Rapport

IMKL 3 vs IMKL 2.3: What, Why & How?

Version 9

Publication date 10/03/2025

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Creation date: 15/07/2024

Publication date: 10/03/2025

Internal file name: IMKL 3 vs IMKL 2.3 - What, Why and How.docx

Document history:

Version	Comments	Date	Author	Status
1	Document created	15/07/2024	Niels Gabriels	Draft
2	Replace URIs update ERDs Add best practice regarding connection lines	23/09/2024	Niels Gabriels	Draft
3	Add best practice regarding waterways	27/09/2024	Niels Gabriels	Draft
4	Renamed document Updates regarding risk	03/10/2024	Niels Gabriels	Draft
5	Changed status to Accepted	18/10/2024	Niels Gabriels	Accepted
6	Changes to subThema and kabelDiameter added for Cables	02/12/2024	Niels Gabriels	Accepted
7	Replace https with http for INSPIRE URIs	20/02/2/25	Niels Gabriels	Accepted
8	Updated namespace for UtilityLink references	21/02/2025	Niels Gabriels	Accepted
9	Clarified validation of refersTo in ExtraPlan	10/03/2025	Niels Gabriels	Accepted

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Table of Contents

1 Introduction

This document provides a comprehensive, in-depth analysis of the differences between IMKL 2.3 and IMKL 3.0. It offers a complete overview of all changes, including new features introduced in IMKL 3.0, whether they are mandatory or optional.

Chapter 2 begins with an overview of general changes that apply across all object types in the IMKL model, setting the foundation for the updates. Chapter 3 presents a series of best practices for creating IMKL 3.0-compliant documents, ensuring smooth implementation of the new version.

Subsequent chapters dive deeper into the specific changes for individual object types, giving you a detailed look at how each element of the model has evolved.

For those looking for a step-by-step guide on how to transform valid IMKL 2.3 documents into valid IMKL 3 documents, we recommend reviewing the *IMKL 2.3 to IMKL 3 migration guide* document.

2 General changes

2.1 Introduction

Several changes that have been made in IMKL 3 impact various objects. In this chapter these general changes are explained.

2.2 IMKL namespace and dependencies

2.2.1 Schema imports

To be able to use the IMKL 3 XSD and other required XSDs, they must be defined in the XML that is generated to represent the *UtilityNetwork*. This can be done as demonstrated in the example below. Schemas that are not used can be removed from the import.

Compared to IMKL 2.3 this means that in IMKL 3:

- the namespace URI for the `imkl` namespace needs to be updated (section 2.2.2);
- the namespace URIs for the `us-net-*` namespaces need to be checked. They should reference the correct 2023.1 version instead of the 2021.1 version (section 2.2.2).

Example IMKL 3:

```
<gml:FeatureCollection
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:act-core="http://inspire.ec.europa.eu/schemas/act-core/4.0"
  xmlns:us-net-common="http://inspire.ec.europa.eu/schemas/us-net-common/4.0"
  xmlns:us-net-el="http://inspire.ec.europa.eu/schemas/us-net-el/4.0"
  xmlns:us-net-tc="http://inspire.ec.europa.eu/schemas/us-net-tc/4.0"
  xmlns:us-net-ogc="http://inspire.ec.europa.eu/schemas/us-net-ogc/4.0"
  xmlns:us-net-sw="http://inspire.ec.europa.eu/schemas/us-net-sw/4.0"
  xmlns:us-net-wa="http://inspire.ec.europa.eu/schemas/us-net-wa/4.0"
  xmlns:us-net-th="http://inspire.ec.europa.eu/schemas/us-net-th/4.0"
  xmlns:net="http://inspire.ec.europa.eu/schemas/net/4.0"
  xmlns:base="http://inspire.ec.europa.eu/schemas/base/3.3"
  xmlns:base2="http://inspire.ec.europa.eu/schemas/base2/2.0"
  xmlns:imkl="https://vocab.belgif.be/ns/imkl/3.0"
  xsi:schemaLocation="https://vocab.belgif.be/ns/imkl/3.0
https://vocab.belgif.be/ns/imkl/3.0/imkl_3_0.xsd"
  xmlns:gml="http://www.opengis.net/gml/3.2"
  xmlns:gmd="http://www.isotc211.org/2005/gmd">
```

2.2.2 IMKL 3 namespace

With the update from IMKL 2.3 to IMKL 3, the namespace for IMKL has changed. This affects how objects and codelist values are referenced. The new namespace for the IMKL 3 schema is:

```
https://vocab.belgif.be/ns/imkl/3.0
```

The schema is available for download at the following URL:

```
https://vocab.belgif.be/ns/imkl/3.0/imkl_3_0.xsd
```

In various sections of IMKL, it is necessary to include references to other IMKL objects, such as when listing all elements of a *UtilityNetwork* (via the *elements* property). This is achieved in the same manner as referencing codelist values, by utilizing the *xlink:href* attribute.

The URI for the referenced object is structured as follows (the versionId is optional and can be omitted):

`[namespace]/[object type]/[object namespace]:[object localId]:[versionId]`

UtilityLink objects are in the *us-net-common* namespace and need to be referenced like this:

```
<net:elements xlink:href="http://inspire.ec.europa.eu/schemas/us-net-
common/4.0/UtilityLink/telecom-be:001" />
```

All other objects are in the *imkl* namespace. For example, referencing an *Appurtenance* object with a namespace of *telecom-be* and a localId of *001*, from a *UtilityNetwork*, is done like this:

```
<net:elements xlink:href="https://vocab.belgif.be/ns/imkl/3.0/Appurtenance/telecom-
be:001" />
```

2.2.3 Updated INSPIRE schemas

IMKL 3 uses the 2023.1 versions of the INSPIRE schemas, whereas IMKL 2.3 utilized the older 2021.1 versions.

In the namespace declarations, you should use the URIs as shown in the example above, referencing the latest 4.0 versions. If you have used the version-specific URIs from 2021.1 (e.g., http://inspire.ec.europa.eu/schemas/2021.1/us-net-common/4.0/), they need to be updated. If you used the general URIs (e.g., http://inspire.ec.europa.eu/schemas/us-net-common/4.0/), no update is necessary.

One significant update in the 2023.1 versions is the inclusion of an updated *ThermalNetwork.xsd* schema, which is now at version 4.0.1 (available at http://inspire.ec.europa.eu/schemas/us-net-th/4.0). The type of the `thermalProductType` element, which was undefined in version 4.0.0, has been added in version 4.0.1. However, the method for providing the `thermalProductType` remains unchanged from IMKL 2.3 (see the example below). The XSD was updated to provide a correct definition, as the `thermalProductType` was not clearly defined before.

Example of thermalProductType in IMKL 2.3 and IMKL 3:

```
<us-net-th:thermalProductType

xlink:href="http://inspire.ec.europa.eu/codelist/ThermalProductTypeExtendedValue/heatingS
team" />
```

The 2023.1 versions of the INSPIRE schemas do not include the *TelecommunicationsNetwork.xsd*. Instead, for IMKL 3, the draft XSD available at http://inspire.ec.europa.eu/schemas/us-net-tc/4.0/TelecommunicationsNetwork.xsd will be used. The draft schema is adopted to fill the gap left by the absence of an official release in the 2023.1 versions.

Aside from these changes, there are no other noteworthy differences in the 2023.1 schema versions.

2.3 Language

2.3.1 Standardisation of language

In IMKL 2.3, a mix of Dutch and English terminology was used. The English terms were derived from INSPIRE, while the Dutch terms were specific additions for IMKL. In IMKL 3, it has been decided to translate all Dutch terms (XML elements and codelist values) into English.

2.3.2 Language-specific free text

In IMKL 3, various elements allow for the specification of free text, such as the disclaimer, labels, descriptions or the colour of cables or pipes. Since the usage of IMKL is no longer limited to Flanders, it is now necessary to indicate the language of the free text in these elements. The supported languages are German (#de), English (#en), French (#fr), or Dutch (#nl). For these language-specific free text fields it is also possible to provide text in multiple languages (see the example below).

Example of kleur IMKL 2.3:

```
<imkl:kleur>wit</imkl:kleur>
```

Example of appearance and colour in IMKL 3:

```
<imkl:appearance>
  <imkl:colour>
    <gmd:PT_FreeText>
      <gmd:textGroup>
        <gmd:LocalisedCharacterString locale="#en">
          White
         </gmd:LocalisedCharacterString>
      </gmd:textGroup>
      <gmd:textGroup>
        <gmd:LocalisedCharacterString locale="#nl">
          Wit
```

```
        </gmd:LocalisedCharacterString>
      </gmd:textGroup>
      <gmd:textGroup>
        <gmd:LocalisedCharacterString locale="#fr">
          Blanc
        </gmd:LocalisedCharacterString>
      </gmd:textGroup>
    </gmd:PT_FreeText>
  </imkl:colour>
</imkl:appearance>
```

In general, the `description` element in IMKL 3 replaces the `omschrijving` element from IMKL 2.3. Due to this change regarding language-specific free text, the `taal` (language) element that was present in most objects in IMKL 2.3 is no longer needed and has been removed in IMKL 3.

Example of omschrijving and taal in IMKL 2.3:

```
<imkl:omschrijving>Dit is een voorbeeld</imkl:omschrijving>
<imkl:taal xlink:href="Nederlands" />
```

Example of description in IMKL 3:

```
<imkl:description>
  <gmd:PT_FreeText>
    <gmd:textGroup>
      <gmd:LocalisedCharacterString locale="#en">This is an
example</gmd:LocalisedCharacterString>
    </gmd:textGroup>
    <gmd:textGroup>
      <gmd:LocalisedCharacterString locale="#nl">Dit is een
voorbeeld</gmd:LocalisedCharacterString>
    </gmd:textGroup>
    <gmd:textGroup>
      <gmd:LocalisedCharacterString locale="#fr">Voici un
exemple</gmd:LocalisedCharacterString>
    </gmd:textGroup>
  </gmd:PT_FreeText>
</imkl:description>
```

This representation follows the existing method for displaying text in multiple languages, as defined in the INSPIRE XSDs.

Example of disclaimer in IMKL 2.3 and IMKL 3:

```
<us-net-common:disclaimer>
  <gmd:PT_FreeText>
    <gmd:textGroup>
      <gmd:LocalisedCharacterString locale="#en">Example</gmd:LocalisedCharacterString>
    </gmd:textGroup>
    <gmd:textGroup>
      <gmd:LocalisedCharacterString locale="#nl">Voorbeeld</gmd:LocalisedCharacterString>
    </gmd:textGroup>
    <gmd:textGroup>
      <gmd:LocalisedCharacterString locale="#fr">Exemple</gmd:LocalisedCharacterString>
    </gmd:textGroup>
  </gmd:PT_FreeText>
</us-net-common:disclaimer>
```

2.4 Codelists

Several updates and additions have been made to codelists:

- New values are added to existing codelists.
- The following new codelists are introduced:
  - SurveyMethodValue
  - VisibilityTypeValue
  - ReferenceSurfaceTypeValue
  - ConstructionTechniqueValue
  - TelecommunicationsCableMaterialTypeIMKLValue
  - UtilityDeliveryTypeIMKLValue
  - UtilityNetworkTypeIMKLValue
- The following codelists have been removed:
  - TaalValue
  - ExtraTopografieTypeValue
  - NauwkeurigheidValue

To determine which codelist should be used for each element, please refer to the separate document: *IMKL3_Codelists.xlsx*. This document provides detailed information on the applicable codelists for each element in the IMKL 3 schema. It also contains the URI for each codelist value.

2.5 Order of elements

The XSD schema of IMKL 3 defines which elements can appear per object and specifies the order of these elements. In IMKL 3, the order of some elements has been changed compared to IMKL 2.3. This adjustment allows for the reuse of common elements through groups (e.g. imkl:UtilityNodeContainerGroup) which simplifies the XSD.

For the correct order of elements, please refer to the XSD schema itself or to the Entity-Relationship Diagrams associated with IMKL 3 (chapter 17). These resources provide detailed information on the sequence of elements required for each object.

2.6 Geometry

2.6.1 Overview

In IMKL 3, the following changes have been made to geometries:

- The coordinate reference system has been updated from Lambert72 to Lambert2008.
- Z-coordinates are now allowed (2.5D), although their inclusion alongside XY-coordinates is optional.
- The `srsDimension` attribute is now mandatory.

These changes are further explained in Sections 2.6.2 and 2.6.3. If you do not plan to include Z-coordinates, you only need to:

- Reproject all geometries into Lambert2008.
- Add the `srsDimension` attribute and set its value to 2 (representing 2D coordinates).

2.6.2 Coordinate reference system

In IMKL 2.3, Lambert72 (EPSG:31370) was used as the coordinate reference system. In IMKL 3, Lambert2008 (EPSG:3812) is used instead. This means that all coordinates need to be converted from Lambert72 to Lambert2008.

To specify the correct coordinate reference system, use the `srsName` attribute.

```
srsName="http://spatialreference.org/ref/epsg/3812/"
```

2.6.3 2.5D and srsDimension

In IMKL 2.3, specifying z-coordinates was not allowed. IMKL 3 now supports the inclusion of 2.5D coordinates which means they can be provided when available for third-party use. However, the KLIP-viewer itself will not use z-coordinates. To provide depth information, it is recommended to include the *StandardCoverageDetail*, *DepthDetail* and *CoverageDetail* objects.

Note that only one Z-coordinate is required for every XY-coordinate pair. Therefore, in the context of IMKL 3 this is referred to as 2.5D rather than a true 3D representation of objects. The interpretation of the Z-coordinate should follow the same guidelines as those of the verticalPosition (chapter 5).

To differentiate between geometries specified in 2D and those in 2.5D, the `srsDimension` attribute must be added. For 2D coordinates, set `srsDimension` to 2. For 2.5D coordinates, set `srsDimension` to 3. Although the usage of 2.5D coordinates is optional, the `srsDimension` attribute itself is mandatory.

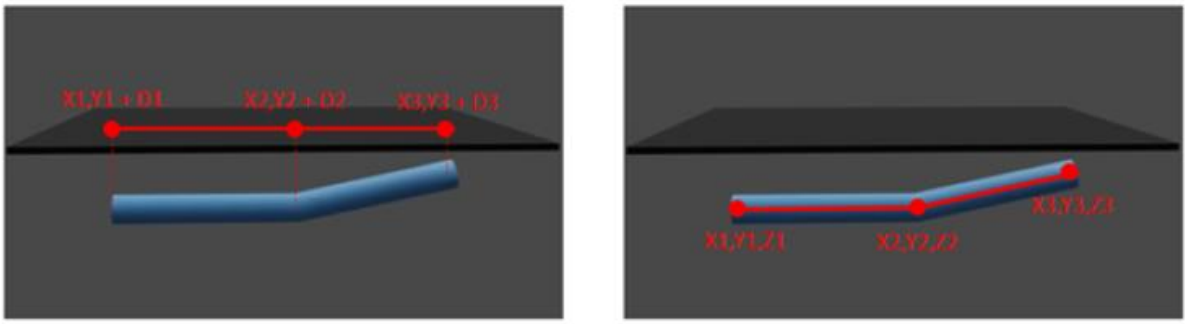


Figure 1 - 2D + depth (left) vs 2.5D (right)

Example of 2D coordinates:

```
<net:centrelineGeometry>
 <gml:LineString srsName="http://spatialreference.org/ref/epsg/3812/" srsDimension="2">
  <gml:posList>603516 692178 603576 692157</gml:posList>
 </gml:LineString>
</net:centrelineGeometry>
```

Example of 2.5D coordinates:

```
<net:centrelineGeometry>
 <gml:LineString srsName="http://spatialreference.org/ref/epsg/3812/" srsDimension="3">
  <gml:posList>603516 692178 20 603576 692157 20</gml:posList>
 </gml:LineString>
</net:centrelineGeometry>
```

Note that `srsDimension` with value 1 is also possible. This is the case when specifying a TAW/DNG level (Tweede Algemene Waterpassing / Deuxième Nivellement General). Here, EPSG:5710 is used. See section 5.3 for more information.

Example of a TAW/DNG level:

```
<imkl:verticalPosition srsName="http://spatialreference.org/ref/epsg/5710/"
srsDimension="1">22.02</imkl:verticalPosition>
```

2.7 Survey

In IMKL 3, a new element of type *Survey* has been introduced for objects where location, depth or vertical position information can be specified. This `imkl:Survey` element allows for the following data to be provided:

- **method:** Specifies the method used to determine the location, depth or vertical position. This element is mandatory but it can be empty and have a *nilReason*.
- **recordedBy:** Indicates the person or organization who conducted the survey. This element is optional.
- **date:** Specifies the date when the survey was conducted. This element is optional.
- **accuracy:** Provides the accuracy with which the location, depth or vertical position was determined. This element is mandatory but it can be empty and have a *nilReason*.

The *Survey* type is utilized in various places across IMKL 3. The name of the element varies depending on the object it applies to, ensuring clarity in interpretation. For example:

- *ActivityComplex* includes a `geometry` and a `geometrySurvey`. The `geometrySurvey` applies to the `geometry`.
- *ExtraPlan* has a `location` and a `locationSurvey`. The `locationSurvey` applies to the `location`.
- *DepthDetail* includes a `verticalPosition`, `depth` or `height` and a `verticalPositionSurvey`. The `verticalPositionSurvey` applies to either the `verticalPosition`, `depth` or `height`.

A `Survey` element is available for objects with a geometry, excluding *Annotations*. It is mandatory for all *Cables*, *Pipes*, *Ducts*, *Appurtenances*, *Towers*, *Poles*, *Cabinets* and *Manholes*. For other objects it is optional.

2.8 isRisicovol

In IMKL 2.3, the `isRisicoVol` element was used to indicate whether a utility network element could be considered risky. However, due to the difficulty in clearly defining what constitutes "risky," this element has been removed in IMKL 3.

However, we do want to emphasize the following:

- For Utility Network Operators:
  - It is important to provide accurate information about the utility network.
  - What fits within the IMKL data model (XML) should be provided in this format.
  - Additional information and safety instructions should be supplied as attachments.
- When working on the field, it is crucial to:
  - Request information / contact the utility network operator if needed.
  - Consult the information that is provided.
  - Adhere to the safety instructions while on-site.

3 Best Practices

3.1 Introduction

This section outlines several best practices for providing specific information in IMKL 3.These recommendations aim to enhance clarity and consistency in data representation.

3.2 Precaution

In IMKL 2.3 the `voorzorgsmaatregel` element could be used to provide information on precautions. In IMKL 3 this element is removed and is replaced with a `documentation` reference. The object that is referenced should be a *Document* object. The *Document* object is similar to an *ExtraPlan*, but without a location.

A *Document* object representing a precaution must have its `documentType` set to *precaution*. The *precaution* value is added to the *DocumentTypeValue* codelist for this purpose and should not be used for *ExtraPlans*.

See chapters 4 and 10 for more information on the *UtilityNetwork* and *Document* objects.

Example IMKL 2.3:

```
<gml:featureMember>
 <imkl:UtilityNetwork gml:id="ID_230dbcf3-4fbd-4118-9f57-b2f370f04107">
  ...
  <imkl:imklId>
   <base:Identifier>
    <base:localId>001</base:localId>
    <base:namespace>aquacom-be</base:namespace>
   </base:Identifier>
  </imkl:imklId>
  ...
  <imkl:voorzorgsmaatregel>
   <imkl:Voorzorgsmaatregel>
    <imkl:bestandLocatie>voorzorgsmaatregel.pdf</imkl:bestandLocatie>
    <imkl:bestandMediaType
     xlink:href="http://mir.agiv.be/cl/IMKL/v2/BestandMediaTypeValue/PDF" />
   </imkl:Voorzorgsmaatregel>
  </imkl:voorzorgsmaatregel>
```

```
  ...
 </imkl:UtilityNetwork>
</gml:featureMember>
```

Example IMKL 3:

```
<gml:featureMember>
  <imkl:UtilityNetwork gml:id="ID_230dbcf3-4fbd-4118-9f57-b2f370f04107">
    ...
    <imkl:imklId>
      <base:Identifier>
        <base:localId>001</base:localId>
        <base:namespace>aquacom-be</base:namespace>
      </base:Identifier>
    </imkl:imklId>
    ...
    <imkl:documentation xlink:href="
https://vocab.belgif.be/ns/imkl/3.0/Document/aquacom-be:D001" />
  </imkl:UtilityNetwork>
</gml:featureMember>

<gml:featureMember>
  <imkl:Document gml:id="ID_5b5e7f28-c98d-4bfd-bf0f-33e5c3cbb9c8">
    <imkl:imklId>
      <base:Identifier>
        <base:localId>D001</base:localId>
        <base:namespace>aquacom-be</base:namespace>
      </base:Identifier>
    </imkl:imklId>
    <imkl:beginLifespanVersion>2001-12-17T09:30:47.0Z</imkl:beginLifespanVersion>
    <imkl:documentType xlink:href="https://vocab.belgif.be/auth/IMKL-
DocumentTypeValue/precaution" />
    <imkl:documentLocation>voorzorgsmaatregel.pdf</imkl:documentLocation>
    <imkl:documentMediaType xlink:href="https://vocab.belgif.be/auth/IMKL-
DocumentMediaTypeValue/PDF" />
    <imkl:inNetwork xlink:href="
https://vocab.belgif.be/ns/imkl/3.0/UtilityNetwork/aquacom-be:001" />
  </imkl:Document>
</gml:featureMember>
```

3.3 Directional Drilling

In IMKL 2.3, there was no direct method to indicate that a cable, pipe or duct was installed using directional drilling (*gestuurde boring*). The only method available was to add an *ExtraPlan* with the `extraPlanType` set to *gestuurdeBoring*.

In IMKL 3, the `constructionTechnique` element can now be used to specify that a cable, pipe or duct is installed via a directional drilling by setting its value to *directionalDrilling*. It is strongly recommended to include the `constructionTechnique` element with the correct value when the construction technique is known. This allows elements with a specific construction technique to be visualized distinctly so they can be easily identified when looking at the map.

The *DocumentTypeValue* codelist in IMKL 3, which replaces the *ExtraPlanTypeValue* codelist from IMKL 2.3, still includes the option *directionalDrilling* (replacing *gestuurdeBoring)*. This allows for the addition of *ExtraPlans* providing additional documentation for a directional drilling.

An ExtraPlan with its `documentType` set to *directionalDrilling* must be linked to a cable, pipe or duct whose `constructionTechnique` is set to *directionalDrilling*. The validation will result in validation errors whenever this requirement is not met.

Example IMKL 3:

```
<gml:featureMember>
  <imkl:Duct gml:id="ID_83dd154b-a708-4d93-bbe0-173f46e896da">
    <net:beginLifespanVersion>2001-12-17T09:30:47.0Z</net:beginLifespanVersion>
    <net:inspireId>
      <base:Identifier>
        <base:localId>D001</base:localId>
        <base:namespace>telecom-be</base:namespace>
      </base:Identifier>
    </net:inspireId>
    ...
    <imkl:constructionTechnique
      xlink:href="https://vocab.belgif.be/auth/IMKL-
ConstructionTechniqueValue/directionalDrilling" />
    ...
  </imkl:Duct>
</gml:featureMember>
```

If a *Cable* or *Pipe* is installed via a combination of *open trench* and *directional drilling* construction techniques, the following approach is recommended:

- Provide a single *Cable* or *Pipe* object representing the entire trajectory of the *Cable* or *Pipe,* and set its `constructionTechnique` to *openTrench*.
- For each section of the *Cable* or *Pipe* where directional drilling is used, provide a *Duct* object and set the `constructionTechnique` of this object to *directionalDrilling*. Link the *Cables* or

Pipes passing through the directional drilling to these *Duct* objects via the *cables* or *pipes* element of the *Duct*.

An alternative method is to specify the *directional drilling* construction technique directly on the *Cable* or *Pipe* itself. However, if the construction technique is not the same for the entire *Cable* or *Pipe* (e.g., a combination of open trench and directional drilling), this requires splitting the *Cable* or *Pipe* into segments, so that each segment has the correct construction technique assigned.

Example of a Cable with a combination of *openTrench* and *directionalDrilling* techniques:

```
<imkl:TelecommunicationsCable>
  <net:inspireId>
    <base:Identifier>
      <base:localId>001</base:localId>
      <base:namespace>telecom-be</base:namespace>
    </base:Identifier>
  </net:inspireId>
  <net:link xlink:href="http://inspire.ec.europa.eu/schemas/us-net-
common/4.0/UtilityLink/electricitycom-be:002" />
  <imkl:constructionTechnique xlink:href="https://vocab.belgif.be/auth/IMKL-
ConstructionTechniqueValue/openTrench" />
</imkl:TelecommunicationsCable>

<imkl:Duct>
  <net:inspireId>
    <base:Identifier>
      <base:localId>D001</base:localId>
      <base:namespace>electricitycom-be</base:namespace>
    </base:Identifier>
  </net:inspireId>
  <net:link xlink:href="http://inspire.ec.europa.eu/schemas/us-net-
common/4.0/UtilityLink/telecom-be:004" />
  <us-net-common:cables xlink:href="
https://vocab.belgif.be/ns/imkl/3.0/TelecommunicationsCable/telecom-be:001" />
  <imkl:constructionTechnique
    xlink:href="https://vocab.belgif.be/auth/IMKL-
ConstructionTechniqueValue/directionalDrilling" />
</imkl:Duct>
```

3.4 Measurement Points and Drinking Water Extraction Points

In some utility networks, measurement locations play an important role in measuring or monitoring specific values, such as groundwater levels. These measurement points are typically vertical drillings.

In IMKL 3, the recommended way to represent these utility network elements is by including them as *Appurtenance* objects. The following information can be provided for each measurement point:

- **Location:** The location should be provided as a 2D or 2.5D point.
- **Depth:** The depth of the *Appurtenance* can be provided by adding a `depthDetail` element. As explained in chapter 5 this depth should be interpreted as the lowest point of the *Appurtenance* (the total depth of the vertical drilling in this case).
- **Height:** An optional `height` element can be included to provide information on the total height of the *Appurtenance*, for example if some part extends above the surface.
- **Type:** The `appurtenanceType` element should be set to *measurementPoint*. This value is available in the following codelists: *OilGasChemicalsAppurtenanceTypeIMKLValue*, *SewerAppurtenanceTypeIMKLValue*, *WaterAppurtenanceTypeIMKLValue* and *ThermalAppurtenanceTypeIMKLValue*.

Extraction points for drinking water share similarities with measurement points, as both can be included as *Appurtenance* objects within IMKL 3. However, for these objects the `appurtenanceType` should be set to *drinkingWaterExtractionPoint*, which is available in the *WaterAppurtenanceTypeIMKLValue* codelist.

3.5 Connection lines

Connection lines are the lines that link the distribution network to the end customer. Since these lines are typically located on the customer's property, it can be useful to differentiate them from the network operator's distribution network. To facilitate this, a specific `utilityDeliveryType` is provided: *connection*. Note that the *connection* option is not part of the *UtilityDeliveryTypeValue* codelist from INSPIRE, but belongs to an IMKL-specific codelist: *UtilityDeliveryTypeIMKLValue*.

At the end of the connection line, a *Connection* object can be included to provide the address details of the connection.

3.6 Vaulted waterways

The recommended way to include underground, vaulted waterways in IMKL is as *SewerPipe* objects with the value *waterDrainageArchedWaterways* for the `subtheme` element. The element `sewerWaterType` should be given the value *storm*. The width of the vaulted waterways can be included via the `pipeDiameter` element.

4 UtilityNetwork

4.1 Overview

The table below gives an overview of the elements within the *UtilityNetwork* object that have changed in IMKL 3 compared to IMKL 2.3.

IMKL 2.3	IMKL 3	Description
omschrijving	description	Renamed
taal	/	Removed
technischContactpersoon	imkl:authorityRole	See the section on authorityRole (IMKL)
heeftDieptes	verticalPositionDetail	See the section on verticalPositionDetail
voorzorgsmaatregel	documentation	See the section on documentation
eigenUtilityFacilityReference	/	Removed See the section on utilityFacilityReference
eigenExtraInformatie	/	Removed See the sections on documentation and annotation
heeftExtraTopografieen	/	Removed See the section on Topographical elements
heeftBeschermdeGebieden	protectedArea	Renamed
standaardDekking	standardCoverageDetail	Renamed See the section on standardCoverageDetail
heeftExtraInformatie	documentation or annotation	See the sections on documentation and annotation

4.2 authorityRole (us-net-common)

The element `us-net-common:authorityRole` must be present and must contain an empty *RelatedParty* element. This `authorityRole` element is ignored in IMKL 3, but it needs to be present to comply with the INSPIRE XSD.

This rule was already the case in IMKL 2.3, but it was not always used correctly.

Example IMKL 2.3 and IMKL 3:

```
<us-net-common:authorityRole>
  <base2:RelatedParty />
</us-net-common:authorityRole>
```

4.3 disclaimer

The `disclaimer` is an example of language-specific free text as explained above. This was already the case in IMKL 2.3.

Example IMKL 2.3 and IMKL 3:

```
<us-net-common:disclaimer>
  <gmd:PT_FreeText>
    <gmd:textGroup>
      <gmd:LocalisedCharacterString locale="#en"> Example
      </gmd:LocalisedCharacterString>
    </gmd:textGroup>
    <gmd:textGroup>
      <gmd:LocalisedCharacterString locale="#nl">Voorbeeld
      </gmd:LocalisedCharacterString>
    </gmd:textGroup>
  </gmd:PT_FreeText>
</us-net-common:disclaimer>
```

4.4 utilityFacilityReference

If an *ActivityComplex* is present it needs to be linked to from the *UtilityNetwork* object. This can be done via the element `utilityFacilityReference`. This was already the case in IMKL 2.3.

In IMKL 2.3, when an *ActivityComplex* was only applicably to the *UtilityNetwork* itself and was not linked to any of the elements within the *UtilityNetwork*, this had to be indicated via the element `eigenUtilityFacilityReference`. This is no longer needed in IMKL 3: The absence of a relationship between an *ActivityComplex* and an element in the *UtilityNetwork* suffices to indicate that the

ActivityComplex is applicable to the *UtilityNetwork* itself. Therefore, the element `eigenUtilityFacilityReference` is removed in IMKL 3.

4.5 authorityRole (IMKL)

The element `imkl:authorityRole` must be present. It replaces the `technischContactpersoon` element of IMKL 2.3.

The `imkl:authorityRole` element is of type *AgentType*. The element should contain the contact information for the person or organisation acting as the point of contact for the utility network. It must include the following elements:

- **name:** The name of the person or organisation
- **phone:** The telephone number. The phone number should include the country code (e.g. +32 for Belgium)
- **email:** The email address

Example IMKL 2.3:

```
<imkl:technischContactpersoon>
 <imkl:TechnischContactpersoon>
  <imkl:naam>Athumi</imkl:naam>
  <imkl:telefoon>0123456789</imkl:telefoon>
  <imkl:email>example@athumi.eu</imkl:email>
 </imkl:TechnischContactpersoon>
</imkl:technischContactpersoon>
```

Example IMKL 3:

```
<imkl:authorityRole>
  <imkl:name>Athumi</imkl:name>
  <imkl:phone>+3212345678</imkl:phone>
  <imkl:email>example@athumi.eu</imkl:email>
</imkl:authorityRole>
```

4.6 documentation

4.6.1 ExtraPlan

All *ExtraPlan*s that are relevant to the *UtilityNetwork* (i.e. applicable to the entire *UtilityNetwork* or to any of the elements within the network) should be linked to from the *UtilityNetwork* object. This must be done via the `documentation` element. A *UtilityNetwork* can have as many `documentation` elements as needed.

In IMKL 2.3, when an *ExtraPlan* was applicable to the entire *UtilityNetwork* and was not specifically linked to any of the elements within the *UtilityNetwork*, this had to be indicated via the element `eigenExtraInformatie`. This is no longer needed in IMKL 3. The absence of a relationship between an *ExtraPlan* and an element in the *UtilityNetwork* suffices to indicate that the *ExtraPlan* is applicable to the UtilityNetwork itself and thus, to all elements within the network. Therefore, the element `eigenExtraInformatie` is removed in IMKL 3.

Example IMKL 3:

```
<imkl:documentation xlink:href="https://vocab.belgif.be/ns/imkl/3.0/ExtraPlan/sewercom-be:EP001" />
```

4.6.2 Precautions

In IMKL 2.3 the `voorzorgsmaatregel` element could be used to provide information on precautions. In IMKL 3 this element is removed and is replaced with a `documentation` reference. The object that is referenced is similar to an *ExtraPlan*, but without a location. See chapter 10 for more information or the Precaution section in the chapter on best practices (chapter 3).

4.7 annotation

All annotations that are relevant to the *UtilityNetwork* should be linked to from the *UtilityNetwork* object. This must be done via the `annotation` element. A *UtilityNetwork* can have as many `annotation` elements as needed.

The same change regarding `eigenExtraInformatie` as described for *ExtraPlan* is applicable to *Annotations*. Although, it is recommended to link annotations to specific elements within the network whenever possible instead of linking them to the UtilityNetwork as a whole.

Example IMKL 3:

```
<imkl:annotation xlink:href="https://vocab.belgif.be/ns/imkl/3.0/Annotation/sewercom-be:AN001" />
<imkl:annotation xlink:href="https://vocab.belgif.be/ns/imkl/3.0/Annotation/sewercom-be:AN002" />
```

4.8 verticalPositionDetail

The element `heeftDieptes` of IMKL 2.3 needs to be replaced with the `verticalPositionDetail` element in IMKL 3. All `CoverageDetail` and `DepthDetail` objects that are used for any element within the *UtilityNetwork* should be referenced here. A *UtilityNetwork* can have as many `verticalPosition` elements as needed. The object or objects representing the standard coverage for the network should not be listed here.

Example IMKL 3:

```
<imkl:verticalPositionDetail
xlink:href="https://vocab.belgif.be/ns/imkl/3.0/DepthDetail/sewercom-be:CD001" />
<imkl:verticalPositionDetail
xlink:href="https://vocab.belgif.be/ns/imkl/3.0/DepthDetail/sewercom-be:DD002" />
<imkl:verticalPositionDetail
xlink:href="https://vocab.belgif.be/ns/imkl/3.0/DepthDetail/sewercom-be:DD003" />
```

4.9 standardCoverageDetail

The element `standaardDekking` of IMKL 2.3 needs to be replaced with the `standardCoverageDetail` element in IMKL 3. In IMKL 2.3 a *UtilityNetwork* could only have a single standard coverage (standard dekking). In IMKL 3 however, it is possible for a *UtilityNetwork* to have multiple standard coverages allowing to specify different standard coverages depending on the subtheme.

A UtilityNetwork can have:

- at most 1 standard coverage per subtheme.
- at most 1 standard coverage without subtheme. If this is present, this will be used as the coverage for an element unless it is overruled by either a `coverageDetail` on the element itself or by a `standardCoverageDetail` with the same subtheme.

Example IMKL 3:

```
<imkl:standardCoverageDetail
xlink:href="https://vocab.belgif.be/ns/imkl/3.0/StandardCoverageDetail/sewercom-be:DD001"
/>
```

4.10 Topographical elements

Topographical elements (known as *Extra Topografie* in IMKL 2.3) provide extra context of the area that can help with orientation on site: e.g. trees, fences or other landmarks. These elements are by definition not directly related to a *UtilityNetwork*. Because of this, the relationship between *UtilityNetwork* and *TopographicalElement* is removed in IMKL 3. Therefore, the element `heeftExtraTopografieen` of IMKL 2.3 is removed from the *UtilityNetwork* object in IMKL 3.

5 DepthDetail and CoverageDetail

5.1 DepthDetail vs CoverageDetail

In IMKL 2.3 the *RelatieveDiepte* and *TAWDiepte* objects were used to provide information on the depth or vertical position of elements within a *UtilityNetwork*. In IMKL 3 these objects are replaced with the *DepthDetail* and *CoverageDetail* objects. Note that this is not a one for one replacement. Both *DepthDetail* and *CoverageDetail* can replace either of the *RelatieveDiepte* and *TAWDiepte* objects.

In IMKL 2.3 the *RelatieveDiepte* object was used to represent a relative depth compared to the surface. *TAWDiepte* was used to represent an absolute TAW/DNG level (Tweede Algemene Waterpassing / Deuxième Nivellement Général).

In IMKL 3 the *DepthDetail* object should be used for elements with a point geometry. It can be used to represent both a relative depth as well as a TAW/DNG level. **For objects with a point geometry the depth or vertical position information should be interpreted as the lowest point of the object.**

Objects with a point geometry are:

- Appurtenance
- Connection
- Tower
- Pole
- Cabinet
- Manhole

The *CoverageDetail* object should be used for elements with a line geometry. **For these elements the depth or vertical position information should be interpreted as the highest part of the element.**

Objects with a line geometry (via the referenced *UtilityLinks*) are:

- ElectricityCable
- TelecommunicationsCable
- Pipe
- OilGasChemicalsPipe
- SewerPipe
- WaterPipe
- ThermalPipe
- Duct

Since *DepthDetail* is applicable only for objects with a point geometry, it is not possible to provide a `location` or `locationSurvey` together with the *DepthDetail*. On the other hand, it is required to provide a `location` and `locationSurvey` in the *CoverageDetail* object. Without a location it would not be clear to which location along the trajectory of the line the depth information applies. The `location` element replaces the `ligging` element of *RelatieveDiepte* and *TAWDiepte*.

5.2 Overview

The table below gives an overview of the elements within the *DepthDetail and CoverageDetail* objects that have changed in IMKL 3 compared to the *RelatieveDiepte* and *TAWDiepte* of IMKL 2.3.

IMKL 2.3	IMKL 3	Description
diepteNauwkeurigheid	verticalPositionSurvey	See the section on verticalPositionSurvey
dieptePeil	depth, height or verticalPosition	See the section on depth, height and verticalPosition
datumOpmetingDieptePeil	verticalPositionSurvey	See the section on verticalPositionSurvey
ligging	location	Renamed Only applicable for CoverageDetail
/	locationSurvey	New Only applicable for CoverageDetail
heeftKabelOfLeiding	on	Renamed See the section on Associations
heeftLeidingElement	on	Renamed See the section on Associations
heeftContainerLeidingElement	on	Renamed See the section on Associations
heeftKabelEnLeidingContainer	on	Renamed See the section on Associations
heeftUtilityNetwork	/	Removed See the section on Associations
maaiveldPeil (TAWDiepte)	referenceSurface > verticalPosition	See the section on referenceSurface

datumOpmetingMaaiveldPeil (TAWDiepte)	referenceSurface > verticalPositionSurvey	See the section on referenceSurface

5.3 depth, height and verticalPosition

Every *DepthDetail* or *CoverageDetail* object should have exactly one of the following elements:

- **depth:** The `depth` element replaces the `dieptePeil` element of the *RelatieveDiepte* object. It represents the depth below the surface.
- **height:** The `height` element is similar to the `depth`, but it represents a height above the surface.
- **verticalPosition:** The `verticalPosition` element should be used to provide a TAW/DNG level. As such, a *DepthDetail* or *CoverageDetail* object replaces the *TAWDiepte* object of IMKL 2.3.
  Note that the `srsName` and `srsDimension` attributes are required for this element.

Example of depth in IMKL 3:

```
<imkl:depth uom="urn:ogc:def:uom:OGC::cm">100</imkl:depth>
```

Example of height in IMKL 3:

```
<imkl:height uom="urn:ogc:def:uom:OGC::cm">100</imkl:height>
```

Example of verticalPosition in IMKL 3:

```
<imkl:verticalPosition
   srsName="http://spatialreference.org/ref/epsg/5710/"
   srsDimension="1">21.65
</imkl:verticalPosition>
```

5.4 verticalPositionSurvey

Every *DepthDetail* and *CoverageDetail* object should have a `verticalPositionSurvey` element. This element is of type *Survey* and provides additional information on the depth, height or verticalPosition. It replaces the `diepteNauwkeurigheid` and `datumOpmetingDieptePeil` elements of *RelatieveDiepte* and *TAWDiepte*.

Example IMKL 3:

```
<imkl:verticalPositionSurvey>
  <imkl:method nilReason="missing" xsi:nil="true" />
  <imkl:date>2001-12-17T09:30:47Z</imkl:date>
```

```
  <imkl:accuracy uom="urn:ogc:def:uom:OGC::cm">30</imkl:accuracy>
</imkl:verticalPositionSurvey>
```

5.5 referenceSurface

Every *DepthDetail* and *CoverageDetail* object has an extra element (compared to *RelatieveDiepte* and *TAWDiepte* of IMKL 2.3) called `referenceSurface`. This element is mandatory and needs to have at least a `type` child element. This `referenceSurfaceType` element indicates the type of the reference surface. For now it should always be of type `surfaceLevel`.

Next to the `referenceSurfaceType` child element, the `referenceSurface` can have the following optional child elements:

- **verticalPosition:** The `verticalPosition` element can be used to indicate the TAW/DNG level of the reference surface at the given location. If no location is given for the reference surface, it is assumed that the location is the same as the location of the *UtilityNetworkElement* or *CoverageDetail* object itself.
  This element replaces the `maaiveldPeil` of the *TAWDiepte* object of IMKL 2.3
- **verticalPositionSurvey:** The `verticalPositionSurvey` element is of type *Survey* and can be used to provide additional information on how the `verticalPosition` was determined. It can be used to provide for example the date the vertical position of the reference surface was determined and thus it replaces the `datumOpmetingMaaiveldPeil` element of the *TAWDiepte* object of IMKL 2.3.
- **location**: The `location` element can be used if the location where the TAW/DNG level of the reference surface was determined is not the same as that of the *UtilityNetworkElement* or *CoverageDetail* object it is linked to.
- **locationSurvey:** The `locationSurvey` element is of type *Survey* and can be used to provide additional information on how the location of the referenceSurface was determined.

Example IMKL 3:

```
<imkl:referenceSurface>
  <imkl:referenceSurfaceType xlink:href="https://vocab.belgif.be/auth/IMKL-
ReferenceSurfaceTypeValue/surfaceLevel" />
  <imkl:verticalPosition srsName="http://spatialreference.org/ref/epsg/5710/"
    srsDimension="1">22.02</imkl:verticalPosition>
  <imkl:verticalPositionSurvey>
    <imkl:method nilReason="unknown" xsi:nil="true" />
    <imkl:date>2001-12-17T09:30:47Z</imkl:date>
    <imkl:accuracy uom="urn:ogc:def:uom:OGC::cm" nilReason="unknown"
xsi:nil="true"></imkl:accuracy>
  </imkl:verticalPositionSurvey>
</imkl:referenceSurface>
```

5.6 Associations

In IMKL 2.3, the relationship between a *RelatieveDiepte* or *TAWDiepte* object and its associated elements was established through one of the following elements: `heeftKabelOfLeiding`, `heeftLeidingElement`, `heeftContainerLeidingElement` or `heeftKabelEnLeidingContainer`. These elements have now been consolidated into a single element: `on`. The specific type of object to which a *DepthDetail* or *CoverageDetail* object is linked can be determined directly from the `href` attribute within the `on` element.

A single *DepthDetail* or *CoverageDetail* can also be linked to multiple objects in IMKL 3. If multiple objects have the same depth, height or vertical position information, the object can be reused and needs to be provided only once. This was not possible in IMKL 2.3. This means a *DepthDetail* or *CoverageDetail* object can have as many `on` elements as needed.

The element `heeftUtilityNetwork` is no longer needed in IMKL 3. The standard coverage of a UtilityNetwork is provided via a different object: *StandardCoverageDetail*.

6 StandardCoverageDetail

The *StandardCoverageDetail* object can be used to provide one or more standard coverages for the *UtilityNetwork*. *StandardCoverageDetail* is similar to the *CoverageDetail* object, but with the following differences:

- Because a standard coverage is not limited to specific elements there is no need to provide a specific location. Hence, there is no option to add the `location` or `locationSurvey` elements.
- Because a standard coverage is not linked to specific elements there is no `on` relationship. There is also no `heeftUtilityNetwork` element like there is in IMKL 2.3. The type of object already implies that the object is a standard coverage for the *UtilityNetwork*.
- There is an extra element called `subtheme`. If there are different standard coverages depending on the subtheme of cables, pipes or ducts, it is now possible to provide multiple standard coverages for a single UtilityNetwork. Via the `subtheme` element you can specify for which subtheme(s) the standard coverage should be used.
  There should be at most one standard coverage per subtheme. There can also be at most one standard coverage without a subtheme per *UtilityNetwork*. The *StandardCoverageDetail* without subtheme will be used as the standard coverage for all cables, pipes or ducts that do not have a standard coverage for their subtheme or that do not have an element specific coverage detail.

Example IMKL 3:

```
<imkl:StandardCoverageDetail gml:id="ID_be8fc9cc-775f-4469-a8ce-bf1c892e5e14">
  <imkl:imklId>
    <base:Identifier>
      <base:localId>DD001</base:localId>
      <base:namespace>sewercom-be</base:namespace>
    </base:Identifier>
  </imkl:imklId>
  <imkl:beginLifespanVersion>2001-12-17T09:30:47Z</imkl:beginLifespanVersion>
  <imkl:referenceSurface>
    <imkl:referenceSurfaceType xlink:href="https://vocab.belgif.be/auth/IMKL-
ReferenceSurfaceTypeValue/surfaceLevel" />
  </imkl:referenceSurface>
  <imkl:depth uom="urn:ogc:def:uom:OGC::cm">100</imkl:depth>
  <imkl:verticalPositionSurvey>
    <imkl:method nilReason="missing" xsi:nil="true" />
    <imkl:date>2001-12-17T09:30:47Z</imkl:date>
    <imkl:accuracy uom="urn:ogc:def:uom:OGC::cm">30</imkl:accuracy>
  </imkl:verticalPositionSurvey>
  <imkl:inNetwork
    xlink:href="https://vocab.belgif.be/ns/imkl/3.0/UtilityNetwork/sewercom-be:001" />
</imkl:StandardCoverageDetail>
```

7 ActivityComplex

7.1 Overview

The table below gives an overview of the elements within the *ActivityComplex* object that have changed in IMKL 3 compared to the *ActivityComplex* object of IMKL 2.3.

IMKL 2.3	IMKL 3	Description
omschrijving	description	Renamed
taal	/	Removed
opKabelEnLeidingen	on	Replaced See the section on Associations
opKabelEnLeidingContainers	on	Replaced See the section on Associations
opContainerLeidingElementen	on	Replaced See the section on Associations
opLeidingElementen	on	Replaced See the section on Associations
heeftUtilityNetwork	/	Removed See the section on Associations
/	geometrySurvey	Added See the section on geometrySurvey

7.2 geometrySurvey

The `geometrySurvey` element is an optional element that is added to *ActivityComplex*. This element is of type *Survey* and provides information on the way the *ActivityComplex* geometry was determined. It did not exist in IMKL 2.3.

7.3 Associations

In IMKL 2.3, the relationship between an *ActivityComplex* object and its associated elements was established through any of the following elements: `opKabelEnLeidingen`, `opKabelEnLeidingContainers`, `opContainerLeidingElementen` and `opLeidingElementen`. These elements have now been consolidated into a single element: `on`. The specific type of object to which a *ActivityComplex* object is linked can be determined directly from the `href` attribute within the `on` element. An *ActivityComplex* can have as many `on` elements as required.

The element `heeftUtilityNetwork` is no longer needed. The absence of on elements already indicates that the *ActivityComplex* relates to the *UtilityNetwork* itself and not to specific elements.

Example IMKL 3:

```
<imkl:on xlink:href="https://vocab.belgif.be/ns/imkl/3.0/SewerPipe/sewercom-be:001" />
<imkl:on xlink:href="https://vocab.belgif.be/ns/imkl/3.0/SewerPipe/sewercom-be:002" />
<imkl:on xlink:href="https://vocab.belgif.be/ns/imkl/3.0/Manhole/sewercom-be:M0001" />
<imkl:on xlink:href="https://vocab.belgif.be/ns/imkl/3.0/Appurtenance/sewercom-be:004" />
<imkl:inNetwork xlink:href="https://vocab.belgif.be/ns/imkl/3.0/UtilityNetwork/sewercom-
be:001" />
```

8 TopographicalElement

8.1 Overview

Topographical elements provide extra context of the area that can help with orientation on site: e.g. trees, fences or other landmarks. In IMKL 2.3 this was known as *ExtraTopografie*. In IMKL 3 this is replaced with the *TopographicalElement* object.

The table below gives an overview of the elements within the *TopographicalElement* object that have changed in IMKL 3 compared to the *ExtraTopografie* object of IMKL 2.3.

IMKL 2.3	IMKL 3	Description
omschrijving	description	Renamed
taal	/	Removed
ligging	location	Renamed
/	locationSurvey	Added See the section on locationSurvey
extraTopografieType	/	Removed See the section on extraTopografieType
inNetwork	/	Removed See the section on Associations

8.2 locationSurvey

The `locationSurvey` element is an optional element that is added to *TopographicalElement*. This element is of type *Survey* and provides information on the way the *TopographicalElement* geometry was determined. It did not exist in IMKL 2.3. The information about the `locationSurvey` is not currently visible in the KLIP viewer. Therefore, providing it is optional, although it can be useful for advanced use cases, such as impact analysis based on IMKL data.

8.3 extraTopografieType

The `extraTopografieType` element of *ExtraTopografie* in IMKL 2.3 was rarely used. Therefore, it was decided to remove this element in IMKL 3.

8.4 Associations

TopographicalElements are by definition not related to a *UtilityNetwork*. Because of this the relationship between *UtilityNetwork* and *TopographicalElement* is removed in IMKL 3. Therefore, the element `inNetwork` no longer exists in the *TopographicalElement* object.

9 ProtectedArea

9.1 Overview

The *ProtectedArea* object replaces the *BeschermdGebied* object of IMKL 2.3.

The table below gives an overview of the elements within the *ProtectedArea* object that have changed in IMKL 3 compared to the *BeschermdGebied* object of IMKL 2.3.

IMKL 2.3	IMKL 3	Description
label	name	Renamed
omschrijving	description	Renamed
taal	/	Removed
beschermdGebiedType	protectedAreaType	Renamed
ligging	geometry	Renamed
/	geometrySurvey	Added See the section on geometrySurvey

9.2 geometrySurvey

The `geometrySurvey` element is an optional element that is added to *ProtectedArea*. This element is of type *Survey* and provides information on the way the *ProtectedArea* geometry was determined. It did not exist in IMKL 2.3. The information about the `geometrySurvey` is not currently visible in the KLIP viewer. Therefore, providing it is optional.

9.3 protectedAreaType

The `protectdAreaType` element is used to specify the type of the protected area. For IMKL 3, the existing codelist is expanded with the following types:

- **infiltrationArea:** This type of protected area can be used for areas that are used for water infiltration.

10 Document and ExtraPlan

10.1 Overview

The *Document* object in IMKL 3 replaces the `voorzorgsmaatregel` element that was part of a UtilityNetwork in IMKL 2.3. Instead of an embedded element within the *UtilityNetwork* the *Document* is a separate object that is referenced from the *UtilityNetwork* via the `documentation` element. *Documents* representing a precaution (replacing the *voorzorgsmaatregel)* should have a `documentType` of *precaution*. These documents should always be linked to a *UtilityNetwork*, never to *UtilityNetworkElement*.

ExtraPlan objects in IMKL 3 are similar to the *ExtraPlan* objects of IMKL 2.3 In IMKL 3, *ExtraPlans* are an extension of the *Document* object type. *ExtraPlans* have a mandatory `location` and an optional `locationSurvey` element whereas *Documents* have neither of these elements. *ExtraPlans* also have `refersTo` elements allowing to link ExtraPlans with UtilityNetwork elements. ExtraPlans are not allowed to have *precaution* as their `documentType`. This `documentType` is reserved for *Document* objects.

The table below gives an overview of the elements within the *Document* and *ExtraPlan* objects that have changed in IMKL 3 compared to the *ExtraPlan* object of IMKL 2.3.

IMKL 2.3	IMKL 3	Description
omschrijving	description	Renamed
taal	/	Removed
extraPlanType	documentType	Renamed Added for precautions (voorzorgsmaatregel)
bestandLocatie	documentLocation	Renamed
bestandMediaType	documentMediaType	Renamed
ligging	location	Renamed **Only applicable for ExtraPlan**
/	locationSurvey	Added See the section on locationSurvey **Only applicable for ExtraPlan**
bestandIdentificator	/	Removed See the section on bestandIdentificator

opKabelEnLeidingen	refersTo	Renamed **Only applicable for ExtraPlan** See the section on Associations
opLeidingElementen	refersTo	Renamed **Only applicable for ExtraPlan** See the section on Associations
opKabelEnLeidingContainers	refersTo	Renamed **Only applicable for ExtraPlan** See the section on Associations
opContainerLeidingElementen	refersTo	Renamed **Only applicable for ExtraPlan** See the section on Associations
inNetwork	inNetwork	Added for precautions (voorzorgsmaatregel) See the section on Associations
heeftUtilityNetwork	/	Removed See the section on Associations

10.2 bestandIdentificator

The `bestandIdentificator` element of *ExtraPlan* in IMKL 2.3 was rarely used. Therefore, it was decided to remove this element in IMKL 3.

10.3 locationSurvey

The `locationSurvey` element is an optional element that is added to *ExtraPlan*. This element is of type *Survey* and provides information on the way the *ExtraPlan* location was determined. It did not exist in IMKL 2.3. The information about the `locationSurvey` is not currently visible in the KLIP viewer. Therefore, providing it is optional.

10.4 Associations

In IMKL 2.3, the relationship between an *ExtraPlan* object and its associated elements was established through any of the following elements: `opKabelEnLeidingen`, `opKabelEnLeidingContainers`, `opContainerLeidingElementen` and `opLeidingElementen`. These elements have now been consolidated into a single element: `refersTo`. The specific type of object to which an *ExtraPlan* object is linked can be determined directly from the `href` attribute within the `refersTo` element. An *ExtraPlan* can have as many `refersTo` elements as required. *Documents* do not have the `refersTo` element. A *Document* can only be linked to a *UtilityNetwork* and thus does not need the `refersTo` element.

The element `heeftUtilityNetwork` is no longer needed. The absence of `refersTo` elements already indicates that the *Document* relates to the *UtilityNetwork* itself and not to specific elements.

Because voorzorgsmaatregel is no longer embedded within *UtilityNetwork*, but rather a separate *Document* object it also requires the `inNetwork` association similar to the `inNetwork` association that was already present for *ExtraPlan*.

11 Annotation

11.1 Overview

The *Annotation* object in IMKL 3 replaces the *Annotatie* object from IMKL 2.3.

The table below provides an overview of the elements within the *Annotation* object that have changed in IMKL 3 compared to the *Annotatie* object in IMKL 2.3.

IMKL 2.3	IMKL 3	Description
label	text	Renamed
omschrijving	description	Renamed
taal	/	Removed
opKabelEnLeidingen	associatedWith	Renamed See the section on Associations
opLeidingElementen	associatedWith	Renamed See the section on Associations
opKabelEnLeidingContainers	associatedWith	Renamed See the section on Associations
opContainerLeidingElementen	associatedWith	Renamed See the section on Associations
heeftUtilityNetwork	/	Removed See the section on Associations
annotatieType	annotationType	Renamed
rotatiehoek	rotationAngle	Renamed
ligging	location	Renamed

11.2 Associations

In IMKL 2.3, the relationship between an *Annotatie* object and its associated elements was established through any of the following elements: `opKabelEnLeidingen`, `opKabelEnLeidingContainers`, `opContainerLeidingElementen`, or `opLeidingElementen`. These elements have now been consolidated into a single element: `associatedWith`. The specific type of object to which an *Annotation* is linked can be determined directly from the `href` attribute within the `associatedWith` element. An *Annotation* can include as many `associatedWith` elements as needed.

Additionally, the `heeftUtilityNetwork` element is no longer required. If no `associatedWith` elements are present, it is implicitly understood that the *Annotation* applies to the *UtilityNetwork* as a whole, rather than to individual elements within it.

12 Appurtenance

12.1 Overview

The table below provides an overview of the elements within the *Appurtenance* object that have changed in IMKL 3 compared to the *Appurtenance* object in IMKL 2.3.

IMKL 2.3	IMKL 3	Description
omschrijving	description	Renamed
taal	/	Removed
liggingNauwkeurigheid	geometrySurvey	See the section on geometrySurvey.
orientatie	orientation	Renamed
subThema	subtheme	Renamed
isRisicovol	/	Removed See the section on isRisicovol.
isBovengrondsZichtbaar	visibility	See the section on visibility.
kleur	appearance	See the section on appearance.
diepte	depthDetail	See the section on depthDetail.
heeftExtraInformatie	documentation or annotation	See the section on documentation and annotation.
hoogte	height	Renamed

12.2 geometrySurvey

The `geometrySurvey` element is an mandatory element that is added to *Appurtenance*. This element is of type *Survey* and provides information on how the *Appurtenance* geometry was determined. The `geometrySurvey` element replaces the `liggingNauwkeurigheid` element of IMKL 2.3.

12.3 visibility

In IMKL 2.3, the `isBovengrondsZichtbaar` element, which was of type Boolean, has been replaced by the `visibility` element in IMKL 3. The `visibility` element is now a codelist rather than a Boolean type.

The mapping of values is as follows:

- A `true` value for `isBovengrondsZichtbaar` should be replaced with *visibleAboveGround*.
- A `false` value for `isBovengrondsZichtbaar` should be replaced with *notVisibleAboveGround*.

This change allows for a more detailed categorization in the future.

Example IMKL 2.3:

```
<imkl:isBovengrondsZichtbaar>false</imkl:isBovengrondsZichtbaar>
```

Example IMKL 3:

```
<imkl:visibility xlink:href="https://vocab.belgif.be/auth/IMKL-
VisibilityTypeValue/notVisibleAboveGround" />
```

12.4 appearance

In IMKL 2.3, the `kleur` element has been replaced by the `appearance` element. While the `kleur` element was a simple text field, the `appearance` element is now a complex type. Currently, the `appearance` element contains a single child element: `colour`. The `colour` element is a language-specific string, allowing the specification of the colour in any of the supported languages.

Example IMKL 2.3:

```
<imkl:kleur>wit</imkl:kleur>
```

Example IMKL 3:

```
<imkl:appearance>
  <imkl:colour>
    <gmd:PT_FreeText>
      <gmd:textGroup>
        <gmd:LocalisedCharacterString locale="#en">
          White
        </gmd:LocalisedCharacterString>
      </gmd:textGroup>
```

```
      <gmd:textGroup>
        <gmd:LocalisedCharacterString locale="#nl">
          Wit
        </gmd:LocalisedCharacterString>
      </gmd:textGroup>
      <gmd:textGroup>
        <gmd:LocalisedCharacterString locale="#fr">
          Blanc
        </gmd:LocalisedCharacterString>
      </gmd:textGroup>
    </gmd:PT_FreeText>
  </imkl:colour>
</imkl:appearance>
```

12.5 depthDetail

The `depthDetail` element replaces the `diepte` element from IMKL 2.3. Instead of referencing a *RelatieveDiepte* or *TAWDiepte* object, the `depthDetail` element should reference a *DepthDetail* object.

For more information, refer to the DepthDetail and CoverageDetail section of the documentation.

12.6 documentation and annotation

The `documentation` and `annotation` elements replace the `heeftExtraInformatie` element from IMKL 2.3. Previously, the `heeftExtraInformatie` element could reference both *ExtraPlan* and *Annotatie* objects. This element is now divided into two distinct elements:

- The `documentation` element should reference *ExtraPlan* objects.
- The `annotation` element should reference *Annotation* objects.

An *Appurtenance* can have as many `documentation` and `annotation` elements as needed.

13 Connection

In IMKL 2.3, some *Appurtenances* could have an *Aansluiting* object linked to them via the `heeftExtraInformatie` element. This allowed to provide address information for the *Appurtenance*. The *Aansluiting* object could only be linked to *Appurtenances* with a specific `appurtenanceType`.

In IMKL 3, the *Aansluiting* object has been removed and is replaced with the *Connection* object. The *Connection* object is a specific type of *Appurtenance* and includes one additional (optional) element called `address`. A *Connection* must still have one of the specific `appurtenanceTypes`:

- WaterAppurtenanceTypeIMKLValue – deliveryPoint
- ThermalAppurtenanceTypeIMKLValue – deliveryPoint
- ElectricityAppurtenanceTypeExtendedValue – deliveryPoint
- OilGasChemicalsAppurtenanceTypeExtendedValue – deliveryPoint
- TelecommunicationsAppurtenanceTypeExtendedValue – termination
- SewerAppurtenanceTypeIMKLValue - deliveryPoint

The `address` element includes the following child elements:

- **municipalityName:** The `municipalityName` element is mandatory and replaces the `gemeente` element of IMKL 2.3. The `municipalityName` is a language-specific string.
- **streetName:** The `streetName` element is mandatory and replaces the `straatnaam` element of IMKL 2.3. The `streetName` is a language-specific string.
- **houseNumber:** The `houseNumber` element is optional and replaces the `huisnummer` element of IMKL 2.3. The `houseNumber` is a simple string.
- **postalCode:** The `postalCode` element is optional and replaces the `postcode` element of IMKL 2.3. The `postalCode` is a simple string.

Example IMKL 2.3:

```
<gml:featureMember>
  <imkl:Aansluiting gml:id="ID_1">
    <imkl:imklId>
      <base:Identifier>
        <base:localId>AS001</base:localId>
        <base:namespace>gascom-be</base:namespace>
      </base:Identifier>
    </imkl:imklId>
```

```
    <imkl:beginLifespanVersion>2001-12-17T09:30:47.0Z</imkl:beginLifespanVersion>
    <imkl:inNetwork xlink:href="http://mir.agiv.be/data/IMKL/v2.3/UtilityNetwork/gascom-
be:001" />
    <imkl:opLeidingElementen
      xlink:href="http://mir.agiv.be/data/IMKL/v2.3/Appurtenance/gascom-be:002" />
    <imkl:adres>
      <imkl:Adres>
        <imkl:gemeente>Gent</imkl:gemeente>
        <imkl:straatnaam>Koningin Fabiolalaan</imkl:straatnaam>
        <imkl:huisnummer>5</imkl:huisnummer>
        <imkl:postcode>9000</imkl:postcode>
      </imkl:Adres>
    </imkl:adres>
  </imkl:Aansluiting>
</gml:featureMember>
```

Example IMKL 3:

```
<imkl:address>
  <imkl:municiaplityName>
    <gmd:PT_FreeText>
      <gmd:textGroup>
        <gmd:LocalisedCharacterString locale="#fr">Gand</gmd:LocalisedCharacterString>
      </gmd:textGroup>
      <gmd:textGroup>
        <gmd:LocalisedCharacterString locale="#nl">Gent</gmd:LocalisedCharacterString>
      </gmd:textGroup>
    </gmd:PT_FreeText>
  </imkl:municiaplityName>
  <imkl:streetName>
    <gmd:PT_FreeText>
      <gmd:textGroup>
        <gmd:LocalisedCharacterString locale="#nl">Koningin
Fabiolalaan</gmd:LocalisedCharacterString>
      </gmd:textGroup>
    </gmd:PT_FreeText>
  </imkl:streetName>
  <imkl:houseNumber>5</imkl:houseNumber>
  <imkl:postalCode>9000</imkl:postalCode>
</imkl:address>
```

14 UtilityNodeContainers: Tower, Pole, Manhole and Cabinet

The table below provides an overview of the elements within the *UtilityNodeContainer* objects that have changed in IMKL 3 compared to their corresponding objects in IMKL 2.3. The UtilityNodeContainers objects are: *Tower*, *Pole*, *Manhole* and *Cabinet*.

IMKL 2.3	IMKL 3	Description
/	beginLifespanVersion	Added to be in line with all other elements.
/	endLifespanVersion	Added to be in line with all other elements.
omschrijving	description	Renamed
taal	/	Removed
liggingNauwkeurigheid	geometrySurvey	See the geometrySurvey section in the Appurtenance chapter.
orientatie	orientation	Renamed
isRisicovol	/	Removed See the section on isRisicovol.
isBovengrondsZichtbaar	visibility	See the visibility section in the Appurtenance chapter.
kleur	appearance	See the appearance section in the Appurtenance chapter.
diepte	depthDetail	See the depthDetail section in the Appurtenance chapter.
heeftExtraInformatie	documentation or annotation	See the documentation and annotation section in the Appurtenance chapter.

15 Cables: ElectricityCable and TelecommunicationsCable

15.1 Overview

The table below provides an overview of the elements within the *ElectricityCable and TelecommunicationsCable* objects that have changed in IMKL 3 compared to their corresponding objects in IMKL 2.3.

IMKL 2.3	IMKL 3	Description
omschrijving	description	Renamed
taal	/	Removed
liggingNauwkeurigheid	locationSurvey	See the geometrySurvey section in the Appurtenance chapter.
isRisicovol	/	Removed See the section on isRisicovol.
isBovengrondsZichtbaar	visibility	See the visibility section in the Appurtenance chapter.
kleur	appearance	See the appearance section in the Appurtenance chapter.
materiaalType	materialType	Renamed
technischeSpecificaties	technicalSpecifications	Renamed
dekking	coverageDetail	See the coverageDetail section.
heeftExtraInformatie	documentation or annotation	See the documentation and annotation section in the Appurtenance chapter.
subThema	subtheme	Renamed
kabelDiameter	cableDiameter	Renamed
/	constructionTechnique	See the constructionTechnique section.
/	cableDiameterAccuracy	Added See the cableDiameterAccuracy section.

15.2 coverageDetail

The `coverageDetail` element replaces the `dekking` element from IMKL 2.3. Instead of referencing a *RelatieveDiepte* or *TAWDiepte* object, the `coverageDetail` element should reference a *CoverageDetail* object.

For more information, refer to the DepthDetail and CoverageDetail section of the documentation.

Example IMKL 3:

```
<imkl:coverageDetail
xlink:href="https://vocab.belgif.be/ns/imkl/3.0/DepthDetail/sewercom-be:CD001" />
```

15.3 cableDiameterAccuracy

The `pipeDiameterAccuracy` element has been added to provide additional information on the accuracy of the `pipeDiameter`. This element is of type *MeasureType* and accepts the following units: mm, cm and m. The `pipeDiameterAccuracy` element is optional.

Example IMKL 3:

```
<imkl:pipeDiameterAccuracy uom="urn:ogc:def:uom:cm">10</imkl:pipeDiameterAccuracy>
```

15.4 constructionTechnique

The `constructionTechnique` element has been added in IMKL 3. This element allows providing additional information regarding the construction technique used during the construction or installation of a cable, pipe or duct. This element is optional, but it is recommended to include it if information about the construction technique is available. If no information is available this can be clarified by adding the element with a *nilReason*.

The `constructionTechnique` should be a valid value from the *ConstructionTechniqueCodelist*. The allowed values are:

- openTrench
- directionalDrilling
- culvert
- other

16 Pipes and Ducts

The table below provides an overview of the elements within the *Pipe* and *Duct* objects that have changed in IMKL 3 compared to their corresponding objects in IMKL 2.3. The Pipe objects are: *Pipe*, *OilGasChemicalsPipe*, *SewerPipe*, *WaterPipe* and *ThermalPipe*

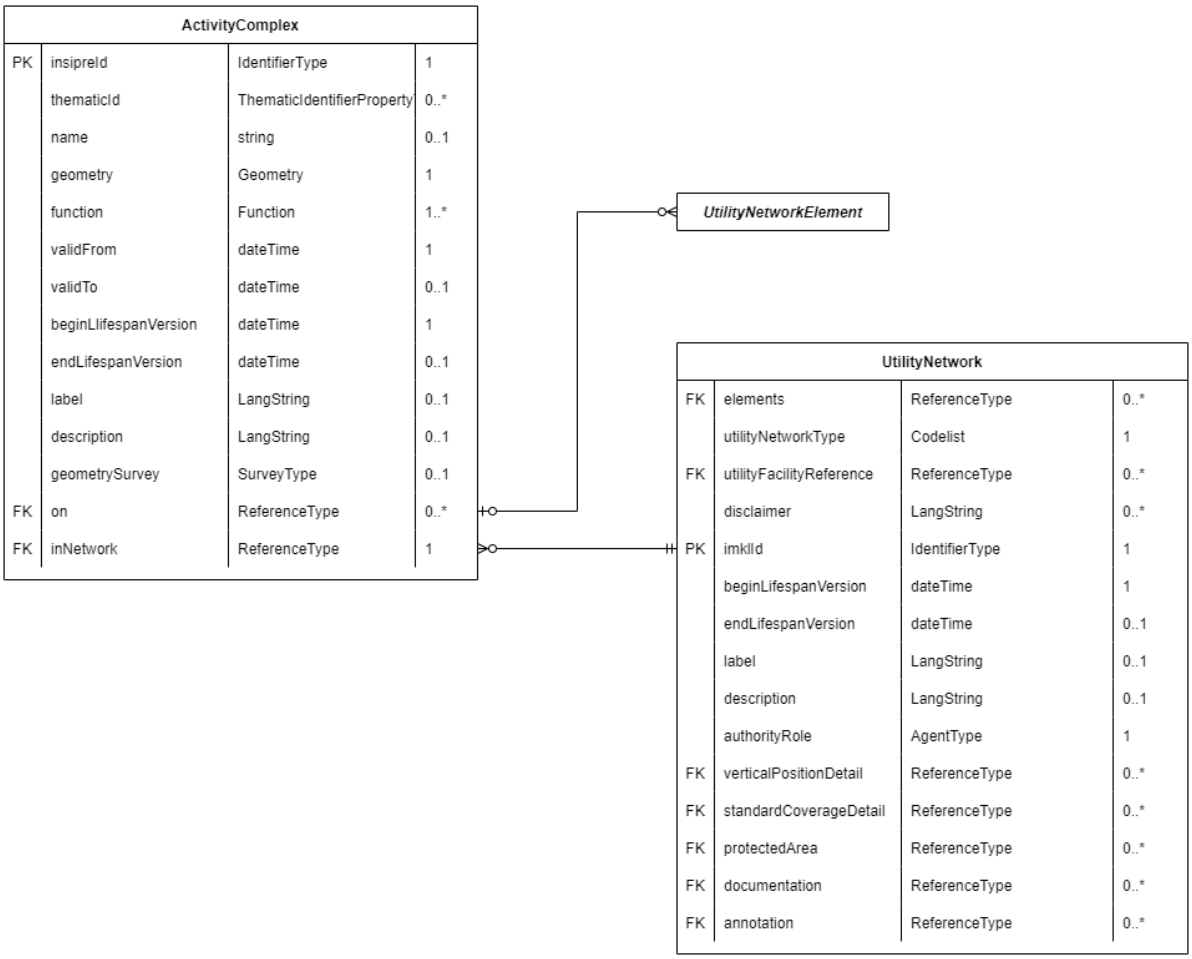
IMKL 2.3	**IMKL 3**	**Description**
omschrijving	description	Renamed
taal	/	Removed
liggingNauwkeurigheid	locationSurvey	See the geometrySurvey section in the Appurtenance chapter.
isRisicovol	/	Removed See the section on isRisicovol.
isBovengrondsZichtbaar	visibility	See the visibility section in the Appurtenance chapter.
kleur	appearance	See the appearance section in the Appurtenance chapter.
materiaalType	materialType	Renamed
technischeSpecificaties	technicalSpecifications	Renamed
dekking	coverageDetail	See the coverageDetail section in the Cables chapter.
heeftExtraInformatie	documentation or annotation	See the documentation and annotation section in the Appurtenance chapter.
/	pipeDiameterAccuracy	See the cableDiameterAccuracy section in the Cables chapter. **Only applicable for Pipes.**
/	ductWidthAccuracy	Similar to pipeDiameterAccuracy. **Only applicable for Ducts.**
/	constructionTechnique	See the constructionTechnique section in the Cables chapter.
subThema	subtheme	Renamed
temperatuur	temperature	Renamed. **Only applicable for ThermalPipe.**

17 Entity-Relationship Diagrams

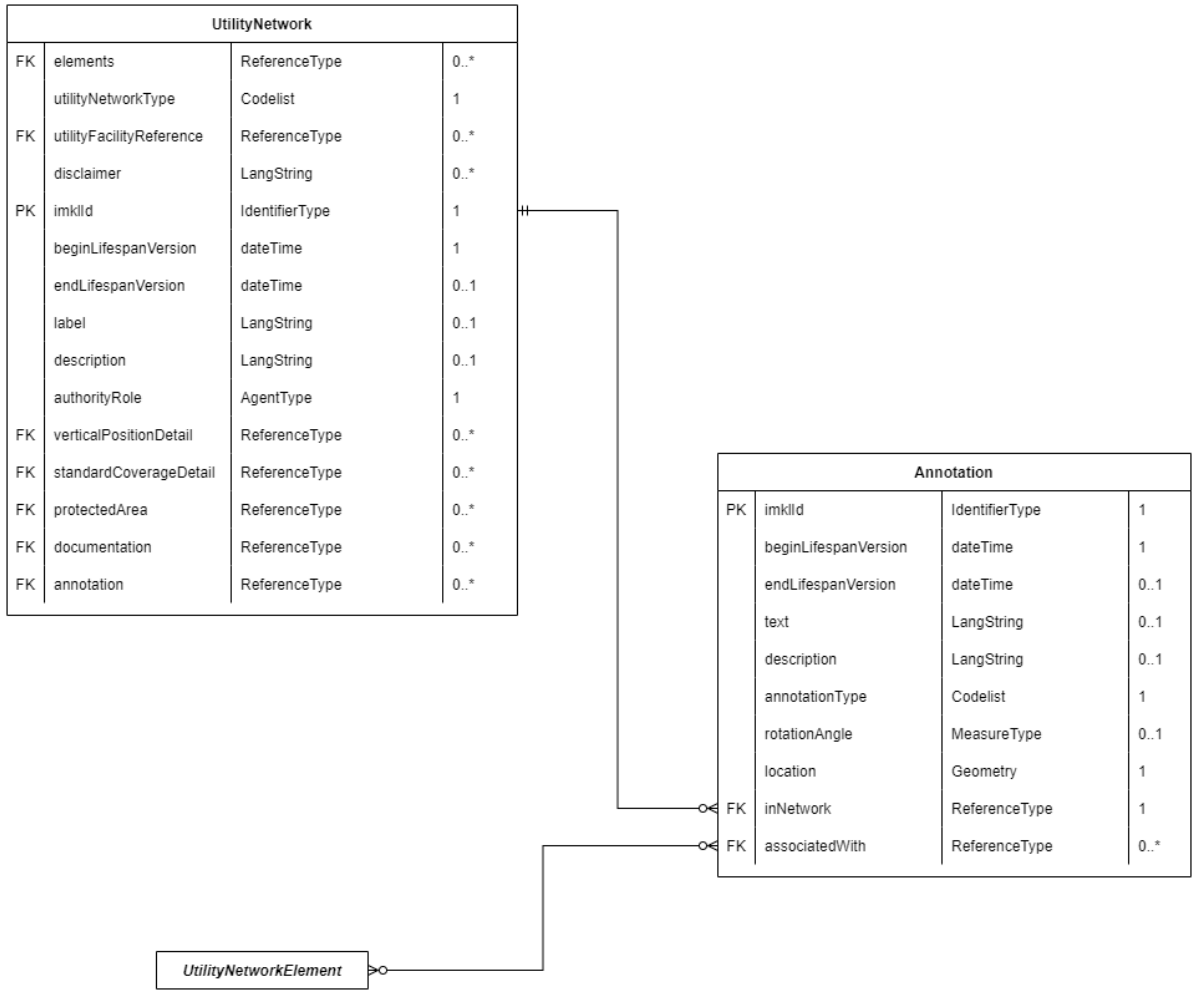
17.1 Overview

This chapter presents the Entity-Relationship Diagrams (ERDs) for the IMKL 3 specification. To enhance readability, the diagrams are divided into multiple diagrams, each concentrating on a specific object. Each diagram includes only the objects and relationships relevant to the object in focus. The order of the attributes in the diagrams represents the sequence in which the elements should appear in the XML.

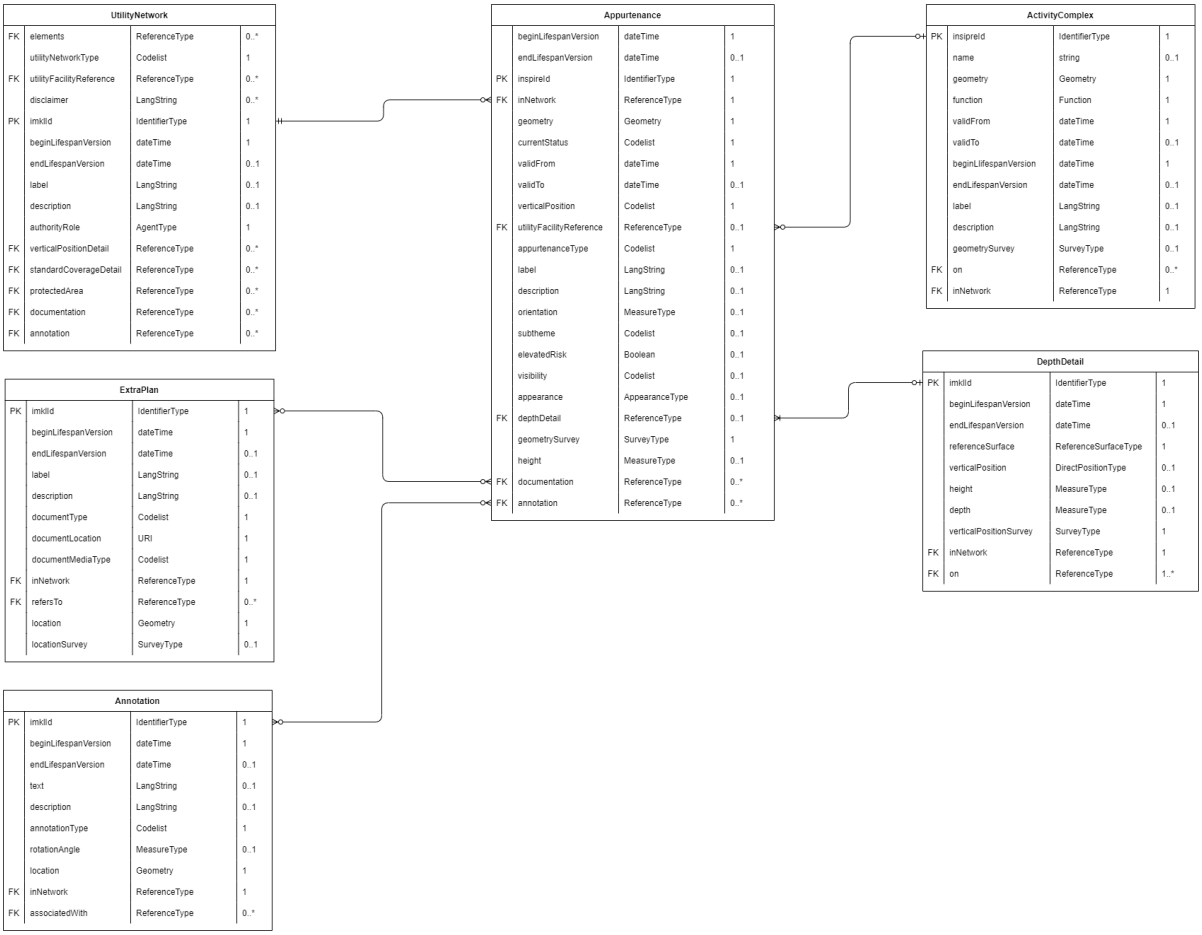
17.2 ActivityComplex



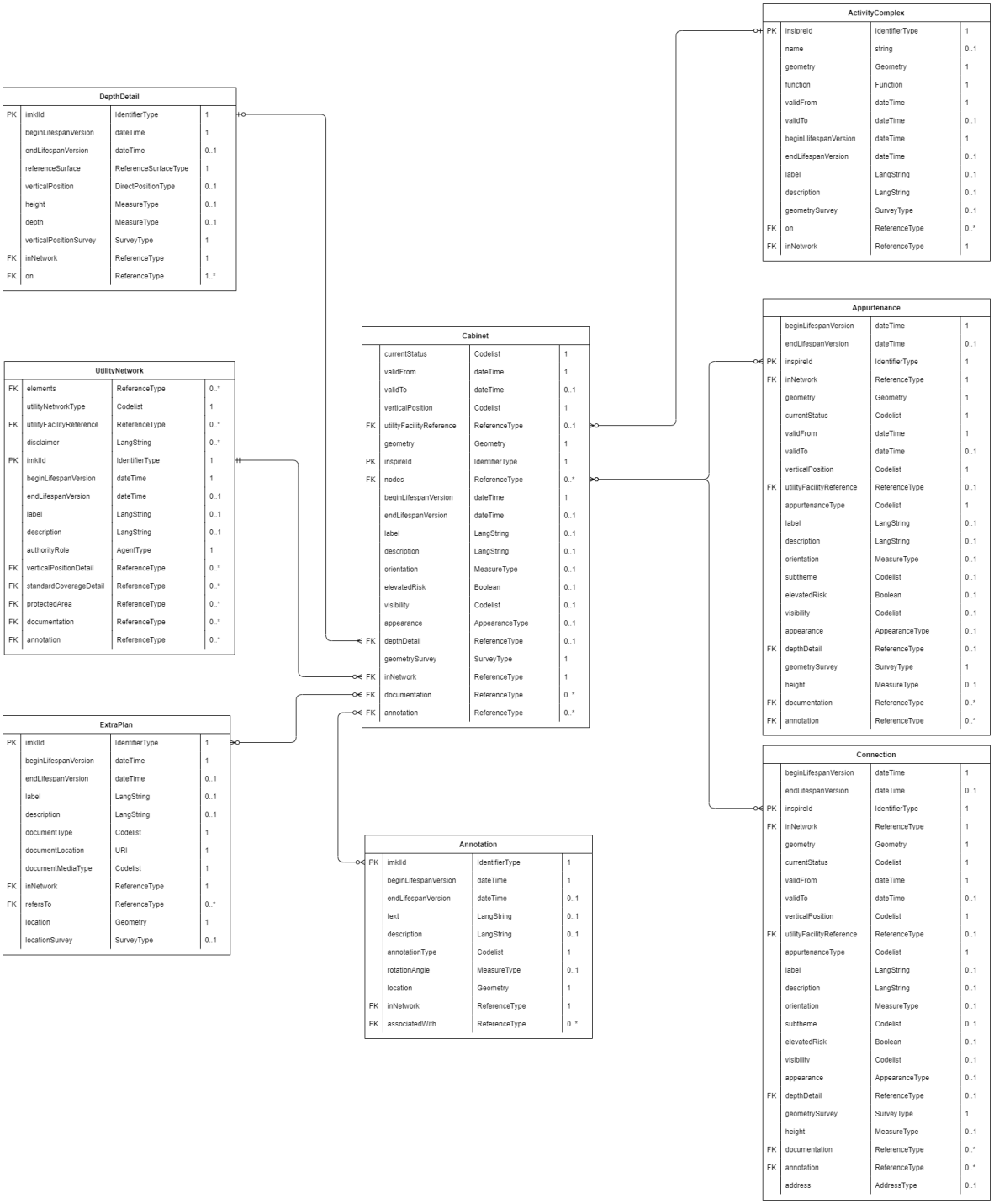
17.3 Annotation



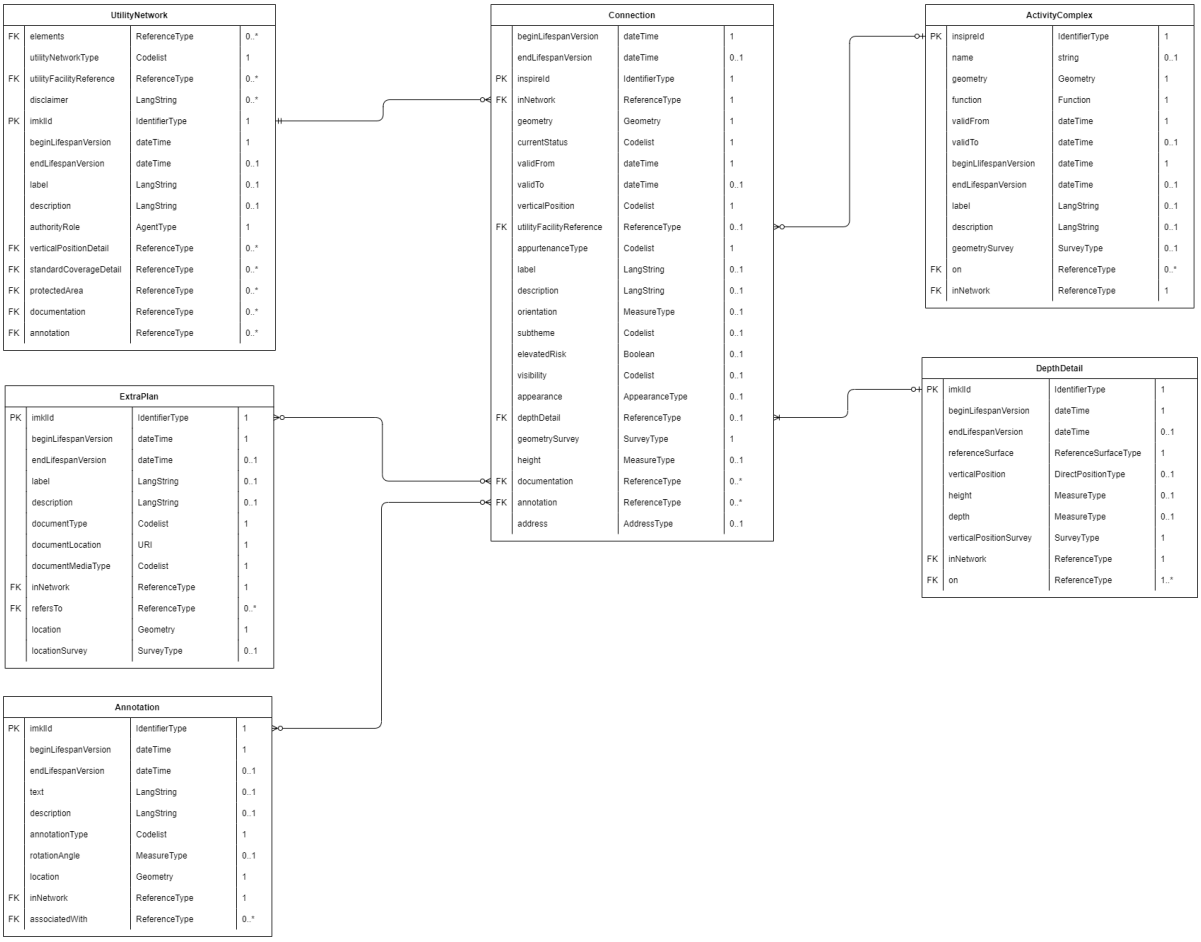
17.4 Appurtenance



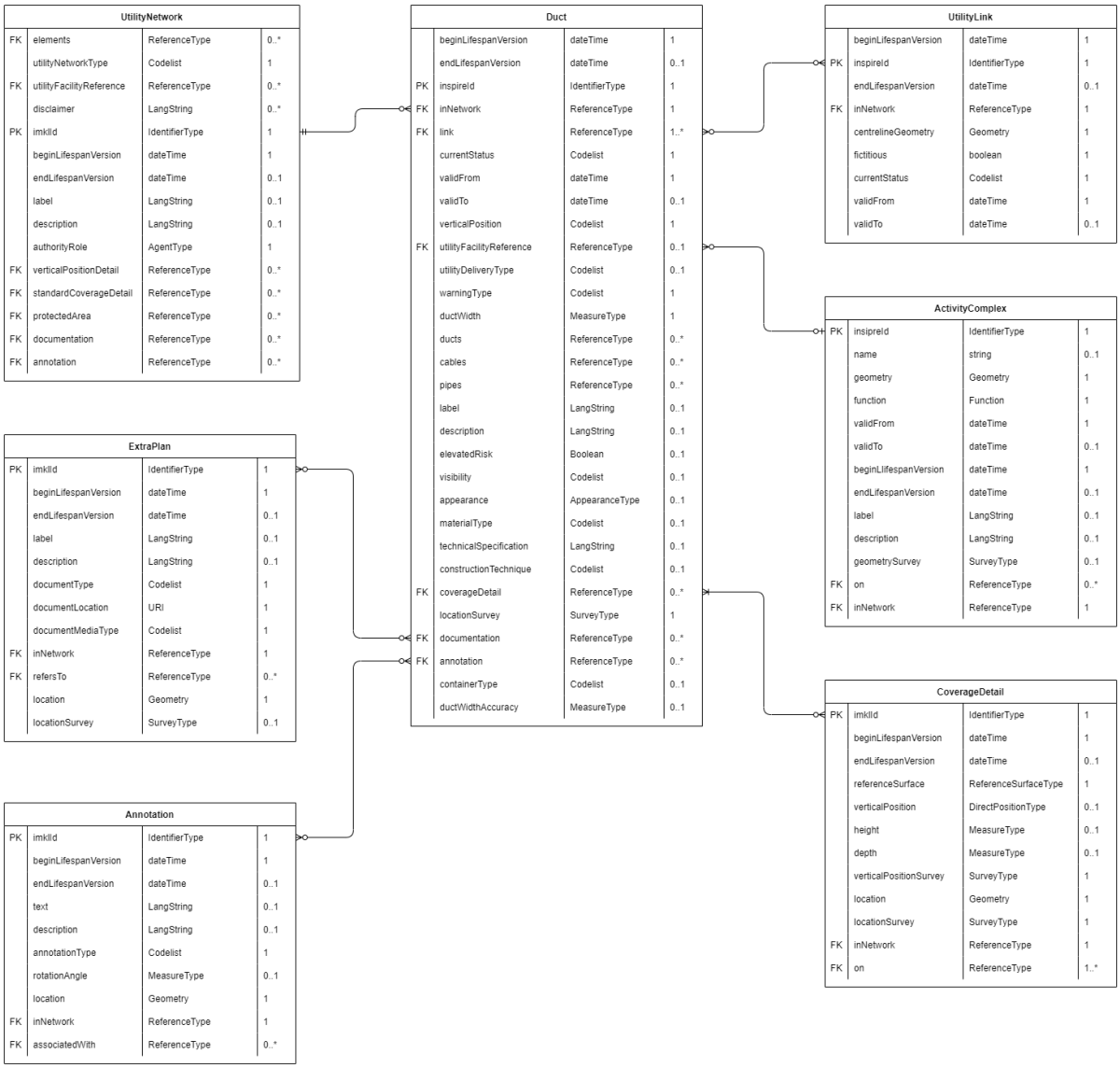
17.5 Cabinet


DepthDetail
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
referenceSurface ReferenceSurfaceType 1
verticalPosition DirectPositionType 0..1
height MeasureType 0..1
depth MeasureType 0..1
verticalPositionSurvey SurveyType 1
FK inNetwork ReferenceType 1
FK on ReferenceType 1..*
UtilityNetwork
FK elements ReferenceType 0..*
utilityNetworkType Codelist 1
FK utilityFacilityReference ReferenceType 0..*
disclaimer LangString 0..*
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
authorityRole AgentType 1
FK verticalPositionDetail ReferenceType 0..*
FK standardCoverageDetail ReferenceType 0..*
FK protectedArea ReferenceType 0..*
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
ExtraPlan
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
documentType Codelist 1
documentLocation URI 1
documentMediaType Codelist 1
FK inNetwork ReferenceType 1
FK refersTo ReferenceType 0..*
location Geometry 1
locationSurvey SurveyType 0..1
Cabinet
currentStatus Codelist 1
validFrom dateTime 1
validTo dateTime 0..1
verticalPosition Codelist 1
FK utilityFacilityReference ReferenceType 0..1
geometry Geometry 1
PK inspireId IdentifierType 1
FK nodes ReferenceType 0..*
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
orientation MeasureType 0..1
elevatedRisk Boolean 0..1
visibility Codelist 0..1
appearance AppearanceType 0..1
FK depthDetail ReferenceType 0..1
geometrySurvey SurveyType 1
FK inNetwork ReferenceType 1
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
Annotation
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
text LangString 0..1
description LangString 0..1
annotationType Codelist 1
rotationAngle MeasureType 0..1
location Geometry 1
FK inNetwork ReferenceType 1
FK associatedWith ReferenceType 0..*
ActivityComplex
PK inspireId IdentifierType 1
name string 0..1
geometry Geometry 1
function Function 1
validFrom dateTime 1
validTo dateTime 0..1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
geometrySurvey SurveyType 0..1
FK on ReferenceType 0..*
FK inNetwork ReferenceType 1
Appurtenance
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
PK inspireId IdentifierType 1
FK inNetwork ReferenceType 1
geometry Geometry 1
currentStatus Codelist 1
validFrom dateTime 1
validTo dateTime 0..1
verticalPosition Codelist 1
FK utilityFacilityReference ReferenceType 0..1
appurtenanceType Codelist 1
label LangString 0..1
description LangString 0..1
orientation MeasureType 0..1
subtheme Codelist 0..1
elevatedRisk Boolean 0..1
visibility Codelist 0..1
appearance AppearanceType 0..1
FK depthDetail ReferenceType 0..1
geometrySurvey SurveyType 1
height MeasureType 0..1
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
Connection
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
PK inspireId IdentifierType 1
FK inNetwork ReferenceType 1
geometry Geometry 1
currentStatus Codelist 1
validFrom dateTime 1
validTo dateTime 0..1
verticalPosition Codelist 1
FK utilityFacilityReference ReferenceType 0..1
appurtenanceType Codelist 1
label LangString 0..1
description LangString 0..1
orientation MeasureType 0..1
subtheme Codelist 0..1
elevatedRisk Boolean 0..1
visibility Codelist 0..1
appearance AppearanceType 0..1
FK depthDetail ReferenceType 0..1
geometrySurvey SurveyType 1
height MeasureType 0..1
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
address AddressType 0..1

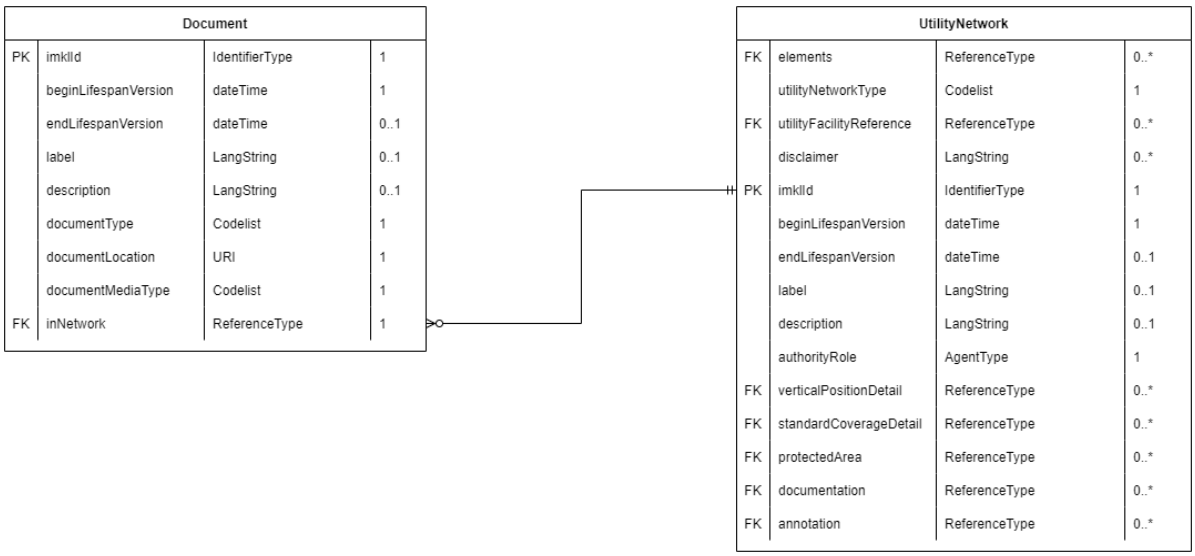
17.6 Connection



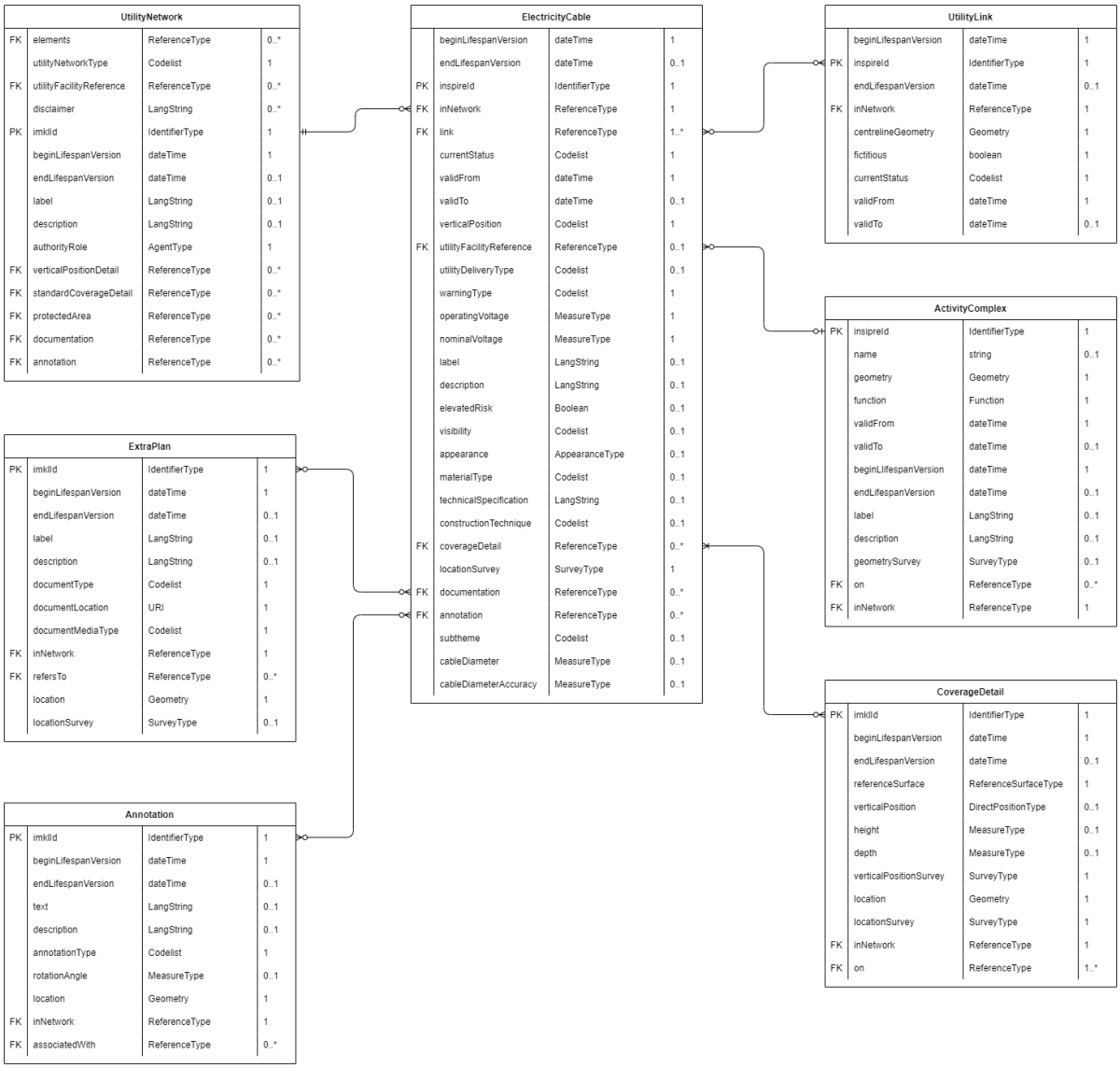
17.7 Duct


UtilityNetwork
FK elements ReferenceType 0..*
utilityNetworkType Codelist 1
FK utilityFacilityReference ReferenceType 0..*
disclaimer LangString 0..*
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
authorityRole AgentType 1
FK verticalPositionDetail ReferenceType 0..*
FK standardCoverageDetail ReferenceType 0..*
FK protectedArea ReferenceType 0..*
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
Duct
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
PK inspireId IdentifierType 1
FK inNetwork ReferenceType 1
FK link ReferenceType 1..*
currentStatus Codelist 1
validFrom dateTime 1
validTo dateTime 0..1
verticalPosition Codelist 1
FK utilityFacilityReference ReferenceType 0..1
utilityDeliveryType Codelist 0..1
warningType Codelist 1
ductWidth MeasureType 1
ducts ReferenceType 0..*
cables ReferenceType 0..*
pipes ReferenceType 0..*
label LangString 0..1
description LangString 0..1
elevatedRisk Boolean 0..1
visibility Codelist 0..1
appearance AppearanceType 0..1
materialType Codelist 0..1
technicalSpecification LangString 0..1
constructionTechnique Codelist 0..1
FK coverageDetail ReferenceType 0..*
locationSurvey SurveyType 1
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
containerType Codelist 0..1
ductWidthAccuracy MeasureType 0..1
UtilityLink
beginLifespanVersion dateTime 1
PK inspireId IdentifierType 1
endLifespanVersion dateTime 0..1
FK inNetwork ReferenceType 1
centrelineGeometry Geometry 1
fictitious boolean 1
currentStatus Codelist 1
validFrom dateTime 1
validTo dateTime 0..1
ActivityComplex
PK inspireId IdentifierType 1
name string 0..1
geometry Geometry 1
function Function 1
validFrom dateTime 1
validTo dateTime 0..1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
geometrySurvey SurveyType 0..1
FK on ReferenceType 0..*
FK inNetwork ReferenceType 1
ExtraPlan
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
documentType Codelist 1
documentLocation URI 1
documentMediaType Codelist 1
FK inNetwork ReferenceType 1
FK refersTo ReferenceType 0..*
location Geometry 1
locationSurvey SurveyType 0..1
CoverageDetail
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
referenceSurface ReferenceSurfaceType 1
verticalPosition DirectPositionType 0..1
height MeasureType 0..1
depth MeasureType 0..1
verticalPositionSurvey SurveyType 1
location Geometry 1
locationSurvey SurveyType 1
FK inNetwork ReferenceType 1
FK on ReferenceType 1..*
Annotation
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
text LangString 0..1
description LangString 0..1
annotationType Codelist 1
rotationAngle MeasureType 0..1
location Geometry 1
FK inNetwork ReferenceType 1
FK associatedWith ReferenceType 0..*

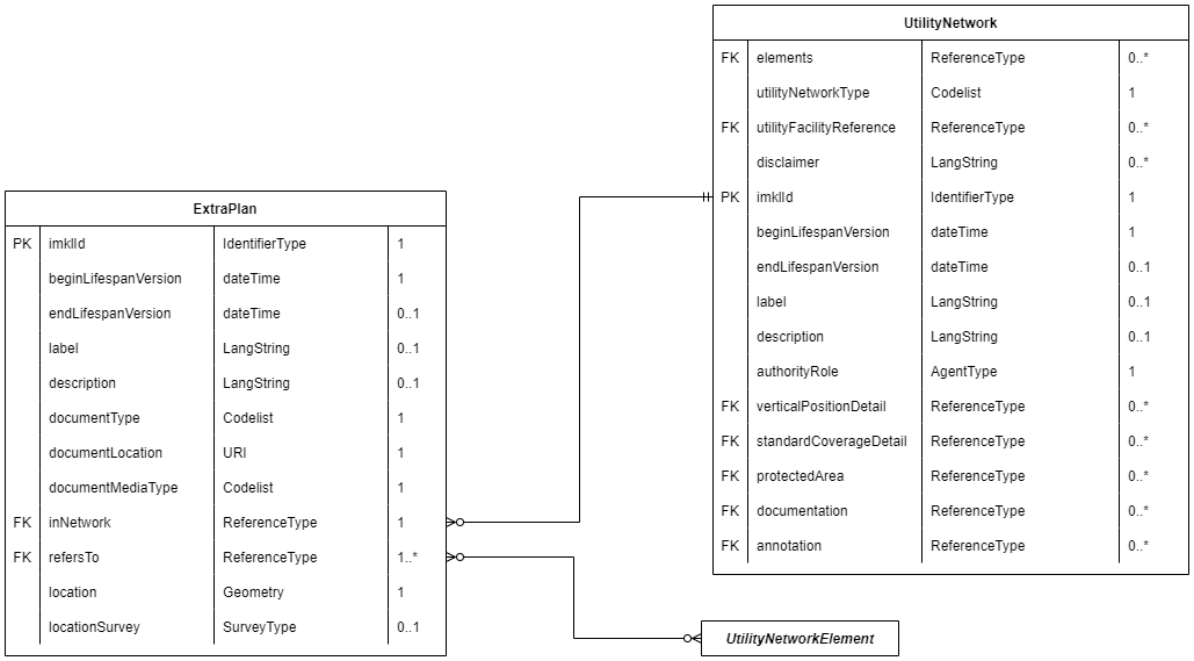
17.8 Document



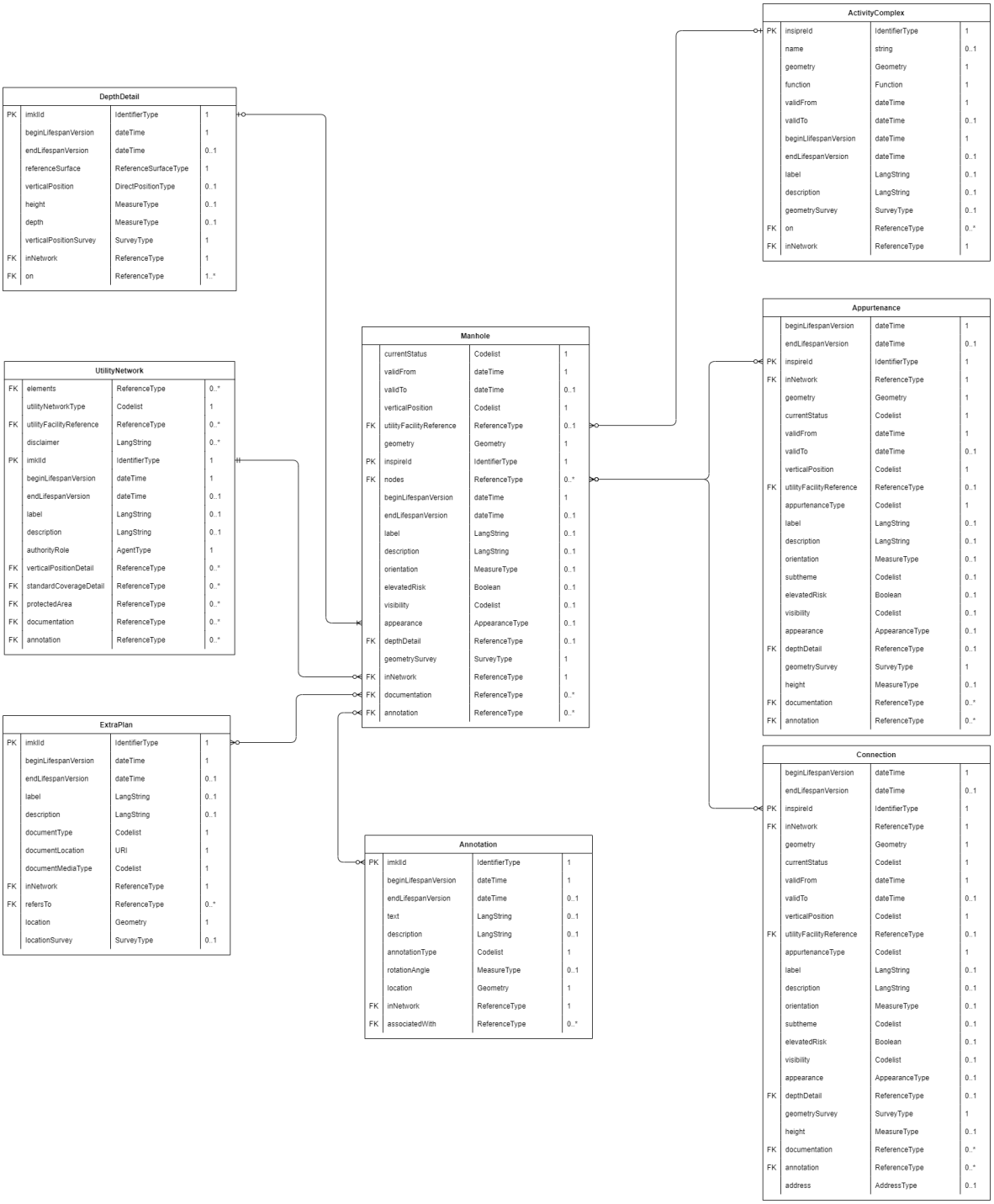
17.9 ElectricityCable



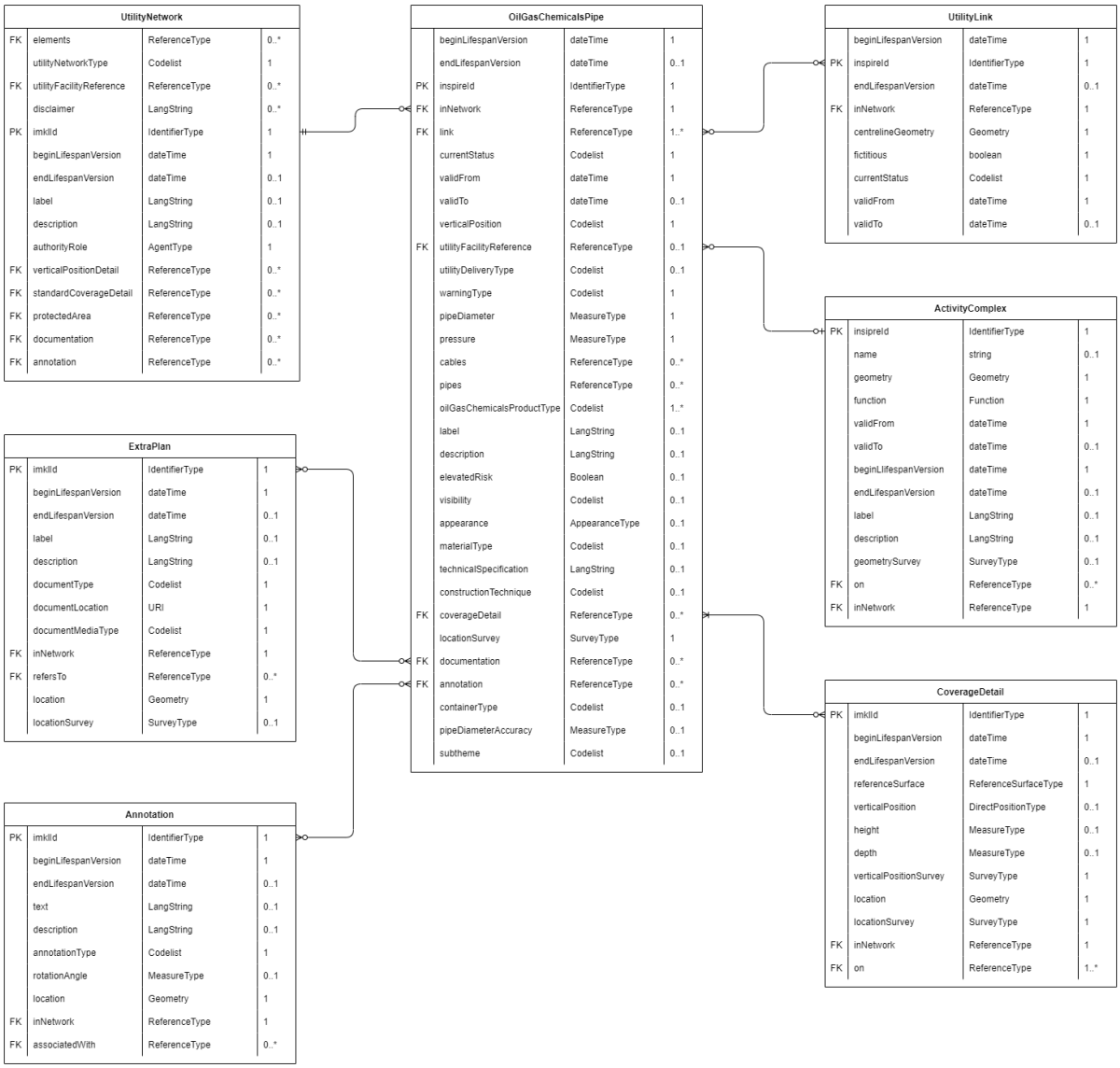
17.10 ExtraPlan



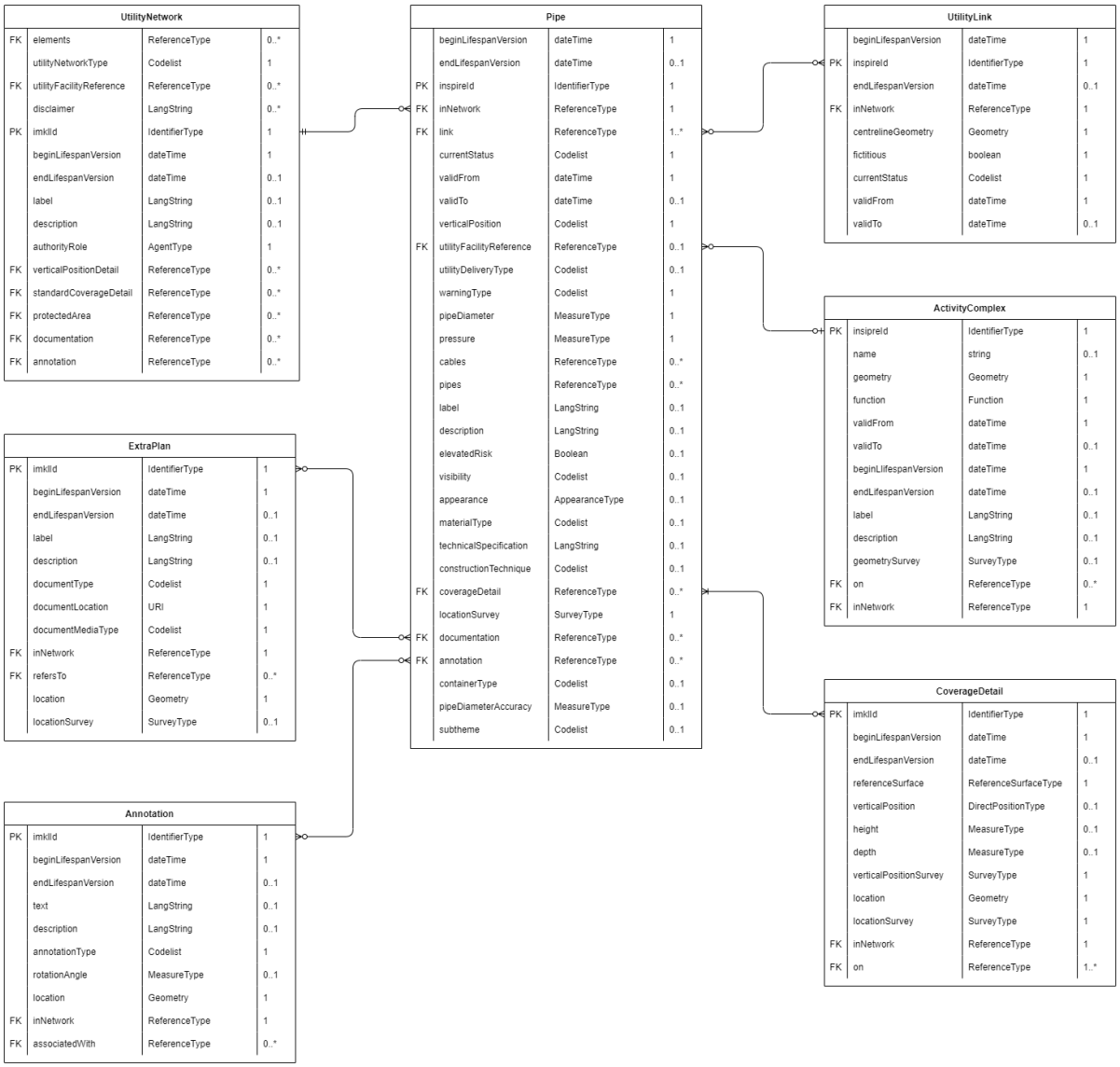
17.11 Manhole



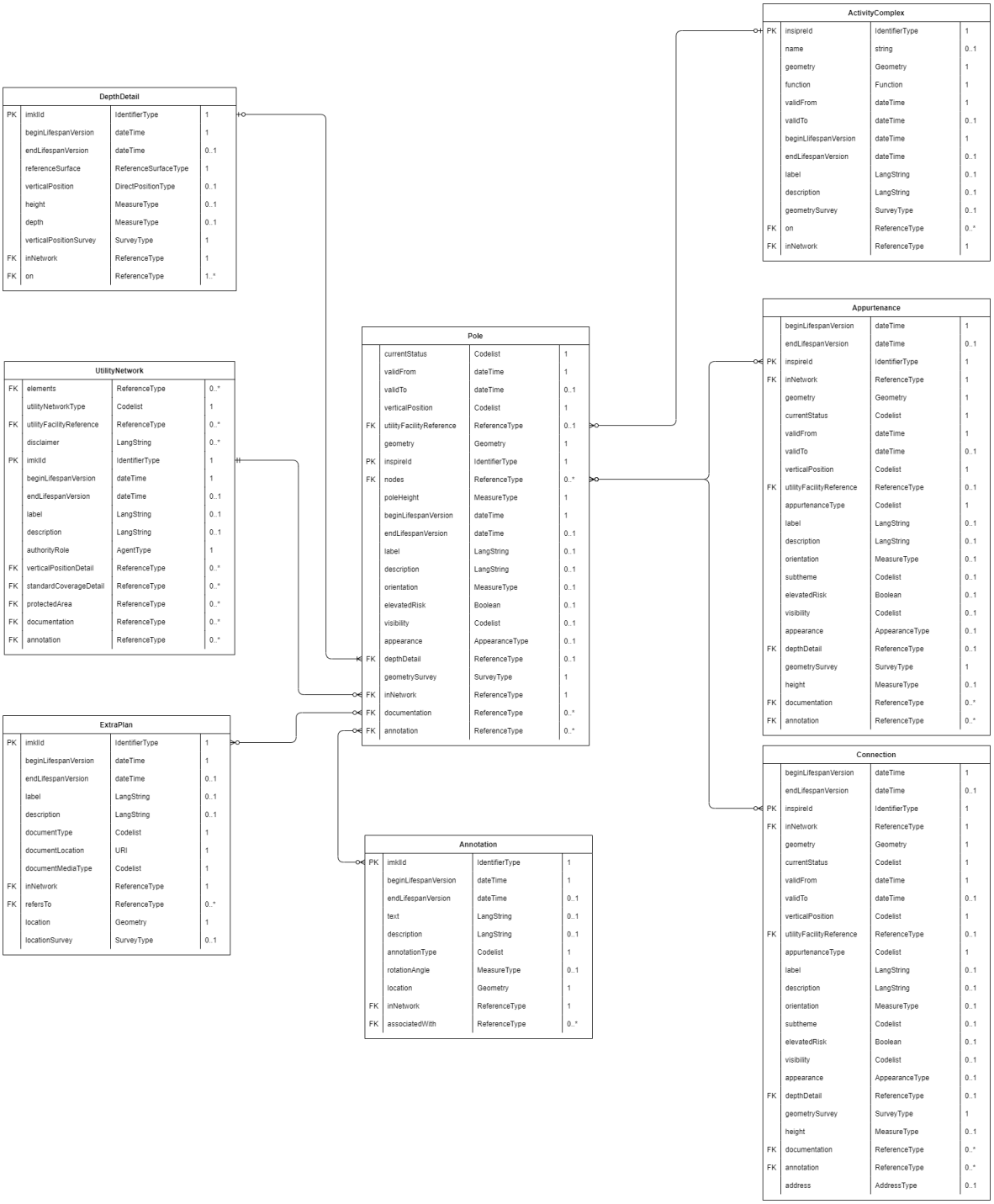
17.12 OilGasChemicalsPipe



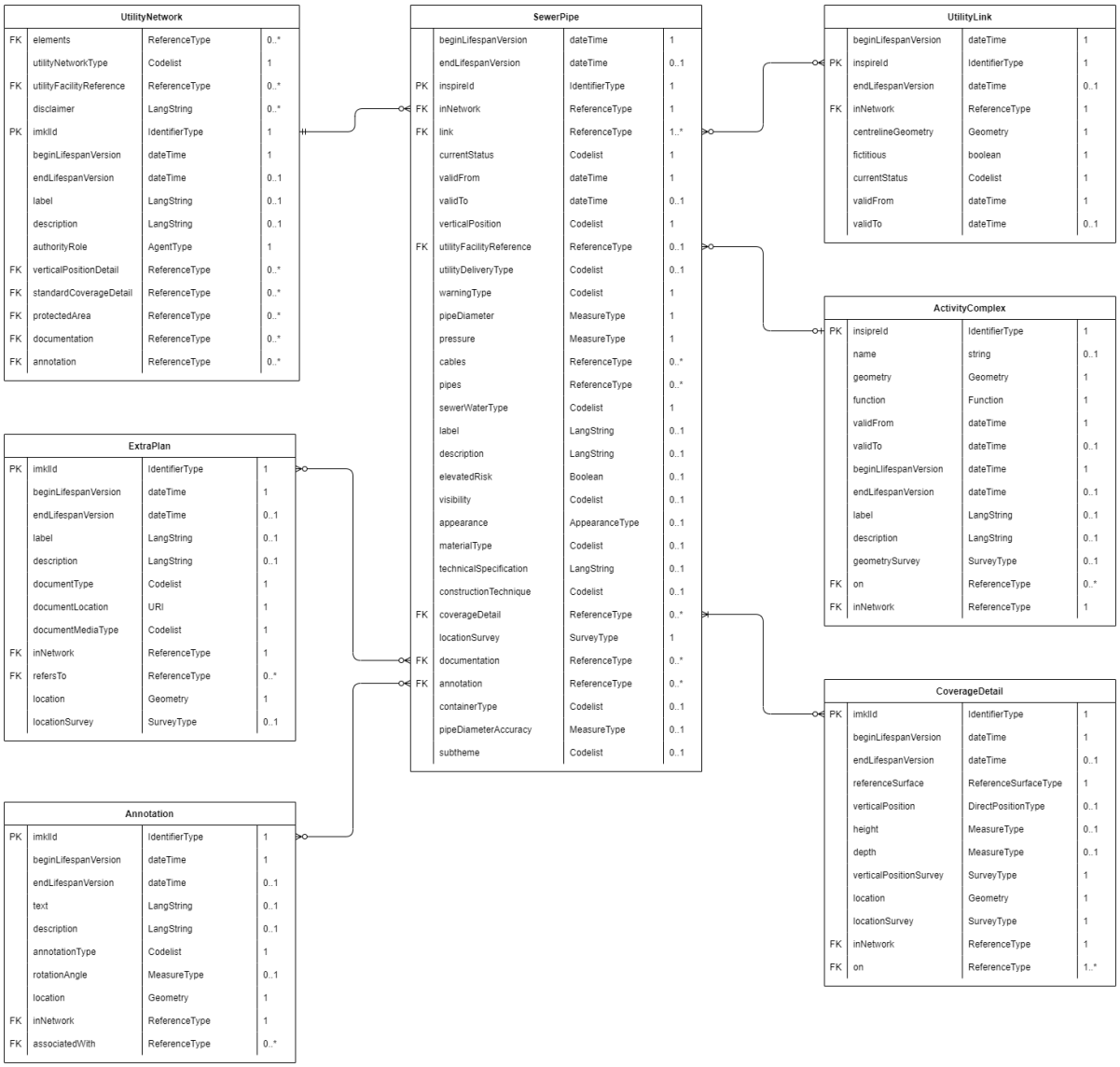
17.13 Pipe


UtilityNetwork
FK elements ReferenceType 0..*
utilityNetworkType Codelist 1
FK utilityFacilityReference ReferenceType 0..*
disclaimer LangString 0..*
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
authorityRole AgentType 1
FK verticalPositionDetail ReferenceType 0..*
FK standardCoverageDetail ReferenceType 0..*
FK protectedArea ReferenceType 0..*
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
Pipe
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
PK inspireId IdentifierType 1
FK inNetwork ReferenceType 1
FK link ReferenceType 1..*
currentStatus Codelist 1
validFrom dateTime 1
validTo dateTime 0..1
verticalPosition Codelist 1
FK utilityFacilityReference ReferenceType 0..1
utilityDeliveryType Codelist 0..1
warningType Codelist 1
pipeDiameter MeasureType 1
pressure MeasureType 1
cables ReferenceType 0..*
pipes ReferenceType 0..*
label LangString 0..1
description LangString 0..1
elevatedRisk Boolean 0..1
visibility Codelist 0..1
appearance AppearanceType 0..1
materialType Codelist 0..1
technicalSpecification LangString 0..1
constructionTechnique Codelist 0..1
FK coverageDetail ReferenceType 0..*
locationSurvey SurveyType 1
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
containerType Codelist 0..1
pipeDiameterAccuracy MeasureType 0..1
subtheme Codelist 0..1
UtilityLink
beginLifespanVersion dateTime 1
PK inspireId IdentifierType 1
endLifespanVersion dateTime 0..1
FK inNetwork ReferenceType 1
centrelineGeometry Geometry 1
fictitious boolean 1
currentStatus Codelist 1
validFrom dateTime 1
validTo dateTime 0..1
ActivityComplex
PK inspireId IdentifierType 1
name string 0..1
geometry Geometry 1
function Function 1
validFrom dateTime 1
validTo dateTime 0..1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
geometrySurvey SurveyType 0..1
FK on ReferenceType 0..*
FK inNetwork ReferenceType 1
ExtraPlan
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
documentType Codelist 1
documentLocation URI 1
documentMediaType Codelist 1
FK inNetwork ReferenceType 1
FK refersTo ReferenceType 0..*
location Geometry 1
locationSurvey SurveyType 0..1
CoverageDetail
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
referenceSurface ReferenceSurfaceType 1
verticalPosition DirectPositionType 0..1
height MeasureType 0..1
depth MeasureType 0..1
verticalPositionSurvey SurveyType 1
location Geometry 1
locationSurvey SurveyType 1
FK inNetwork ReferenceType 1
FK on ReferenceType 1..*
Annotation
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
text LangString 0..1
description LangString 0..1
annotationType Codelist 1
rotationAngle MeasureType 0..1
location Geometry 1
FK inNetwork ReferenceType 1
FK associatedWith ReferenceType 0..*

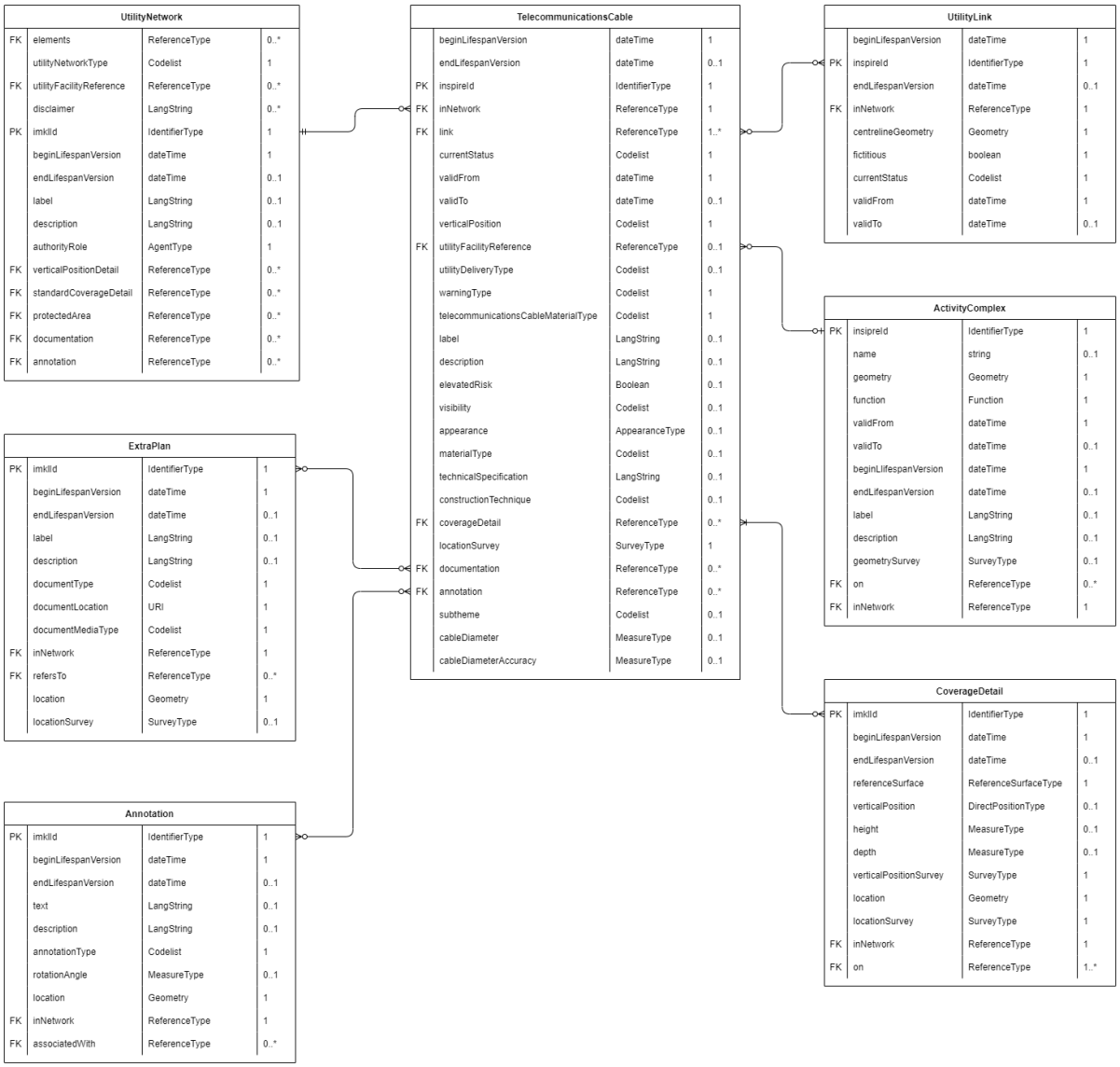
17.14 Pole


DepthDetail
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
referenceSurface ReferenceSurfaceType 1
verticalPosition DirectPositionType 0..1
height MeasureType 0..1
depth MeasureType 0..1
verticalPositionSurvey SurveyType 1
FK inNetwork ReferenceType 1
FK on ReferenceType 1..*
UtilityNetwork
FK elements ReferenceType 0..*
utilityNetworkType Codelist 1
FK utilityFacilityReference ReferenceType 0..*
disclaimer LangString 0..*
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
authorityRole AgentType 1
FK verticalPositionDetail ReferenceType 0..*
FK standardCoverageDetail ReferenceType 0..*
FK protectedArea ReferenceType 0..*
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
ExtraPlan
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
documentType Codelist 1
documentLocation URI 1
documentMediaType Codelist 1
FK inNetwork ReferenceType 1
FK refersTo ReferenceType 0..*
location Geometry 1
locationSurvey SurveyType 0..1
Pole
currentStatus Codelist 1
validFrom dateTime 1
validTo dateTime 0..1
verticalPosition Codelist 1
FK utilityFacilityReference ReferenceType 0..1
geometry Geometry 1
PK inspireId IdentifierType 1
FK nodes ReferenceType 0..*
poleHeight MeasureType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
orientation MeasureType 0..1
elevatedRisk Boolean 0..1
visibility Codelist 0..1
appearance AppearanceType 0..1
FK depthDetail ReferenceType 0..1
geometrySurvey SurveyType 1
FK inNetwork ReferenceType 1
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
Annotation
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
text LangString 0..1
description LangString 0..1
annotationType Codelist 1
rotationAngle MeasureType 0..1
location Geometry 1
FK inNetwork ReferenceType 1
FK associatedWith ReferenceType 0..*
ActivityComplex
PK inspireId IdentifierType 1
name string 0..1
geometry Geometry 1
function Function 1
validFrom dateTime 1
validTo dateTime 0..1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
geometrySurvey SurveyType 0..1
FK on ReferenceType 0..*
FK inNetwork ReferenceType 1
Appurtenance
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
PK inspireId IdentifierType 1
FK inNetwork ReferenceType 1
geometry Geometry 1
currentStatus Codelist 1
validFrom dateTime 1
validTo dateTime 0..1
verticalPosition Codelist 1
FK utilityFacilityReference ReferenceType 0..1
appurtenanceType Codelist 1
label LangString 0..1
description LangString 0..1
orientation MeasureType 0..1
subtheme Codelist 0..1
elevatedRisk Boolean 0..1
visibility Codelist 0..1
appearance AppearanceType 0..1
FK depthDetail ReferenceType 0..1
geometrySurvey SurveyType 1
height MeasureType 0..1
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
Connection
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
PK inspireId IdentifierType 1
FK inNetwork ReferenceType 1
geometry Geometry 1
currentStatus Codelist 1
validFrom dateTime 1
validTo dateTime 0..1
verticalPosition Codelist 1
FK utilityFacilityReference ReferenceType 0..1
appurtenanceType Codelist 1
label LangString 0..1
description LangString 0..1
orientation MeasureType 0..1
subtheme Codelist 0..1
elevatedRisk Boolean 0..1
visibility Codelist 0..1
appearance AppearanceType 0..1
FK depthDetail ReferenceType 0..1
geometrySurvey SurveyType 1
height MeasureType 0..1
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
address AddressType 0..1

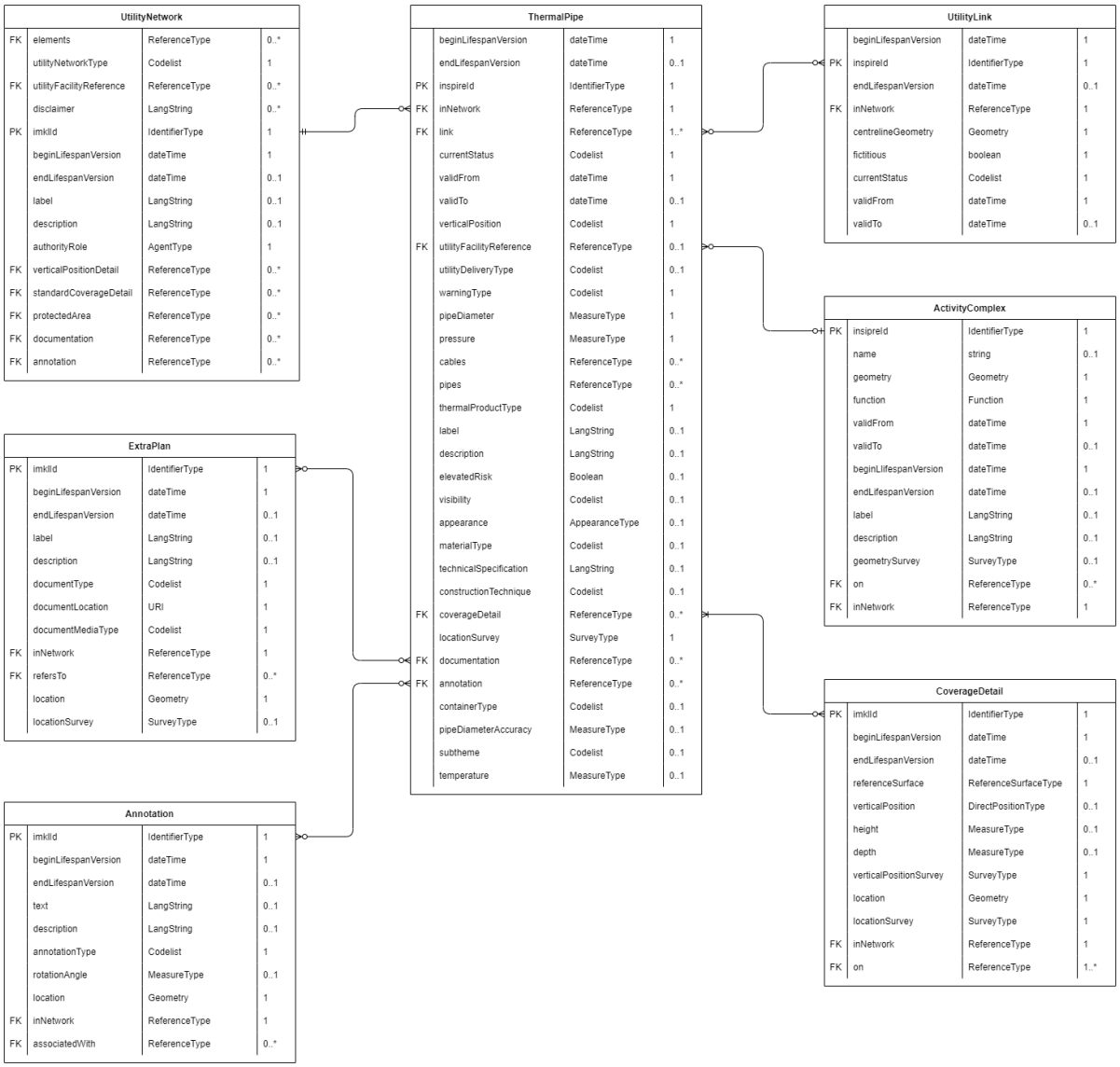
17.15 SewerPipe



17.16 TelecommunicationsCable



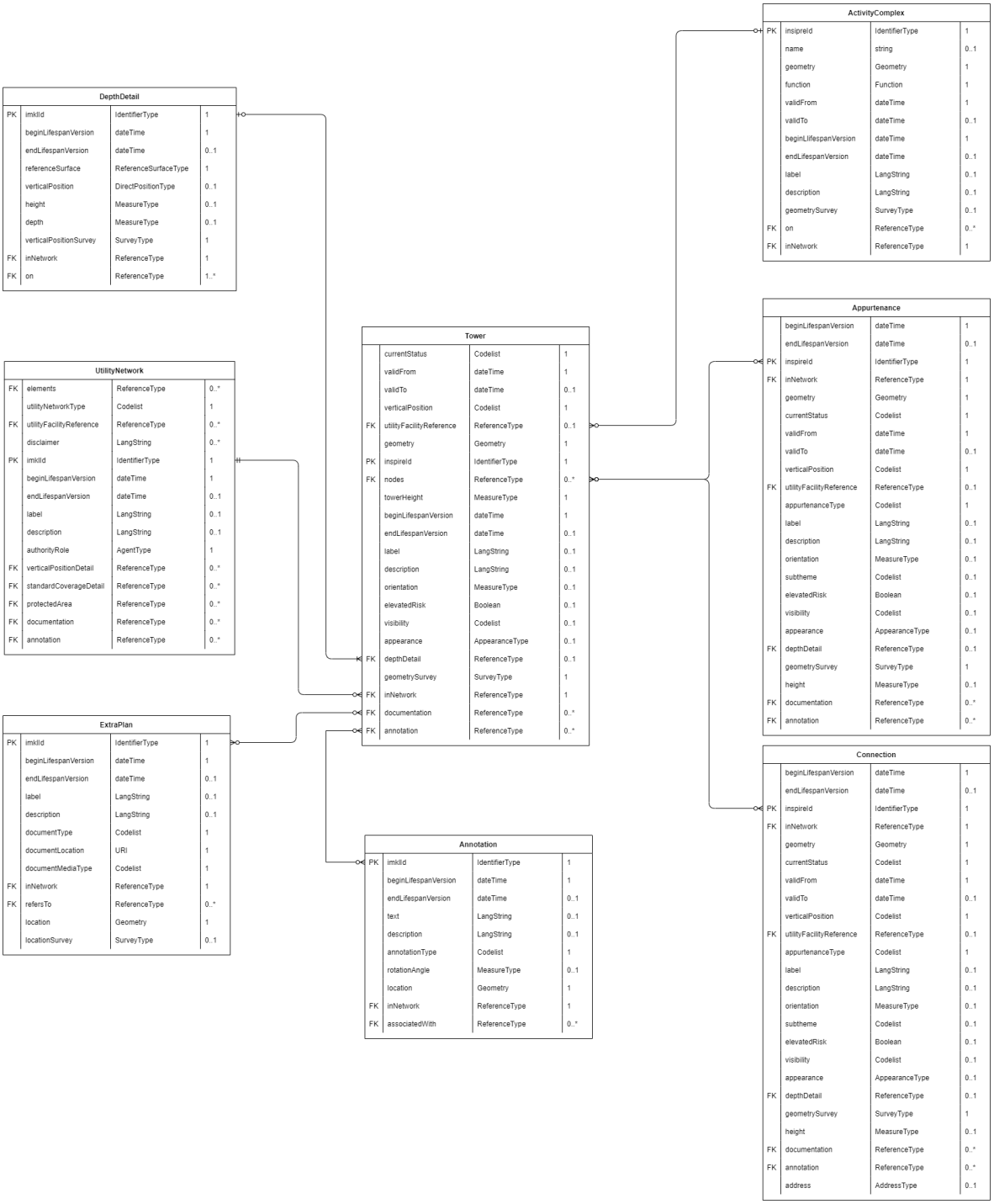
17.17 ThermalPipe



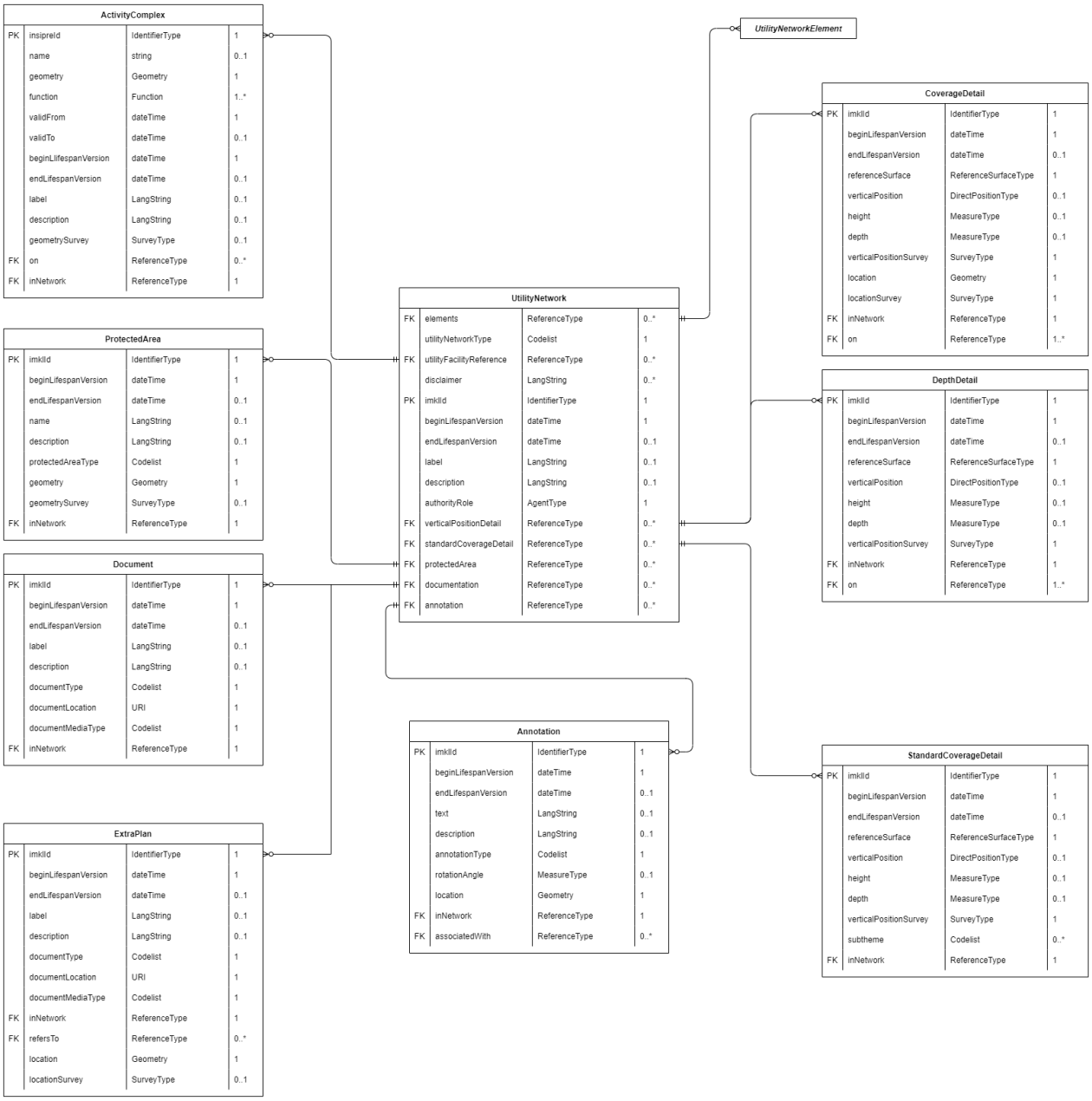
17.18 TopographicalElement

TopographicalElement			
PK	imklId	IdentifierType	1
	beginLifespanVersion	dateTime	1
	endLifespanVersion	dateTime	0..1
	label	LangString	0..1
	description	LangString	0..1
	location	Geometry	1
	locationSurvey	SurveyType	0..1

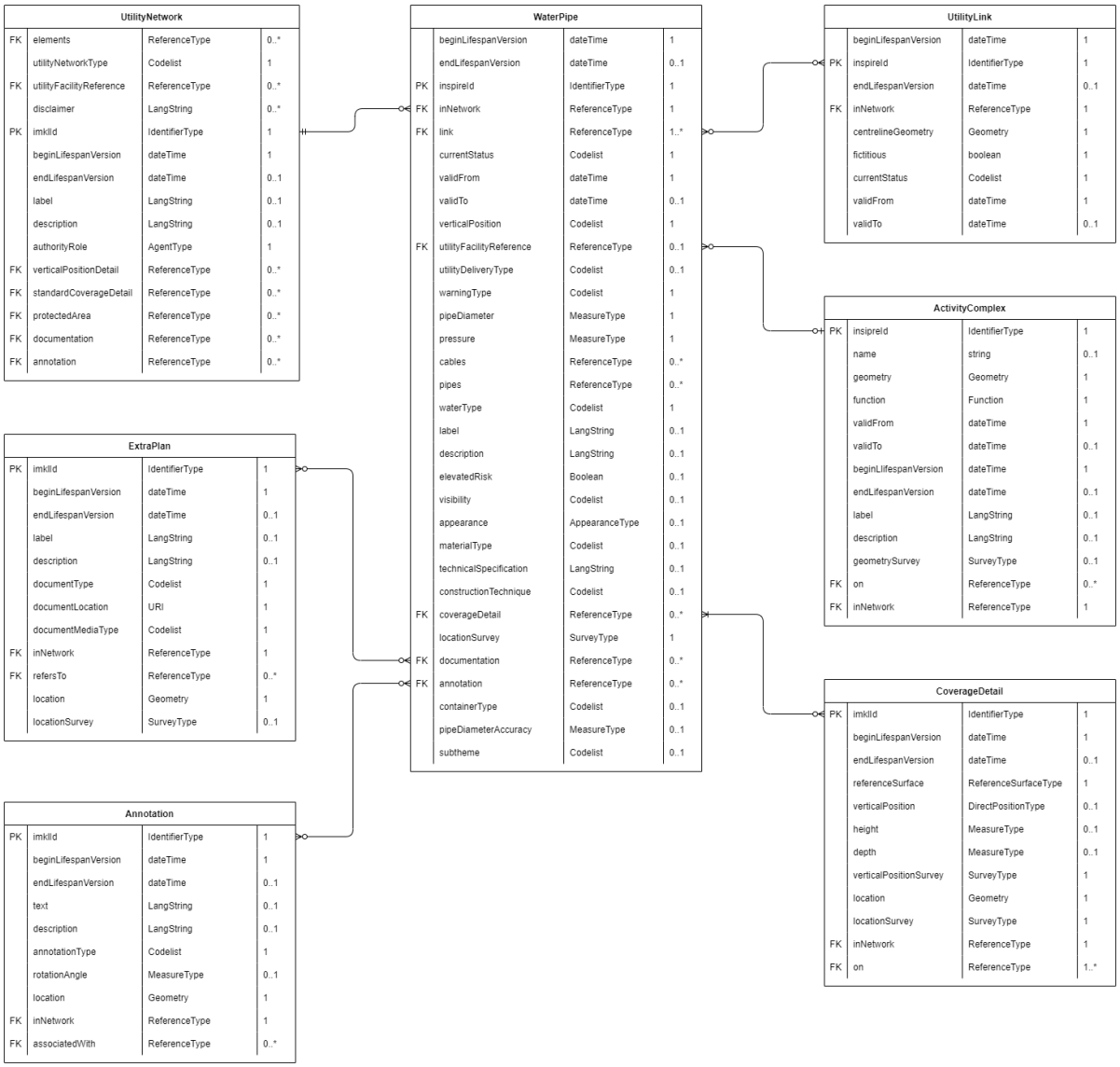
17.19 Tower


DepthDetail
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
referenceSurface ReferenceSurfaceType 1
verticalPosition DirectPositionType 0..1
height MeasureType 0..1
depth MeasureType 0..1
verticalPositionSurvey SurveyType 1
FK inNetwork ReferenceType 1
FK on ReferenceType 1..*
UtilityNetwork
FK elements ReferenceType 0..*
utilityNetworkType Codelist 1
FK utilityFacilityReference ReferenceType 0..*
disclaimer LangString 0..*
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
authorityRole AgentType 1
FK verticalPositionDetail ReferenceType 0..*
FK standardCoverageDetail ReferenceType 0..*
FK protectedArea ReferenceType 0..*
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
ExtraPlan
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
documentType Codelist 1
documentLocation URI 1
documentMediaType Codelist 1
FK inNetwork ReferenceType 1
FK refersTo ReferenceType 0..*
location Geometry 1
locationSurvey SurveyType 0..1
Tower
currentStatus Codelist 1
validFrom dateTime 1
validTo dateTime 0..1
verticalPosition Codelist 1
FK utilityFacilityReference ReferenceType 0..1
geometry Geometry 1
PK inspireId IdentifierType 1
FK nodes ReferenceType 0..*
towerHeight MeasureType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
orientation MeasureType 0..1
elevatedRisk Boolean 0..1
visibility Codelist 0..1
appearance AppearanceType 0..1
FK depthDetail ReferenceType 0..1
geometrySurvey SurveyType 1
FK inNetwork ReferenceType 1
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
Annotation
PK imklId IdentifierType 1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
text LangString 0..1
description LangString 0..1
annotationType Codelist 1
rotationAngle MeasureType 0..1
location Geometry 1
FK inNetwork ReferenceType 1
FK associatedWith ReferenceType 0..*
ActivityComplex
PK inspireId IdentifierType 1
name string 0..1
geometry Geometry 1
function Function 1
validFrom dateTime 1
validTo dateTime 0..1
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
label LangString 0..1
description LangString 0..1
geometrySurvey SurveyType 0..1
FK on ReferenceType 0..*
FK inNetwork ReferenceType 1
Appurtenance
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
PK inspireId IdentifierType 1
FK inNetwork ReferenceType 1
geometry Geometry 1
currentStatus Codelist 1
validFrom dateTime 1
validTo dateTime 0..1
verticalPosition Codelist 1
FK utilityFacilityReference ReferenceType 0..1
appurtenanceType Codelist 1
label LangString 0..1
description LangString 0..1
orientation MeasureType 0..1
subtheme Codelist 0..1
elevatedRisk Boolean 0..1
visibility Codelist 0..1
appearance AppearanceType 0..1
FK depthDetail ReferenceType 0..1
geometrySurvey SurveyType 1
height MeasureType 0..1
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
Connection
beginLifespanVersion dateTime 1
endLifespanVersion dateTime 0..1
PK inspireId IdentifierType 1
FK inNetwork ReferenceType 1
geometry Geometry 1
currentStatus Codelist 1
validFrom dateTime 1
validTo dateTime 0..1
verticalPosition Codelist 1
FK utilityFacilityReference ReferenceType 0..1
appurtenanceType Codelist 1
label LangString 0..1
description LangString 0..1
orientation MeasureType 0..1
subtheme Codelist 0..1
elevatedRisk Boolean 0..1
visibility Codelist 0..1
appearance AppearanceType 0..1
FK depthDetail ReferenceType 0..1
geometrySurvey SurveyType 1
height MeasureType 0..1
FK documentation ReferenceType 0..*
FK annotation ReferenceType 0..*
address AddressType 0..1

17.20 UtilityNetwork



17.21 WaterPipe



17.22 Types

SurveyType			
	method	Codelist	1
	recordedBy	AgentType	0..1
	date	dateTime	0..1
	accuracy	MeasureType	1

AgentType			
	name	string	1
	phone	string	1
	email	string	1

AppearanceType			
	colour	LangString	1

IdentifierType			
	localId	string	1
	namespace	string	1
	versionId	string	0..1

ReferenceSurfaceType			
	type	Codelist	
	verticalPosition	DirectPositionType	
	verticalPositionSurvey	SurveyType	
	location	Geometry	
	locationSurvey	SurveyType	

AddressType			
	municipalityName	LangString	1
	streetName	LangString	1
	houseNumber	string	0..1
	postalCode	string	1