

IMKL 2.3 to IMKL 3 Migration Guide

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1 General changes

1.1 Introduction

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

1.2 IMKL namespace and dependencies

1.2.1 Schema imports

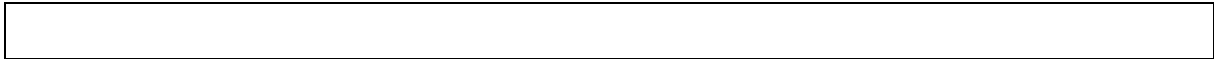
To be able to use the IMKL 3 XSD and other required XSDs, they must be defined in the XML that is generated to represent the UtilityNetwork. This can be done as demonstrated in the example below. Schemas that are not used can be removed from the import.

Compared to IMKL 2.3 this means that in IMKL 3:

- the namespace URI for the *imkl* namespace needs to be updated (section 1.2.2);
- 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 1.2.2).

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="http://TODO/imkl3"
  xmlns:gml="http://www.opengis.net/gml/3.2"
  xmlns:gmd="http://www.isotc211.org/2005/gmd">
```



1.2.2 IMKL 3 namespace

With the update from IMKL 2.3 to IMKL 3, the namespace for IMKL has changed. This affects how entities and codelist values are referenced. **The new namespace for IMKL 3 is yet to be defined. This document will be updated when the new namespace is known.**

1.2.3 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., <https://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., <https://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 <https://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="https://inspire.ec.europa.eu/codelist/ThermalProductTypeExtendedValue/heatingSteam" />
```

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.

1.3 Language

1.3.1 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.

1.3.2 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 entities 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>
```

1.4 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
- 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.

1.5 Order of elements

The XSD schema of IMKL 3 defines which elements can appear per entity 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 16). These resources provide detailed information on the sequence of elements required for each entity.



1.6 Geometry

1.6.1 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 1.6.2 and 1.6.3. 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).

1.6.2 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/"
```

1.6.3 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* entities.

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 4).

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.

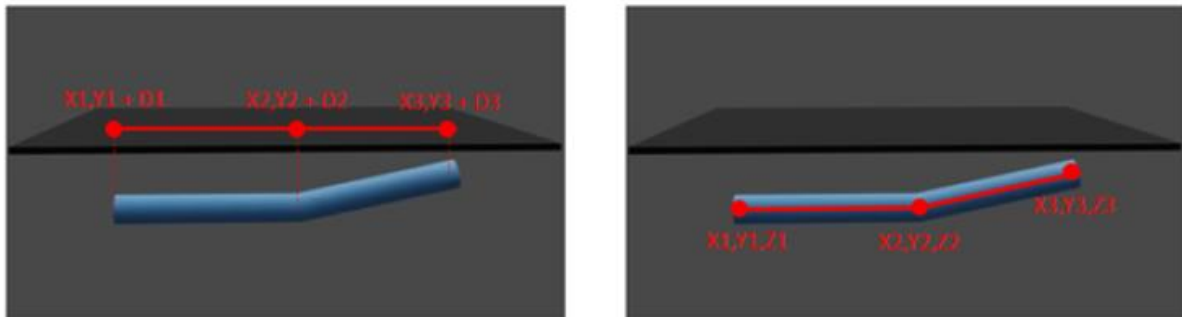


Figure 1 - 2D + depth (left) vs 2.5D (right)

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 4.3 for more information.

Example of a TAW/DNG level:

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

1.7 Survey

In IMKL 3, a new element of type *Survey* has been introduced for entities where location, depth or vertical position information can be specified. This *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 entity 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 entities with a *geometry*, excluding *Annotations*. It is mandatory for all cables, pipes, ducts, appurtenances, towers, poles, cabinets and manholes. For other entities it is optional.

2 Best Practices

2.1 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.

2.2 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 entity that is referenced should be a *Document* entity. The *Document* entity is similar to an *ExtraPlan*, but without a location.

A *Document* entity 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 3 and 9 for more information on the *UtilityNetwork* and *Document* entities.

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



```
</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="http://TODO/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="http://TODO/DocumentTypeValue/precaution" />
    <imkl:documentLocation>extraplan1.png</imkl:documentLocation>
    <imkl:documentMediaType xlink:href="http://TODO/DocumentMediaTypeValue/PNG" />
    <imkl:inNetwork xlink:href="http://TODO/UtilityNetwork/aquacom-be:001" />
  </imkl:Document>
</gml:featureMember>
```


2.3 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="http://TODO/ConstructionTechniqueValue/directionalDrilling" />
    ...
  </imkl:Duct>
</gml:featureMember>
```



2.4 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* entities. 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 4 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: *OilGasChemicalsAppurtenanceTypeIMKL Value*, *SewerAppurtenanceTypeIMKL Value*, *WaterAppurtenanceTypeIMKL Value* and *ThermalAppurtenanceTypeIMKL Value*.

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

3 UtilityNetwork

3.1 Overview

The table below gives an overview of the elements within the *UtilityNetwork* entity 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
heeftExtraTopografieën	/	Removed See the section on Topographical elements
heeftBeschermdGebieden	protectedArea	Renamed
standaardDekking	standardCoverageDetail	Renamed See the section on standardCoverageDetail
heeftExtraInformatie	documentation or annotation	See the sections on documentation and annotation



3.2 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>
```

3.3 disclaimer

It is strongly recommended to include a *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>
```

3.4 utilityFacilityReference

If an *ActivityComplex* is present it needs to be linked to from the *UtilityNetwork* entity. 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 applicable 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.

3.5 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
- **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>0123456789</imkl:phone>
  <imkl:email>example@athumi.eu</imkl:email>
</imkl:authorityRole>
```

3.6 documentation

3.6.1 ExtraPlan

All *ExtraPlans* 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* entity. 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="http://TODO/ExtraPlan/sewercom-be:EP001" />
```

3.6.2 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 entity that is referenced is similar to an *ExtraPlan*, but without a location. See chapter 9 for more information or the Precaution section in the chapter on best practices (chapter 2).

3.7 annotation

All annotations that are relevant to the *UtilityNetwork* should be linked to from the *UtilityNetwork* entity. 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="http://TODO/Annotation/sewercom-be:AN001" />
<imkl:annotation xlink:href="http://TODO/Annotation/sewercom-be:AN002" />
```

3.8 verticalPositionDetail

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

Example IMKL 3:

```
<imkl:verticalPositionDetail xlink:href="http://TODO/DepthDetail/sewercom-be:CD001" />
<imkl:verticalPositionDetail xlink:href="http://TODO/DepthDetail/sewercom-be:DD002" />
<imkl:verticalPositionDetail xlink:href="http://TODO/DepthDetail/sewercom-be:DD003" />
```

3.9 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 theme.

A *UtilityNetwork* can have:

- at most 1 standard coverage per theme.
- at most 1 standard coverage without theme. 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 theme.

Example IMKL 3:

```
<imkl:standardCoverageDetail xlink:href="http://TODO/StandardCoverageDetail/sewercom-be:DD001" />
```

3.10 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* entity in IMKL 3.

4 DepthDetail and CoverageDetail

4.1 DepthDetail vs CoverageDetail

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

In IMKL 2.3 the *RelatieveDiepte* entity 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* entity 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 entities with a point geometry the depth or vertical position information should be interpreted as the lowest point of the entity.**

Entities with a point geometry are:

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

The *CoverageDetail* entity 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.**

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

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

Since *DepthDetail* is applicable only for entities with a point geometry, it is not possible to provide a location together with the *DepthDetail*. On the other hand, it is required to provide a location in the *CoverageDetail* entity. 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*.

4.2 Overview

The table below gives an overview of the elements within the *DepthDetail* and *CoverageDetail* entities 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
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



4.3 depth, height and verticalPosition

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

- **depth:** The *depth* element replaces the *dieptePeil* element of the *RelatieveDiepte* entity. 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* entity replaces the *TAWDiepte* entity 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>
```

4.4 verticalPositionSurvey

Every *DepthDetail* and *CoverageDetail* entity 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>
```

4.5 referenceSurface

Every *DepthDetail* and *CoverageDetail* entity 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 *type* element indicates the type of the reference surface. For now it should always be of type *surfaceLevel*.

Next to the *type* 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 *UtilityNetwork* or *CoverageDetail* entity itself.
This element replaces the *maaiveldPeil* of the *TAWDiepte* entity 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* entity 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 *UtilityNetwork* or *CoverageDetail* entity 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:type xlink:href="http://TODO/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>
```

4.6 Associations

In IMKL 2.3, the relationship between a *RelatieveDiepte* or *TAWDiepte* entity 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 entity to which a *DepthDetail* or *CoverageDetail* entity 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 elements in IMKL 3. If multiple elements have the same depth, height or vertical position information, the entity can be reused and needs to be provided only once. This was not possible in IMKL 2.3. This means a *DepthDetail* or *CoverageDetail* entity 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 entity: *StandardCoverageDetail*.

5

StandardCoverageDetail

The *StandardCoverageDetail* entity can be used to provide one or more standard coverages for the *UtilityNetwork*. *StandardCoverageDetail* is similar to the *CoverageDetail* entity, 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 entity already implies that the entity 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:type xlink:href="http://TODO/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="http://TODO/UtilityNetwork/sewercom-be:001" />
</imkl:StandardCoverageDetail>
```



6 ActivityComplex

6.1 Overview

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

6.2 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.

6.3 Associations

In IMKL 2.3, the relationship between an *ActivityComplex* entity 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 entity to which a *ActivityComplex* entity 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="http://TODO/SewerPipe/sewercom-be:001" />
<imkl:on xlink:href="http://TODO/SewerPipe/sewercom-be:002" />
<imkl:on xlink:href="http://TODO/Manhole/sewercom-be:M0001" />
<imkl:on xlink:href="http://TODO/Appurtenance/sewercom-be:004" />
<imkl:inNetwork xlink:href="http://TODO/UtilityNetwork/sewercom-be:001" />
```



7 TopographicalElement

7.1 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* entity.

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

7.2 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.

7.3 extraTopografieType

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

7.4 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* entity.



8 ProtectedArea

8.1 Overview

The *ProtectedArea* entity replaces the *BeschermdeGebied* entity of IMKL 2.3.

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

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

8.2 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.

8.3 protectedAreaType

The *protectedAreaType* 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.

9 Document and ExtraPlan

9.1 Overview

The *Document* entity 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 entity that is referenced from the *UtilityNetwork* via the *documentation* element. *Documents* representing a precaution (replacing the *voorzorgsmaatregel*) should have a *documentType* of *precaution*.

ExtraPlan entities in IMKL 3 are similar to the *ExtraPlan* entities of IMKL 2.3 In IMKL 3, *ExtraPlans* are an extension of the *Document* entity type. *ExtraPlans* have a mandatory *location* and an optional *locationSurvey* element whereas *Documents* have neither of these elements. *ExtraPlans* can also have optional *refersTo* elements allowing to link *ExtraPlans* with *UtilityNetwork* elements.

The table below gives an overview of the elements within the *Document* and *ExtraPlan* entities that have changed in IMKL 3 compared to the *ExtraPlan* entity 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

9.2 bestandIdentificator

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

9.3 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.

9.4 Associations

In IMKL 2.3, the relationship between an *ExtraPlan* entity 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 entity to which an *ExtraPlan* entity 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* or *ExtraPlan* relates to the *UtilityNetwork* itself and not to specific elements.

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



10 Annotation

10.1 Overview

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

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

10.2 Associations

In IMKL 2.3, the relationship between an *Annotatie* entity 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 entity 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.



11 Appurtenance

11.1 Overview

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

IMKL 2.3	IMKL 3	Description
omschrijving	text	Renamed
taal	/	Removed
liggingNauwkeurigheid	geometrySurvey	See the section on geometrySurvey
orientatie	orientation	Renamed
subThema	subtheme	Renamed
isRisicovol	/	Removed See the section on elevatedRisk
/	elevatedRisk	See the section on elevatedRisk
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

11.2 geometrySurvey

The *geometrySurvey* element is a 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.

11.3 elevatedRisk

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.

In its place, IMKL 3 introduces a new optional element called *elevatedRisk*, which can be applied to all utility network elements. When its value is set to *true*, this element is used to signify that the risk associated with a particular utility network element is **higher than the standard risk level for the corresponding utility network**. It does not comment on the absolute risk level but instead provides a relative comparison to other elements within the same utility network.

Based on the above definition, elements with an elevated risk should be the exception rather than the rule. This distinction is why the *elevatedRisk* element is considered here as a new element rather than simply a renaming of the *isRisicoVol* element.

The primary purpose of the *elevatedRisk* element is to alert people working on-site that **extra safety precautions might be necessary** beyond the usual safety measures for typical utility network elements managed by a particular network operator. These additional safety measures can be documented as part of the overall precautions linked to the *UtilityNetwork* (as a *Document*) or as *ExtraPlans* linked to the element itself.

The *elevatedRisk* element is optional. If the element is not provided, it is interpreted as indicating that the element does not have an elevated risk, equivalent to including the element with a *false* value.

The information on *elevatedRisk* can be utilized in the KLIP viewer to highlight elements that possess an elevated risk and to alert users to review the related documents. The specific implementation of this functionality in the KLIP viewer is yet to be determined and is beyond the scope of this document.

11.4 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="http://TODO/VisibilityTypeValue/notVisibleAboveGround" />
```

11.5 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>
```

11.6 depthDetail

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

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

11.7 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* entities. This element is now divided into two distinct elements:

- The *documentation* element should reference *ExtraPlan* entities.
- The *annotation* element should reference *Annotation* entities.

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

12 Connection

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

In IMKL 3, the *aansluiting* entity has been removed and is replaced with the *Connection* entity. The *Connection* entity 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 *municipality* 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:municipalityName>
    <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:municipalityName>
  <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>

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13 UtilityNodeContainers: Tower, Pole, Manhole and Cabinet

The table below provides an overview of the elements within the *UtilityNodeContainer* entities that have changed in IMKL 3 compared to their corresponding entities in IMKL 2.3. The *UtilityNodeContainers* entities 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 elevatedRisk section in the Appurtenance chapter.
/	elevatedRisk	See the elevatedRisk section in the Appurtenance chapter.
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.



14 Cables: ElectricityCable and TelecommunicationsCable

14.1 Overview

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

IMKL 2.3	IMKL 3	Description
omschrijving	description	Renamed
taal	/	Removed
liggingNauwkeurigheid	geometrySurvey	See the geometrySurvey section in the Appurtenance chapter
isRisicovol	/	Removed See the elevatedRisk section in the Appurtenance chapter.
/	elevatedRisk	See the elevatedRisk section in the Appurtenance chapter.
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

/	constructionTechnique	See the constructionTechnique section
/	pipeDiameterAccuracy	Added See the pipeDiameterAccuracy section

14.2 coverageDetail

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

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

Example IMKL 3:

```
<imkl:coverageDetail xlink:href="http://TODO/DepthDetail/sewercom-be:CD001" />
```

14.3 pipeDiameterAccuracy

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>
```

14.4 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

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15 Pipes and Ducts

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

IMKL 2.3	IMKL 3	Description
omschrijving	description	Renamed
taal	/	Removed
liggingNauwkeurigheid	geometrySurvey	See the geometrySurvey section in the Appurtenance chapter.
isRisicovol	/	Removed See the elevatedRisk section in the Appurtenance chapter.
/	elevatedRisk	See the elevatedRisk section in the Appurtenance chapter.
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 pipeDiameterAccuracy 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

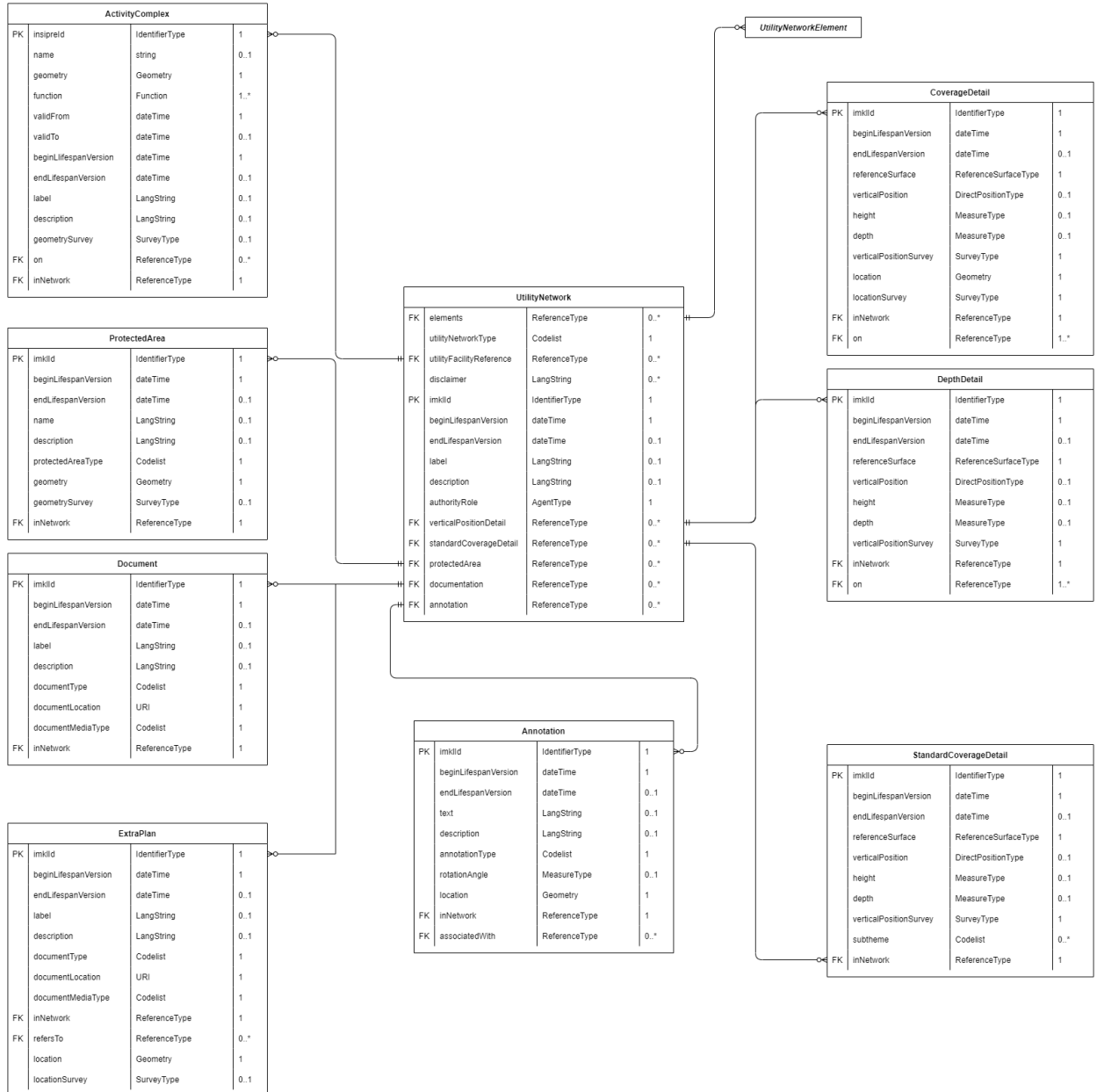
16 Entity-Relationship Diagrams

16.1 Overview

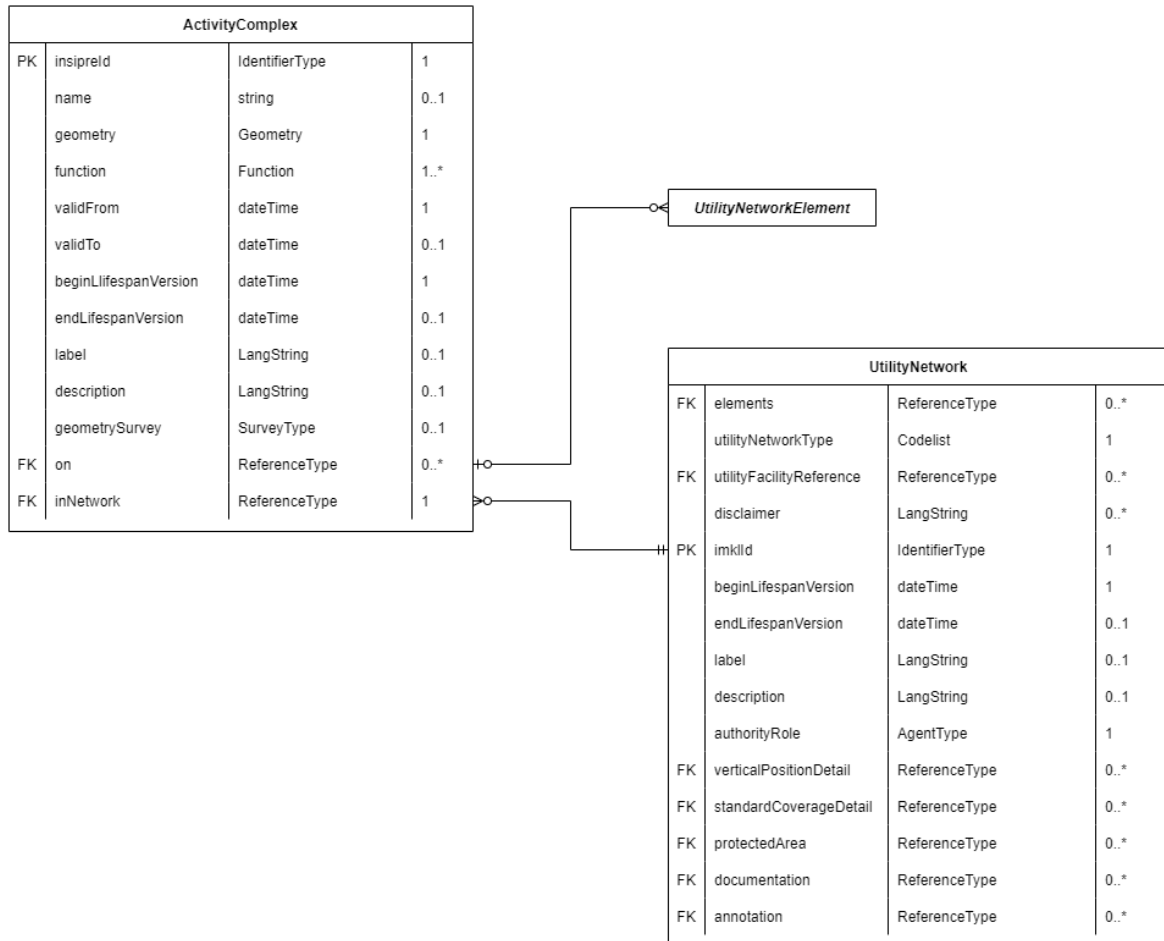
This chapter presents the Entity-Relationship Diagrams (ERDs) for the IMKL 3 specification. To enhance readability, the diagrams are divided into multiple diagrams, each concentrating on a specific entity. Each diagram includes only the entities and relationships relevant to the entity in focus. The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



16.2 UtilityNetwork

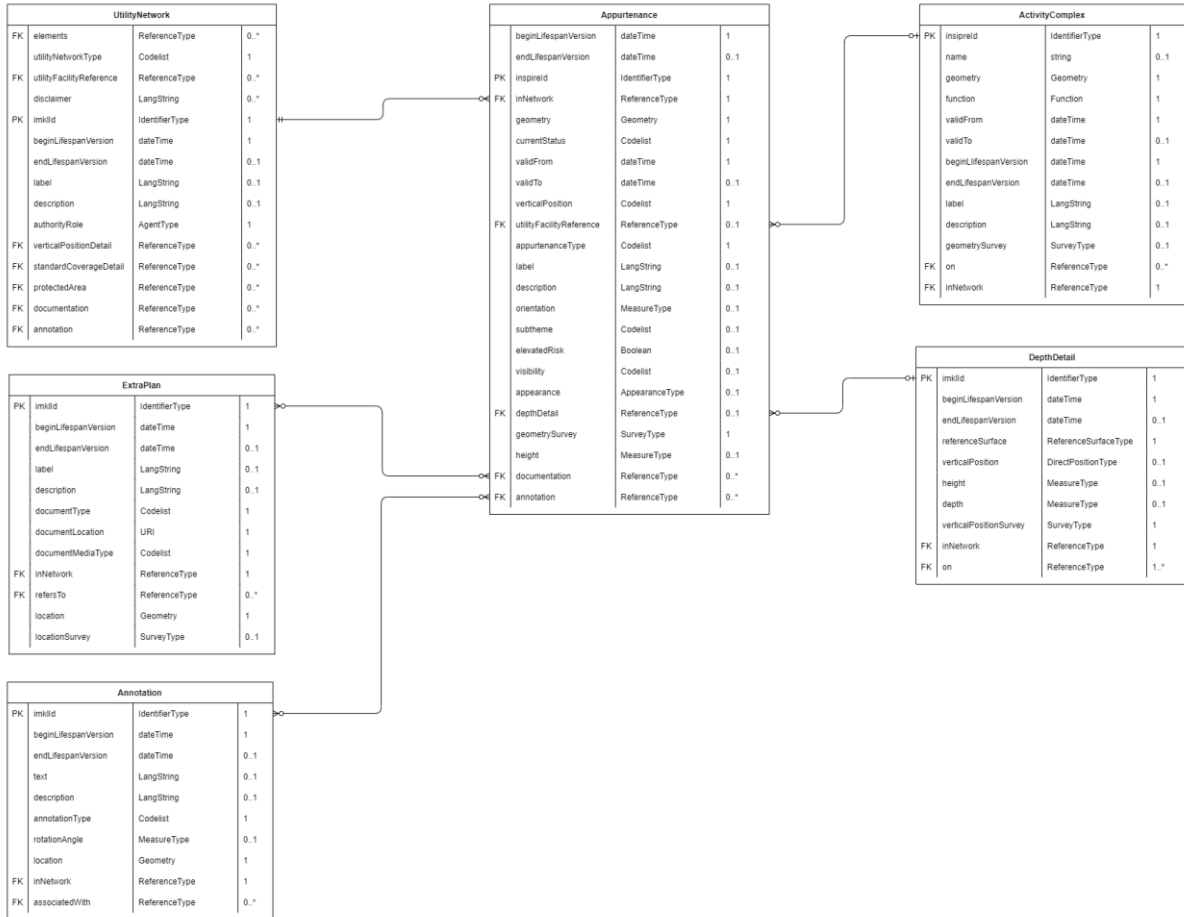


16.3 ActivityComplex

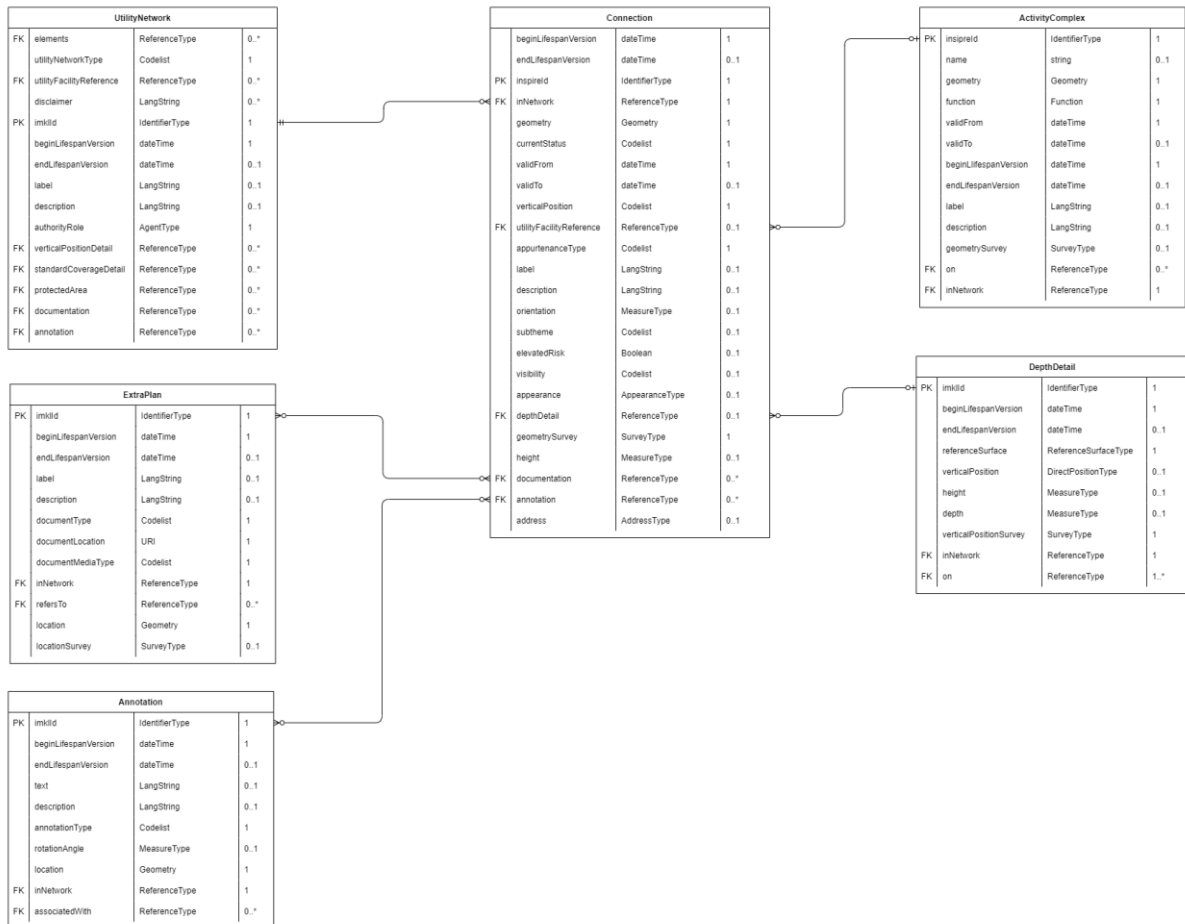




16.4 Appurtenance

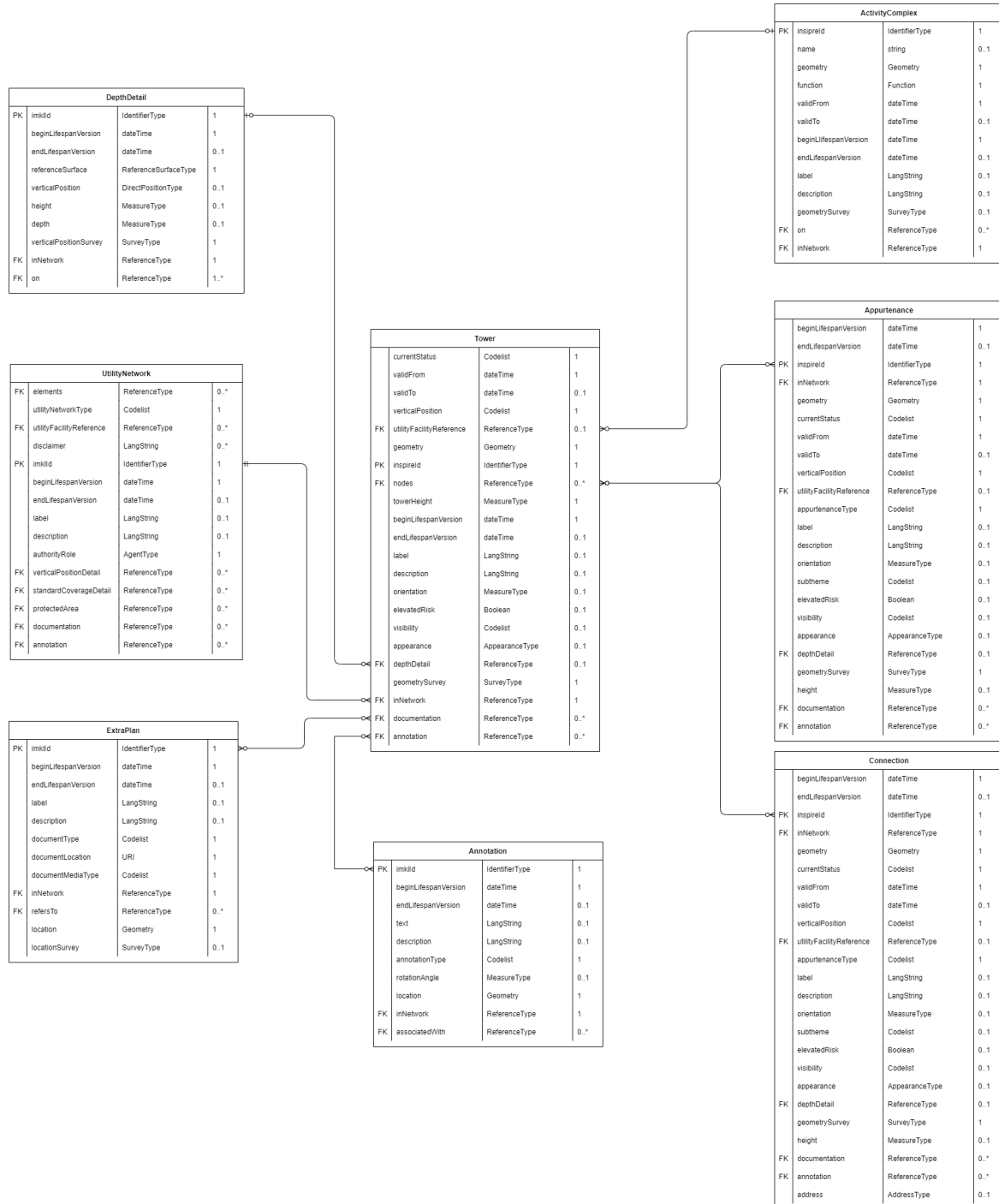


16.5 Connection



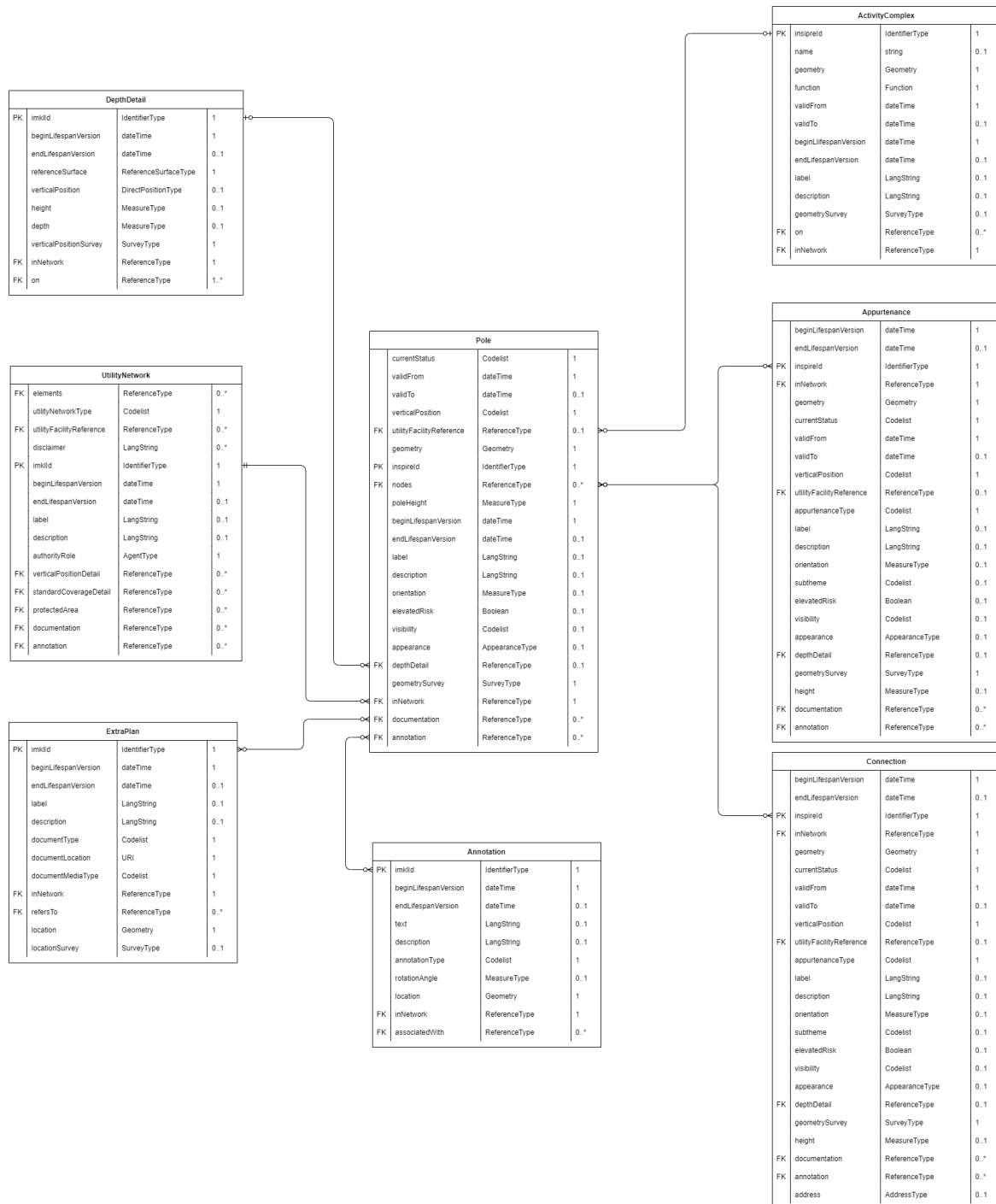


16.6 Tower



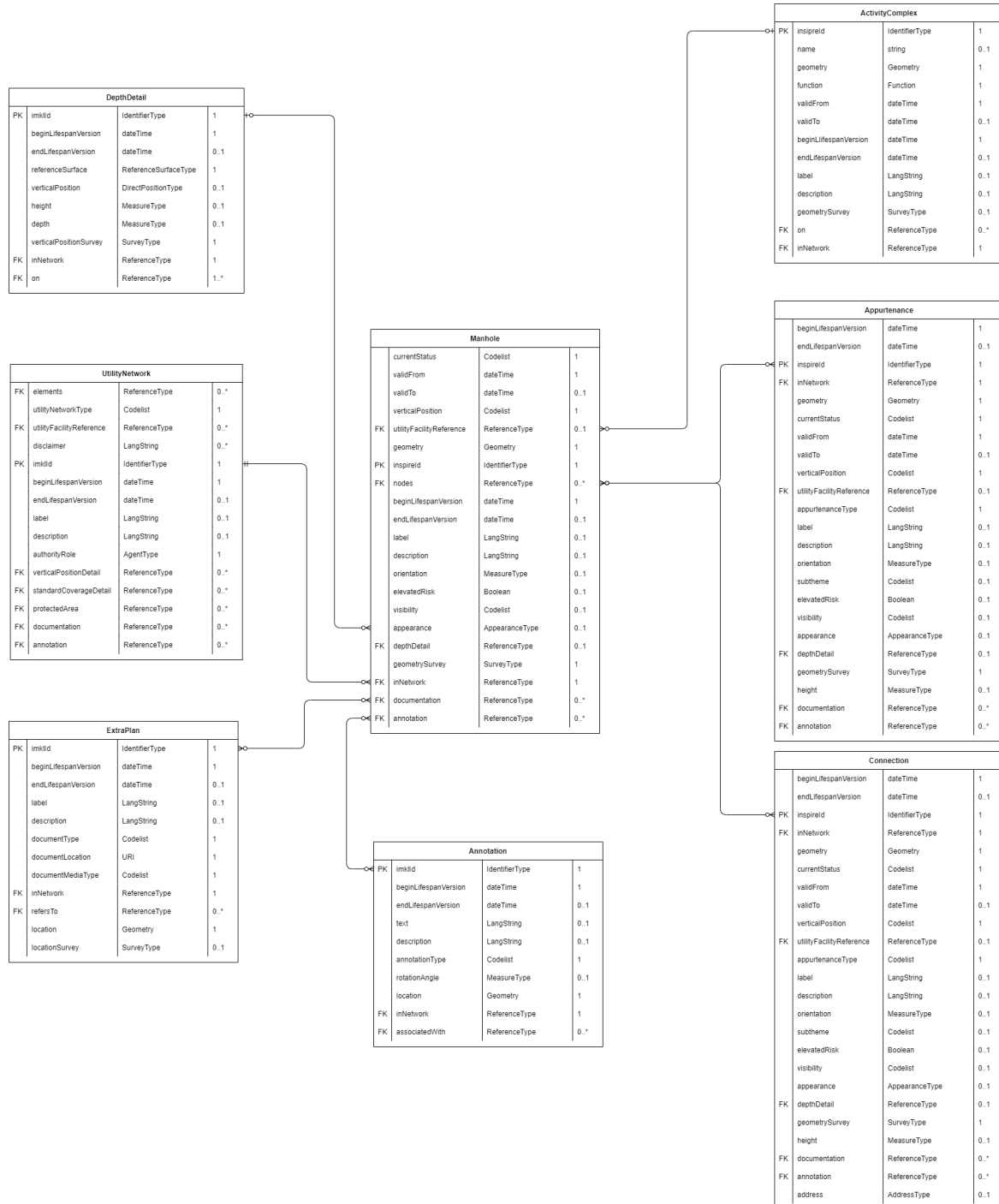


16.7 Pole



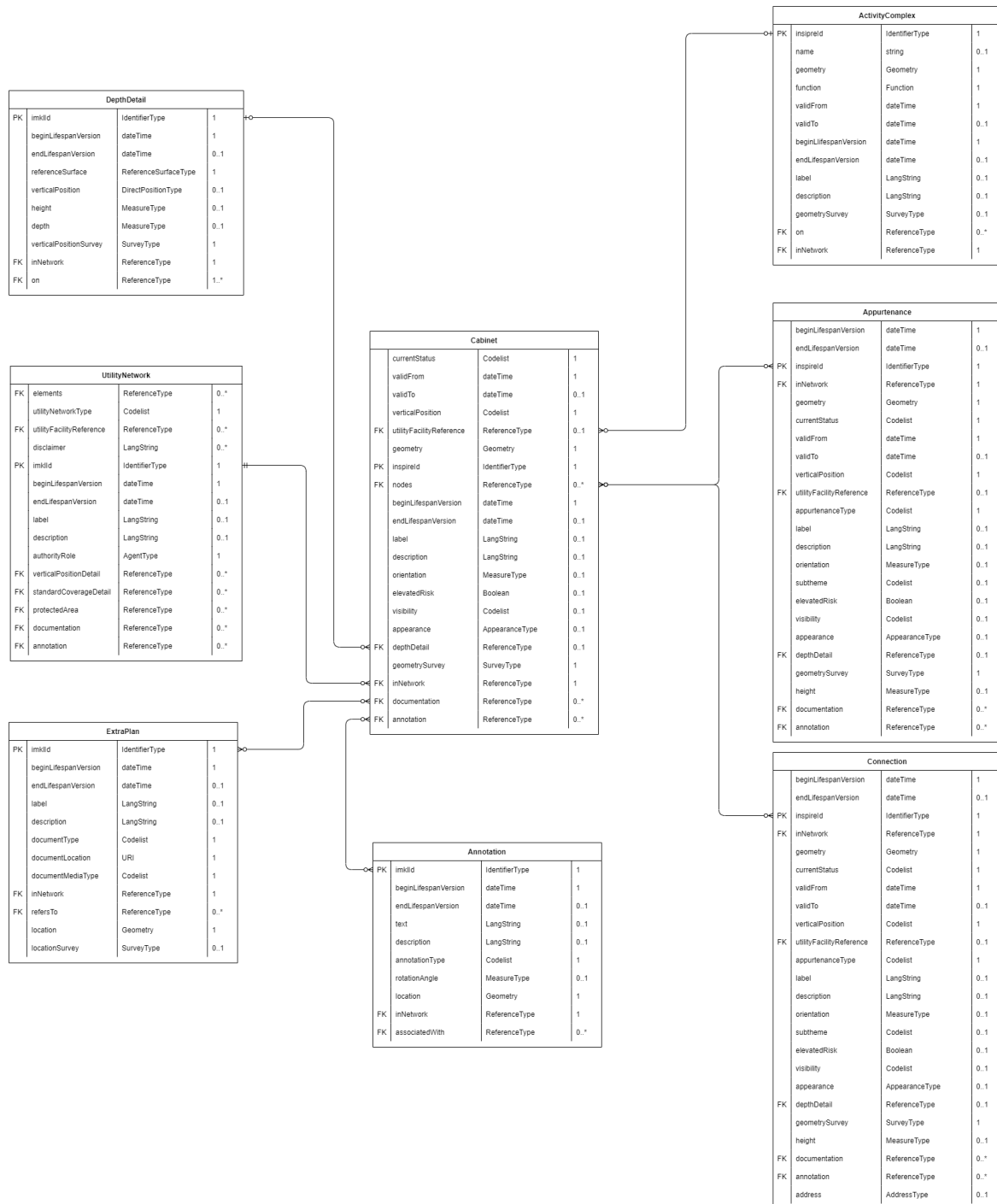


16.8 Manhole



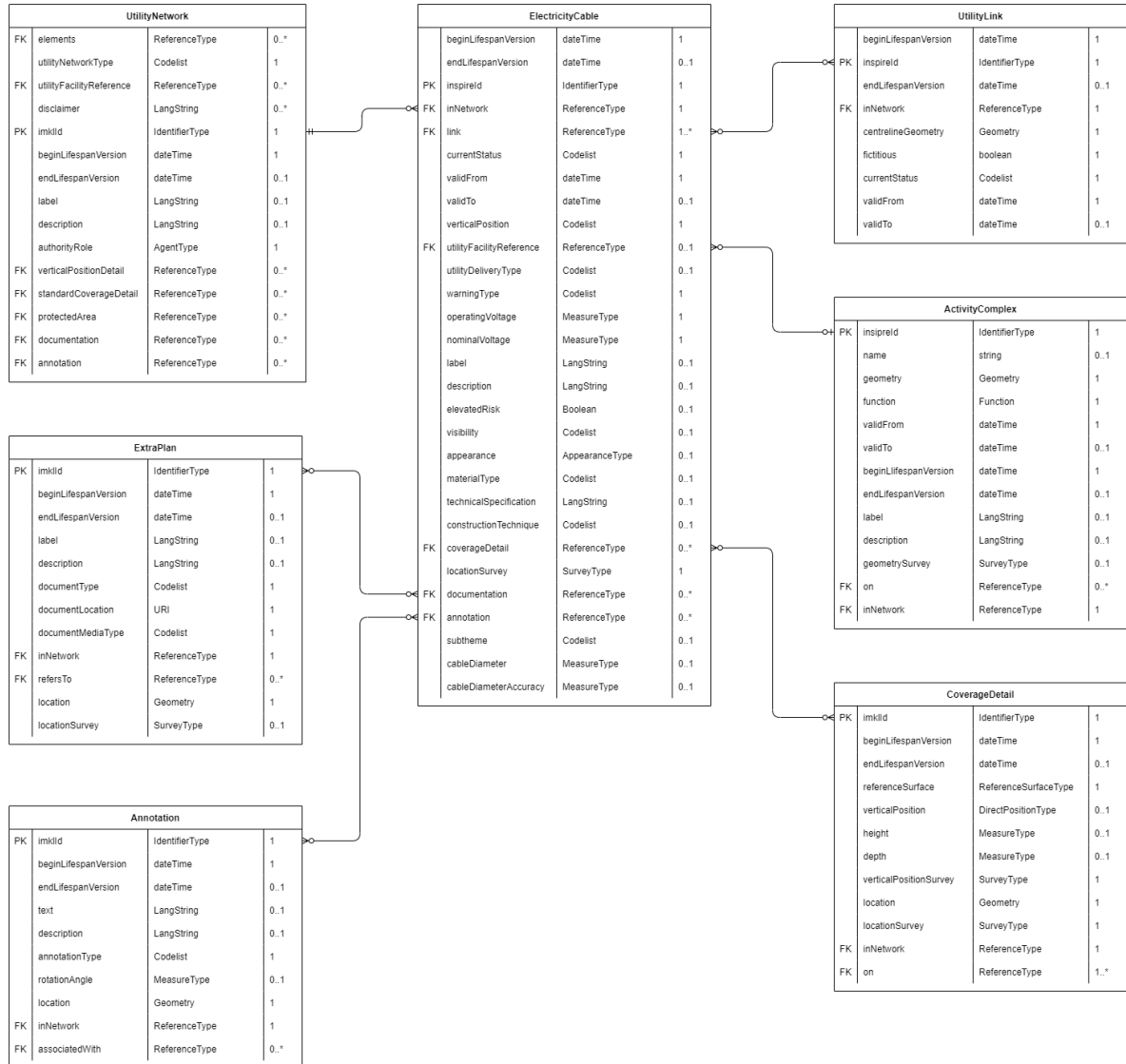


16.9 Cabinet



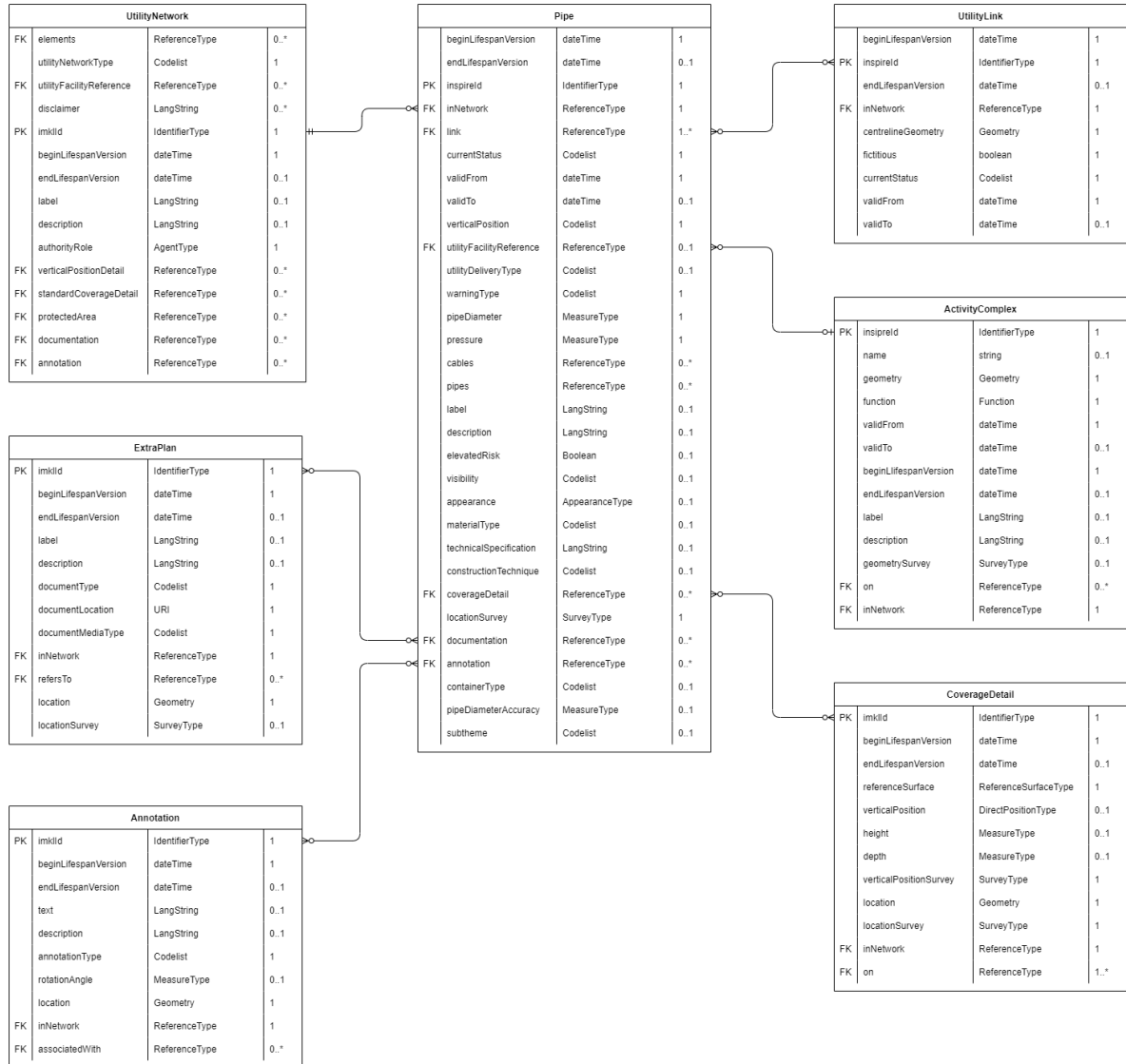


16.10 ElectricityCable



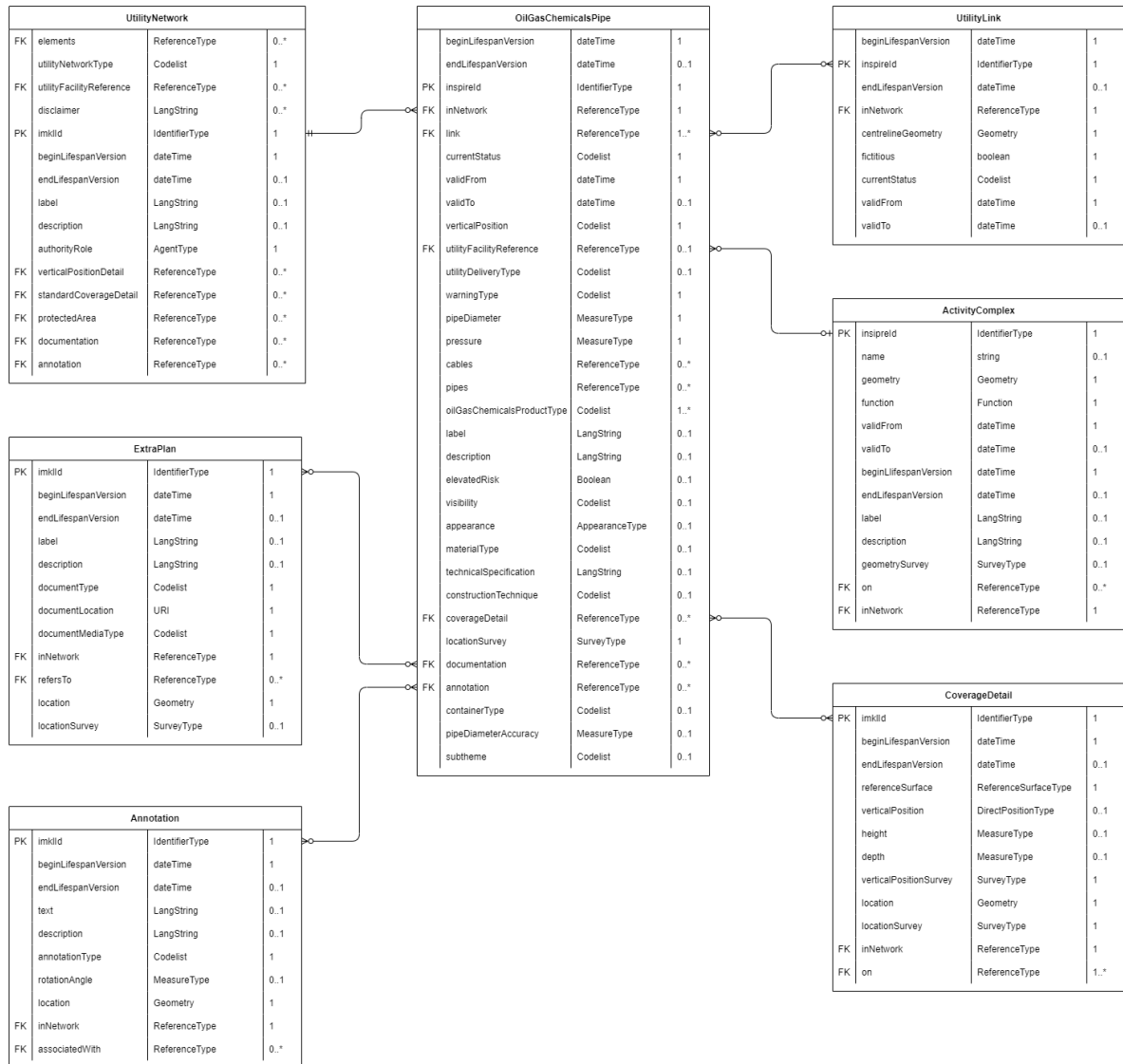


16.12 Pipe



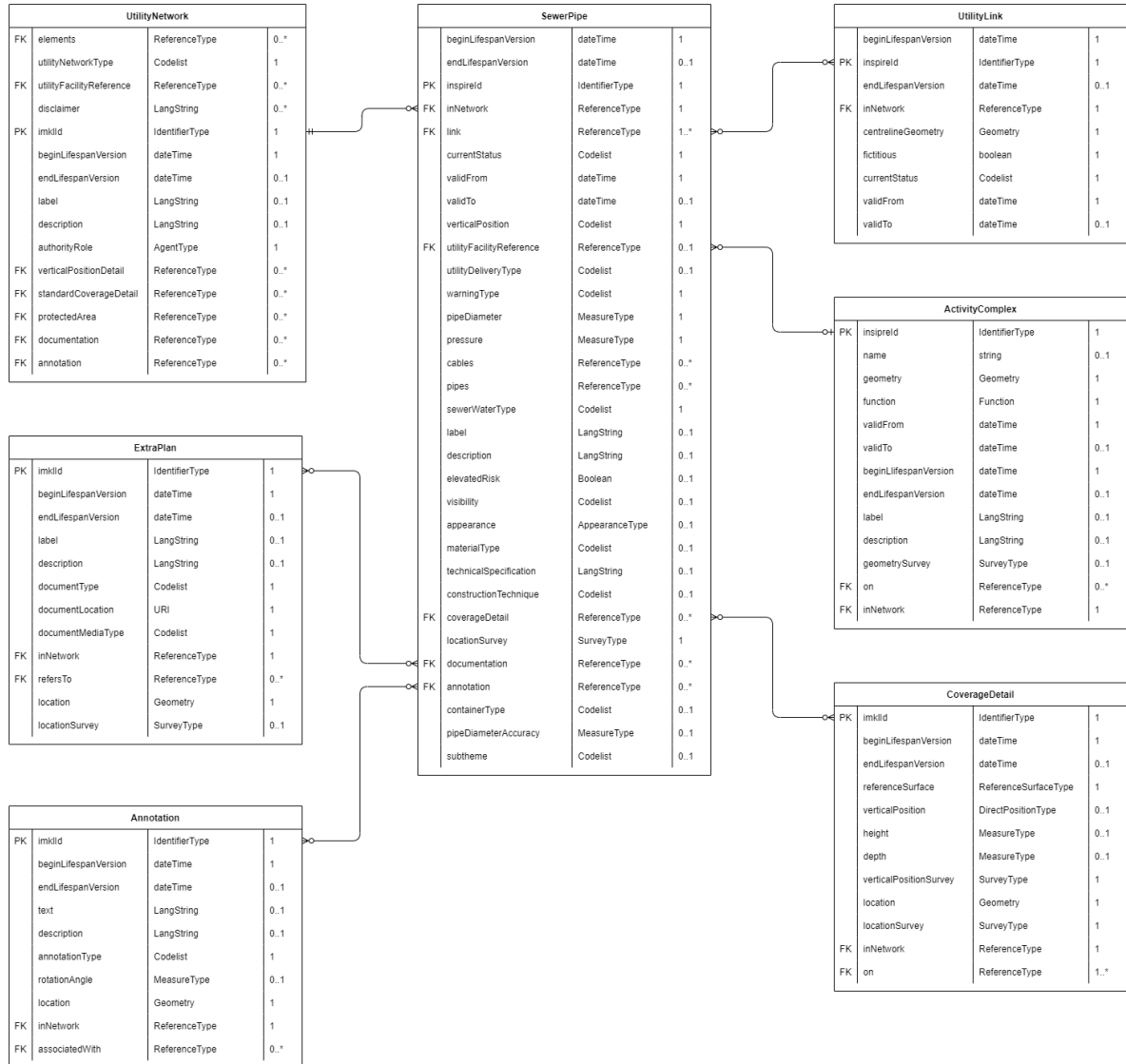


16.13 OilGasChemicalsPipe

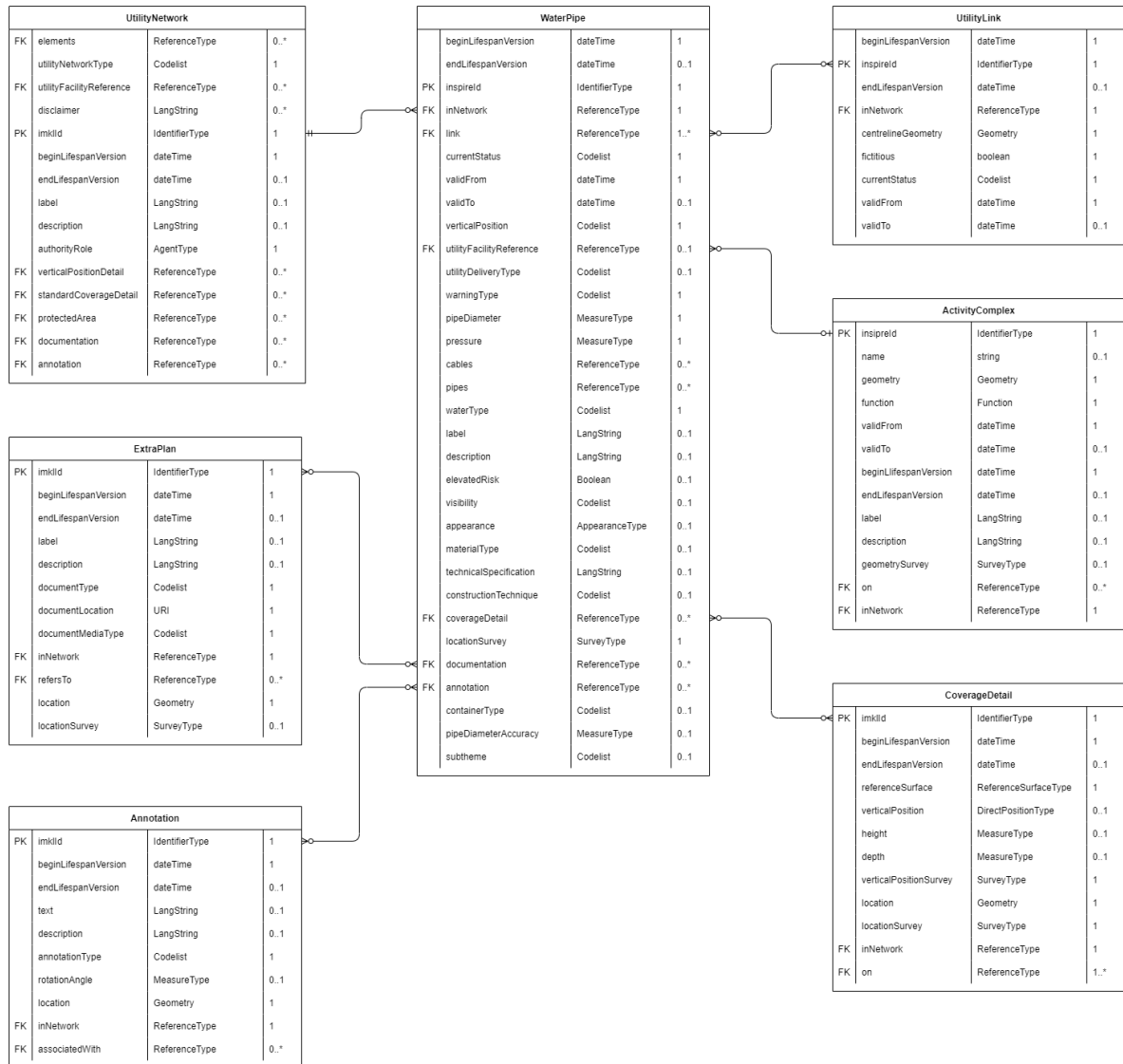




16.14 SewerPipe

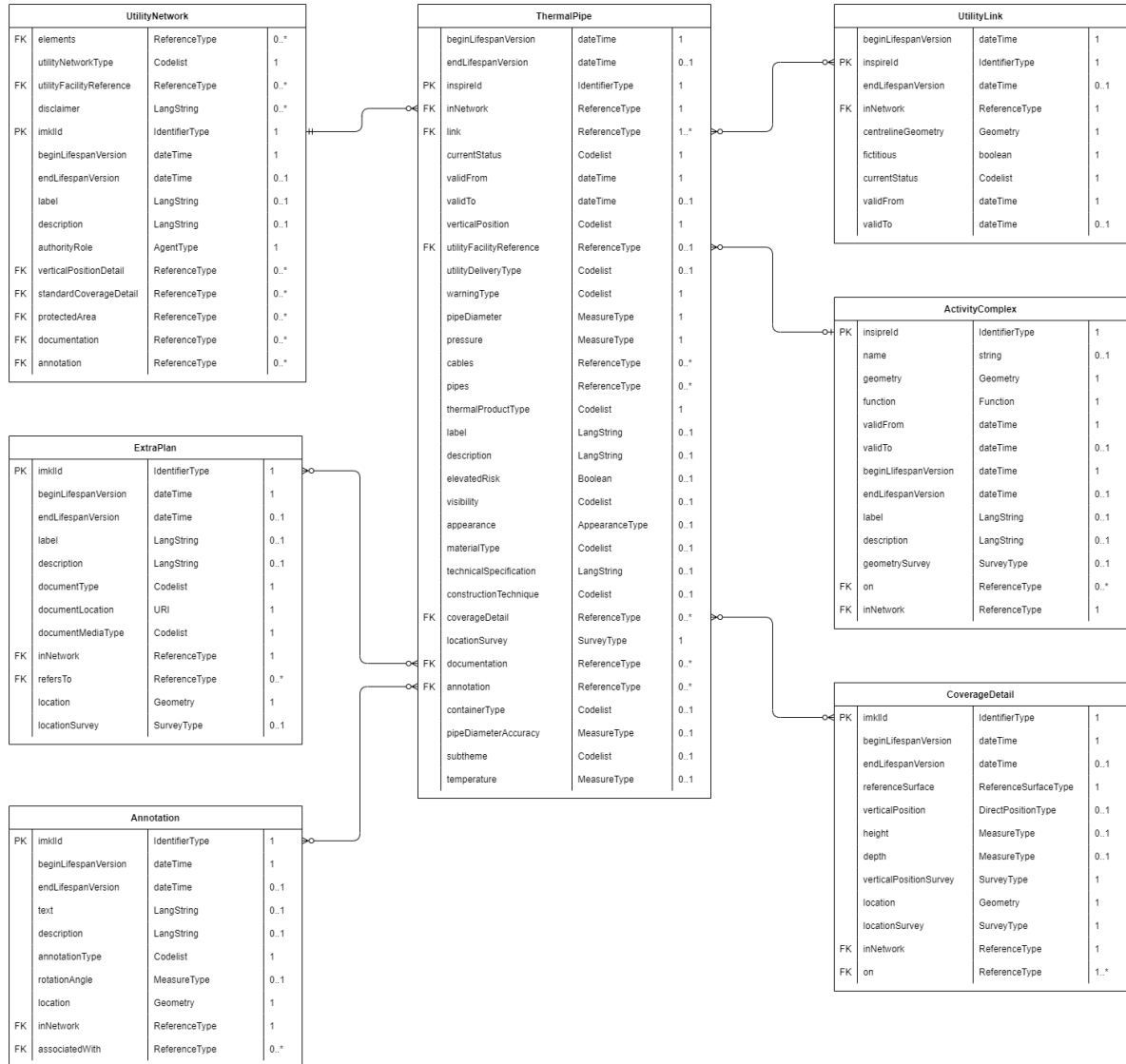


16.15 WaterPipe

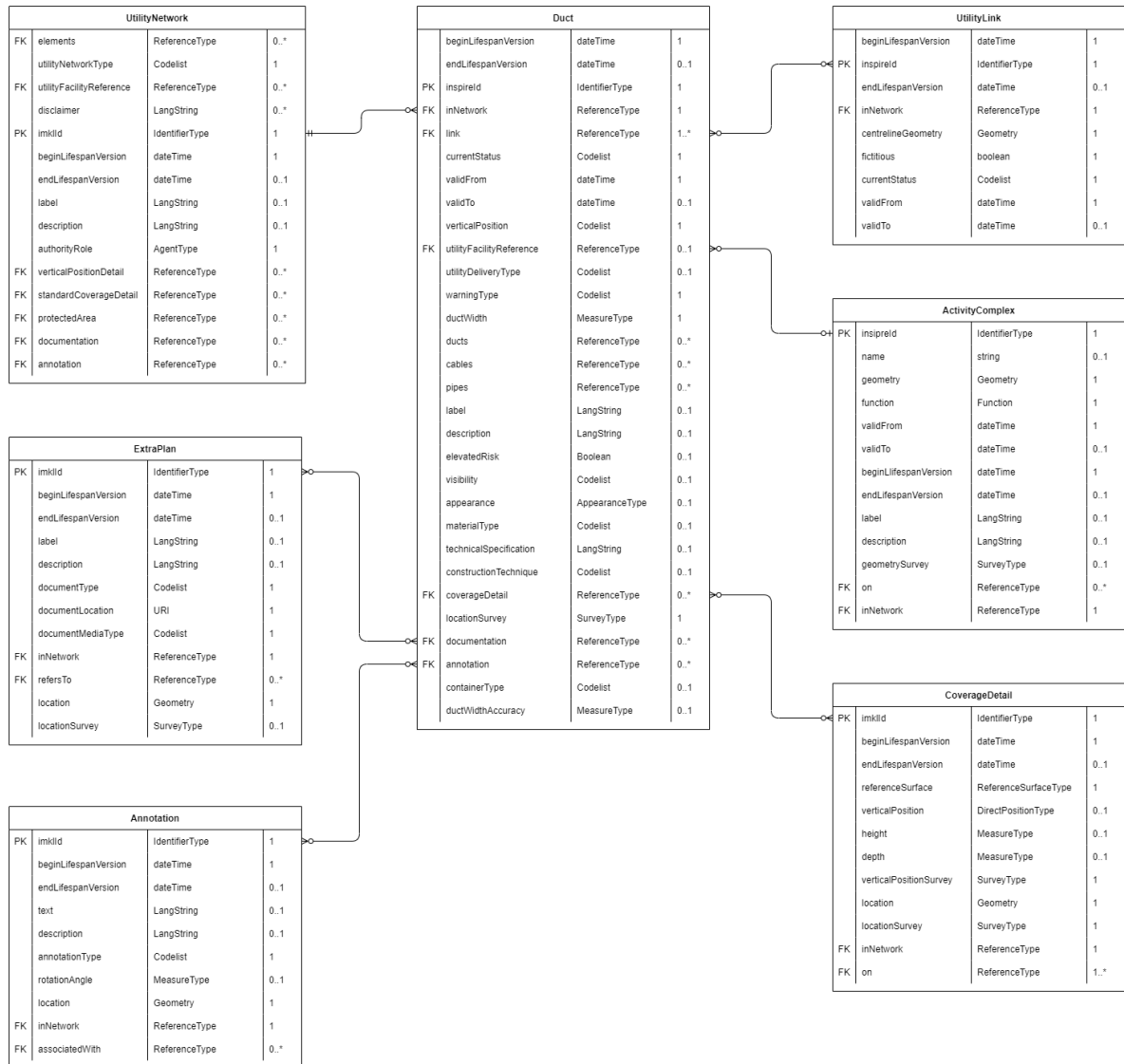




16.16 ThermalPipe

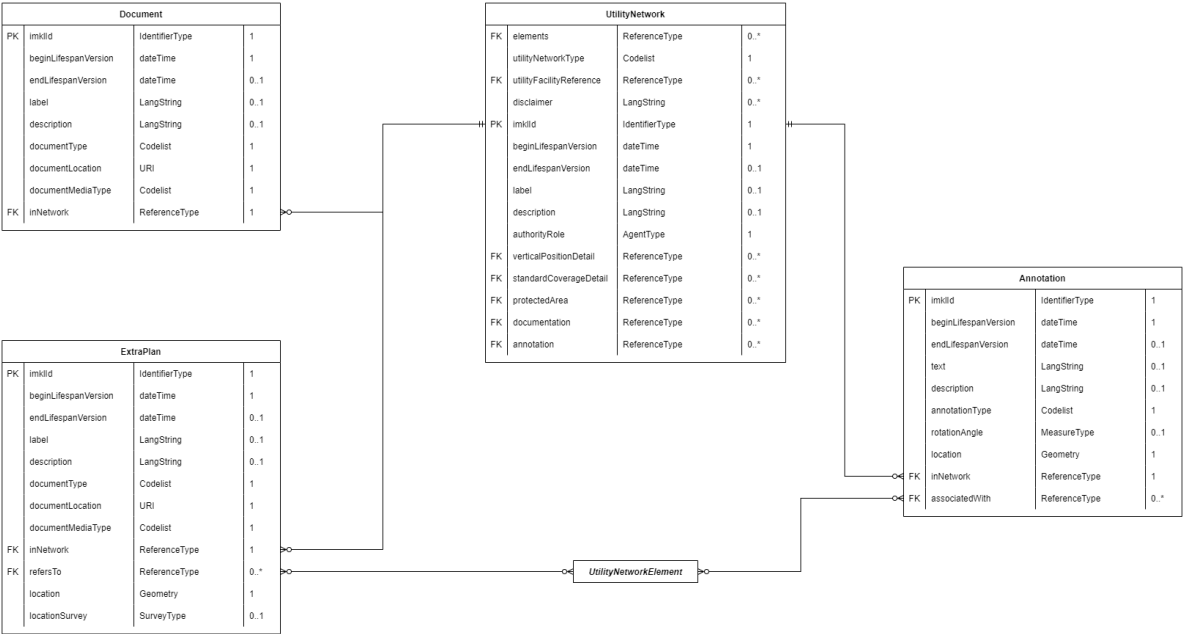


16.17 Duct





16.18 Document, ExtraPlan and Annotation



16.19 TopographicalElement

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

16.20 Types

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

AppearanceType			
	colour	LangString	1

ReferenceSurfaceType			
	type	Codelist	
	verticalPosition	DirectPositionType	
	verticalPositionSurvey	SurveyType	
	location	Geometry	
	locationSurvey	SurveyType	

AgentType			
	name	string	1
	phone	string	1
	email	string	1

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

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