the water sector.
 - Vendors of modelling and asset management products for the water sector.

2.4. Out of Scope

This document does not apply to the classification of assets that are:

- Incorporated in domestic and commercial water supply and wastewater systems.
- Within the property connection or boundary e.g., taps, hot water systems and hot water pipes.
- Part of agriculture or aquaculture system.

2.5. Assumptions

In using Uniclass the key assumptions are:

- The organisations using this guide are looking for a way of recording details of their named assets in a systematic manner, preferably in digital form.
- Where the organisation has an existing classification scheme for their assets, that their asset information system will be able to develop a mechanism to map between their classification scheme and the Uniclass codes.

2.6. Challenges

In order to assist the reader in the use of this guide the following challenges have been identified:

- That the Uniclass scheme is not seen as being applicable to the water sector, at times dismissing the scheme without looking at how it could work for them.
- That many organisations do not adequately understand how to apply the Uniclass classification scheme, and the associated asset definitions.
- The Uniclass classification scheme only goes down to the product level for the water sector. A further system, such as Product Data Templates (from BIM4Water) or Virtual Buildings Information System (Australia) is required if you wish to classify components or additional individual components may be added as products to Uniclass.
- Water companies potentially use their asset hierarchies for multiple purposes (e.g. if the primary need is mechanical and electrical their hierarchy may miss several levels of asset detail (e.g. civil).
- We may find existing asset hierarchies are incomplete but also conceptually un-matchable without changing the existing structure, e.g. a company may capture a block of Uniclass products into a single asset.
- Adequate planning and deployment of resources is required to ensure successful implementation of the water Uniclass system.

3. Uniclass for the Water Sector

3.1. What is Uniclass?

Uniclass was initially developed for the building and construction industry. As a consequence, the Uniclass code set has a number of historical code areas with similar names that are not directly applicable to the water sector. This guide assists water businesses to quickly and easily apply the most relevant Uniclass codes for their organisation.

Uniclass is an international classification hierarchy for assets. It was developed in the UK and first released in 2015. It is currently managed by NBS on behalf of the UK government. The UK BIM4Water, Water Industry Classification Hierarchy and Standardisation group (which includes representatives and input from the UK, Australia and New Zealand) has been working with Uniclass to develop clear classification codes for the water sector.

Uniclass uses a set of tables to group similar things together, arrange them consistently, and make searching easy. The tables are ordered as a hierarchy (imagine a ladder or pyramid) which helps users classify at all scales, from very large things like a hotel complex or road network to small products like staples or clay bricks, and everything in between. In addition, there are also tables to support information management processes, project management and communication.

The name Uniclass expresses that it is a unified classification scheme. It is suitable for everyone involved in the built environment, where the whole lifecycle of buildings, landscape features, and infrastructure assets can all be classified using its consistent approach. It has the scope to expand for any future industry needs.

Currently Uniclass updates are provided quarterly, and users can see what new codes have been added, and any changes that have been made.

3.2. Why use the Uniclass classification scheme?

The Uniclass classification scheme is intended to be a universal naming convention to more effectively enable sharing of information within and between organisations.

The benefits of the Uniclass classification scheme are that it:

- Increases effective collaboration with other organisations on big data and artificial intelligence initiatives to improve customer outcomes.
- Enables Regulators to ensure like for like measurement between companies.
- Provides a standard classification to support Open Data.
- Enables efficient exchange of information with enterprise asset management systems.
- Organises assets in a logical order.
- Streamlines the process for the supply chain in tendering for capital and maintenance works within the water sector by providing clarity and consistency.
- Supports the use of a common terminology to describe and define assets within the water industry.
- Provides a building block for digital twins and national initiatives.
- Avoids duplication and unreliable asset data.

3.3. How to start using Uniclass

The intent of this guide is to allow each water business to map their asset classification hierarchy to Uniclass to facilitate the benefits listed above. This approach allows businesses to implement the Uniclass classification without disrupting existing business processes, reports, and system integrations. The Uniclass system can be used directly if an organisation is embarking on naming its digital assets or is looking at an enhanced classification scheme. When using Uniclass, please refer to the <https://uniclass.thenbs.com/> to obtain the most up to date codes. For the water sector there are four main tables that are routinely used (Figure 1).

Figure 1: Key tables used in Uniclass for the water sector

Complex (Co)	Describes a project in overall terms. Looking at the highest level of different water networks to treatment systems - water, wastewater, surface water and recycled water
Entity (En)	Discrete elements of the network or treatment system. Typically they are larger elements of the supply network or treatment plant e.g. pumping stations and pipelines.
System (Ss)	The key components that make up an Entity. They are typically a collection or category of products e.g. wastewater disinfection systems, grit treatment and removal systems.
Product (Pr)	Individual items that make up a system. Typically of devices e.g. sand filter, membrane filter.

Each of these tables has an alphanumeric code used to identify the asset. The code starts with the first two letters of the relevant table, for example.

Complex – **Co**, Entity – **En**, System – **Ss**, Product – **Pr**

These letters are followed by a series of numbers that identify the asset within the Uniclass hierarchy tables. More detailed examples are provided in Section 6.

*It is **not** intended that the Uniclass classification replaces an organisation's existing asset classification scheme.* Rather, that the organisation maps its asset classification scheme to the water Uniclass classification scheme to improve data sharing within and between organisations involved in water asset management.

4. Overview of Uniclass water and wastewater tables

4.1. Table definition

The definitions associated with each Uniclass code can be found at the (<https://uniclass.thenbs.com/>) It is intended that these definitions will be held in the NBS systems and administered by a third party to ensure the table and the definitions are accurate and concurrent.

4.2. How to find the Uniclass Codes

When looking on the NBS web site, as noted above, the four key code groups to start with are: Complexes, Entities, Systems and Products. Most of the codes for Complexes, Entities and Systems relevant to the water sector can be found as follows:

- Water:
 - Water Extraction and Treatment (codes starting with 55_15); or
 - Water Supply (codes starting with 55_70)
- Wastewater and Drainage
 - Wastewater collection (codes starting with 50_15)
 - Wastewater treatment and disposal (codes starting with 50_75)
 - Drainage Storage, treatment and disposal (codes starting with 50_70)

4.3. General considerations when using water and wastewater tables

- At the complex level the word 'complexes' is used to describe non-linear assets such as pump stations, 'networks' is used to describe linear assets such as pipelines.
- At the system level asset descriptions have deliberately been kept general, with the detail being determined at the product level classification. This is significantly different to how most building assets are defined, because the building hierarchy is able to reach a finer level of detail.
- Disinfection systems have been separated from dosing equipment as users require data on these systems separately from dosing equipment.
- In some cases, at the product level, there may be multiple suitable classifications; particularly as these often differentiate generic products from products made from a certain material. Where a generic product description is available then that should be selected where possible.
- The codes within the tables referenced above are fixed, however you may wish to utilise Element/Function and Space/Location tables.

Specific considerations for use of the Uniclass tables can be found in Appendix A

5.Examples of applying Uniclass tables

The following are examples demonstrating how the Uniclass tables may be used to classify water and wastewater assets.

5.1. Example 1: Classification values from the Uniclass table for wastewater

Example 1 shows the components of the tables used for classification of raked bar screens and needle valves from a wastewater treatment plant. The items highlighted by the red dotted boxes indicate the classification numbers and names that were used at the Co, En, Ss and Pr levels.

Facility – Treatment
Co_50 Waste disposal complexes
Co_50_35 Wastewater collection complexes
Co_50_75 Wastewater treatment and disposal complexes
Co_50_75_90 Wastewater treatment complexes
En_50_75 Wastewater treatment and disposal entities
En_50_75_80 Sludge treatment entities
En_50_75_95 Wastewater treatment entities
Ss_50_75_77 Wastewater activated sludge systems
Ss_50_75_77_01 Wastewater activated sludge aeration tank systems
Ss_50_75_77_70 Wastewater return activated sludge systems
Ss_50_75_94 Wastewater screenings handling systems
Ss_50_75_94_16 Combined screenings capture and handling systems
Ss_50_75_94_56 Screenings Capture systems
Ss_50_75_94_64 Screenings handling systems
Pr_60_45_94 Wastewater screening and water abstraction products
Pr_60_45_94_06 Band screens
Pr_60_45_94_70 Raked bar screens
Pr_65_54_94 Water supply and wastewater valves
Pr_65_54_94_39 Knife gate valves
Pr_65_54_94_55 Needle valves

5.2. Example 2: Water network pumping station

Example 2 seeks to classify a submersible water pump. The items highlighted by the red dotted boxes are the classification numbers and names that were selected to describe each of these assets.

Facility – Networks

Co_55 Piped supply complexes

Co_55_15 Water extraction and treatment complexes

Co_55_70 Water supply complexes

Co_55_70_20 Potable water distribution complexes

Co_55_70_60 Potable water distribution networks

En_55 Piped supply entities

En_55_15 Water extraction and treatment entities

En_55_70 Water supply entities

En_55_70_85 Treated water pipelines

En_55_70_87 Treated water pumping stations

En_55_70_89 Treated water storage entities

Ss_55 Piped supply systems

Ss_55_15 Water extraction treatment and storage systems

Ss_55_15_95 Treated water pumping systems

Ss_55_15_95_23 Treated water dry well pumping system

Ss_55_15_95_95 Treated water wet well pumping system

Ss_55_15_95 Treated water storage tank systems

Pr_65 Services and process distribution products

Pr_65_53 Pump products

Pr_65_53_24 Drainage pumps

Pr_65_53_24_86 Submersible pumps

Pr_65_53_86 Supply and exhaust pumps

Pr_65_53_86_12 Centrifugal pumps

5.3. Example 3: Linear wastewater pipeline networks

Example 3 seeks to classify a wastewater pressure pipeline and needle valve. The items highlighted by the red dotted boxes are the classification numbers and names that were selected to describe each of these assets.

Facility – Linear pipes

Co_50 Waste disposal complexes

Co_50_35 Wastewater collection complexes

Co_50_35_96 Wastewater collection networks

Co_50_35_98 Wastewater transfer complexes

Co_50_75 Wastewater treatment and disposal complexes

Co_50_75_90 Wastewater treatment complexes

En_50_35 Wastewater and surface water collection entities

En_50_35_93 Wastewater collection pumping stations

En_50_35_98 Wastewater collection pipelines

Ss_50_35_03 Wastewater pipeline systems

Ss_50_35_03_34 Wastewater gravity pipeline systems

Ss_50_35_03_65 Wastewater pressure pipeline systems

Pr_65_52_63 Pipes and fittings

Pr_65_52_63_25 Ductile iron pipes and fittings

Pr_65_52_63_82 Steel pipeline

Pr_65_54_94 Water supply and wastewater valves

Pr_65_54_94_39 Knife gate valves

Pr_65_54_94_55 Needle valves

5.4. Example 4: Linear combined wastewater pipeline networks

Example 4 seeks to classify a combined wastewater pressure pipeline and needle valve. The primary difference here is at the Complex level. All other codes remain the same. The items highlighted by the red dotted boxes are the classification numbers and names that were selected to describe each of these assets.

Facility – Linear pipes

Co_50 Waste disposal complexes

Co_50_35 Wastewater collection complexes

Co_50_35_Combined wastewater collection networks

Co_50_35_98 Combined wastewater transfer complexes

Co_50_35_96 Wastewater collection networks

Co_50_35_98 Wastewater transfer complexes

Co_50_75 Wastewater treatment and disposal complexes

Co_50_75_90 Wastewater treatment complexes

En_50_35 Wastewater and surface water collection entities

En_50_35_93 Wastewater collection pumping stations

En_50_35_98 Wastewater collection pipelines

Ss_50_35_03 Wastewater pipeline systems

Ss_50_35_03_34 Wastewater gravity pipeline systems

Ss_50_35_03_65 Wastewater pressure pipeline systems

Pr_65_52_63 Pipes and fittings

Pr_65_52_63_25 Ductile iron pipes and fittings

Pr_65_52_63_82 Steel pipeline

Pr_65_54_94 Water supply and wastewater valves

Pr_65_54_94_39 Knife gate valves

Pr_65_54_94_55 Needle valves

5.5. Example 5: Administrative building in a water treatment plant

Facility – Water treatment plant

Co_55 Piped supply complexes

Co_55_15 Water extraction and treatment complexes

Co_55_15_50 Water treatment complexes

Co_55_15_96 Water storage complexes

Co_55_70 Water supply complexes

En_20 Administrative, commercial and protective service entities

En_20_15 Administrative office entities

En_20_15_10 Multiple occupation office buildings

En_20_15_70 Single occupation office buildings

Ss_30 Roof, floor and paving systems

Ss_30_10 Roof structure systems

Ss_30_10_30 Framed roof structure systems

Ss_30_10_30_03 Aluminium roof framing systems

Ss_30_10_30_25 Heavy steel roof framing systems

Ss_30_20 Flooring and decking systems

Ss_30_25 Ceiling and soffit systems

Pr_65 Services and process distribution products

Pr_65_67 Air and fume distribution products

Pr_65_67_29 Fans

Pr_65_67_29_72 Roof mounted fans

Pr_80 Services and process general products

Pr_80_77 Services support and containment products

Pr_80_77_28 Equipment enclosures, cabinets, boxes and housings

Pr_80_77_28_74 Roof penetration boxes

Example 5 shows the components of the tables used for classification of an administrative building and its roof, ventilation fan and roof penetration box for a water treatment plant. The items highlighted by the red dotted boxes indicate the classification numbers and names that were used at the Co, En, Ss and Pr levels.

Note that it is not essential that the numbers in the classification scheme are congruent. In Example 1 the first two numbers for each classification level for Co, En and Ss are congruent, but the Pr number is not. For Example 5 none of the group numbers¹ for Co, En, Ss or Pr are congruent. All four levels of the classification scheme must be used to properly classify the asset.

¹ Group Numbers are the first pair of number following the table identifier, e.g., Co_50

5.6. Example 6: Water storage – dam

Example 6 shows the components of the tables used for classification of a control system for an arch type of water storage dam. The items highlighted by the red dotted boxes indicate the classification numbers and names that were used at the Co, En, Ss levels.

Facility – Water storage impoundment or dam

Co_32 Water and land management complexes

Co_32_15 Dam complexes

Co_32_15_05 Arch dams

Co_32_15_10 Buttress dams

Co_32_15_26 Earth Dam

En_32_15 Dam entities

En_32_15_23 Dam spillways

Ss_25_17 Dam and Levee structure systems

Ss_25_17_05 Arch dam systems

Ss_25_17_10 Buttress dam systems

Ss_75 Communications, security, safety, control and protection systems

Ss_75_70 Control and management systems

Ss_75_70_20 Dam control systems

6.Change Management

The use of an effective asset classification scheme is an essential early step to becoming an effective digital utility. The approach proposed is to map the revised Uniclass classification scheme against the current/historic asset classification system used by the business. If a business does not currently have an asset classification scheme, then Uniclass should be used as that scheme.

In adopting the Uniclass classification scheme, the business needs to be clear on how it will be adopted. Options range from:

- Using the Uniclass classification scheme for the primary internal asset classification scheme; or
- Cross referencing the existing asset classification scheme to the Uniclass classification scheme to allow sharing of information with external parties. Note that if an organisation chooses to cross reference their classification system to Uniclass then they will also need to maintain this linkage as an owned and stewarded dataset.

In both cases, the objective needs to be clearly stated by the business and preferably championed by a member of the Senior Leadership Team. Where Uniclass will be adopted as the primary classification scheme, then a whole of business change management effort, led by the leadership team will be required. This is because implementation is likely to result in significant change for the business, which needs to be well communicated and carefully managed.

Cross referencing your current asset register against Uniclass is likely to be far less disruptive for the business; primarily requiring effort to map the current asset classification to Uniclass and provide a mechanism for readily accessing and presenting the Uniclass classification. However, this option assumes that there is an existing and robust classification scheme. Without such a basis, the better option would be to adopt Uniclass as the primary classification scheme.

7.Acronyms

Acronym	Name
BIM4Water	Building information Management for Water
CEN	European Committee for Standardisation
Co	Complex
En	Entity
NBS	An integrated digital platform provider managing Uniclass
Pr	Product
Ss	System
TR	Technical Reference
VBIS	Virtual Building Information Systems
WICHS	Water Industry Classification Hierarchy and Standardisation group
WSAA	Water Services Association of Australia

8. Appendix A – Detailed considerations for using the Uniclass tables

8.1. Odour treatment systems

These systems are generic and not classified as water or wastewater systems. They can be found as systems under:

- Odour - Ss_85_30_58

Wastewater, surface water (stormwater) and combined wastewater tables

- Assets related to wastewater, combined wastewater and surface water typically start with a 50 e.g., Co_50, En_50, Ss_50. Collection is under 50_35 and treatment/disposal is under 50_75.
 - Drainage is treated separately under 50_70 and is related to roadside and construction drainage not wastewater or water treatment. Only use this code if you are referring to these specific types of drainage.
- At the Entity level wastewater, combined wastewater and surface water are able to use the same assets to avoid duplication, i.e., Complex codes are used to separate the water types, the Entity level is used to describe more detailed aspects.
- The following System levels and all items under these headings are not considered part of the wastewater system and should not be used when describing treatment plants or wastewater collection assets:
 - Ss_50_35_06 Below-ground inspection systems
 - Ss_50_35_08 Below-ground gravity drainage systems
 - Ss_50_35_10 Below-ground pumped drainage systems
 - Ss_50_70_05 Below-ground drainage disposal systems
 - Ss_50_70_24 Drainage disposal systems
 - Ss_50_70_45 Land drainage systems
 - Ss_50_70_60 Private drainage treatment systems
 - Ss_50_70_65 Pressure relief drainage systems
 - Ss_50_70_80 Storm water gravity drainage systems
 - Ss_50_70_82 Surface and wastewater gravity drainage systems
 - Ss_50_70_83 Surface water tank systems
 - Ss_50_70_85 Sustainable drainage systems (SuDS)
 - Ss_50_75_01 Aeration Systems
 - Ss_50_75_03 Aquaculture disposal systems
 - Ss_50_75_41 Inlet works systems

NB: Product descriptions have been included at the System level such as bricks and manhole systems due to legacy issues. Water sector users should not use them. The System level should instead represent the key components that make up an entity.

Potable (or Drinking) and recycled water tables

- Assets related to the water supply systems typically start with a 55 e.g., Co_55, En_55, Ss_55. Water extraction and treatment are typically under 55_15, with water supply under 55_70.
- The classification for raw water storages, rivers etc. is found in the general classification for these assets e.g., Co_32. It is not under water extraction and treatment because these assets have broader use than just water supply.
- Recycled water and potable water should use Complex codes specific to the water type but use the Entity level codes to avoid duplication, i.e., the Complex codes are used to separate the water types, the Entity level is used to describe more detailed aspects that are typically consistent between each water type.
- No treatment Complex is allocated for Recycled water. If the recycled water produced by the treatment plant is used for drinking purpose, use Water Treatment Complexes otherwise use Wastewater Treatment Complexes.
- The following System levels are not considered part of the reticulated water supply system and should not be used when describing treatment plants or water supply assets:
 - Ss_55_15_65 Treated water storage tank systems
 - Ss_55_70_03 Aquaculture supply and recirculation systems
 - Ss_55_70_38 Hot and cold-water supply systems
 - Ss_55_70_39 Hydroelectric pressure water supply systems
 - Ss_55_70_42 Irrigation systems
 - Ss_55_70_94 Washing systems
 - Ss_55_70_96 Water feature systems
 - Ss_55_70_97 Consumer water reclamation systems
 - Ss_55_70_98 Consumer water treatment systems
 - Ss_55_70_99 Water movement control systems

