
# Documentation on the Modeling of Geoinformation of Official Surveying and Mapping

# (GeoInfoDoc)

Chapter 5
Technical applications of the basic schema

Section 5.3

Explanations on ALKIS

for the AAA Technical Schema of Version 5.1

Status: 31 July 2006

Editors: Günther Rothberger and Markus Seifert

by order of the AdV Working Group Real Estate Cadastre

# Table of Contents

# Foreword

The explanations below provide an expert comment on the ALKIS technical schema. The technical principles for modelling originate in documents and resolutions passed by the Working Group for Real Estate Cadastre and the Expert Group for "Integrated Modelling for the Real Estate Cadastre", which was dissolved on completion of the most significant principles in June 2002. The ALKIS technical schema was then updated and consequently also the commentary in as part of the revision for the AAA application schema. The results of the revision list have therefore been incorporated into the explanations below.

These technical explanations are aimed at application software developers and technical experts involved in the introduction of ALKIS. A basic knowledge of both object-orientated modelling and international GIS standardisation (OGC, ISO) is assumed. The ALKIS technical schema is completely described in the conceptual description language UML (Unified Modelling Language). UML is used, because both the ISO specifications and the common AAA basic schema are described in UML. This creates a continuous and unified description of the AAA application schema, in order to clearly illustrate the complex technical connections that are extremely complex in parts. The fundamental principles for the data-specific application of UML are documented in Annex 1. Further information can be found in the corresponding technical literature.

The sections of the following parts are arranged in line with the structuring of the feature catalogue description. The associated references can thus be simply created and the explanations on ALKIS, ATKIS and AFIS can subsequently be merged to form one document. Chapters with overlapping subjects (e.g. Actual use) are reconciled between the accountable technical working groups.

This document is based on drafts complied by the Expert Group "Integrated Modelling of the Real Estate Cadastre" and has been refreshed and updated as part of the AAA application schema revision by Mr *Günther Rothberger* (LGB Brandenburg) and Mr *Markus Seifert* (Bavarian State Surveying Agency).

# 0 Preliminary remarks

The following statements are unchanged extracts from the request record of the Working Group for Real Estate Cadastre (Status: 4 June 1997) and provide an overview of the strategic orientation of the ALKIS technical schema.

The modeling of the ALKIS application schema has created a standard that satisfies the requirements of the GIS market, specifically of the surveying and cadastre administration, the users and the GIS software. This means:

- The ALKIS standard will satisfy the current and future requirements of the real estate cadastre. It contributes towards cost-efficient management of the real estate cadastre. The various characteristics of the real estate cadastre and special features of the VKV organization have been taken into consideration. The standard is arranged so as to facilitate standardization of the real estate cadastre in Germany. This is also reflected in a core data inventory for standardized use throughout Germany. The preconditions for joint use of ALKIS data in primary database and ATKIS data are also satisfied.
- The ALKIS standard is designed such that it satisfies the requirements of users to have geo information as basic information. It is therefore geared specifically to the diverse application requirements. For the user, long-term investment in geo-information, which spans offices and states, will also pay off. The ALKIS standard will have a unified image, especially to outsiders, in order to help the user handle geographic data of state surveying and mapping. Attention has also been paid to the option of simple and versatile integration of geographic data and technical data.
- The ALKIS standard enables GIS software manufacturers to benefit from investing long-term in its implementation on their systems. It reflects the current status of information technology demonstrates the future management of geodata of state surveying and mapping and enables simple linking to technical data of all kinds.

Communication with the ALKIS database (ALKIS data in primary database) is made by the processes: Qualification, management and utilisation processes. Output data for management are ALKIS revision data; target data are the ALKIS data in primary database. The result of the utilisation processes are ALKIS outputs, which are submitted to the user via the transfer process in the form of ALKIS transfer data (see GeoInfoDoc Chapter 3.0).

The collection is not part of the ALKIS application schema. Several basic aspects are mentioned, however, as there is a dovetailing with the processes in ALKIS, thus clarifying the context as a whole.

**Fundamental principles**

The conceptual design has taken account of the fundamental, generally valid statements for the following developments:

- The current procedural solutions ALB and ALK,
- The "General study on integration of ALB, ALK and ATKIS" defined by steering committees ALB and ALK/ATKIS,
- The new conceptual designs of the ALB procedure currently being defined in various states (joint development of AGLB 95 for Bavaria, Saxony and Thuringia, the Hamburg Project HALB and the Hessian ALB),
- The procedural concept ALB II defined by the ALB steering committee.

**Consideration of existing draft standards and de-jure standards**

The consolidated results of the national and international efforts to achieve standardisation have been observed. International standardisation projects in the field of geoinformation are currently being implemented by the "Technical Committee 211 Geographic Information/Geomatics" of the "International Organization for Standardization (ISO)".

## 0.1 Fundamentals of modelling

The ALKIS data in primary database are held largely redundancy-free on the basis of an object-oriented modelling solution. The technically independent data previously managed attributively as descriptive factual data in the ALB for the parcel are modelled as independent objects. For example, the incorporation of data on owners and entitled heirs calls for the introduction of objects without spatial reference. The data held in the point file on the points of the real estate cadastre (boundary point, building point etc.) have been incorporated. For modeling the geodetic control stations for basic surveying, the corresponding technical schema has been modelled with the designation “Official Fixed Point Information System (AFIS)”. This has been integrated into the common application schema.

### 0.1.1 Core data inventory

The core data inventory is the database provided by all surveying authorities of the states of the Federal Republic of Germany in ALKIS for all users throughout the country. The data is contained in the attached table. It includes also the corresponding metadata, identified in the common AAA metadata catalogue as an obligatory requirement.

The following were taken into consideration for stipulating the core data inventory:

1. Data in primary database required throughout Germany by legal, official and industrial users.
2. Data in primary database specified as compulsory for standard outputs.
3. The (future) utilisation type groups and utilisation types (minimum program) to be supplied for area evaluation in accordance with the law on agricultural statistics. Until all states have transferred to the new structure, certain differentiations between "industrial and commercial area" feature types must appear for the transitional period (see Table).
4. Data in primary database agreed as binding between the AdV and BLK for communication between the land register and real estate cadastre.
5. The interoperation between ALKIS and ATKIS.
6. The AFIS-ALKIS-ATKIS technical schema, Version 5.0.

The core data inventory includes not only the data in primary database available through migration on introduction of ALKIS, but also the data in primary database and the corresponding metadata, collected only following the introduction of ALKIS and managed throughout Germany.

The technical view of actual use in the real estate cadastre is now harmonising with the landscape view in ATKIS. In order to derive the ground area in ATKIS from the actual use in ALKIS, this requires all the necessary feature types to be explained for the core data inventory. Taking a holistic view of official surveying and mapping, the core data inventories of ALKIS, ATKIS and AFIS should also be merged to form a core database containing its geodata. For this reason, all feature types commonly used by ALKIS and ATKIS for actual use are completely applied to the ALKIS core data inventory. All the ground areas in ATKIS can thus be derived from ALKIS and vice versa.

In accordance with the requirements of the utility companies, the categorisation of buildings into residential buildings, commercial buildings and public buildings is taken into account in the core data inventory.

The ALKIS core data inventory decided by the AdV Plenum is described below in tabulated format. The used terminology is explained in more detail to enhance clarity.

Individual land register data, the original recording and update responsibility for which lies with other agencies, can be managed only when notified by same (e.g. groups of persons and addresses).

**Cardinalities**

When dealing with cardinalities, their structure is to be viewed under the following framework conditions. The explanations of the cardinalities for Columns 1 and 2 are provided below:

(1) Cardinality 0..1 and/or 0..*: The element belongs to the core data inventory and can be submitted to users, if it exists in technical view and if it is actually occupied. Example:

A person's Christian name is an optional attribute, as for technical reasons the Christian name does not always have to be occupied (e.g. in the case of companies). If the attribute occurs, it shall always be delivered as part of a core data inventory output.

(2) Cardinality 1..1, and/or 1..*:

These elements are usually mandatory for technical reasons and are already defined as compulsory elements in the feature catalogue description. Other elements that are previously set in the feature catalogue description can now become compulsory elements in the core data inventory through this cardinality indication (e.g. quality description for point location).

The formation regulations of the ALKIS feature catalogue description must of course be observed.

| **ALKIS data in primary database** | | | |
|---|---|---|---|
| 1 | 2 | 3<br>Feature type groups<br>Feature, attribute and relation types | 4<br>Comments,<br>value types |
| Feature type group: **Data on the parcel** | | | |
| Feature type: **Parcel** | | | |
| | | Attribute type: | |
| **1** | 1 | State | |
| **1** | 1 | District number | |
| **1** | 1 | Parcel number | |
| **1** | 1 | Parcel code | |
| **1** | 1 | Legal area | |
| 0 | 1 | Parcel number | |
| 0 | 1 | Responsible agency | Catalogue of departments |
| | | Relation type: | |
| **0** | * | Points_out | Parcel points out location description with house number |
| **0** | * | Shows_to | Parcel shows to location description without house number |
| **1** | 1 | is_registered | Parcel - register number |
| Feature type: **Specific parcel boundary** | | | |
| | | Attribute type: | |

| ALKIS data in primary database | | | | |
|---|---|---|---|---|
| 1 | 2 | | 3<br>Feature type groups<br>Feature, attribute and relation types | 4<br>Comments,<br>value types |
| 1 | * | | Type | Value |
| | | | Disputed boundary | 1000 |
| | | | District boundary | 7104 |
| | | | Administrative region boundary | 7103 |
| | | | State boundary | 7102 |
| | | | Germany boundary | 7101 |
| Feature type: **Boundary point** | | | | |
| | | | Attribute type: | |
| **1** | 1 | | Monument | Value |
| | | | Monument, general | 1000 |
| | | | No monument | 9500 |
| | | | Not to be specified according to the source | 9998 |
| | | | | |
| Feature type group: **Data on the house** | | | | |
| Feature type: **House** | | | | |
| | | | Attribute type: | |
| **1** | 1 | | House function | Value |
| | | | Residential | 1000 |
| | | | House of Business or commercial | 2000 |
| | | | House of Building and Research | 3000 |
| | | | | |
| | | | | |
| 1 | 1 | | Quality data | AX_DQWithDataCollection |
| | | | | Value |
| | | | Determined from cadastre surveys | 1000 |
| | | | Digitalized from cadastre maps | 4200 |
| | | | From other documents | 4300 |
| | | | Not to be specified according to the source | 9998 |
| | | | | |
| Feature type group: **Data on location** | | | | |
| Feature type: **Location description with house number** | | | | |
| | | | Attribute type: | |
| **0** | 1 | | Encoded location description | |
| **0** | 1 | | Uncoded location description | |
| 1 | 1 | | House number | |
| | | | Relation type: | |
| **1** | * | | Belongs_to | Location belongs to parcel |
| Feature type: **Location description without house number** | | | | |
| | | | Attribute type: | |
| **0** | 1 | | Encoded location description | |
| **0** | 1 | | Uncoded location description | |
| | | | Relation type: | |

| ALKIS data in primary database | | | | |
|---|---|---|---|---|
| 1 | 2 | | 3<br>Feature type groups<br>Feature, attribute and relation types | 4<br>Comments,<br>value types |
| **1** | * | | Belongs_to | Location belongs to parcel |
| | | | | |
| Feature type area ***actual use*** | | | | |
| Feature type group: **Residential area** | | | | |
| Feature type: **Residential area surface** | | | | |
| | | | | |
| Feature type: **Industrial and commercial area** | | | | |
| | | Attribute type: | | |
| 1 | 1 | | Function | |
| | | | Industrial and commercial | 1700 |
| Feature type: **Dump** | | | | |
| Feature type: **Mining operation** | | | | |
| Feature type: **Opencast mine, pit, quarry** | | | | |
| Feature type: **Combined use area** | | | | |
| Feature type: **Area with specific functional characteristic** | | | | |
| Feature type: **Sport, leisure and recreational area** | | | | |
| | | Attribute type: | | |
| 1 | 1 | | Function | |
| | | | Public park | 4400 |
| Feature type: **Cemetery** | | | | |
| | | | | |
| Feature type group: **Traffic** | | | | |
| Feature type: **Road traffic** | | | | |
| Feature type: **Place** | | | | |
| Feature type: **Path** | | | | |
| Feature type: **Rail traffic** | | | | |
| Feature type: **Air traffic** | | | | |
| Feature type: **Navigation** | | | | |
| | | | | |
| Feature type group: **Vegetation** | | | | |
| Feature type: **Agriculture** | | | | |
| Feature type: **Wood** | | | | |
| Feature type: **Copse** | | | | |
| Feature type: **Heath** | | | | |
| Feature type: **Moor** | | | | |
| Feature type: **Marsh** | | | | |
| Feature type: **Unproductive area** | | | | |
| | | | | |
| Feature type group: **Water** | | | | |
| Feature type: **Flowing water** | | | | |
| Feature type: **Basin** | | | | |

| ALKIS data in primary database | | | |
|---|---|---|---|
| 1 | 2 | 3<br>Feature type groups<br>Feature, attribute and relation types | 4<br>Comments,<br>value types |
| Feature type: **Standing water** | | | |
| Feature type: **Sea** | | | |
| | | | |
| Feature type group: **Catalogue** | | | Catalogues are used to decode keys (e.g. district designations) |
| | | | |
| Feature type: **Department** | | | |
| | Attribute type: | | |
| 1 | 1 | Key | |
| 1 | 1 | Name | |
| Feature type: **Federal state** | | | |
| | Attribute type: | | |
| 1 | 1 | Key | |
| 1 | 1 | Name | |
| Feature type: **Government district** | | | |
| | Attribute type: | | |
| 1 | 1 | Key | |
| 1 | 1 | Name | |
| Feature type: **District or region** | | | |
| | Attribue type: | | |
| 1 | 1 | Key | |
| 1 | 1 | Name | |
| Feature type: **Municipality** | | | |
| | Attribute type: | | |
| 1 | 1 | Key | |
| 1 | 1 | Name | |
| Feature type: **Municipality section** | | | |
| | Attribute type: | | |
| 1 | 1 | Key | |
| 1 | 1 | Name | |
| Feature type: **Cadastral District** | | | |
| | Attribute type: | | |
| 1 | 1 | Key | |
| 1 | 1 | Name | |
| Feature type: **Cadastral District section or fields** | | | |
| | Attribute type: | | |
| 1 | 1 | Key | |
| 1 | 1 | Name | |
| Feature type: **Register sheet district** | | | |
| | Attribute type: | | |
| 1 | 1 | Key | |
| 1 | 1 | Name | |
| Feature type: **Location description catalogue entry** | | | |
| | Attribute type: | | |
| 1 | 1 | Key | |

| ALKIS data in primary database | | | | |
|---|---|---|---|---|
| 1 | 2 | 3<br>Feature type groups<br>Feature, attribute and relation types | | 4<br>Comments,<br>value types |
| 1 | 1 | Name | | |
| | | | | |
| Feature type group: **Data on the network point** | | | | |
| | | | | |
| Feature type: **Minor control point** | | | | |
| Attribute type: | | | | |
| 0 | 1 | Point code | | |
| | | | | |
| Feature type group: **Data on the point location** | | | | |
| | | | | |
| Feature type: **Point location** | | | | |
| Attribue type: | | | | |
| 0 | 1 | Real estate map | | |
| 1 | 1 | Quality data | | AX_DQPointLocation |
| | | | | Value |
| | | | Determined from cadastre surveys | 1000 |
| | | | Digitalized from cadastre maps | 4200 |
| | | | Not to be specified according to the source | 9998 |
| | | | | |
| Feature type group: **Personal and land register data** | | | | |
| Feature type: **Register sheet** | | | | |
| | | Attribute type: | | |
| **1** | 1 | Register sheet code | | |
| **1** | 1 | Sheet type | | Value |
| | | | Land register sheet | 1000 |
| | | | Cadastre sheet | 2000 |
| | | Relation type: | | |
| **0** | * | Consists_of | | Register sheet consists of register number (or name numbers) |
| Feature type: **Register number** | | | | |
| | | Attribute type: | | |
| **1** | 1 | Register type | | Value |
| | | | Real estate | 1100 |
| | | | Flat / partial ownership of property | 1301 |
| | | | Co-ownership in accordance with § 3, subsection 4 of the GBO | 1302 |
| | | | Leasehold | 2101 |
| | | | Secondary Leasehold | 2102 |
| | | | Divided Leasehold | 2201 |
| | | | Flat / partial leasehold | 2301 |

| ALKIS data in primary database | | | |
|---|---|---|---|
| 1 | 2 | 3<br>Feature type groups<br>Feature, attribute and relation types | 4<br>Comments,<br>value types |
| | | Flat / partial secondary leasehold | 2302 |
| **1** | 1 | Continuous number | |
| 0 | 1 | Proportion | |
| | | Relation type: | |
| **1** | 1 | Is_part_of | Register number is part of a register sheet |
| 0 | * | Real_estate_consists_of | Real estate consists of parcel |
| 0 | * | Refers_to | Register Number refers to parcel |
| 0 | * | To | Register number belongs to register number (recursive relation) |
| Feature type: **Name number** | | | |
| | | Attribute type: | |
| **0** | 1 | Continuous number in accordance with DIN 1421 | |
| **0** | 1 | Number | |
| 0 | 1 | Proportion | |
| | | Relation type: | |
| **0** | 1 | Named | Name number denotes (named) a person (owner) |
| **1** | 1 | Is_part_of | Name number is part of a register sheet |
| 0 | 1 | Consits_of_legal relationship_with | Name number consists of name number (recursive relation) for indicating legal relationships |
| | | | |
| Feature type: **Person** | | | |
| | | Attribute type: | |
| **1** | 1 | Surname or company | |
| 0 | * | Christian name | |
| 0 | * | Name component | |
| 0 | * | Academic degree | |
| 0 | 1 | Birth name | |
| 0 | 1 | Date of birth | |
| | | Relation type: | |
| **0** | * | Refers_to | Person refers to a name number |
| 0 | * | Has | Person has an address |
| 1 | 1 | Quality data | AX_DQNoDataCollection |
| | | | |
| Feature type: **Group of persons** | | | |
| | | Attribue type: | |
| **1** | 1 | Name of group of persons | |
| | | Relation type: | |

| ALKIS data in primary database | | | |
|---|---|---|---|
| 1 | 2 | 3<br>Feature type groups<br>Feature, attribute and relation types | 4<br>Comments,<br>value types |
| **2** | * | Consists_of | Group of persons consists of persons |
| Feature type: **Address** | | | |
| | Attribute type: | | |
| **1** | 1 | Destination | |
| **1** | 1 | Town/City | |
| **0** | 1 | Post code – mail delivery | |
| **0** | 1 | Post code – PO Box | |
| 0 | 1 | Street | |
| 0 | 1 | House number | |
| 0 | 1 | Town/City (official name directory) | |
| 0 | 1 | PO Box | |
| | Relation type: | | |
| **1** | * | Belongs_to | Address belongs to a person |
| 1 | 1 | Quality data | AX_DQNoDataCollection |
| | | | |
| Feature type group: **Subject to public law and other stipulations** | | | |
| Feature type: **Classification according to road law** | | | |
| | Attribute type: | | |
| **1** | 1 | Definition type | Value |
| | | Federal motorway | 1110 |
| | | Federal road | 1120 |
| | | Country or state road | 1130 |
| | | District road | 1140 |
| | | Municipality road | 1150 |
| | | Other official roads | 1180 |
| 0 | 1 | Name | |
| | | | |
| Feature type: **Classification according to water law** | | | |
| | Attribute type: | | |
| **1** | 1 | Definition type | Value |
| | | Waters of I. Order<br>- Federal waterway | 1310 |
| | | Waters of II. Order<br>- According to national law | 1320 |
| | | Waters of II. Order | 1330 |
| | | Waters of III. Order | 1340 |
| | | | |
| Feature type: **Building, space or land regulation law** | | | |
| | Attribute type: | | |
| **1** | 1 | Definition type | Value |
| | | Regrouping of parcels | 1750 |

| ALKIS data in primary database | | | |
|---|---|---|---|
| 1 | 2 | 3<br>Feature type groups<br>Feature, attribute and relation types | 4<br>Comments,<br>value types |
| | | Redevelopment | 1840 |
| | | Land consolidation | 2100 |
| 0 | 1 | Responsible department | |
| 0 | 1 | Name | |
| 0 | 1 | Description | |
| | | | |

*Figure 5.3 - 1.: ALKIS core data inventory*

### 0.1.2 Conceptual schema language

The ALKIS technical schema is entirely recorded using the conceptual description language UML in order to guarantee a correct link to the AFIS-ALKIS-ATKIS-basic schema (see also Chapter 3.1.2 of GeoInfoDoc of the main document). Relevant Word or HTML documents are derived as required from the UML model using Rose script. Revisions to the model are made only in the UML data model. The relevant NAS interface files can also be derived using a further derivation tool (see Chapter 10). Consistency between the data model, the catalogues and the interface is thus guaranteed at all times. In principle, however, the derived catalogues cannot reflect the technically defined correlations like the original UML data model. There is currently no usable software-independent interface to replace the UML data model, which means that only the Rational Rose software used by the AdV currently enables full legibility of the data model. Use of the Rational Rose UML tool is therefore recommended in order to see the full information scope of the data model at a glance.

Consistency conditions, formation regulations, information on basic spatial reference forms and also further information and qualifications are also described – where possible – in the formal description "Object Constraint Language (OCL)". Only where this is not possible is such information described in the form of text.

### 0.1.3 Harmonization of the geographic data base on ATKIS

The ALKIS and ATKIS geographic database have been semantically and structurally harmonized. The objective of developing a standardized data model as the basis of data exchange between ALKIS and ATKIS has thus been achieved. The semantic relations between the two systems have been examined, specified according to standard regulations and harmonized. Modeling thus enables information for ALKIS and ATKIS to be recorded only once.

The existing feature catalogue description ATKIS-OK (ATKIS feature catalogue description) and OBAK-LIKA (sample feature illustration catalogue real estate cadastre) incorporated the land use directory (Nutzungsartenverzeichnis - NAV 95), the OSKA-LIKA/DGK5 (feature key catalogue) and the OSKA-KLASS (feature key catalogue classification) to create the basis of harmonization in AAA technical schema. The semantic correlations and modeling for the features of the actual use of the real estate cadastre and the corresponding feature type areas of DLM (residential area, traffic, vegetation, water) and also for the building and topography of the real estate cadastre and ATKIS were harmonized in particular.

Due to the **catalogue harmonization** between ALKIS and ATKIS, the AAA application schema has common feature types that can also be used jointly in the procedural solutions of ALKIS and ATKIS. The diagram below shows the intersection of the feature types in the AFIS-ALKIS-ATKIS application schema.

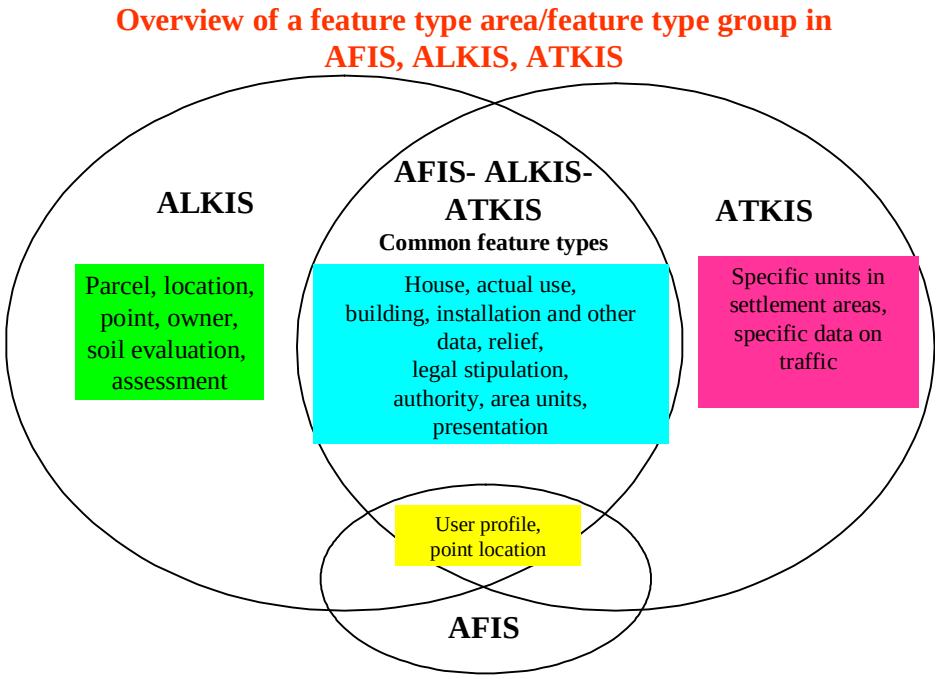



*Figure 5.3 - 2.: Common use of feature types*

As the diagram shows, there is a very close unification in the central area. For this area, the features with the properties (semantic and geometry) can be held and managed only once. Geometrical differences exist between ALKIS and ATKIS that can be compensated only by geometrically more precise details being held for ALKIS and ATKIS as a "basic geometry". Other geometries for the individual DLMs in ATKIS changed by the required degree of abstraction are created through generalisation. These features are then stored in the individual DLMs as presentation or map geometry objects.

The semantic harmonisation of the feature type area actual use between ALKIS and ATKIS could be fully reached. In terms of geometric expression, however, ATKIS takes into account of the line modelling of roads, paths, railways and waters. Due to the degree of abstraction in ATKIS, these surface objects in ALKIS are in some cases modelled only as line representations of surfaces. During the harmonisation process this situation in the designation of feature types (e.g. street axis instead of street) was particularly considered.

The medium-term aim of the AAA concept is to merge spatial reference (AFIS), real estate cadastre (ALKIS) and topography (ATKIS) to form **one** database that contains **no** redundant features. The common feature types are allowed in respect of model type for the real estate cadastre and for the basic DLM. A further harmonisation of the feature types is necessary with the target to reach a harmonised geometrical form (e.g. surface of streets). Also the core data between ALKIS and ATKIS must be matched, so that the standard outputs can be derived by a common database with common functions (e.g. filter encoding).

### 0.1.4 Contents of the ALKIS data in primary data base

The contents of the real estate cadastre are derived from the following main tasks:

- Description of the use and ownership on nationwide property for all real estate (parcels and buildings) and provision in a public register,
- Legal assurance of ownership as official directory of the site in accordance with § 2, subsection 2 of the GBO in conjunction with the land register,
- Spatial and real estate related basic information system for requirements placed on legal relations, the authorities and industry,
- Connection to the stipulations subject to public law for other technical areas through links in the real estate cadastre and
- Basis for property tax and ratable value determination.

### 0.1.5 Quality data and accuracies in the AAA technical schema

Quality data can be managed within the metadata, insofar as they relate to the database as a whole. They can, however, also be stored by feature type (e.g. point-related). Provided in the relevant feature type is a "Quality data" attribute type, which for the point location, for example, refers to data type "AX_DQPointLocation".

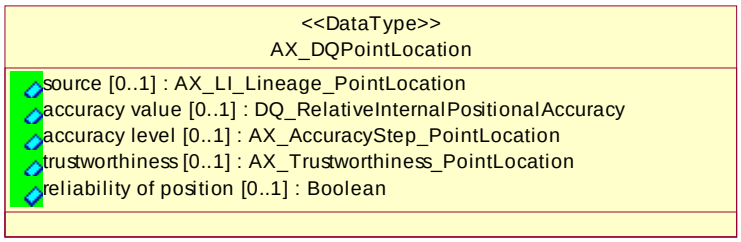



*Figure 5.3 - 3. : Quality data in ALKIS*

The "DQPointLocation" data type contains data on source, accuracy, trustworthiness and reliability of the information on a point location. The data on source are to be represented in conformity with the specifications in ISO 19115.

The AAA technical schema contains the geometric accuracies of the spatially referenced feature types in dependence of the various model types. The table below shows a summary of the most commonly used model types and their accuracies:

| Model type | Geometric accuracy | Comment |
|---|---|---|
| Digital real estate cadastre model (DLKM) | cm to dm | Dependent upon data origin (recording) |
| Digital basis landscape model (Basic DLM) | ± 3m | Applies only to essential elements: Nodes and line elements for the road and rail networks). Less accurate in all other cases. |
| Digital landscape model 50 (DLM 50) | ± 30m | Applies only to essential elements: Nodes and line elements for the road and rail networks). Less accurate in all other cases. |
| Digital landscape model 250 (DLM 250) | Unknown | No verification |
| Digital landscape model 1000 (DLM 1000) | Unknown | No verification |

*Figure 5.3 - 4.: Geometric accuracies for selected model types*

The association to technical data comprises the options for integration and linking of the data within and outside of ALKIS. For example, a parcel feature can be linked with the relevant cadastral field sheets and/or field sheet numbers. The data outside of the surveying authority (geographic technical data) can be linked to the ALKIS data in primary database using references. The AAA basic schema provides the necessary tools. These are transferred to all ALKIS technical feature types by way of inheritance and are then always available as options.

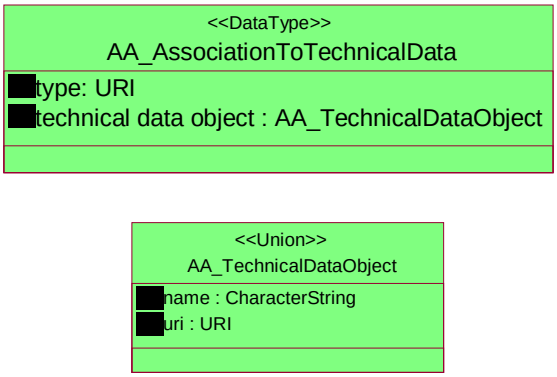



*Figure 5.3 - 5.: Modeling the technical data connection in UML*

Each feature in the ALKIS data in primary database can manage the "refers to outside" feature type, which conceals the "AA_AssociationToTechnicalData ". The "type" attribute type refers to an externally (outside of ALKIS) managed code list, in which the type of the association to technical data is specified (e.g. cadastral field sheet). The reference to the technical data object can consist either of a name and/or ID or from a URI and is managed in the "technical data object" attribute type. This also enables references to be made to other features in a technical database.

A definitive code list containing possible associations to technical data was not realized within ALKIS and shall be specified by each state. The following diagram shows various possible associations to technical data within a code list.

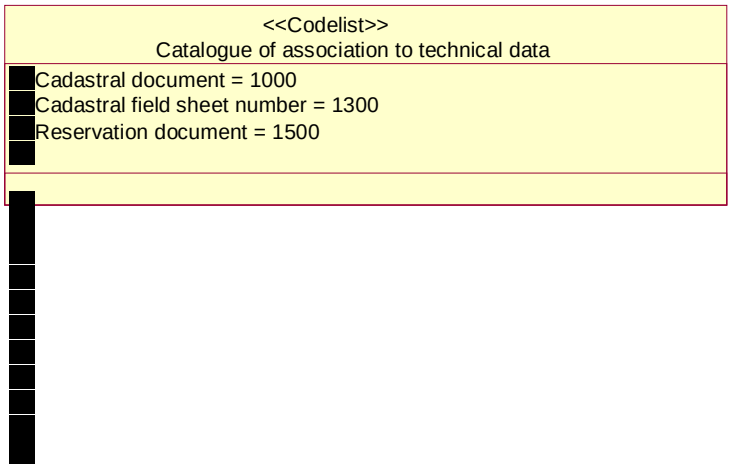



*Figure 5.3 - 6.: Examples of possible technical data connections*

### 0.1.6 Inheritance of properties from the AFIS-ALKIS-ATKIS Basic Schema

The basic schema contains generally valid data for creating feature types in the abstract class "AA_feature". By connecting the technical feature types in the ALKIS technical schema to AA_Feature via inheritance, these properties are transferred to the respective technical feature types. The table below contains a brief explanation on some selected properties for the basic schema, which is transferred to ALKIS feature types.

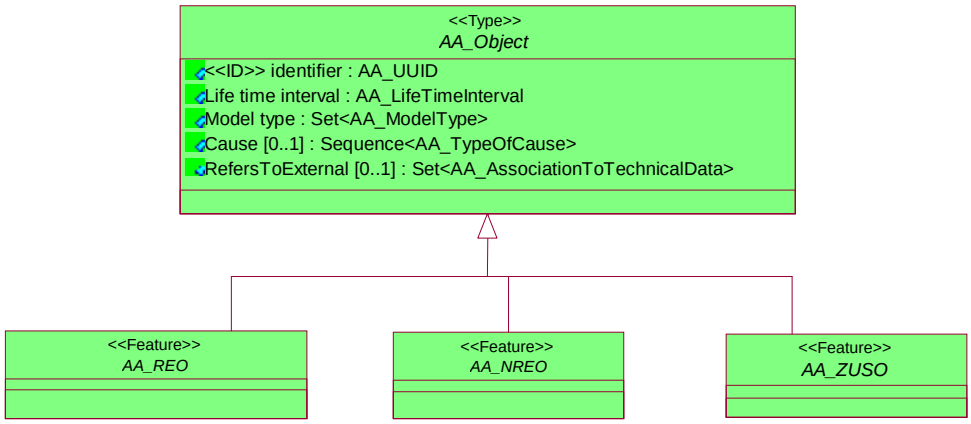



*Figure 5.3 - 7.: Modelling the basic class AA_Object in UML*

| **Properties of the basic class AA-Object** | |
|---|---|
| **Identifier** | **The identifier is the unique designation for a feature and will in the future replace the corresponding technical code (e.g. point code, building code). Therefore technical codes are optionally applied as far as they exist.** |

| | |
|---|---|
| **Refers to external** | **Can be used to create references to externally managed technical documents, e.g. cadastre document (see also internal chapter on association to technical data)** |
| **Cause** | **Indicates the technical reason for the emergence, revisions and demise of a feature. The update causes are defined at technical level and not in the basic schema.** |
| **Model type** | **The model type defines the technical association of the individual feature types to the various technical schemas. In ALKIS, all technical feature types in the database carry model type DLKM.** |
| **Lifetime interval** | **The lifetime interval indicates the system-related time of creation and expiry of an ALKIS feature in primary database.** |

*Figure 5.3 - 8.: Inheritance of properties from basic schema*

Further explanations on properties can be found from the basic schema.

### 0.1.7 Theme formation in ALKIS to illustrate identical geometry

The AFIS-ALKIS-ATKIS basic schema enables feature types with the following geometric and topological features to be described:

(1) Point, line or surface features containing topological information. Line and surface features are non-intersecting. The feature types are derived from the TA_* classes of the basic schema and share the geometry.

(2) Point, line or surface features, which (can) share reciprocally dependent lines or point geometries. The feature types are derived from the AG_* classes of the basic schema.

(3) Point, line or surface features containing reciprocally independent geometries. The feature types are derived from the AU_* classes of the basic schema.

To prove the identity of common geometries for objects of characteristics (1) and (2), use is made of the construct for the theme formation in the AFIS-ALKIS-ATKIS application schema, which is also anchored in the AFIS-ALKIS-ATKIS basic schema. One theme summarises all affected feature types. Topological relations and common geometric usage are possible only within a theme. The following 3 types of theme use the ALKIS technical schema:

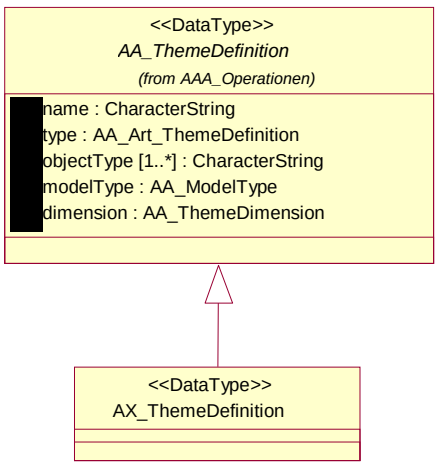
(1) Topological themes (TS_Theme)

(2) Themes with general, common point and line use (AA_PointLineTheme)

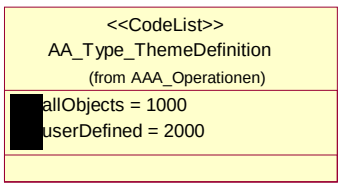
(3) Themes with individual, common point and line use (AA_PointLineTheme).

For features associated with theme types (1) and (2), database of geometrical identity is compulsory, for theme type (3) features, a decision as to whether geometric identities are explicitly set or not can be made at instance level (by the administrator involved in the collection process).

The names of the these and the associated feature types are defined in the application schema according to the specifications of data type AX_ThemeDefinition (in the NAS operations package) in what is referred to as an *instance-forming grade* (instances of AX_ThemeDefinition). For each theme, an additional model type is defined for which this theme applies. This rules out the possibility of common geometric use of features for various model types (e.g. ALKIS and ATKIS). The AX_ThemeDefinition class is inherited from the AA_ThemeDefinition class of the basic schema.




The table below shows the themes defined for the ALKIS application scope. It is not possible to form further identity combinations in the ALKIS application schema. A distinction is drawn between mandatory (value = 1000) and user-defined (value = 2000) theme formation for the "type" property of the "AX_ThemeDefinition" data type. In the case of mandatory theme formation, all indicated feature types are part of the theme and the feature types always share the geometries. The user-defined theme formation is set in the collection process, if from a technical point of view, an identity has to be expressed between two or several feature types, e.g. between parcel boundary and line of the house. The "dimension" attribute type indicates the dimensionality of the geometric complex, i.e. a distinction is drawn between point-line themes and topological surface themes. A dimension stated with a value of 1000 refers to a point-line theme; a value of 2000 indicates a topological theme.




## Themedeclarationen DLKM of the GeoInfoDok

| Themename | Themenart und -dimension | With the Theme associated feature types |
|---|---|---|
| **Topological themes** | | |
| "Parcel DLKM" | Topological themes, theme associates all features of the feature types | AX_Parcel, AX_SpecificParcelBoundary, AX_PointLocationTA |
| " SoilEvaluation DLKM" | Topological theme, theme associates all features of the feature types | AX_ AX_SoilEvaluation |
| "area DLKM" | Topological theme, theme associates all features of the feature types | AX_MunicipalArea |
| **Themes with general, common point line use** | | |
| " House DLKM" | Point-line-theme, theme associates all features of the feature types | AX_House, AX_PartOfHouse, AX_SpecificHouseLine, AX_RidgeLine, AX_PointLocationAG |
| " ActualUse DLKM (ground area)" | Topological theme, theme associates all features of the feature types | AX_Basin, AX_StandingWater, AX_Sea, AX_FlowingWater, AX_ResidentialAreaSurface, AX_IndustrialAndCommercialArea, AX_Dump, AX_MiningOperation, AX_OpencastMinePitQuarry, AX_AreaWithSpecificFunctionalCharacteristic, AX_SportLeisureAndRecreationArea, AX_Cemetery, AX_CombinedUseArea, AX_Agriculture, AX_Wood, AX_Copse, AX_Heath, AX_Moor, AX_Marsh, AX_UnproductiveArea, AX_RoadTraffic, AX_Place, AX_Path, AX_RailTraffic, AX_AirTraffic, AX_Navigation |
| " buildings DLKM " | Point-line-theme, theme associates all features of the feature types | AX_Tower, AX_BuildingOrUnitForIndustryAndCommerce, AX_ReservoirStorageBuilding, AX_BuildingOrUnitForSportLeisureAndRecreation, AX_HistoricalBuildingOrHistoricalInstallation, AX_OtherBuildingOrOtherInstallatio, AX_InstallationInPublicAreas, AX_BuildingInTrafficArea, AX_BuildingInWaterArea, AX_PointLocationAG |
| "embamkment DLKM " | Point-line-theme, theme associates all features of the feature types | AX_Embankmentsurface, AX_GroundEdge |
| "Assessment DLKM" | Point-line-theme, theme associates all features of the feature types | AX_Assessment |
| " Daysection DLKM" | Point-line-theme, theme associates all features of the feature types | AX_Daysection |
| **Individuel theme formation** | | |
| "Parcel and Houses DLKM" | Point-line-theme associates selected features of the feature types (individual use) | AX_Parcel, AX_SpecificParcelBoundary, AX_PointLocationTA, AX_House, AX_PartOfHouse, AX_SpecificHouseLine, AX_PointLocationAG |
| "Tatsächliche Nutzung DLKM (overlaping surface)" | Point-line-theme associates selected features of the feature types (individual use) | AX_Basin, AX_StandingWater, AX_Sea, AX_FlowingWater, AX_ResidentialAreaSurface, |

| Themename | Themenart und -dimension | With the Theme associated feature types |
|---|---|---|
| | | AX_IndustrialAndCommercialArea, AX_Dump, AX_MiningOperation, AX_OpencastMinePitQuarry, AX_AreaWithSpecificFunctionalCharacteristic, AX_SportLeisureAndRecreationArea, AX_Cemetery, AX_CombinedUseArea, AX_Agriculture, AX_Wood, AX_Copse, AX_Heath, AX_Moor, AX_Marsh, AX_UnproductiveArea, AX_RoadTraffic, AX_Place, AX_Path, AX_RailTraffic, AX_AirTraffic, AX_Navigation |
| "Actual Use DLKM (Level overlaping)" | Point-line-theme associates selected features of the feature types (individual use) | AX_Basin, AX_StandingWater, AX_Sea, AX_FlowingWater, AX_ResidentialAreaSurface, AX_IndustrialAndCommercialArea, AX_Dump, AX_MiningOperation, AX_OpencastMinePitQuarry, AX_AreaWithSpecificFunctionalCharacteristic, AX_SportLeisureAndRecreationArea, AX_Cemetery, AX_CombinedUseArea, AX_Agriculture, AX_Wood, AX_Copse, AX_Heath, AX_Moor, AX_Marsh, AX_UnproductiveArea, AX_RoadTraffic, AX_Place, AX_Path, AX_RailTraffic, AX_AirTraffic, AX_Navigation |
| "Parcel and actual use DLKM" | Point-line-theme associates selected features of the feature types (individual use) | AX_Parcel, AX_ AX_SpecificParcelBoundary, AX_Basin, AX_StandingWater, AX_Sea, AX_FlowingWater, AX_ResidentialAreaSurface, AX_IndustrialAndCommercialArea, AX_Dump, AX_MiningOperation , AX_OpencastMinePitQuarry, AX_AreaWithSpecificFunctionalCharacteristic, AX_SportLeisureAndRecreationArea, AX_Cemetery, AX_CombinedUseArea, AX_Agriculture, AX_Wood, AX_Copse, AX_Heath, AX_Moor, AX_Marsh, AX_UnproductiveArea, AX_RoadTraffic, AX_Place, AX_Path, AX_RailTraffic, AX_AirTraffic, AX_Navigation |
| "Pracel and dams DLKM " | Point-line-theme associates selected features of the feature types (individual use) | AX_Parcel, AX_DamWallDyke |
| "Parcel and Stipulation governed by public law DLKM" | Point-line-theme associates selected features of the feature types (individual use) | AX_Parcel, AX_SpecificParcelBoundary, AX_ClassificationAccordingToRoadLaw, AX_OtherStipulationsAccordingToRoadLaw AX_ClassificationAccordingToWaterLaw, AX_OtherStipulationsAccordingToWaterLaw, AX_NatureEnvironmentOrSoilConservationLaw, |

| Themename | Themenart und -dimension | With the Theme associated feature types |
|---|---|---|
| | | AX_BuildingSpaceOrLandRegulationLaw, AX_HistoricalMonumentProtection, AX_ForestryLaw, AX_OtherLaw , AX_ProtectionZone |
| "Parcel and SoilEvaluation DLKM" | Point-line-theme associates selected features of the feature types (individual use | AX_Parcel, AX_SpecificParcelBoundary AX_SoilEvaluation, AX_Assessment |

*Figure 5.3 - 9.: Example - theme formation in ALKIS*

The use of common line geometries calls for the formation of so-called "split points" at the geometrical interface points (separation)

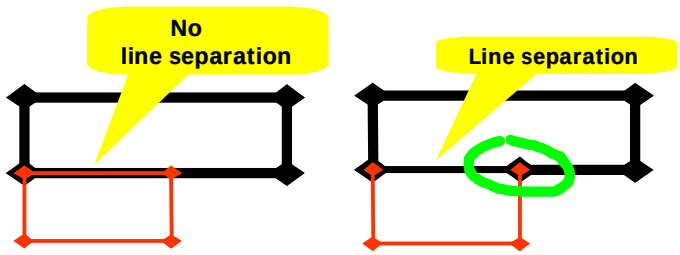



*Figure 5.3 - 10.: Separation based on creation of split points*

In the event that a geometrically identity has to be individually marked in ALKIS, the parcel boundary has to be split into several line sections (GM_Curve) in accordance with the technical specification. A 1..1 relation always exists between the line sections and the edges of the parcel. The identities, i.e. the split points and the theme association are set in the collection process. The diagram below explains the facts:

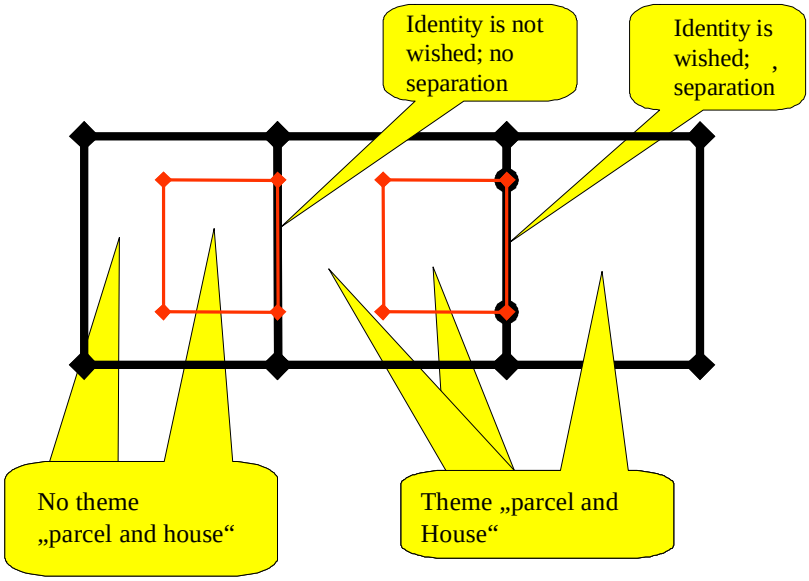



*Figure 5.3 - 11.: Theme association for instance themes*

The example below is to express the identity between a house and the corresponding parcel. For this, in the data collection process must set the theme association. Thus, a building point separates a parcel boundary such that the existing edge is split into two edges. Congruent with the edges, a line is formed at the geometric level. Between the edges is a so-called “pseudo node”, which is not part of a point location and therefore a boundary point. The node is represented at geometric level by a point (GM_Point).

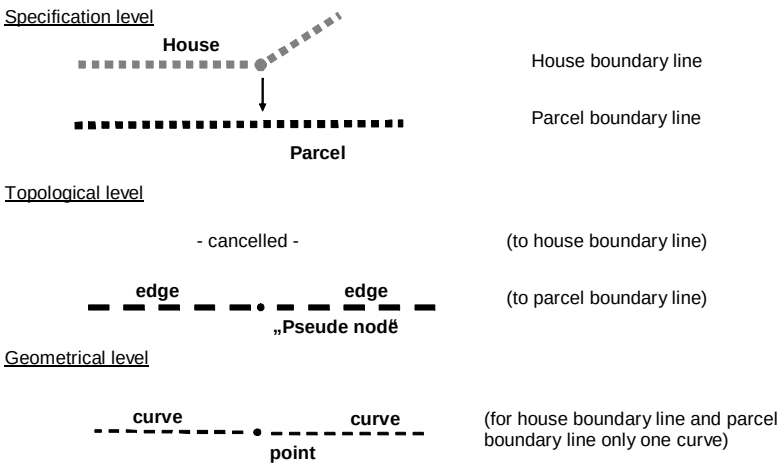



*Figure 5.3 - 12.: Example for proving identities in ALKIS*

It is necessary to separate edges, as with many themes (e.g. parcel and actual use), both participating features manage topological elements and following separation, completeness of the topology must be restored. This can occur only through reference to the identical geometry, which in the case of actual use, must be a GM_OrientableCurve and as a result of the common theme applies also for the parcel. At topological level, reciprocally independent elements are managed for the corresponding feature instances. The diagram below shows the descriptive facts.

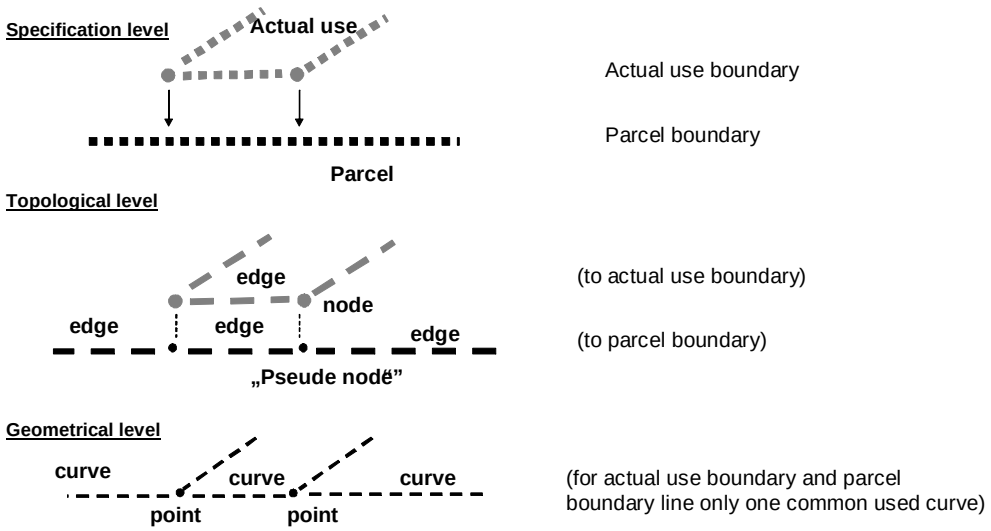



*Figure 5.3 - 13.: Example of the individual instance theme "actual use - parcel"*

Another kind of building an identity can be realised with the parcel boundary is separated by a boundary point after setting a monument. The geometry of this point is identical with the geometry of a house point. In this case the boundary point is not a pseudo node but a node of a parcel face.

The geometry is always output redundant through the NAS. The "non-genuine split points" (= split points with GM_Point) are also transferred. They must also be detected as such as they lie on the parcel boundary yet belong to no ZUSO boundary point. If in an accepting system the topology is to be restored, the corresponding structures are derived via geometry comparison and/or geometric identity.

Each AX_user result proves the themes used in the AX_Metadata_use result.

## 0.2 Directory of ALKIS feature type areas with feature type groups and feature types

The table below provides an overview of the feature types, categories and data types modelled in ALKIS with the associated identifiers. For each spatially-referenced feature, the spatial reference type is also indicated. The meaning of this spatial reference type is shown by the common basic schema or the explanations for the individual feature types.

The listed feature types and data types all carry model type "DLKM" or "DKKM". Feature types with other model types from the AFIS-ALKIS-ATKIS technical schema are therefore not listed.

| **Feature type area**<br>**Feature type group**<br>**Feature type** | **Identifier** | **Feature type** | **Spatial reference type (only in combination with REO)** |
|---|---|---|---|
| **Feature type area "parcel, location, points"** | | | |
| | | | |
| Data on the parcel | | | |
| AX_Parcel | 11001 | REO | TA_MultiSurfaceComponent |
| AX_SpecificParcelBoundary | 11002 | REO | TA_CurveComponent |
| AX_BoundaryPoint | 11003 | ZUSO | |
| AX_Parcel_coreData | 11004 | Abstract class | |
| AX_ParcelNumber | 11005 | Data type | |
| AX_OtherProperties_parcel | 11006 | Data type | |
| | | | |
| Data on location | | | |
| AX_LocationDescriptionWithoutHouseNumber | 12001 | NREO | |
| AX_LocationDescriptionWithHouseNumber | 12002 | NREO | |
| AX_LocationDescriptionWithPseudoNumber | 12003 | NREO | |
| AX_LocationDescription | 12004 | Data type | |
| AX_Location | 12005 | Abstract class | |
| | | | |
| Data on the network point | | | |
| AX_MinorControlPoint | 13001 | ZUSO | |
| AX_SecurityPoint | 13002 | ZUSO | |
| AX_OtherSurveyingPoint | 13003 | ZUSO | |
| AX_NetworkPoint | 13004 | Abstract class | |
| | | | |
| Data on the point location | | | |
| AX_PointLocation | 14001 | Abstract class | |
| AX_PointLocationAG | 14002 | REO | AG_PointObject |
| AX_PointLocationAU | 14003 | REO | AU_PointObject |
| AX_PointLocationTA | 14004 | REO | TA_PointComponent |

| **Feature type area**<br>**Feature type group**<br>**Feature type** | **Identifier** | **Feature type** | **Spatial reference type (only in combination with REO)** |
|---|---|---|---|
| AX_DQPointLocation | 14006 | Data type | |
| | | | |
| Update certifcation | | | |
| AX_UpdateCertifcationCoverSheet | 15001 | NREO | |
| AX_UpdateEvent | 15002 | NREO | |
| AX_TransitionSurface | 15003 | NREO | |
| AX_UpdateNumber | 15004 | Data type | |
| AX_PrivateExtract | 15005 | Data type | |
| | | | |
| Data on reservation | | | |
| AX_Reservation | 16001 | NREO | |
| AX_PointIdentifierDeclined | 16002 | NREO | |
| AX_PointIdentifierComparative | 16003 | NREO | |
| | | | |
| Data on history | | | |
| AX_HistoricalParcel | 17001 | REO | AU_SurfaceObject |
| AX_HistoricalParcelALB | 17002 | NREO | |
| AX_HistoricalParcelWithoutSpatialReference | 17003 | NREO | |
| AX_Register_HistoricalParcel register | 17004 | Data type | |
| AX_Register_HistoricalParcelALB | 17005 | Data type | |
| | | | |
| Feature type area "owner" | | | |
| | | | |
| Personal and land register data | | | |
| AX_Person | 21001 | NREO | |
| AX_GroupOfPersons | 21002 | NREO | |
| AX_Address | 21003 | NREO | |
| AX_Management | 21004 | NREO | |
| AX_Representation | 21005 | NREO | |
| AX_NameNumber | 21006 | NREO | |
| AX_RegisterSheet | 21007 | NREO | |
| AX_RegisterNumber | 21008 | NREO | |
| AX_Proportion | 21009 | Data type | |
| AX_DQNoDataCollection | 95102 | Data type | |
| | | | |
| Feature type area "house" | | | |
| | | | |
| Data on the house | | | |
| AX_House | 31001 | REO | AG_SurfaceObject |
| AX_PartOfHouse | 31002 | REO | AG_SurfaceObject |
| AX_SpecificHouseLine | 31003 | REO | AG_LineObject |
| AX_RidgeLine | 31004 | REO | AG_LineObject |
| AX_SpecificHousePoint | 31005 | ZUSO | |
| AX_Use_House | 31006 | Data | |

| **Feature type area**<br>**Feature type group**<br>**Feature type** | **Identifier** | **Feature type** | **Spatial reference type (only in combination with REO)** |
|---|---|---|---|
| | | type | |
| | | | |
| Feature type area "actual use" | | | |
| AX_ActualUse | 40001 | Abstract class | |
| | | | |
| Residential area | | | |
| AX_ResidentialAreaSurface | 41001 | REO | TA_SurfaceComponent |
| AX_IndustrialAndCommercialArea | 41002 | REO | TA_SurfaceComponent |
| AX_Dump | 41003 | REO | TA_SurfaceComponent |
| AX_MiningOperation | 41004 | REO | TA_SurfaceComponent |
| AX_OpencastMinePitQuarry | 41005 | REO | TA_SurfaceComponent |
| AX_CombinedUseArea | 41006 | REO | TA_SurfaceComponent |
| AX_AreaWithSpecificFunctionalCharacteristic | 41007 | REO | TA_SurfaceComponent |
| AX_SportLeisureAndRecreationArea | 41008 | REO | TA_SurfaceComponent |
| AX_Cemetery | 41009 | REO | TA_SurfaceComponent |
| | | | |
| Traffic | | | |
| AX_RoadTraffic | 42001 | REO | TA_SurfaceComponent |
| AX_Path | 42006 | REO | TA_SurfaceComponent |
| AX_Place | 42009 | REO | TA_SurfaceComponent |
| AX_RailTraffic | 42010 | REO | TA_SurfaceComponent |
| AX_AirTraffic | 42015 | REO | TA_SurfaceComponent |
| AX_Navigation | 42016 | REO | TA_SurfaceComponent |
| | | | |
| Vegetation | | | |
| AX_Agriculture | 43001 | REO | TA_SurfaceComponent |
| AX_Wood | 43002 | REO | TA_SurfaceComponent |
| AX_Copse | 43003 | REO | TA_SurfaceComponent |
| AX_Heath | 43004 | REO | TA_SurfaceComponent |
| AX_Moor | 43005 | REO | TA_SurfaceComponent |
| AX_Marsh | 43006 | REO | TA_SurfaceComponent |
| AX_UnproductiveArea | 43007 | REO | TA_SurfaceComponent |
| | | | |
| Water | | | |
| AX_FlowingWater | 44001 | REO | TA_SurfaceComponent |
| AX_Basin | 44005 | REO | TA_SurfaceComponent |
| AX_StandingWater | 44006 | REO | TA_SurfaceComponent |
| AX_Sea | 44007 | REO | TA_SurfaceComponent |
| | | | |
| Feature type area “buildings, installations and other data” | | | |
| AX_DQWithDataCollection | 95104 | Data type | |
| | | | |
| Buildings and installations in residential areas | | | |
| AX_BuildngsInstallationsAndOtherData | 50001 | Abstract class | |
| AX_Tower | 51001 | REO | AG_Object |
| AX_BuildingOrUnitForIndustryAndCommerce | 51002 | REO | AG_Object |

| **Feature type area**<br>**Feature type group**<br>**Feature type** | **Identifier** | **Feature type** | **Spatial reference type (only in combination with REO)** |
|---|---|---|---|
| AX_ReservoirStorageBuilding | 51003 | REO | AG_Feature |
| AX_TransportUnit | 51004 | REO | AU_Object |
| AX_Line | 51005 | REO | AU_LineObject |
| AX_BuildingOrUnitForSportLeisureAndRecreation | 51006 | REO | AG_Object |
| AX_HistoricalBuildingOrHistoricalInstallation | 51007 | REO | AG_Object |
| AX_MedicinalSpringGasSource | 51008 | REO | AU_PointObject |
| AX_OtherBuildingOrOtherInstallation | 51009 | REO | AG_Object |
| AX_InstallationInPublicAreas | 51010 | REO | AG_Object |
| AX_SpecificBuildingPoint | 51011 | ZUSO | |
| | | | |
| Buildings, units and installations for transport | | | |
| AX_BuildingInTrafficArea | 53001 | REO | AG_Object |
| AX_RoadTrafficUnit | 53002 | REO | AU_Object |
| AX_RoadPathSteepTrack | 53003 | REO | AU_Object |
| AX_RailTrafficUnit | 53004 | REO | AU_Object |
| AX_CableRailwaySuspensionRailway | 53005 | REO | AU_LineObject |
| AX_Track | 53006 | REO | AU_Object |
| AX_AirTrafficUnit | 53007 | REO | AU_Object |
| AX_InstallationsForNavigation | 53008 | REO | AU_Object |
| AX_BuildingInWaterArea | 53009 | REO | AG_Object |
| | | | |
| Specific vegetation attribute | | | |
| AX_VegetationAttribute | 54001 | REO | AU_Object |
| | | | |
| Specific features of water | | | |
| AX_WaterAttribute | 55001 | REO | AU_Object |
| AX_SubordinateWater | 55002 | REO | AU_Object |
| | | | |
| Specific data on water | | | |
| AX_WaterLevel | 57001 | REO | AU_PointObject |
| AX_NavigationLineFerryTransport | 57002 | REO | AU_LineObject |
| | | | |
| Feature type area "relief" | | | |
| | | | |
| Relief forms | | | |
| AX_EmbankmentCliff | 61001 | REO | AG_SurfaceObject |
| AX_Embankmentsurface | 61002 | REO | AG_SurfaceObject |
| AX_DamWallDyke | 61003 | REO | AU_Object |
| AX_CaveEntrance | 61005 | REO | AU_PointObject |
| AX_RocksLumpOfRockNeedleRock | 61006 | REO | AU_Object |
| AX_Dune | 61007 | REO | AU_SurfaceObject |
| AX_ContourLine | 61008 | REO | AU_LineObject |
| AX_SpecificTopographicPoint | 61009 | ZUSO | |
| | | | |
| Feature area “legal stipulations, area units, catalogues” | | | |
| | | | |
| Stipulations subject to public law and other stipulations | | | |

| **Feature type area**<br>**Feature type group**<br>**Feature type** | **Identifier** | **Feature type** | **Spatial reference type (only in combination with REO)** |
|---|---|---|---|
| AX_ClassificationAccordingToRoadLaw | 71001 | REO | AG_Object |
| AX_OtherStipulationsAccordingToRoadLaw | 71002 | REO | AG_Object |
| AX_ClassificationAccordingToWaterLaw | 71003 | REO | AG_SurfaceObject |
| AX_OtherStipulationsAccordingToWaterLaw | 71004 | REO | AG_SurfaceObject |
| AX_ProtectedAreaAccordingToWaterLaw | 71005 | ZUSO | |
| AX_NatureEnvironmentOrSoilConservationLaw | 71006 | REO | AG_Object |
| AX_ProtectedAreaAccordingToNatureEnvironmentOrSoilConservationLaw | 71007 | ZUSO | |
| AX_BuildingSpaceOrLandRegulationLaw | 71008 | REO | AG_SurfaceObject |
| AX_HistoricalMonumentProtection | 71009 | REO | AG_Object |
| AX_ForestryLaw | 71010 | REO | AG_SurfaceObject |
| AX_OtherLaw | 71011 | REO | AG_SurfaceObject |
| AX_ProtectionZone | 71012 | REO | AG_SurfaceObject |
| | | | |
| Soil evaluation, assessment | | | |
| AX_SoilEvaluation | 72001 | REO | TA_MultiSurfaceComponent |
| AX_SampleRegionalSampleAndComparisonSection | 72002 | REO | AU_Object |
| AX_TrenchOfSoilEvaluation | 72003 | REO | AU_PointObject |
| AX_Assessment | 72004 | REO | AG_SurfaceObject |
| AX_IndexTrench | 72005 | Data type | |
| AX_ Daysection | 72006 | REO | AG_SurfaceObject |
| | | | |
| Catalogues | | | |
| AX_NationalState | 73001 | NREO | |
| AX_FederalState | 73002 | NREO | |
| AX_GovernmentDistrict | 73003 | NREO | |
| AX_DistrictOrRegion | 73004 | NREO | |
| AX_Municipality | 73005 | NREO | |
| AX_MunicipalitySection | 73006 | NREO | |
| AX_CadastralDistrict | 73007 | NREO | |
| AX_CadastralDistrictSectionOrFields | 73008 | NREO | |
| AX_AdministrativeCommunity | 73009 | NREO | |
| AX_RegisterSheetDistrict | 73010 | NREO | |
| AX_Department | 73011 | NREO | |
| AX_Association | 73012 | NREO | |
| AX_LocationDescriptionCatalogueEntry | 73013 | NREO | |
| AX_MunicipalityCode | 73014 | Data type | |
| AX_CatalogueEntry | 73015 | Abstract class | |
| AX_RegisterSheetDistrictCode | 73016 | Data type | |
| AX_DepartmentCode | 73017 | Data type | |
| AX_FederalStateCode | 73018 | Data type | |
| AX_CadastralDistrictCode | 73019 | Data | |

| **Feature type area**<br>**Feature type group**<br>**Feature type** | **Identifier** | **Feature type** | **Spatial reference type (only in combination with REO)** |
|---|---|---|---|
| | | type | |
| AX_CadastralDistrictSectionOrFieldsCode | 73020 | Data type | |
| AX_GovernmentDistrictCode | 72021 | Data type | |
| AX_DistrictCode | 73022 | Data type | |
| AX_CodedLocationDescription | 73023 | Data type | |
| | | | |
| Geographical area units | | | |
| AX_Domicile | 74005 | REO | AU_PointObject |
| | | | |
| Administrative area units | | | |
| AX_BuildingBlock | 75001 | REO | AU_SurfaceObject |
| AX_EconomicUnit | 75002 | ZUSO | |
| AX_MunicipalArea | 75003 | REO | TA_MultiSurfaceComponent |
| AX_Area | 75010 | Abstract class | |
| | | | |
| “User profile” feature type area | | | |
| | | | |
| User profile | | | |
| AX_User | 82001 | NREO | |
| AX_UserGroup | 82002 | Abstract class | |
| AX_UserGroupWithAccessMonitoring | 82003 | NREO | |
| AX_UserGroupNBA | 82004 | NREO | |
| AX_TemporalRange | 82005 | Data type | |
| | | | |
| “Migration” feature type area | | | |
| | | | |
| Migration objects | | | |
| AX_HouseFormation | 91001 | REO | AU_Line object |
| AX_TopographicalLine | 91002 | REO | AU_Line object |

*Figure 5.3 - 14.: ALKIS feature types*

# 1 Feature type area “parcel, location, point”

The feature type area of “parcel, location, point” consists of the following feature type groups:

- “Data on the parcel”
- “Data on location”
- “Data on the network point”
- “Data on the point location”
- “Update database document”
- “Data on reservation”
- “Data on history”
- “Data on control points of state surveying”

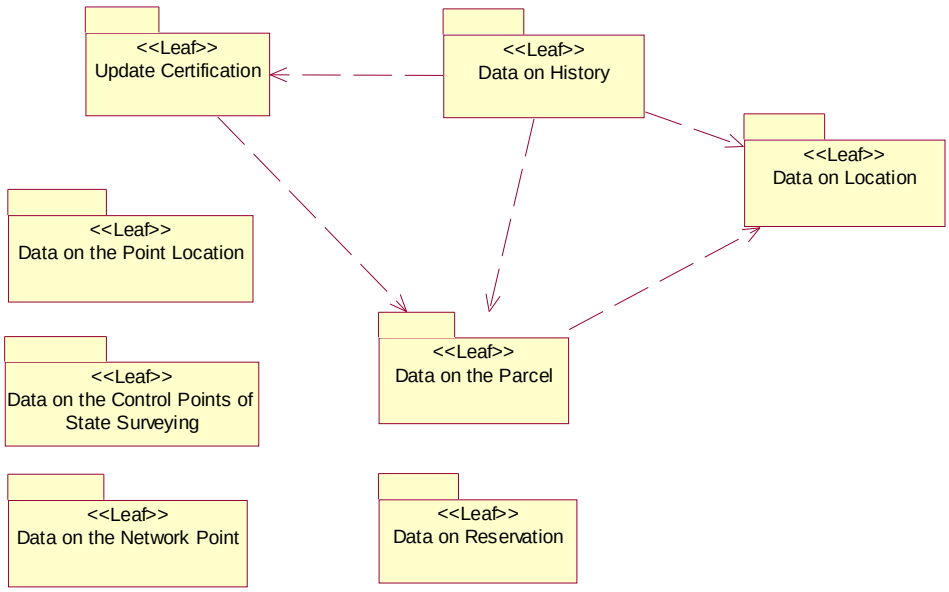



*Figure 5.3 - 15.: Feature type area "parcel, location, point"*

**Control points for state surveying**

The control points feature type group for state surveying is part of the AFIS-ALKIS-ATKIS technical schema and due to its close technical relation to the point location, is included in the “parcel, location, point” feature type area. The feature types of this feature type groups contain the model type for AFIS (DFGM) and are therefore not explained in any further detail here.

## 1.1 Feature type group “data on the parcel”

The “data on the parcel” feature type group are described in more detail below. The group consists essentially of the parcel, specific parcel boundary, boundary point feature types and also of the abstract, top class parcel core data. The individual correlations to the geometric / topology levels are described schematically in the overview below. The parcel theme consisting of parcel, specific parcel boundary, boundary point are illustrated together with the corresponding geometry / topology elements defined in the basic schema. A distinction is drawn between technical features and abstract classes.

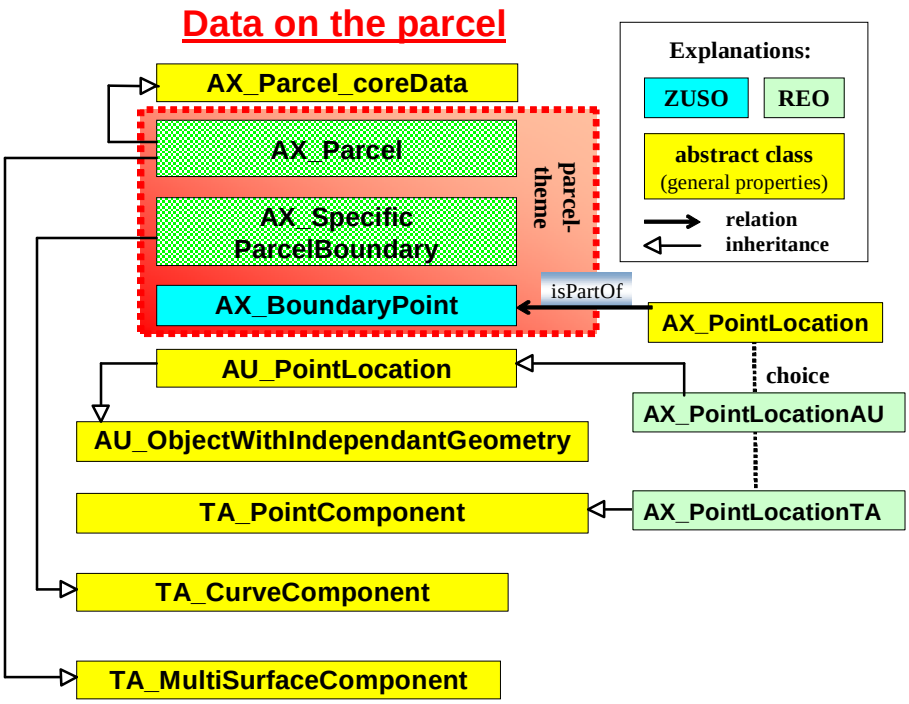



*Figure 5.3 - 16.: Model schema on “data on the parcel”*

The following are shown:

(1) A boundary point, which belongs to the common topology schema “parcel, specific parcel boundary and boundary point, must always inherit from TA_PointComponent.

(2) The parcel inherits from TA_MultiSurfaceComponent. The parcel can thus consist of several non-coherent part surfaces (over-hook parcels).

(3) A boundary point can also have a geometry independent of the actual marked boundary point (indirectly marked boundary point).

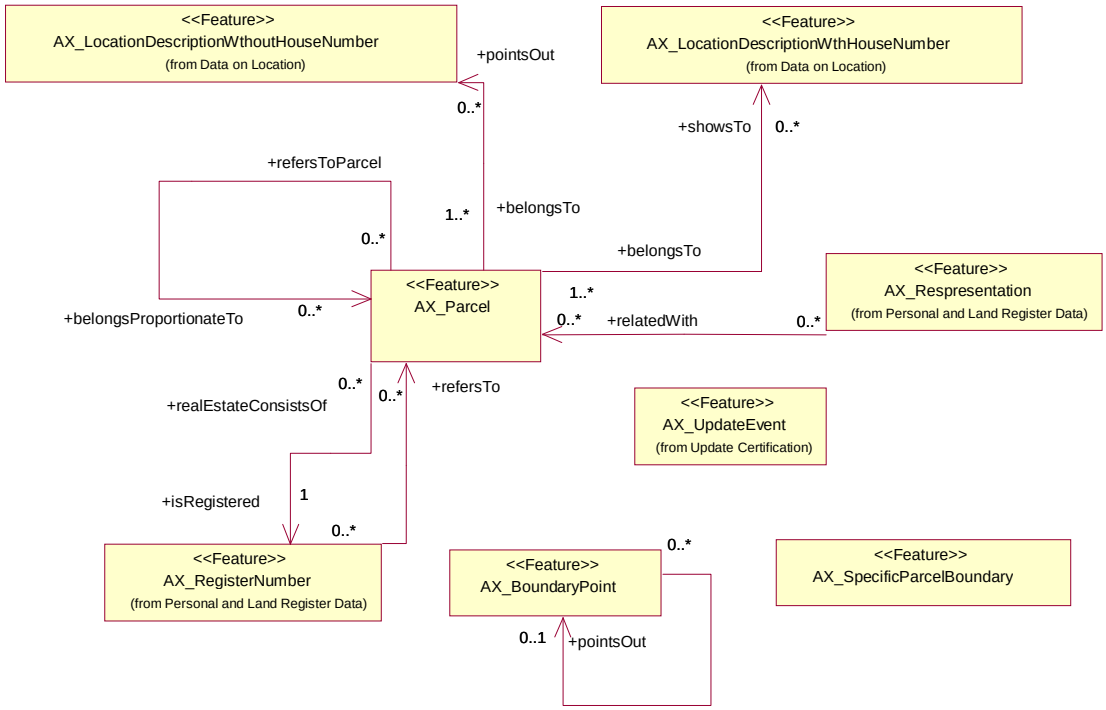



*Figure 5.3 - 17.: Feature type group for data on the parcel in UML*

The diagram shows in overview format the feature types that relate to the parcel and which partially originate from other feature type groups.

### 1.1.1 Feature type “parcel”

The features of the parcel are described as a cadastral register unit to prove the ground surfaces in the real estate cadastre by the parcel feature type. Parcel related properties (self-related, externally-related), which are of a generally valid nature and can be transferred according to the technical conditions to other feature types, e.g. “historical parcel”, are grouped based on technical modelling viewpoints in UML into an abstract class, the parcel core data. The corresponding feature type carries the designation “parcel core data”.

As a spatially referenced elementary feature, the parcel technical feature represents within ALKIS a central element with the technically defined relations with the following object types:

- “Register number”
- “Location description with house number”
- “Location description without house number”
- “Update event”

- “Representation”.

The correlations can be taken from the UML graphic in Section 1.1.

The attribute type “responsible agency” is used if the administrative district of a department cannot be derived through a cadastral district. Administrative districts of cadastre offices are usually described through districts. Other authorities often have other administrative district structures.

The relations to the feature types of the “actual use” feature type area and also the “stipulation governed by public law and other stipulations” feature type group and “soil evaluation, assessment” are enabled exclusively through the spatial reference.

The self-related attribute types for this feature type are derived partially from the abstract top class “AX_parcel_Coredata”, while the geometric and topological features are transferred from the abstract feature class “TA_MultiSurfaceComponent” of the AAA basic schema. With this feature type it is possible to build geometrically and topologically separated parcel surfaces (overhook parcels). A mesh may transiently consist of several steep parcel surfaces. The “parcel designation” attribute type is feature-forming. The parcel participates in the “parcel” obligated for the managing topological theme of “parcel”, which guarantees that all feature types associated with this theme share the geometric properties. This means that the coordinates of the boundary points are identical to the coordinates of the start and end points of the specific parcel boundary and the coordinates of the base points of the parcel surface. Further details are provided in the theme definition below.

```
<AX_ThemeDeclaration>
  <name>Parcel</name>
  <type>1000</type>
  <featureType>AX_Parcel</featureType>
  <featureType>>AX_SpecificParcelBoundary</featureType>>
  < featureType >AX_PointLocationTA</featureType >
  <modelType>DLKM</modelType>
  <dimension>2000</dimension>
</AX_ThemeDeclaration>

      type=1000 means compulsory theme
      dimension=2000 means topological surface theme
```

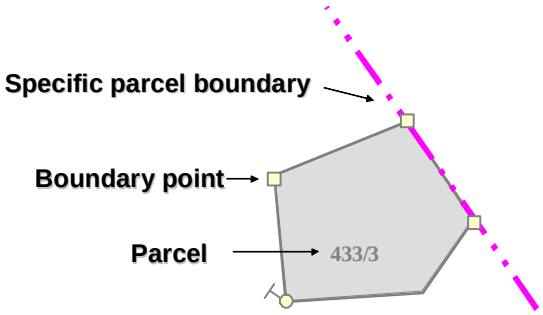



*Figure 5.3 - 18.: Parcel theme in UML and the corresponding graphic representation*

The specific externally-related properties (relation types) are described in the feature. Relations are explained in more detail below:

***Relation type: "isRegistered" and inverse relation type "estateConsistsOf"***

The parcel uses the "isRegistered" relation to create the association with the land register data for the register number feature type. The counter relation "estateConsistsOf" specifies the parcels, which form a real estate in the legal sense. It must be present for register types "real estate", "split real estate according to the flat ownership law" and "split real estate in accordance with § 3, subsection 4 of the land register act" as long as no feature AX_HistoricalParcelWithoutSpatialReference above the relation type "IsRegistered" refers to the AX_RegisterNumber. The information regarding conformity with the land register cannot be obtained solely through the "isRegistered" relation for the register number feature type, as real estate can also be registered in the cadastre. In addition, the "is part of" relation from the register number to the register sheet must therefore be evaluated. If the register number is managed on a register sheet of type "land register sheet", the real estate is posted in the land register.

This and other links of the parcel to other features demonstrate that the "parcel" feature must be present in digital format and with its spatial relation for the management of ALKIS.

***Relation type: "pointsOut" and inverse relation type "belongsTo"***

The "pointsOut" relation enables a parcel to have one or several local descriptions, in the form of a named place, a water designation and/or street designation without house number. The counter relation "belongsTo" indicates that the location description is valid for one or several parcels.

***Relation type: "belongsProportionateTo"***

The relation "belongsProportionateTo" indicates residents rights (residents path, residents moat or residents stream) that are not registered to the land register. This relation is created as a recursive relation, because proportions of one parcel belong to a different parcel. It occurs only with parcels that exhibit a relation to a register type: "residents path", "residents moat" or "residents stream". The model is shown in the UML diagram below, according to which, for example, the parcel of a resident path belongs proportionately to one or several parcels.

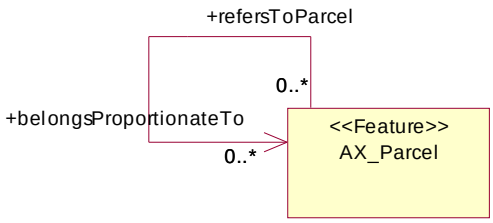


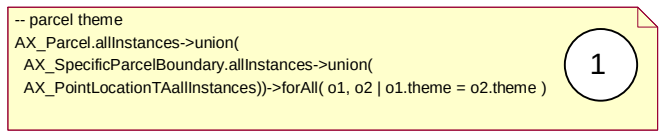

*Figure 5.3 - 19.: AX_Parcel – Relation "belongsProportionateTo" from UML*

### Spatial reference

The parcel inherits properties from the "TA_MultiSurfaceComponent" basic class. Neighbouring associations can thus be created through evaluations. If a parcel presently consists of isolated parcel components, it should in future be separated into independent parcels. As part of the migration process, spatially separate parcel components are approved for a transitional period. In this case, the parcel consists of at least two parcel components.

### OCL Code Interpretation

The consistency conditions for the parcel technical feature are described in the OCL Code of the UML reference schema as follows:



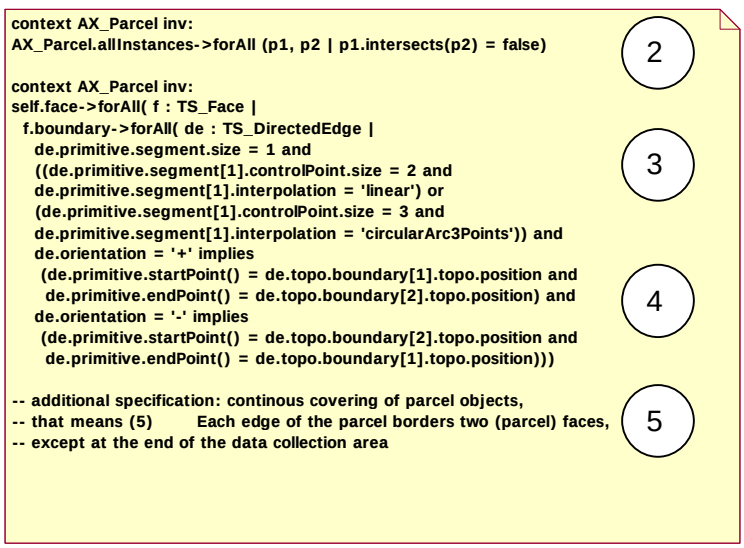




*Figure 5.3 - 20.: AX_Parcel – conditions in OCL*

The text to the left of the circled figures means:

(1) To show necessarily geometric identity (see Section 0.1.8) between parcel, specific parcel boundary and point location TA (ZUSO boundary point), an appropriate theme formation (parcel theme) has been modelled.

(2) No intersection between two parcels.

(3) Each line segment is determined by precisely two positions.

(4) The lines and the arcs defined by three points are approved as interpolation types. They are oriented. Continuous and intersection-free covering of features and feature parcel feature type.

(5) Each edge of the parcel borders two (parcel) faces, except at the end of the data collection area.

### 1.1.2 Feature type “specific parcel boundary”

The specific parcel boundary serves to technically differentiate between specific types of boundaries. It is formed only when specific technical properties are present, see AA “type of parcel boundary”, e.g. "disputed boundary", district boundary. It inherits properties from the TA_CurveComponent basic class and can therefore consist of various interpolation types (line, circle). Due to the theme definition, it is geometrically identical with the definition geometry of a “parcel” feature. The technical schema therefore contains no explicit relation. In the standard case of a conventional parcel boundary without specific properties, no technical feature types exist in ALKIS. The non-specific parcel boundary is juts are part of the parcel area. When illustrating area units in the form of the specific parcel boundary (e.g. cadastral district, fields etc.), the cardinality [1..*] guarantees for attribute type “type of parcel boundary” that all functions which unify a parcel boundary can be itemised explicitly within an object (multiplicity). The possibility of a hierarchical approach wherein only the highest function is illustrated is therefore ruled out.

In the case of attribute type “type of parcel boundary”, for value types fields boundary (3000), cadastral district boundary (7003) and municipality boundary (7106), geometric conformity with the corresponding data from feature type group “Administrative area units” must be guaranteed, as these areas can also have a spatial reference and/or a spatial reference can be derived.

**OCL Code Interpretation**

The diagram below shows in extracts the modelling of feature type “specific parcel boundary” from the UML model. The data listed in the OCL Code of the UML schema contain the following technically defined consistency conditions:

(1) The “specific parcel boundary” is identical to edges of the mesh, which contributes to placement of the spatial reference for the corresponding “parcel”.

(2) For attribute type “type of parcel boundary”, for fields (value type: 3000), the cadastral district (value type: 7003), and the federal state (value type: 7102), conformity with the information in the parcel code must be guaranteed.

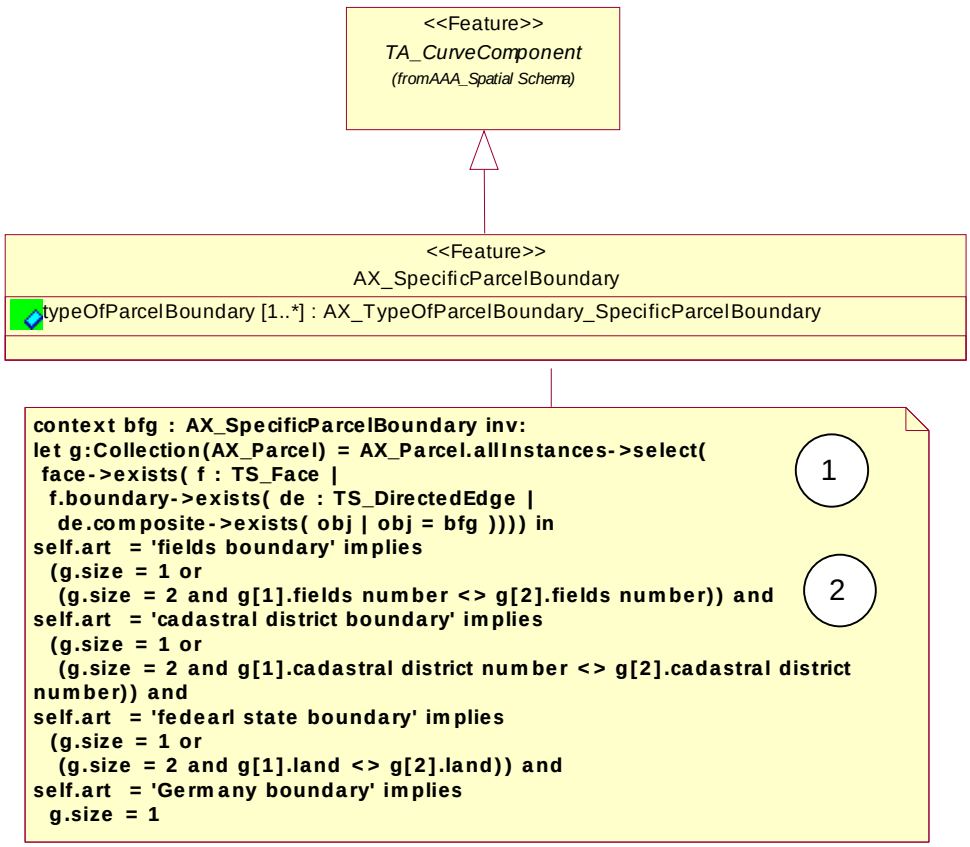



*Figure 5.3 - 21.: AX_SpecifiParcelBoundary – conditions in OCL*

### 1.1.3 Feature type “boundary point”

The boundary point as a point of the parcel that largely determines the boundary contour through boundary codes is technically described with the specific properties in the boundary point feature type. The boundary point feature type is a composed object (ZUSO) and consists of a REO “point location_TA”, which is the component of the common geometry topology

theme and is used for illustration in the real estate map. In addition to this, one or several REO “point location_AU” REOs can be used to illustrate other non-official reference systems, which are not part of the parcel theme and not used for illustration in the real estate map. Quality related and spatially referenced properties on the boundary point are held in the point location feature type. The “technical parenthesis” between the two feature types is effected through the ZUSO feature object type.

**Properties**

At technical object level, the following properties especially are described in more detail.

***Attribute type "other properties"***

Attribute type "other properties" of the feature type boundary point is a migration container, in which point information currently held in the ALK point file, could be stored for a transitional period (e.g. location description).

***Attribute type "point code"***

Due to carrying the object identifier, the point code attribute type will now no longer be required for clear identification of a point. It is therefore no longer a statutory requirement to carry the point code. It can instead be used as an alternative for carrying previously used point numbers.

***Relation "refers to"***

To create a technical assignment between an indirectly marked boundary point and the corresponding boundary point located within the parcel boundary, which has not been marked due to local obstacles, the "refers to" relation for the technical object must be occupied. The spatial reference is described via the point location_AU, which is also used for illustration in the real estate map. Further explanations on how to deal with the indirect boundary point are provided below.

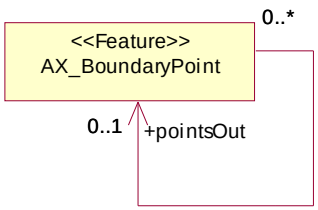



*Figure 5.3 - 22.: AX_BoundaryPoint – Relation "refers to" from UML*

***Attribute type "Responsible department"***

A relation to the catalogue of the department that bears technical responsibility for the boundary point is implicitly created through the "responsible department" attribute type.

***Geometry / topology***

To describe the geometric and/or topological facts for the boundary point, the point location variants "point location TA and point location AU" of the abstract top class AX_Point location are used (see Section 1.4 "data on point location"). The modelling therefore covers the following cases:

(1) Boundary point in the parcel boundary.

(2) A boundary point independent of the geometry of the parcel (indirectly marked boundary point).

(3) Boundary point with coordinates in various reference systems.

**Boundary point in various reference systems**

All boundary points located within a parcel boundary have a “point location” with spatial reference type “nodes” of the mesh, which contributes towards determining the spatial reference of the corresponding parcel. Only this “point location” results in illustration in the real estate map. This “point location” belongs to the TA_PointComponent class and is derived from the ISO TS_*ComponentClasses (“simple topology”). The individual technical correlations can be found in the following example: “Boundary point of various reference systems”. In this example, a boundary point in location reference system ETRS89 (UTM diagram) is held as an official reference system and also in system 42/83 (GK diagram) as further valid coordinates. In addition to the technical object boundary point, feature types point location TA and point location AU are carried at geometry / topology level with the corresponding geometric objects from type GM_Point, which carry the coordinates. The reference systems are detailed in accordance with ISO within GM_Point.

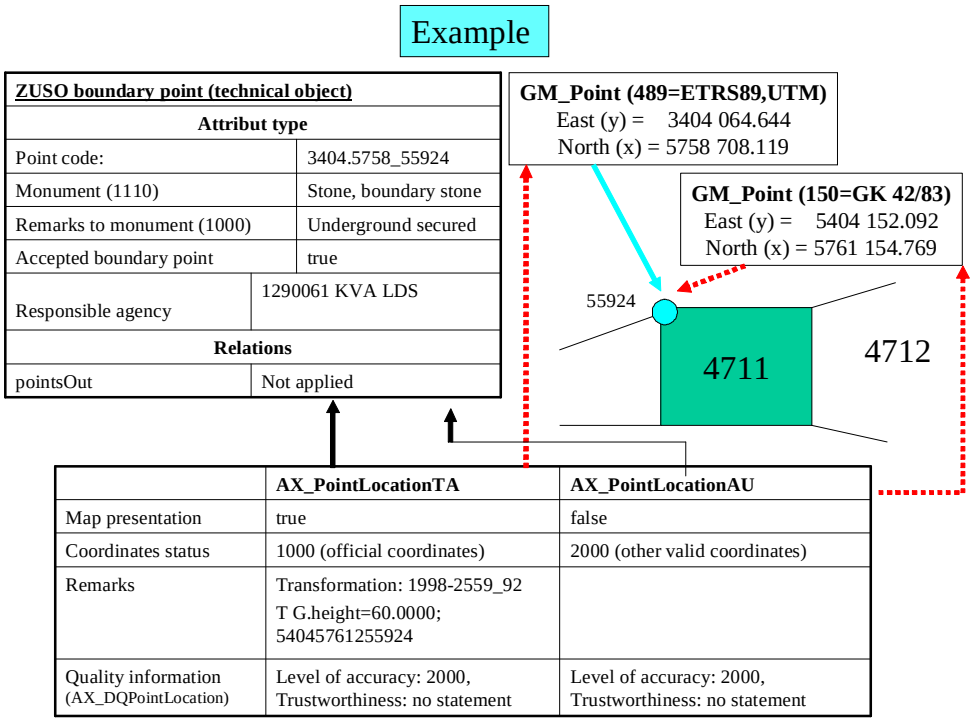
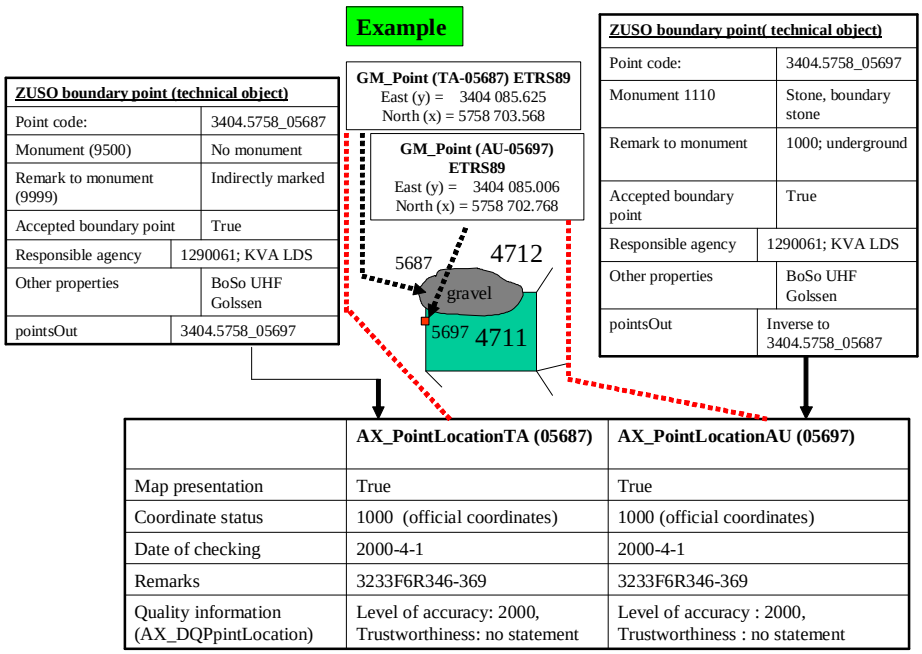



*Figure 5.3 - 23.: Boundary point in various reference systems*

### Indirectly marked boundary point

A boundary point independent of the geometry of the parcel (indirectly marked boundary point) is represented by the point location AU. This boundary point is not part of the geometry topology theme “parcels”. The example below shows the technical modelling for the indirectly marked boundary point. Illustration in the real estate map uses boundary point with “point location TA” and also the indirectly marked boundary point with Point location AU”. The technical assignment between the two technical objects is effected through the “refers to” relation.




| | AX_PointLocationTA (05687) | AX_PointLocationAU (05697) |
|---|---|---|
| Map presentation | True | True |
| Coordinate status | 1000 (official coordinates) | 1000 (official coordinates) |
| Date of checking | 2000-4-1 | 2000-4-1 |
| Remarks | 3233F6R346-369 | 3233F6R346-369 |
| Quality information (AX_DQPpintLocation) | Level of accuracy: 2000, Trustworthiness: no statement | Level of accuracy : 2000, Trustworthiness : no statement |

*Figure 5.3 - 24.: Boundary point, indirectly marked*

### Geometric identity between boundary point and building point

In ALKIS, the multiple function of points, as occurs in ALK for instance, is in principle no longer supported. Only in specific, **technically** justified cases in which a geometric identity is to be proved, can the same geometry (GM_Point) be assigned during the data collection process to the boundary point and the building point. For this purpose, an independent theme shown in the diagram below has been created. Despite the geometric identity, redundant geometries are transferred at the interface. In the accepting systems, the identities are to be determined via a geometry comparison. The theme association is specified at instance level during the data collection process.

If the boundary point is geometrically identical with the house point, the identity can be proved only through reference to the same geometric object GM_Point, i.e. at geometric level,

insofar as both object instances belong to the individual theme “parcels and houses” in accordance with the model view (see Section 1.4 “Data on point location”).

```
<AX_ThemeDefinition>
  <name>parcels and houses</name>
  <type>2000</ type >
  <feature type>AX_Parcel</ feature type >
  <feature type>AX_SpecificParcelBoundary</ feature type >
  <feature type>AX_PointLOcationTA</feature type>
  <feature type >AX_House</feature type >
  <feature type>AX_PartOfHouse</feature type >
  <feature type>AX_SpecificHouseLine</feature type>
  <feature type>AX_PointLocationAG</feature type>
  <modelType>DLKM</modeltype>
  <dimension>1000</dimension>
</AX_ThemeDefinition>
```

*Figure 5.3 - 25.: Theme of parcels and houses in UML*

These technical facts are described in the example below, according to which the building with point location AG and the boundary point with point location TA are geometrically identical and belong to the appropriately defined individual theme. Accordingly, existing at geometric level is only a geometric object of type GM_Point, which carries the coordinates and is assigned to point location TA and point location AG.

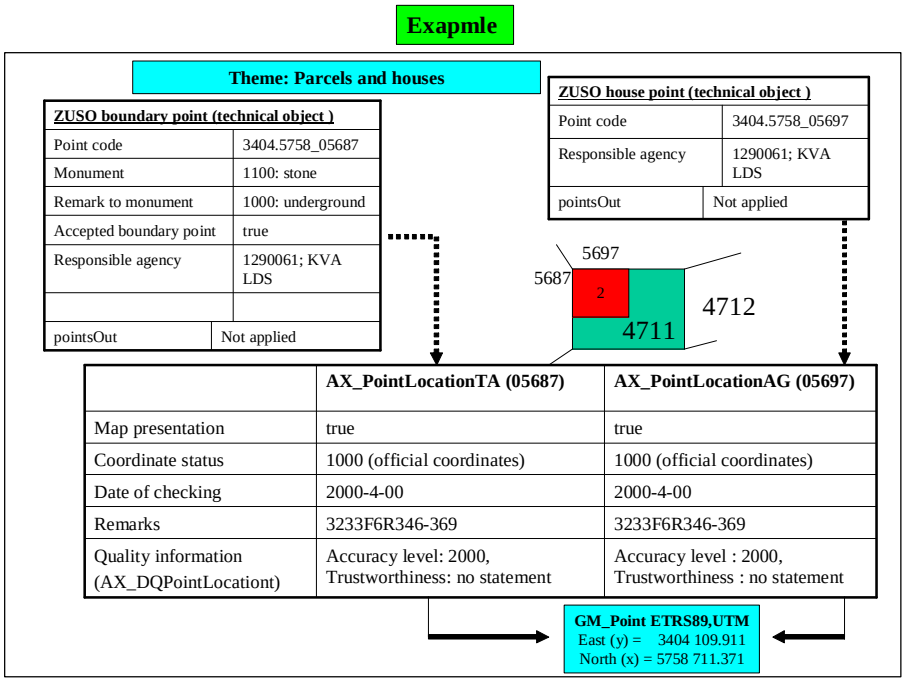



*Figure 5.3 - 26.: Geometric identities with points*

If in an alternative case, a geometric identity exists between a boundary point and a minor control point, neither of which belong to a theme (see Section 1.4 “Data on the point location”), the identity can be determined only through geometric comparison or in isolated cases through a reference in the “Other properties” attribute. In this case, the spatial reference is represented by two independent GM_Points.

### 1.1.4 Feature type “parcel core data”

This abstract feature type is used to summarise several properties that can also be used in various other technical objects (e.g. “historic parcel” feature type). The following properties are explained in more detail for the “parcel core data” feature type:

***Attribute type “other properties”***

The “other properties” attribute type picks up the land-parcel related information, e.g. data on actual use and the classification of the previous procedural solutions of the ALB in a structured format, as long as these data are not carried as independent spatially referenced elementary objects of the “actual use” or “legal stipulations, area units, catalogues” feature type areas. The following information can be accommodated: Actual use, sectional areas (ALB- LF14), accountable department (ALB- LF20, 21, 22). The attribute can occur in multiples.

***Attribute type “time of creation”***

This attribute occurs if the time of technical creation differs from the time set by the system on entry into the data in primary database as the start of the lifetime (see lifetime interval for objects). The associated regulations are to be composed specific for each state.

***Attribute type “object coordinates”***

Through the “object coordinates” in the dimensional unit [mm], the parcel object is represented by a point in an official location reference system. The corresponding data are taken from procedural solution ALB or ALK as part of migration. The object coordinate is currently still used as an intersection characteristic for various technical information systems (e.g. records of past real estate transactions).

## 1.2 Feature type group “data on the location”

Feature type group for “data on the location” consists of the following feature types:

- “Location description with house number”

- "Location description without house number"
- "Location description with pseudo number"

as non-spatially referenced elementary objects, the abstract feature type "location" and the selection data type "location description", as shown by the diagram below. Selection type means that either an encoded **or** an unencoded location description can be carried. They are mutually exclusive.

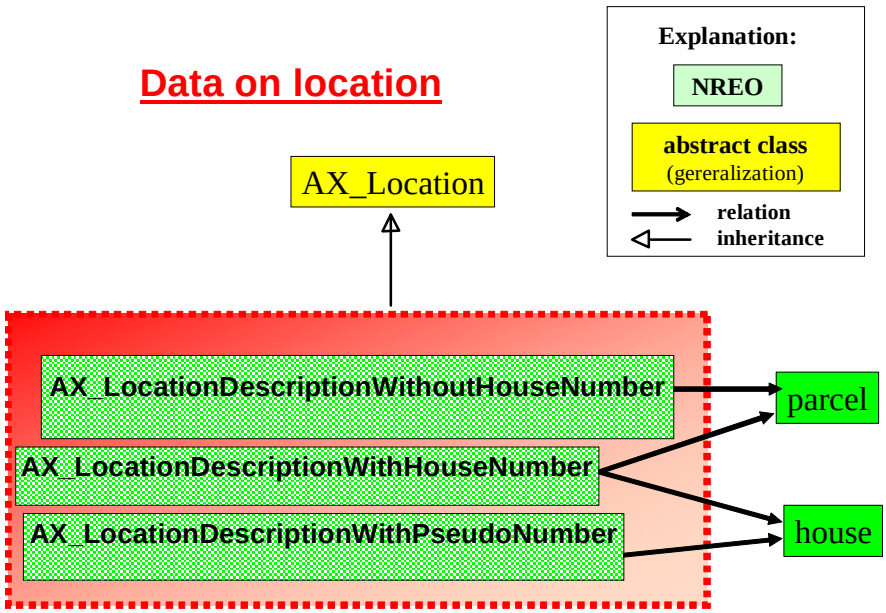



*Figure 5.3 - 27.: Feature type group "Data on location"*

The diagram shows that a location description without house number is assigned to a parcel and a location description with house number can be assigned to a parcel and/or to a building. The location description with pseudo number can, by contrast, be linked only to a building. The location description is logically assigned to a parcel or to a building by means of explicit relations, such as those shown in the UML overview below.

Due to differing consistency conditions, it was necessary to separate the location description into three different feature types. For example, the relation from the location description to the parcel must not be occupied if a pseudo number is present. Land parcels are assigned to buildings and vice versa via a geometric intersection of objects and their spatial reference. The spatial reference can thus also be determined for the location.

### 1.2.1 Feature type “location description without house number”

The feature type “location description without house number” is used to describe the position of parcels that have no house number, e.g. roads, bodies or water and locations used for agricultural and forestry purposes.

### 1.2.2 Feature type “location description with house number”

The feature type “location description with house number” as a non-spatially referenced elementary object with the attribute types house number and district represents the customary or officially specified location description for parcel and building. It inherits the unencoded or encoded location description from the abstract top class AX_Position, whereby the house code of previous character can be largely restored (alternative numbering of the adjacent house).

**Properties**

The following properties are described in more detail:

***Relation “belongs to”***

The relation “a location description with house number” belongs to one or several objects of feature type “parcel”, the location description (e.g. Heinrich-Mann-Allee 107) can be assigned to one or several parcels.

***Relation “relates to”***

An object of feature type “location description with house number” can be assigned to a building via the “relates to” relation.

### 1.2.3 Feature type “location description with pseudo number”

In the absence of a definitive house number for a building, the cadastre-managing authority may, for internal purposes, assign a provisional number referred to as “pseudo number” via the feature type “location description with pseudo number”.

***Location description for adjacent building***

The location description for an adjacent building is derived through feature type “location description with pseudo number” and the corresponding relations, whereby the real house number is carried as the pseudo number and a continuous number is also carried to differentiate from the main building. The assignment of the adjacent building to the main

building can be recognised in that the house number of the building is identical to the pseudo number of the adjacent building. The continuous number is assigned by the cadastre authority and is used to assign individual adjacent buildings by house number. Unlike ALK, the main building in ALKIS is not assigned a continuous number. The technical facts appear in the example below, which also compares the current ALK perception of ALKIS modelling is compared.

### 1.2.4 Selection data type “location description”

The “location description” selection data type is assigned data via an encoded or unencoded location description. An object from feature type group data on the location can assume precisely one attribute type of this type, whereby encoded location description via catalogue entry occurs through a corresponding decryption in the form of text, e.g. Augustusring.

### 1.2.5 Feature type “location”

The abstract top class position as “non-spatially referenced elementary object” contains as properties encoded or unencoded data, which apply to all feature types of the feature type group and which are transferred to same. In accordance with the consistency conditions in the technical schema, either only the encoded or unencoded location description can be held. Redundancies existing in the current procedural solutions shall be eliminated as part of pre-migration.

### 1.2.6 Feature type “spatial referenced address of the house”

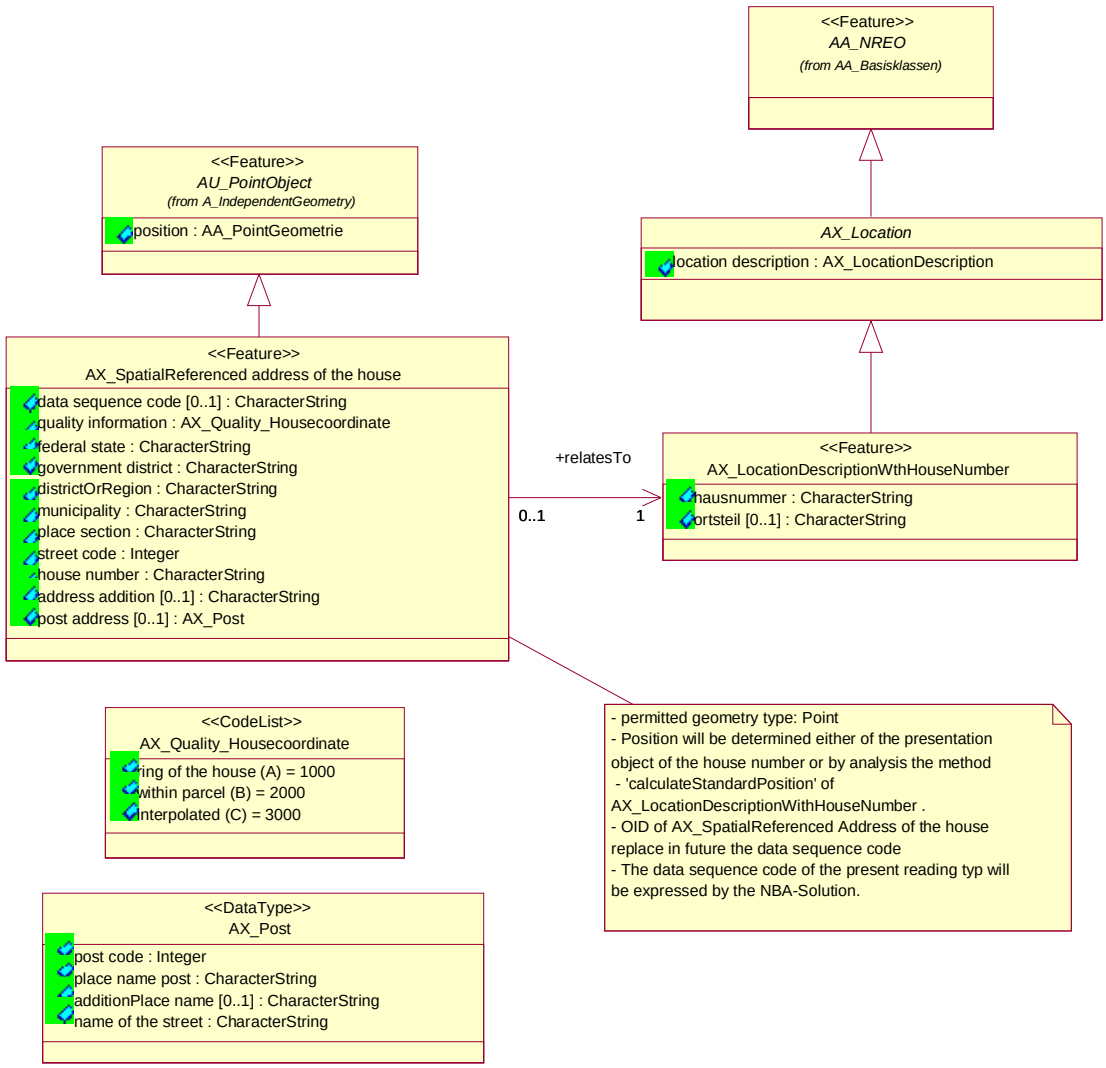



*Figure 5.3 - 28.: Overview of the spatial referenced address of the house*

The spatial referenced address of the house is modelled as data in primary database object, because these information are saved permanently and further will be given away in form of the NBA- Solution. The information is transferred from the present data in primary database respectively from the present data sequence code of “spatial referenced address of the house”. The information is modelled as data in primary data object in the feature type group data on location with the key number 12006. Each object of “spatial referenced address of the house number“ must have exactly a relation to a location with house number. The reversible relation is optional (0..1), so that nobody will be forced to use the new solution of management of the spatial referenced address of the house, especially by the first creating the ALKIS data in primary database.

In accordance with the consistency of the feature type "AX_LocationDescriptionWithHouseNumber" the relation to the feature type "AX_SpatialReferencedAddress of the house"must only be created, if the relation to the feature type "AX_House" exists and if "AX_SpatialReferencedAddress of the house" permanently will be stored in the data in primary database. By Changing the feature type "AX_LocationDescriptionWithHouseNumber" the feature type "AX_SpatialReferencedAddress of the house" must be correspondingly updated.

The distribution of the data will be made by using the NBA- Solution. The present solution of distribution the house coordinates can be created by a XSLT- transforming process.

In addition the spatial referenced address of the house exists also as output feature type. In this case it will be called "AX_CoordinatesOfTheHouse". The way to create this output can be sketched as follows:

- Creating the output feature type „AX_CoordinatesOfTheHouse" by using the corresponding filter expressions out the data in primary database. In this case other data will be used if needed (e. g. post code).
- Delivery the output data as product
- Transformation the output data in the database as feature type of the data in primary database "AX_SpatialReferencedAddress of the house", as far as the output data will be permanently stored.

The information of the post will be deposited by the attribute type of this feature type. The reason to create the data of spatial referenced address of the house as a "product feature type" in the ALKIS data in primary database is necessary in order to separate technical information from product information. Therefore the feature type location description with house number cannot contain the data of spatial referenced address of the house. In addition the product feature type spatial referenced address of the house is on the geometry level a point object, whereas the location description with house number is modelled as object type NREO. A combined inheritance of the both basis classes is not allowed. Therefore the spatial referenced address of the house will be connected by a relation to the location. The mechanism of the inheritance of the object based modelling is not used in this case. The relation is also necessary for the updating process, in order to update automatically the spatial referenced address of the house by changing the location description.

The description as feature type in the data in primary database of the UML- Model is made in analogy to the modelling of the update certification cover sheet. Both feature types describe an output of the utilisation process, which are saved permanently in a database.

The attribute type post address with its properties are described by the data type AX_Post. It is only an optional attribute type, so that

- The federal states, who lead these information in their own authority, are able to do it directly in the data in primary database,
- The federal states, which lead this information in external database, outside of ALKIS, can add it later.

In both cases above the end product to the client must contain this information.

The object type on the geometry level is a point (not MultiPoint). The spatial position is taken by a presentation object, which describes the house number. The OID of the spatial referenced address of the house replace in future the data sequence code in the present solution. The data sequence code of the present reading type (N= New, U=Update, D=Delete) will be expressed by the NBA- Solution.

## 1.3 Feature type group “data on the network point”

The feature type group network point consists of the following feature types

- “Minor control point”
- “Security point”
- “Other surveying point”
- “Network point”

The abstract top class network point describes generally valid properties that are transferred to all feature types of the feature type group, such as point code, responsible agency, other properties, horizontal visibility, relative height, geodetic mark. The UML diagram below provides an overview of the feature type group.

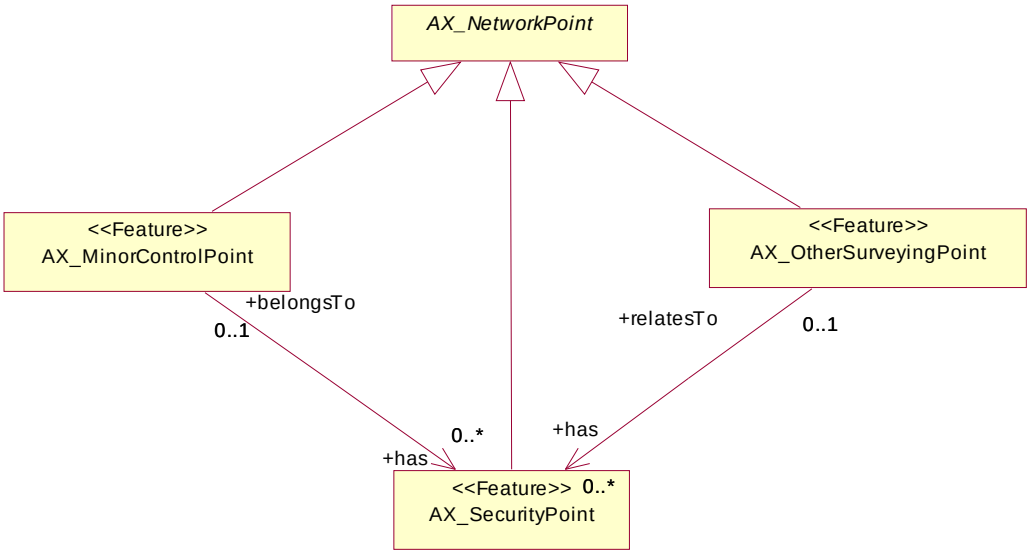



*Figure 5.3 - 29.: Feature type group data on the network point*

## 1.4 Feature type group “data on the point location”

An object of the “point location” feature type defines the spatial position or the level position or the height of an object of feature types “horizontal control point, vertical control point, gravity control point and reference station point” in AFIS and also “boundary point, specific house point, minor control point, security point, other surveying point, specific topographical point and specific building point” in ALKIS in a coordinate reference system (CRS). The listed feature types (surveying points) are composed object types (ZUSO); objects from the point location type are approved only as a component of an object of these feature types.

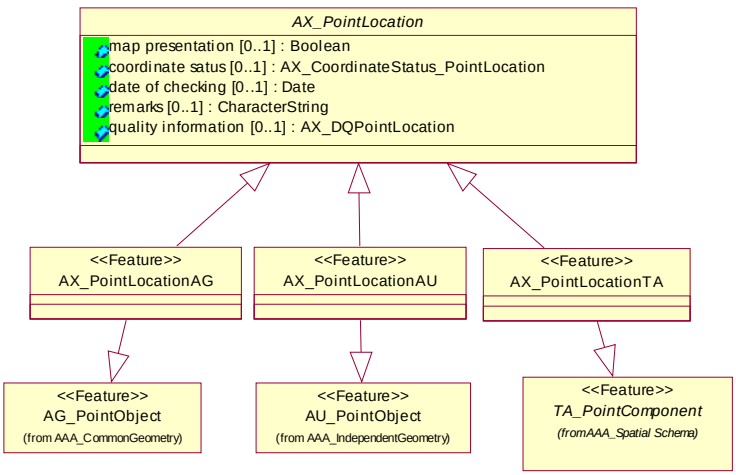



*Figure 5.3 - 30.: Modelling of the data for the point location from UML*

The feature type group "data on the point location" consists of the instance-capable feature types "AX_PointLocationAU", "AX_PointLocationAG", "AX_PointLocationTA" and also of the abstract top class "AX_PointLocation". The instance-capable classes are differentiated only by their respective geometric and/or topological character. For point locationAU, the spatial reference is modelled attributively, i.e. precisely one GM_Point element exists for each AX_PointLocationAU. If identical geometries exist (AX_PointLocationAG, AX_PointLocationTA), the spatial reference is accessed from each point location through a relation at a common GM_Point (see Figure 5.3 – 30).

The following consistency conditions and formation regulations apply, described as Note in UML model:

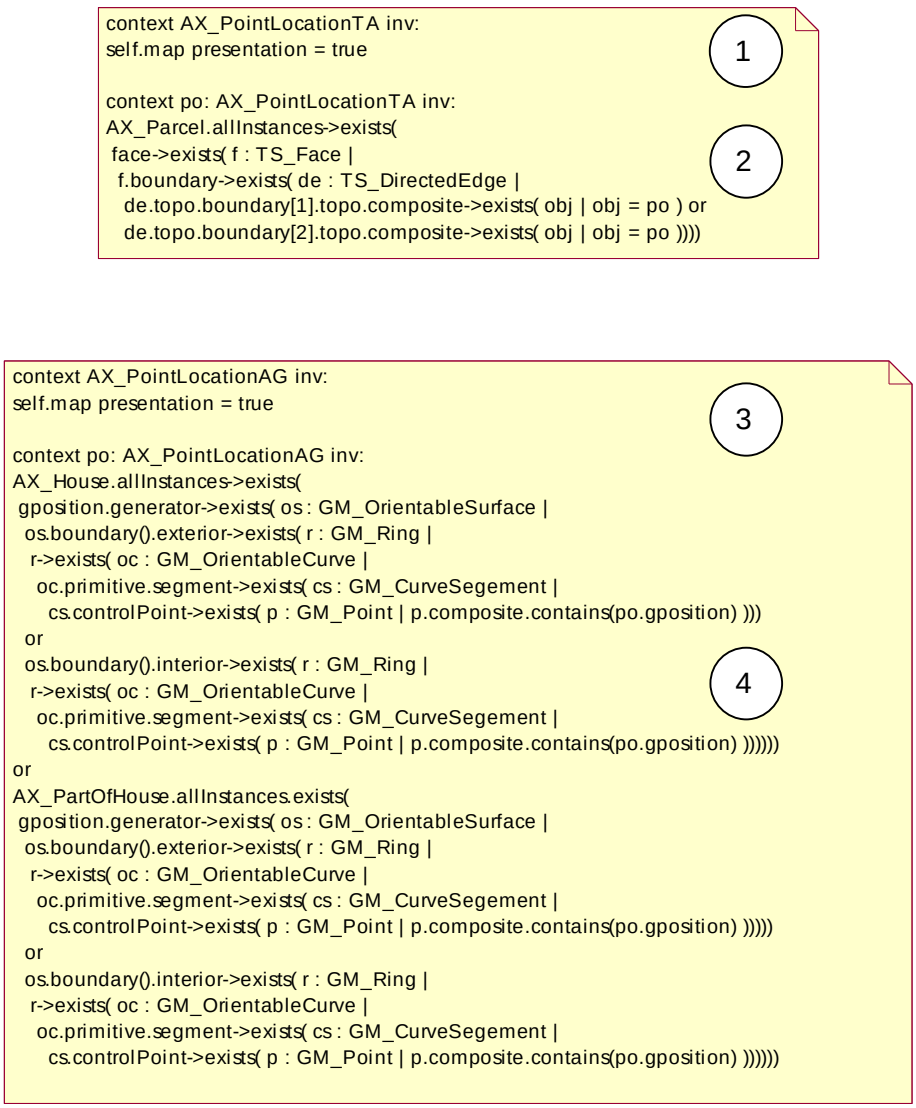



*Figure 5.3 - 31.: AX_PointLocation – conditions in OCL*

(1) For each object of feature type “boundary point”, which lies within a parcel boundary, there is precisely one “PointLocationTA”. In this case, the “map presentation” attribute must be set to “TRUE”.

(2) The “PointLocationTA” must coincide with a node (start or end point) of the parcel boundary (= edge).

(3) For each “PointLocationAG” the “map presentation” attribute must be set to “true”.

(4) Objects of feature types “specific house point” and “specific building point” are referenced through precisely one “PointLocationAG” object. Its geometry must coincide with one point of the geometry of a house, part of house or building object.

The following regulations also apply:

(1) A “boundary point” differing from the geometry of the parcel surface (indirectly marked boundary point) represents only “PointLocationAU” objects.

(2) The “PointLocationAU” object is also used to illustrate other reference systems.

(3) Objects of feature types "horizontal control point", "vertical control point", "gravity control point", "reference station point", "specific topographical point", "minor control point", "security point" and "other surveying point" reference only "PointLocationAU" objects, as these are always geometrically independent of other feature types.

(4) Feature types “boundary point“, “specific house point”, “specific topographical point,“ “specific building point“, “minor control point“, “security point“ and “other surveying point“ always refer to only one point location with attribute type “map presentation“ and value type “TRUE”.

All indicated characteristics of feature type point location refer at geometric level to a geometric object of the GM_Point type, which bears the coordinates and at the same time refers to the coordinate reference system (CRS). Depending on the CRS, it can relate to a differing number of coordinate values and/or differing coordinate types.
Examples:

(1) Geocentric, right-angled, metric coordinates (X, Y, Z)

(2) Geographic coordinates (longitude and latitude in degrees, ellipsoidal height in metres) (LAT, LON, H)

(3) Metric height system, height only (h)

(4) Gauß-Krüger or UTM coordinates (right, high and/or east, north).

For point locations, no composed reference systems (ISO 19111, Figure 6.2.3) are permitted, in which for example a metric height system and a projected position system (east, north, h)

are grouped. If both position and height details are held for a surveying point, these shall be stored at various point locations. Example:

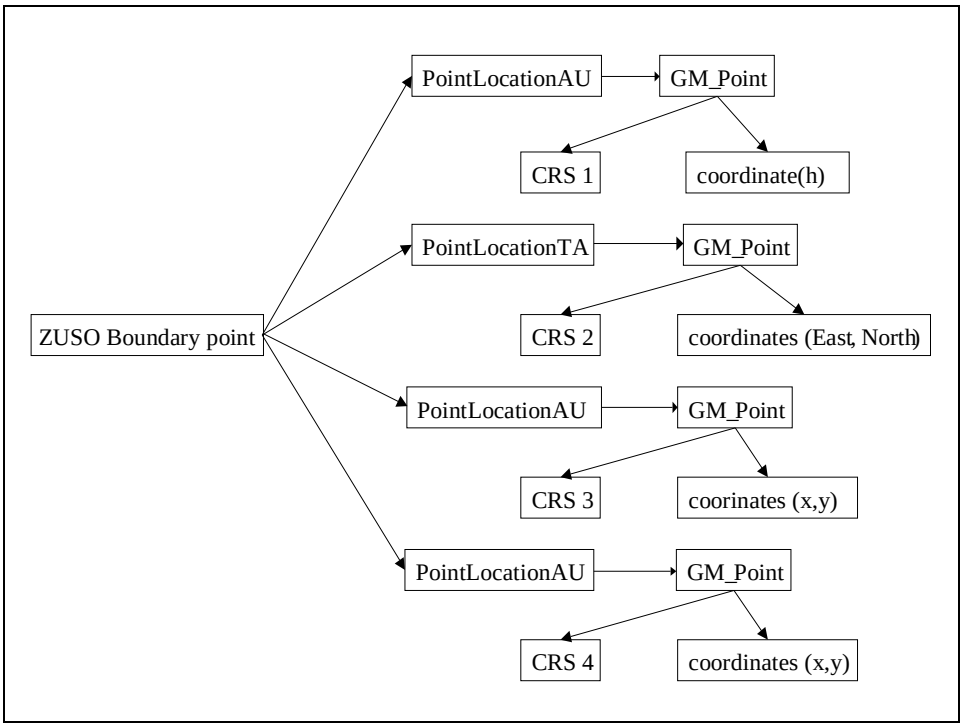



*Figure 5.3 - 32.: Relation point location to technical object*

Each point location object can only ever belong to one point object; this is also the case if several points fall on top of each other (e.g. boundary point has identical position to building point). The identity can be proved only through reference to the same geometric object (GM_Point) if both objects belong to the same theme. For point objects that cannot belong to a theme, a potentially existing identity (e.g. minor control = boundary point) can be established only through a comparison of coordinates.

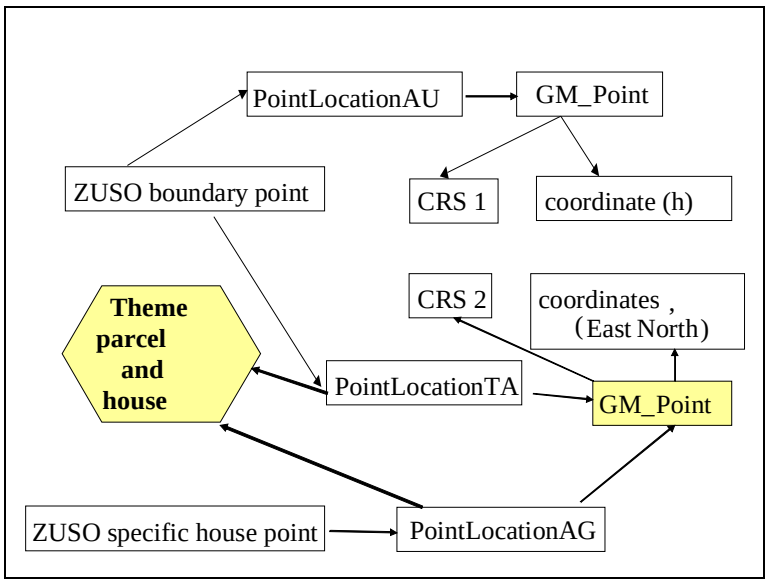



*Figure 5.3 - 33.: Identity boundary point / specific house point*

All “point location objects” can alternatively carry quality data on the source, calculation, accuracy and reliability of position of the coordinates. The options in this respect are described in data type “AX_DQPointLocation” on the basis of the conditions specified in ISO 19115.

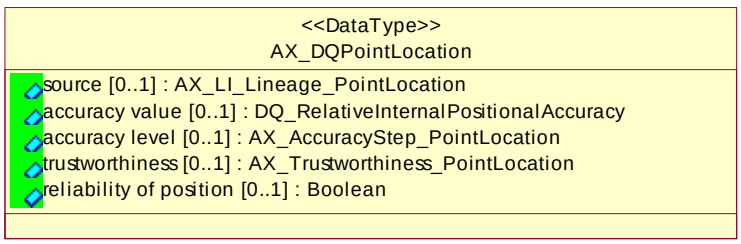



*Figure 5.3 - 34.: Data type AX_DQpoint location*

If the data collection and/or collection point are to be recorded, this takes place via LI_ProcessStep and LI_SourceElements. Data collection is recorded in a LI_SourceElement (via the code from CodeList AX_data collection_point location). The collection point is recorded in a LI_ProcessStep with self.description = 'collection’ and the collection point in self.processor.

If the calculation or determination is to be recorded with date, an appropriate origin.processStep with self.dateTime and self.description set attributes (“Calculation” and/or “Determination”) must be created. If necessary, the organising point can be recorded again in self-processor.

**Example:**

The quality element for a point location with the following properties:
- Collection point 'State+Point type+Point'
- Data collection determined ‘from cadastre surveys (1000)’
- Calculation date ’01.04.2001’
- No determining date
- Accuracy level 2000
- Accuracy value 2.2 cm
- Trustworthiness 1200

appears as follows:

self.origin.processStep[1].description = "collection"
self.origin.processStep[1].processor = <Collection point in accordance with coding in metadata catalogue>
self.origin.processStep[2].description = "calculation"
self.origin.processStep[2].dateTime = 01.04.2001
self.origin.source[1].description = "1000"
self.origin.source[1].sourceStep = self.origin.processStep[1]
self.accuracyvalue.result[1] = 2.2 cm
self.accuracy level = “2000”
self.trustworthiness = "1200"

## 1.5 Feature type group “update certification”

Changes to the parcel are recorded in update certification documents. All changes that can be a component of a update certification document (e.g. change of location description, actual use) must be treated as central to the parcel, as no spatially-referenced data are currently used to communicate with the Land Registry. All changes to an update certification document must therefore always to reference to a parcel. Each update event therefore relates to one or more parcels. The update certification document represents an output that records changes to the parcel and is modelled as a feature type in the primary database, as it can be permanently stored in order to create a purely digital update database. The type of changes that result in a update certification document and/or update notification being created shall be specified by state and controlled in the relevant business processes outside of ALKIS in the collection and qualification components.

With the AX_CauseTypeUtilizationRequest 1210 “Update certifictionByUpdating” the complete Update certification will be created, how it is described by using the filter encoding. The Creation of the Update certification will automatically be started during the updating process, but it is not stored in the database.

With the Utilization request 1211 = “Update certifictionAdditionalRequesting” the kernel - Update certification will be created with all important, legal information.

For both Utilization requests the storing of a full history is not neceassary.

Which kind of updating information leads to create an update certification or update information is decided by the country, in order to navigate the business processes of the collection component and qualification component external of ALKIS.

Given this documentary proof, a close relation with the parcel details exists and these data have therefore been included in the feature type area “data on the parcel”. The feature type group “update certification” consists of the following feature types

- “Update certification cover sheet”
- “Update event”.

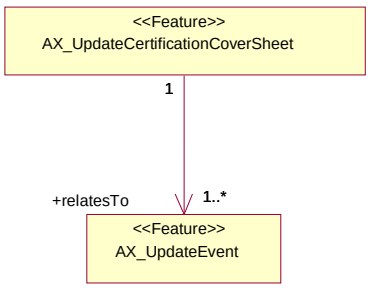



*Figure 5.3 - 35.: Feature type group “update certification” from UML*

The revision case also brackets update events, although only to control the sequence of updating data in primary database and not to create an update certification document.

The update certification document is not a standard ALKIS output, which means that other content and layout can be further substantiated through state-specific stipulations.

### 1.5.1 Feature type “update certification cover sheet”

The feature type “update certification cover sheet” contains one or several update events, the contents of which can be used to create an update certification. It also carries all administrative tasks required for update certification. For each update certification a clear designation is ensured by using an attribute type update certification number of continuous number data type. The other attribute types also prove that an update certification has been created and the announcement and the output permission have been given.

### 1.5.2 Feature type “update event”

The “update event” feature type describes the data required to create a update certification document and specifies, via the update event number, the sequence in which the update events are to be handled in a update certification document. The feature type is necessary for reconstructing the update certification.

The heading in the update certification document of the data type cause indicates the reason for the change described under an update event.

**Example of modelling an update certification**

Update certification cover sheet relates to feature type “update event” and brackets all the update events described in an update certification document (1st bracket level). Under an update event number update events can be described on several ALKIS objects for specific parcels. The figure schematically illustrates an update certification with three update event numbers including designations of the ALKIS instances handled during the procedure. Continuous number 2 with heading “Land parcel splitting” describes changes to the parcel and to actual use. In this respect, the update event number where necessary “brackets” several update causes (parcel splitting and changes to feature types of the feature type area for actual use) at the ALKIS objects (2nd bracket level). This bracketing is to be carried out either by the coordinator (heading selected from the catalogue of update events) or is where possible program-controlled by a particular method.

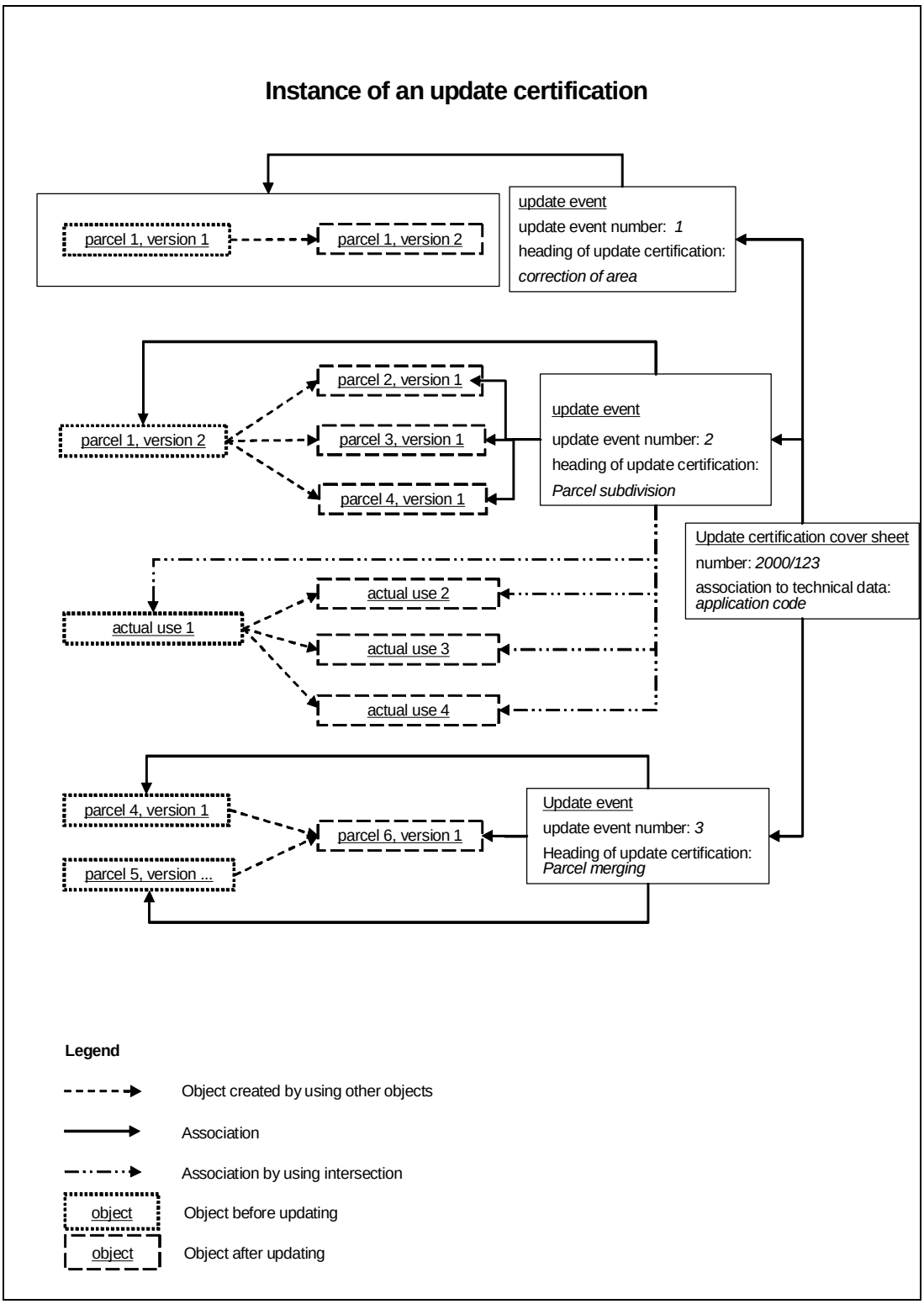



*Figure 5.3 - 36.: Example to show the structural arrangement of the update certification*

## 1.6 Feature type group “data on reservation”

Feature type group for “data on reservation” consists of the following non spatially-referenced feature types:

- “Reservation”
- “Point identifier declined”
- “Point identifier comparative”

as shown by the diagram below.

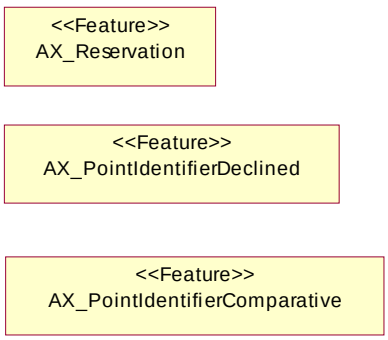



*Figure 5.3 - 37.: Data on reservation*

### 1.6.1 Feature type “reservation”

Almost all technical point objects, with the exception of the “specific house point” and also the “specific building point”, for which a reservation for a point code can be made lie within feature type area “parcel, position, point”. Accordingly, the reservation is also included in this feature type area. The “reservation” feature type can be used to reserve the following attributive order features

(1) Number (e.g. point code, parcel code, update number and also marking report number)

(2) Application number

(3) Request number.

The reservation contains order numbers of the real estate cadastre, which are assigned order-specific for a surveying issue.

The application number is a registration number assigned as part of application management for the cadastre-managing department. This application management is running outside of ALKIS.

The request number denotes the job to be processed within the ALKIS data update component, e.g. reservation request, updating request, utilization request.

### 1.6.2 Feature type “point identifier declined”

The feature type “point identifier declined” is to guarantee clarity for assigning point codes. Point codes that are no longer current in the real estate cadastre and therefore may not be used are stored in this feature type.

### 1.6.3 Feature type “point identifier comparative”

This feature type is used in order to assign a provisional point code assigned during the data collection process to a final point code assigned during the update process. This comparison can alternatively be assigned to an application of the application manager.

## 1.7 Feature type group “data on history”

The feature type group data on history holds feature types

- “Historical parcel”
- “Historical parcel ALB”
- “Historical parcel without spatial reference”

as well as the following data types: “registering historical parcel” and “registering historical parcel ALB”. In these data types all important registering information of the historical parcel is combined. The data type is used by the feature type AX_HistoricalParcel and AX_HistoricalParcelALB. The modelling-based conversion of the ALKIS technical schema in accordance with the UML notation is shown in the diagram below.

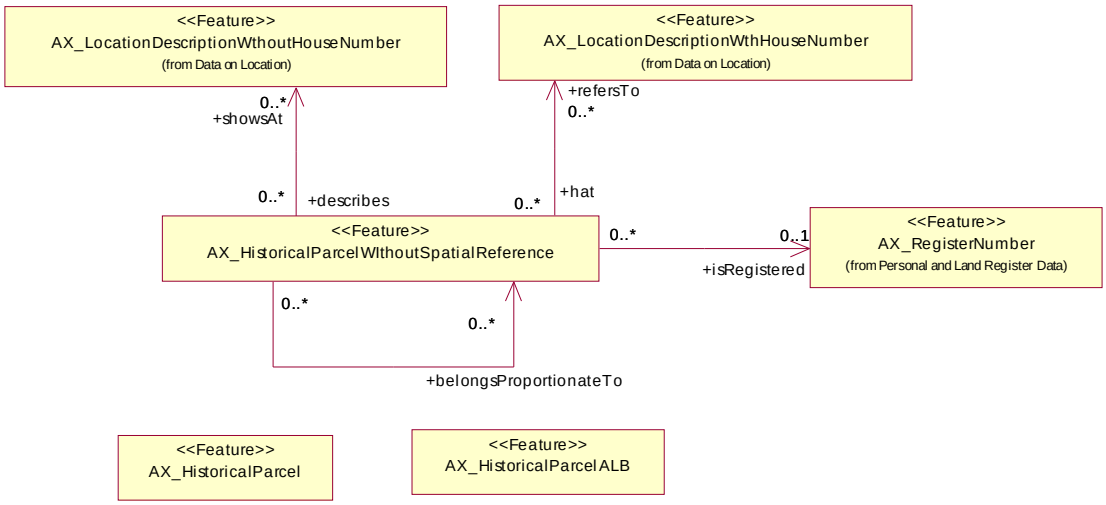



*Figure 5.3 - 38.: Feature type group "data on history" from UML"*

The feature type "historical parcel" and also "historical parcel without spatial reference" inherit their properties from feature type "parcel core data", while feature type "historical parcel ALB" contains reduced properties in accordance with the current historical management of the ALB procedural solution. References between the historical feature types and the data on register sheet and register number are created via data type "register of historical parcel" and "register of historical parcel ALB".

The historical development within or even outside of ALKIS can be understood within the context of state-specific requirements in accordance with the following two modelled variants:

**Standard history**

### 1.7.1 Feature type "historical parcel"

As part of the ALKIS standard history management, only feature type parcel is historized (technical specifications from the current procedural solution ALB), insofar as an object-forming property changes. Feature type "historical parcel" with spatial reference to the current parcel emerges from the current parcel in ALKIS. Also, at the time when the parcel is historized, the link to the corresponding feature type "register location" and also the "register sheet" is evaluated, in order to be able to occupy the corresponding attribute types for feature type "historical parcel", e.g. register sheet code. This is described from technical modelling viewpoints in the UML reference schema through data type "register historical parcel".

***Attribute type successor parcel code***

Attribute type “successor parcel code” carries the designations for the parcels that are direct successors to the historical parcel. Research therefore also conducted on standard history.

### 1.7.2 Feature type “historical parcel ALB”

In order to be able to carry a complete parcel history for the ALKIS standard history too, all parcels that have already been historized in the ALB are migrated to ALKIS, where they are then carried under feature type “historical parcel ALB” as non spatially-referenced elementary objects. A reference to the earth’s surface can be created by transferring the “object coordinates”, insofar as they are already carried in the ALB history. Tracking can take place via attribute types “predecessor parcel code” and also “successor parcel code. Data type “register historical parcel ALB” can be used add the historical land register data (e.g. register sheet code) of the ALB to the corresponding historical ALB parcels. Historical documents carried outside of ALKIS can be accessed by an association to technical data.

Attribute type “predecessor parcel code” is to be occupied so that parcels that have already been historized and transferred to ALKIS through migration can be fully researched. The attribute type “successor parcel code” is required for the connection between the parcel object (current or historical) in ALKIS and the parcel historized in the ALB, as ALKIS no longer contains a link via the parcel code.

Theoretically, the data on the predecessor **or** the successor parcel code is sufficient to clearly derive the historical development of a parcel. However, the formation of these historical relations in the ALB is not always complete. Therefore, as an option, it is possible to indicate predecessor and successor parcel designations.

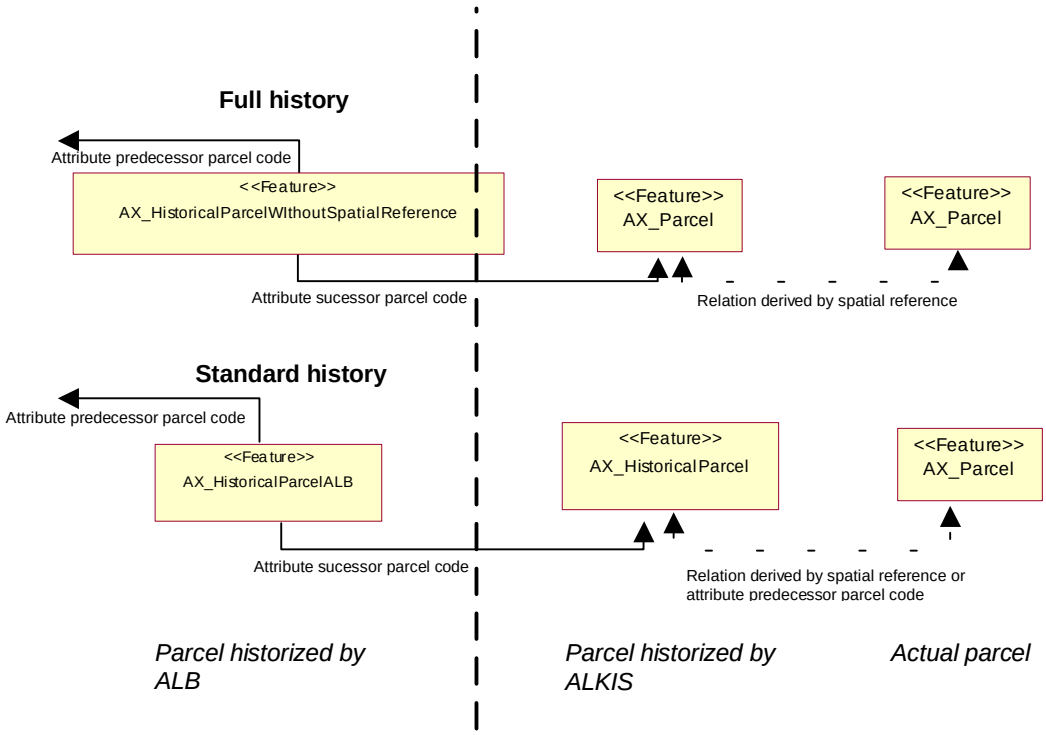



*Figure 5.3 - 39.: Standard - full history in ALKIS*

**Full history**

Within ALKIS, history is fully managed in digital format using versioning as a tool for historical management (see Chapter 3, Section 3.4 of GeoInfoDoc) via functions of the lifetime interval. The demise of an object (historical object) on the basis of changes to object-forming characteristics can be derived from the data of the lifetime interval. In this case, the object versions are marked as obsolete (lifetime interval=obsolete) and no “historical parcel” feature type is created. The scope of the historical data to be managed can be individually specified.

### 1.7.3 Feature type “historical parcel without spatial reference”

As part of migration, feature type “historical parcel without spatial reference” is carried with the full history. This feature type is no longer a current parcel that has already been historized in the ALB and migrated for research purposes in accordance with ALKIS. In order for the migrated feature type to be changed for full historical management, the missing properties

(e.g. relation types for feature type register number and/or register sheet, location description and updating cause) must be created through suitable migration methods insofar as these data are contained in the respective ALB procedural solutions. The description of these methods shall be arranged specific for each state. This feature type can then used to carry out tracking in relation to the current ALKIS feature types on the basis of the created relations.

In this case too, attribute type “predecessor parcel code” is to be occupied so that parcels that have already been historized and transferred to ALKIS through migration can be fully researched. Theoretically, the data on the predecessor **or** the successor parcel designation is sufficient to clearly derive the historical development of a parcel. However, the formation of these historical relations in the ALB is not always complete. Therefore, as an option, it is possible to indicate predecessor and successor parcel designations.

In the ALB, data element LF 15 (real estate of ground reference) for the historic parcel can where necessary be retained as a sole reference to the database. Data element LF15 contains both register code and the register type, although no further data on the owner / leaseholder etc. For historical databases, these data are to be taken only from the relevant “land registry file”. Viewed in this context, the “is_registered” relation cannot be created during migration of the ALB data. This also applies to transferring the BEDV history by the ALB system. Data element LF15 has no content, as in the BEDV system; it is not stored for the historical parcel. To enable information to be transferred to ALKIS, a “refers_to_external” relation is created from element LF15 for “historical databases”. This creates the option of accessing the historical database (historical research) via this code (LF15) in the land register.

# 2 Feature type area “owner”

The feature type area owner consists of data protection and technical modelling aspects exclusively from personal and data in primary database feature type group. The reference to the owner in accordance with the German Civil Code and the Land Register Act is to be created through the term “owner”, as in the modelling; this reference is possible only via the person feature type and specifically in the role as owner.

The personal and data in primary database in ALKIS are managed with the “inventory of land register” and the “first section” of the land register in mutual conformity.

The ownership details are crucial to carrying out the tasks of the cadastre authority. Insofar as this information of the cadastre authority is not provided via an automated land register with the right to transfer to third parties in direct call-off, these data are to be managed redundantly and in conformity in the real estate cadastre.

These data are managed in the real estate cadastre either in the form of information (in the case of land register data) or in the original jurisdiction (for registers outside of the land register).

**Modelling**

For object-oriented modelling of the personal and land register data, a clear separation from other data in ALKIS is ensured so that in future redundancy-free management between land registry and real estate cadastre can take place, subject to the administration of justice holding a structured land register. In this case, the entire feature type area “owner” can be eliminated, provided that no other cadastre registers occur.

Personal and data in primary database comprises:

(1) Land register designation (or designation of an alternative directory in which the owner data are managed) including the number of the inventory of land register and type of register,

(2) Data on the owners, leaseholder and utilisation holder of a building, including their addresses,

(3) Data on the arrangement plan and separate absolute ownership for apartment and part ownership,

(4) Legal relationships.

Appropriate data are held for the parcels not posted in the land register.

**Spatial reference**

The feature types of feature type group “personal and land register data” are objects without direct spatial reference (NREO). A spatial reference exists only indirectly as register data always relate to parcels that by contrast have a direct spatial reference. This spatial reference is to be evaluated via the “register number – parcel” relation.

## 2.1 Feature type group “personal and land register data”

The feature type group personal and land register data consist of the following feature types

- “Person”
- “Name number”
- “Group of persons”
- “Address”
- “Management”
- “Representation”
- “Register sheet”
- “Register number”

### 2.1.1 Feature type “person” and his or her rules (owner, manager, representative and user)

All personal data required for the clear identification of a person is recorded in the “Person” feature type. In addition, the location that has collected this data can also be denoted under the “collection point” quality element. It is always advisable to update this information if data are in fact part of the real estate cadastre, although the responsibility for data collection does not always lie with the cadastre authority (e.g. transfer of data from the registry office).

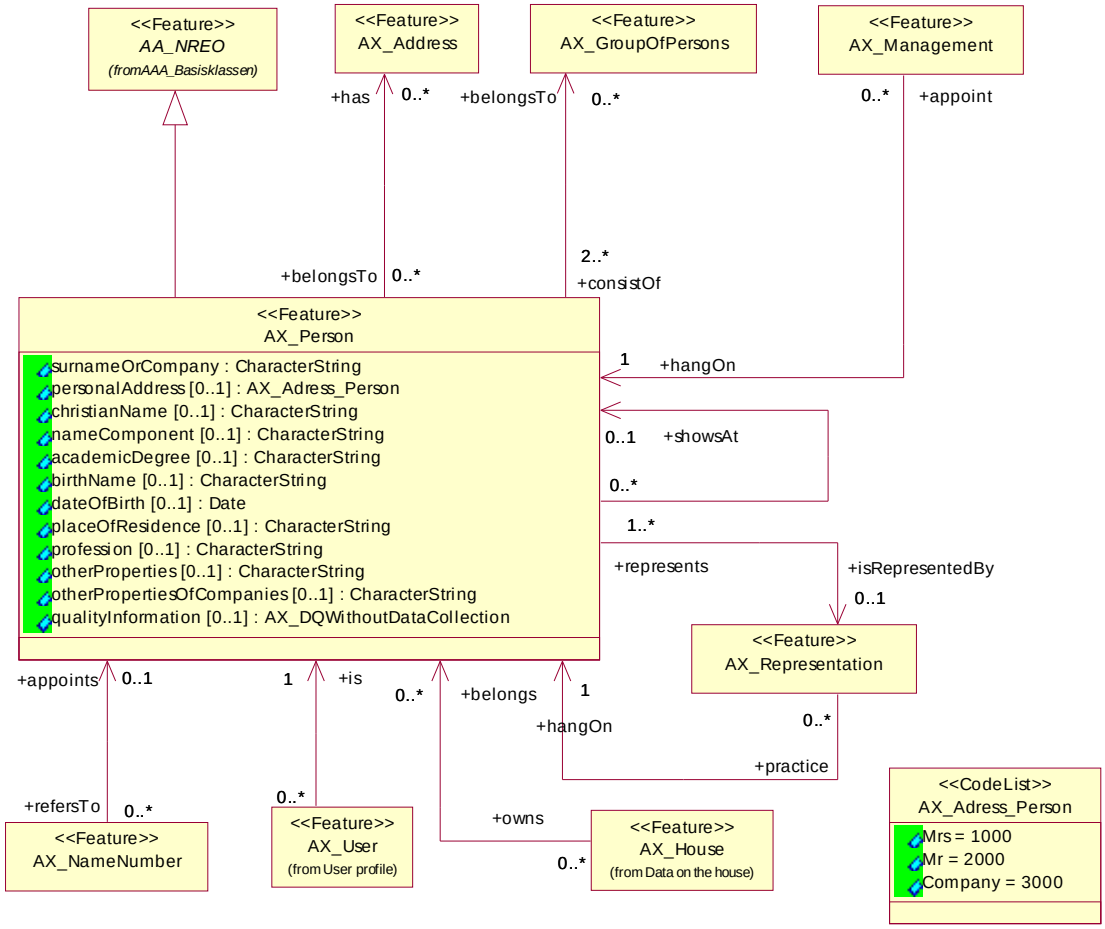



*Figure 5.3 - 40.: Person and his or her roles – representative, manager, owner and user in UML*

The feature type inherits from abstract data type NREO (see basic schema).

In the real estate cadastre, persons can have various functions or roles (owner, representative, manager and user). In the automated real estate register (ALB), one and the same person is shown repeatedly in accordance with the posting in the land register. In ALKIS, each person is now managed redundancy-free wherever possible. The various functions of the person are summarised and shown in person roles (e.g. role of “real estate owner”). Roles can be derived only implicitly via the person-name number, person-administration, person-representative and person-user relation.

A person can have several roles. However, the person can then only be managed in ALKIS if he or she has at least one role. This is expressed in the formation regulation that requires at least one relation for management, representation, name number, building or user. Figure 5.3 – 41 shows the individual functions and relations for the person feature type.

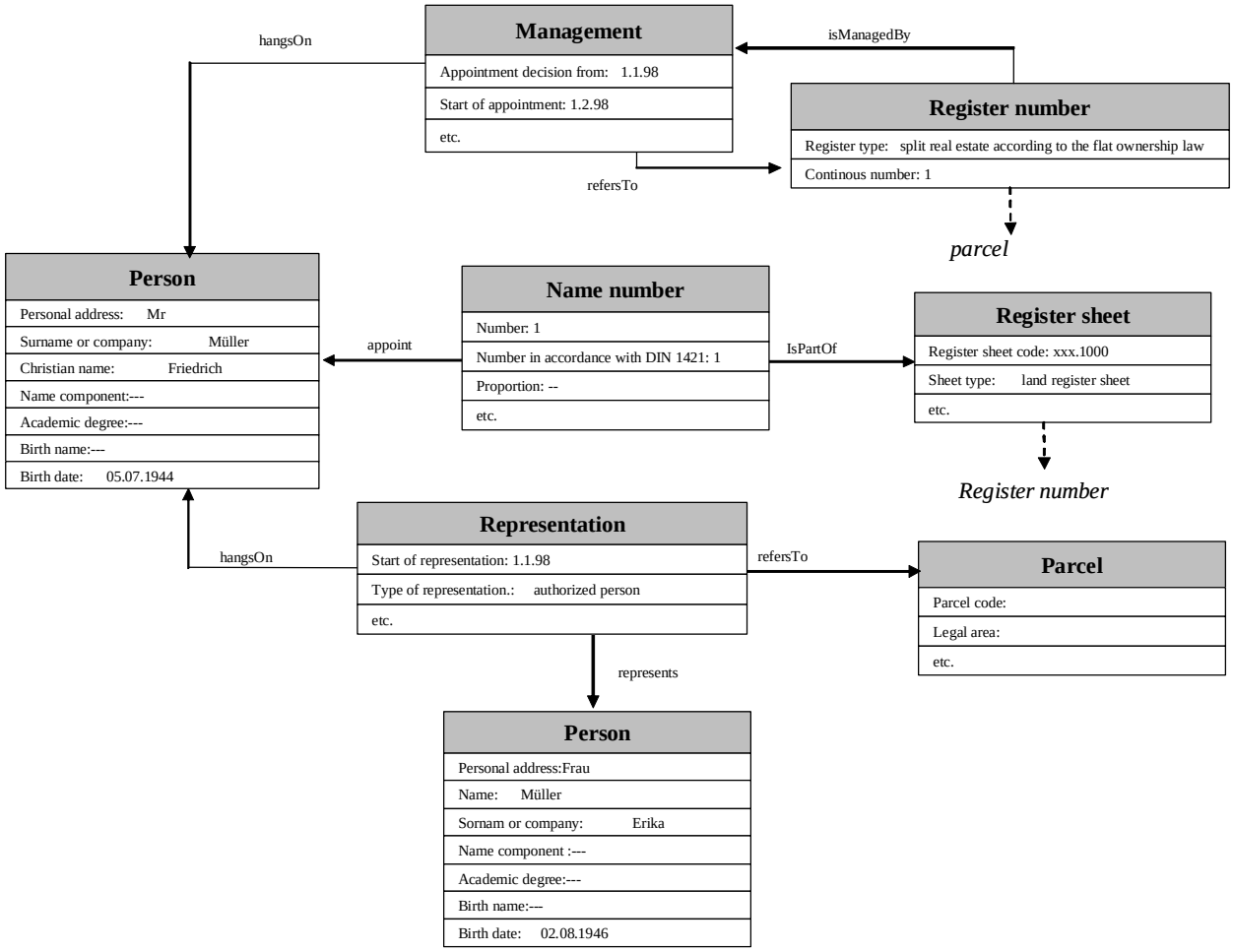



*Figure 5.3 - 41.: Person and its roles – representative manager and owner*

***Person – user relation***

To represent personal data within user profiles, a relation is created from the "user" feature type to the "person" feature type (user role). Individual access authorisations for the ALKIS data in primary database can thus be registered and saved (see data on user profiles).

***Person – representative relation***

Two persons are always created from the feature type "representative" (role of representative) relations. One person who is represented and one another person who carries out the representation. In addition, a further relation is created to the parcel to which the representation relates (not shown here). A person that holds the authority to represent another person can also be represented again.

***Person – name number relation***

A common element of the real estate cadastre and the land register is the owner / leaseholder of a real estate. In ALKIS, the owner of a real estate can be derived via relation chain parcel – register number – register sheet – name number – person. The owner can be a person only if it is posted on the register sheet under a name number (first section of the land register: owner directory).

***Person – managemnt relation***

Individual postings (e.g. real estate or equivalent rights) are not managed by the respective owners, rather by a manager who is the contact person for questions in relation to the registered information. The feature type “management” can refer to the registered information affected by the management via the “refers to” relation.

***Person – address relation***

This relation is optional only, as in individual cases the addresses of persons are not known and cannot be researched as part of migration or the current business processes. Furthermore, for persons assuming the role of “user”, an address is not always required, e.g. when this relates to public employee of the cadastre authority.

***Person – group of persons relation***

At least two persons can alternatively be assigned to groups of persons (see “person group” feature type).

***Person – person relation***

It is often the case that persons are carried in the land register and in the real estate cadastre with various names. Persons can change their names through marriage, although the change is not usually announced to the land registry. The land registry, however, would like to prove an announced name change in the real estate cadastre. In these cases, an additional “person” object can be created with the properties that differ from the land register entry and the two objects can be related via the recursive person – person relation. The drawback to this modelling is that for an object of the real world (person), two objects are created, which contradicts the fundamental principles of modelling. The states that carry full history are able to create various “statuses” for the person in the form of versions. The “person” object occurs only once; the various names are expressed in various versions. Via the “data collection point” quality element, the objects/versions” can be clearly distinguished according to the land register and cadastre status.

***Person – house relation***

To show building ownership, which is carried separately from ownership of the associated real estate in other verifications, a relation can as an option be created between feature types “building” and “person”.

### 2.1.2 Feature type “group of persons”

Natural or judicial persons can be summarised in ALKIS as groups of persons under one key. This feature type does not, however, exist in the land register.

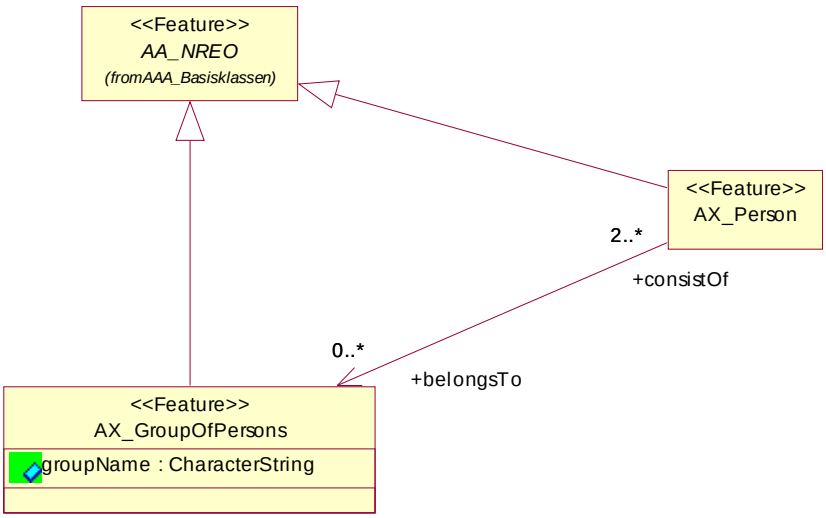



*Figure 5.3 - 42.: Modelling of feature type AX_GroupOfPersons” in UML*

Example:

The real estates of the Diocese Passau are registered under various owners (e.g. parish benefice foundations) in the land register. The assignment of a parish benefice foundation to the associated diocese cannot, however, be determined from the register data. The advantage of concentration into one group of persons lies in the simplification of cadastre-based processes that affect all parcels of the group of persons, e.g. parcel list with all parcels of a group of persons.

***Group of persons – person relation***

Within a group of persons, not all the personal data is carried, only the references to those persons making up the group of persons. It only makes sense to form a group of persons if it consists of at least two persons. This is expressed in cardinality 2...*.

### 2.1.3 Feature type “address”

This feature type carries all information on the postal address of a person. Electronic communication media addresses (e.g. email) can also be recorded in attribute type “other addresses”. Addresses are often used by other specialists administrations (e.g. local authorities). The origin of the information can therefore, as an option, be stored in attribute type “quality data”.

A peculiarity for attributes of feature type “address” is the distinction between the postal location and the location according to the official place name directory, which is generally created and maintained by the internal ministry of a federal state. In special cases, the data may deviate from each other.

***Address - person relation***

An address must always have a reference to at least one person or a department. By contrast, persons or departments are not required to have an address (see also feature type “person”), as they are often unknown, specifically in the case of persons.

### 2.1.4 Feature type “management”

The “management” feature type (role of manager) always refers to a register number with the administered real estate (e.g. split real estate of an owner community). A management of a real estate is therefore to be determined via the real estate – register number – management – person relation. Other references such as “order decision” can be incorporated via attribute types. The management relates to one or several register numbers.

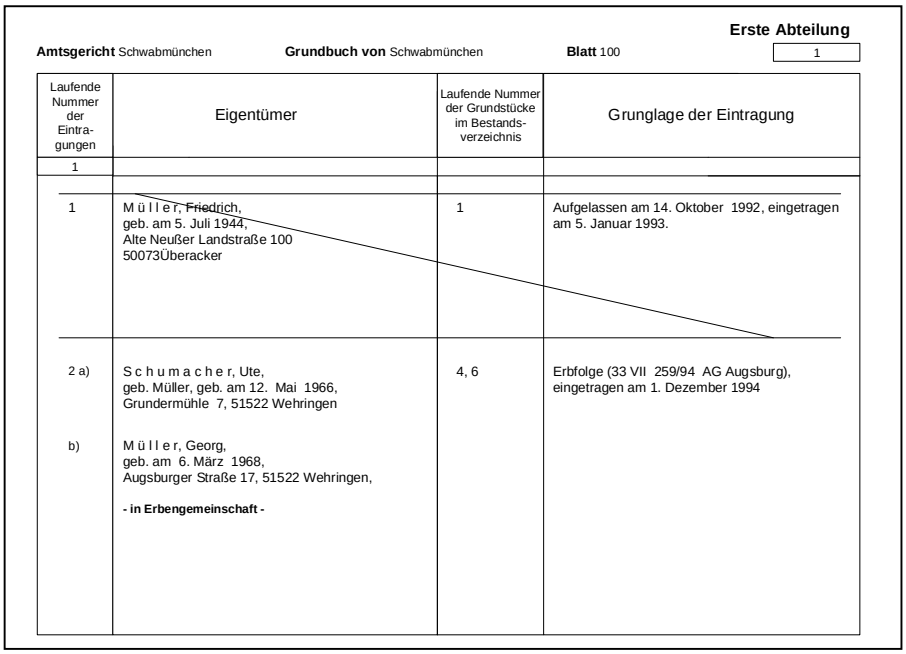
### 2.1.5 Feature type “representation”

Representation indicates which person represents another person in real estate issues. The person to be represented is indicated via the “isRepresentedBy” relation for the person feature type. The person carrying out representation is indicated through the “hangsOn” relation. Other references such as “start of representation” can also be incorporated via attribute types. A representation can relate to one or several parcels.

### 2.1.6 Feature type “name number”

The name number denotes the continuous number under which the owner or leaseholder is carried in the register sheet (first section in the land register sheet). It creates the relation

between the person and the posting itself (via the register sheet ) and therefore also specifies the role of the person as owner or leaseholder.



**Erste Abteilung**

**Amtsgericht** Schwabmünchen **Grundbuch von** Schwabmünchen **Blatt** 100 1

| Laufende Nummer der Eintra-gungen | Eigentümer | Laufende Nummer der Grundstücke im Bestands-verzeichnis | Grunglage der Eintragung |
|---|---|---|---|
| 1 | | | |
| 1 | M ü l l e r, Friedrich,<br>geb. am 5. Juli 1944,<br>Alte Neußer Landstraße 100<br>50073Überacker | 1 | Aufgelassen am 14. Oktober 1992, eingetragen am 5. Januar 1993. |
| 2 a) | S c h u m a c h e r, Ute,<br>geb. Müller, geb. am 12. Mai 1966,<br>Grundermühle 7, 51522 Wehringen | 4, 6 | Erbfolge (33 VII 259/94 AG Augsburg), eingetragen am 1. Dezember 1994 |
| b) | M ü l l e r, Georg,<br>geb. am 6. März 1968,<br>Augsburger Straße 17, 51522 Wehringen,<br>**- in Erbengemeinschaft -** | | |

*Figure 5.3 - 43.: Example of an owner directory in the land register*

The continuous number of the entry (column 1) in Figure 5.3 – 43 corresponds to the “name number” feature type in the ALKIS technical model. In this example, the legal community (heirs community) is not posted under a name number.

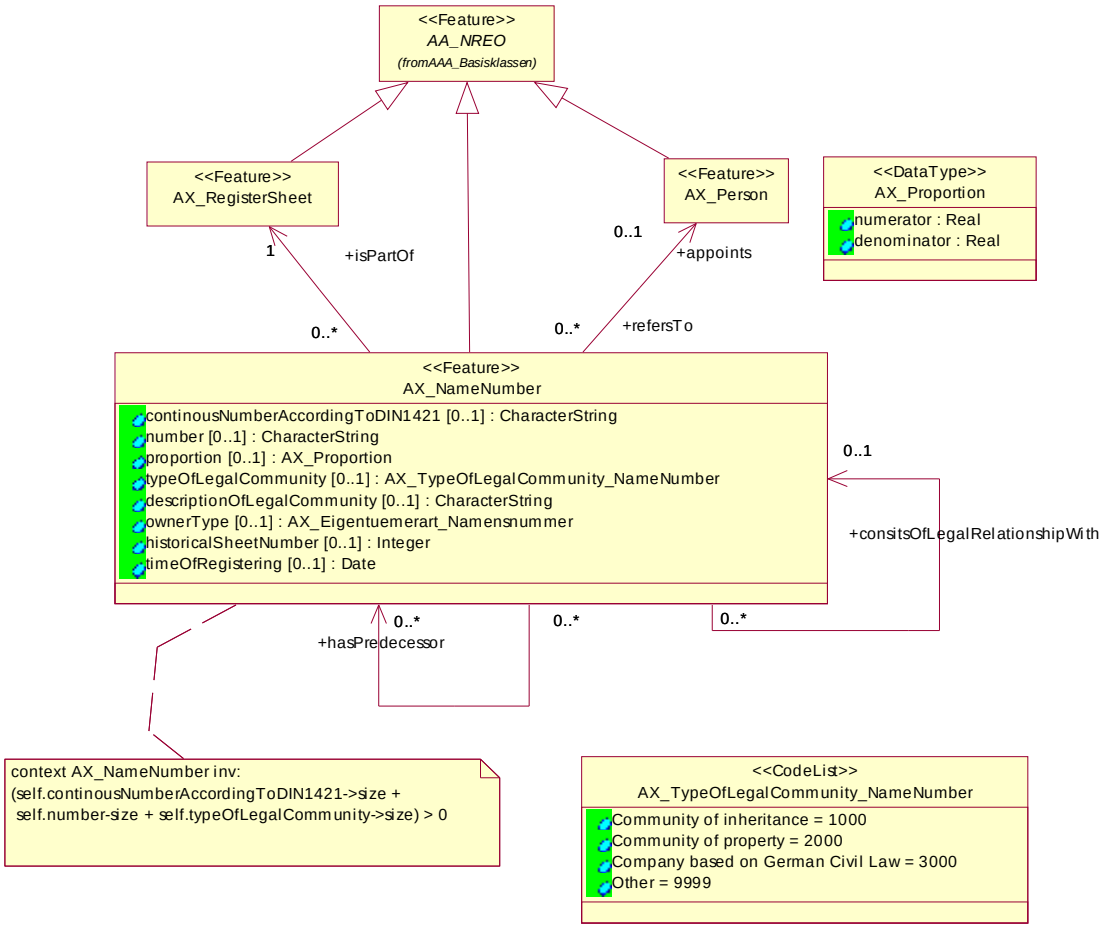



*Figure 5.3 - 44.: Modelling of feature type AX_name number" in UML*

***Name number – name number relation (has predecessor)***

This relation is required to reconstruct a register sheet with several name numbers, if individual postings have been cleared (in red). It can as an option be used to reconstruct the sequence of entries in the register sheet, even after the name numbers have been deleted.

***Name number – name number relation (consists of legal relationship with)***

No feature type is provided in ALKIS for legal communities. Legal communities are therefore carried in the register sheet under a name number. Legal communities are formed via the recursive name number – name number relation. The type of legal community is recorded via an attribute. As in fact "standard", although not all, types of legal community are recorded in ALKIS, the legal community posted in the land register can as an option be described in attribute type "description of legal community". The "continuous number in according to DIN 1421" and "number" attribute types are optional, as legal communities are usually registered without continuous number (see Figure 5.3 – 44). The name numbers that contain legal

communities are also registered under a continuous number on a register sheet. A relation **between** all name numbers that belongs to a legal community (e.g. community of inheritance) is not provided, rather only between the legal community and the associated name numbers.

In ALKIS, the persons are also carried under a legal community where a legal relationship exists. The individual persons behave accordingly “for the common hand” and hold no shares definable by percentage. It is entirely possible, however, for a legal community as a whole to hold shares in a land register data.

In a special case, a legal community can in turn consist of a legal community. A recursive relation “consists_of_legal relationship_with” can therefore be used in this case.

### 2.1.7 Feature type “register sheet”

Currently, the land register code clearly denotes data in the land register throughout Germany. In ALKIS, this code becomes the register sheet code on the basis of the modelling, whereby the register sheet, e.g. land register sheet is again assigned a clear technical code. The posting register sheet code is a derived attribute type, which comprises the combination of the codes for the federal sate, the register sheet district and also the register sheet number with extended alphabet. The first two components are grouped together in the data type “AX_RegisterSheetDistrict_Code”, which is also used to decode the corresponding catalogue entry.

The register sheet refers via a relation of the feature type “posting location”, which in turn contains the actual postings. The register sheet must also have at least one relation to a name number in the owner directory, insofar as owner or other entitled party (e.g. leaseholder) are recorded on a sheet.

Sheet types

(1) Land register sheet

(2) Cadastre sheet

(3) Pseudo sheet

(4) Purchaser sheet

(5) Fictitious sheet

are combined under register sheet. The distinction is drawn in the “sheet type” attribute type.

### Land register sheet

Postings in the land register are carried under a register number in the land register sheet, i.e. a register sheet with sheet type land register sheet is created in ALKIS. This is expressed by the consistency condition described in a “note”.

### Cadastre sheet

In accordance with § 2 (2) of the Land Register Act, ALKIS contains “register free real estates”. Proof of such is registered on a cadastre sheet.

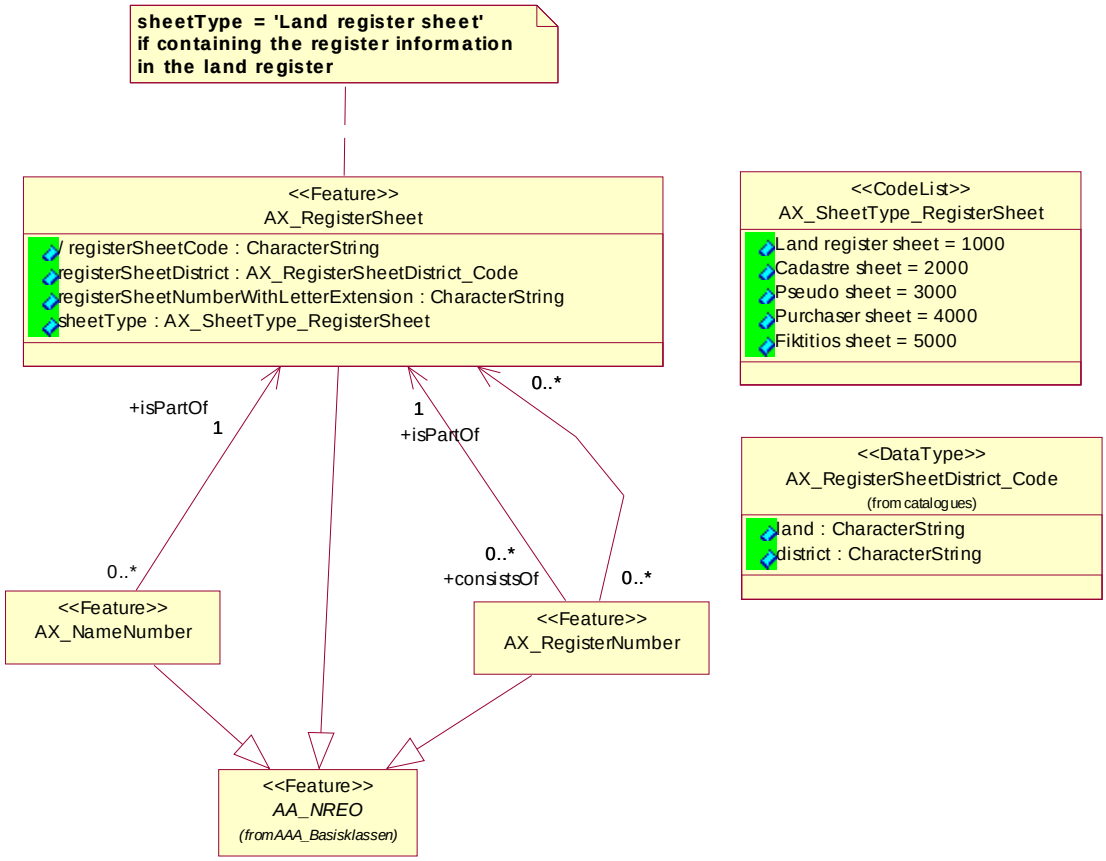



*Figure 5.3 - 45.: Modelling of feature type “AX_RegisterSheet” in UML*

### Purchaser sheet

Alternatively, to create an update certification, the update data (e.g. the new owner of a newly formed real estate) is indicated in a purchaser sheet and submitted to the authority holding the land register. The purchaser sheet, however, contains only a proposed posting for entry into the land register and in this respect has no legal effect. Following the posting in the land

register, the purchaser sheet is transferred to a land register sheet, i.e. the purchaser sheet is then historized and/or deleted.

**Pseudo sheet**

The pseudo sheet permits entry of a posting that is already legally effective although not yet complete in the land register. Following the posting in the land register, the pseudo sheet is transferred to a land register sheet, i.e. the pseudo sheet is then historized and/or deleted.

**Fictitious sheet**

Another option is the “fictitious sheet” sheet type, which technically brackets the parts of a split real estate posted in the land register (e.g. for WEG). Only the parts of a split real estate and not the split real estate as a whole are posted in the land register. The fictitious sheet is a technical cadastre tool and has no legal effect.

The advantages of the fictitious sheet are:

(1) It is sufficient to create the relation “real estate_consists_of” from the to the parcel only once and not also from every posted part. The essential advantage lies in the update of the split real estate, as only one relation has to be changed.

(2) Additional information that affects the entire real estate (e.g. administrator) can easily be appended to this fictitious sheet and thus does not need to be connected to all co-ownership parts.

(3) Plausibility checks for the completeness of all parts (“1/1 tests”) can easily be realised.

(4) The fiction sheet carries a sheet number, which is just created by the system of a database.

### 2.1.8 Feature type “register number”

The register number is the posting entered under a continuous number in the inventory of land register of the posting (e.g. real estate, leasehold).

A register number is always part of a register sheet, i.e. the relation “is part of” must always be occupied. A register sheet can consist of several register numbers.

The diagram below shows the correlations between register sheet, register number (registered real estate) and the associated parcel.

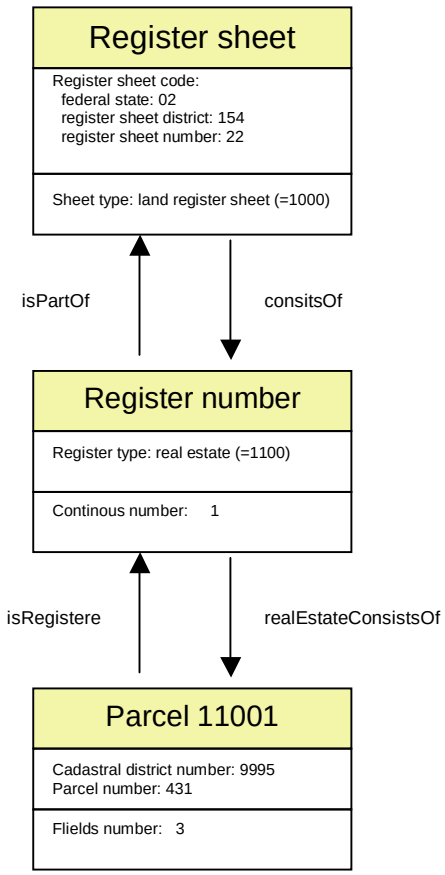



*Figure 5.3 - 46.: Modelling: Registering of a real estate in ALKIS*

The register sheet consists of a register number (in this case with register type real estate). The real estate consists of parcel no. 431.

The various value type groups of attribute type “register type” in some cases require the formation of specific objects in accordance with certain regulations. For example, the value types for split registering exist for feature type “register number” under attribute type “register type”. The split registering always require a relation to a “fictitious sheet”. These regulations are described in the feature catalogue description for the definition of the relation.

Residents path, residents moat or residents stream have previously been carried as references or as residents entries for the affected parcels. These data are illustrated in the integrated model as postings (cadastre sheet). Residents real estates belong to the registering-free real estates and are therefore not carried in the land register, rather in the real estate cadastre.

All postings currently appearing in the land register and real estate cadastre are repeated under attribute type “register type”. Additional data on the register type, specifically the laws (e.g. window laws) are recorded in the text field of attribute type “register text”.

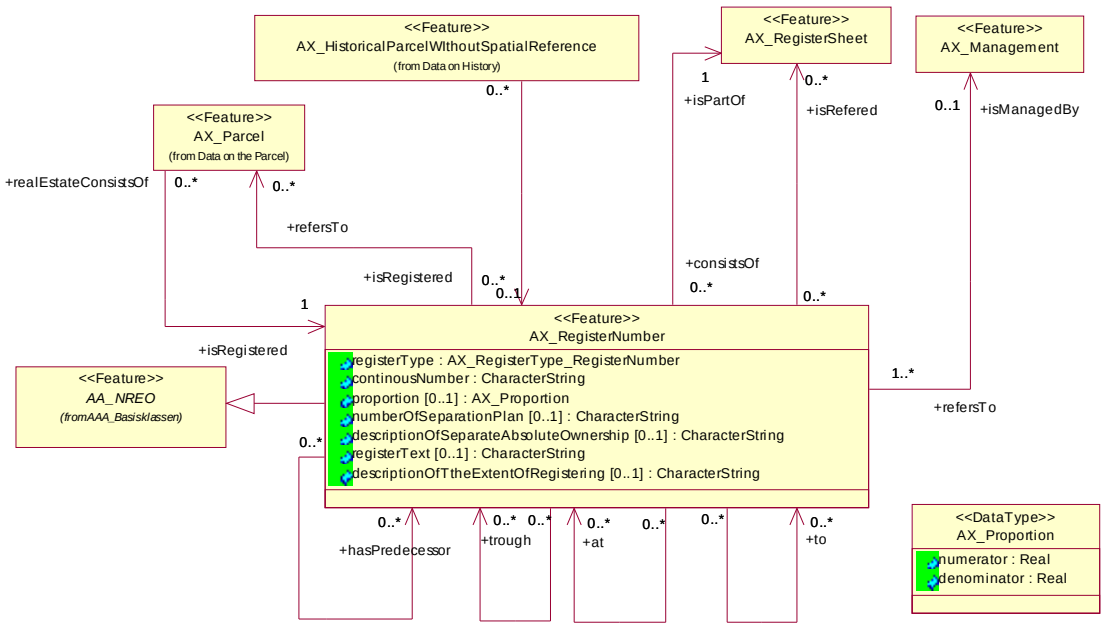



*Figure 5.3 - 47.: Modelling of feature type "AX_RegisterNumber" in UML*

***Recursive relations "through" "at" and "to"***

Register numbers can have reciprocal relations, both for postings on the same register sheet , expressed through a "to" relation and also for postings on a different register sheet, expressed through a "at" relation. The graphic illustration shows these relations as recursions. The data are derived from the content in the inventory of land register of the land register sheet.

**Amtsgericht** Schwabmünchen **Grundbuch von** Schwabmünchen **Blatt** 100 **Bestandsverzeichnis** 2

| Laufende Nummer der Grund-stücke | Bisherige laufende Nummer der Grund-Stücke | Bezeichnung der Grundstücke und der mit dem Eigentum verbundenen Rechte | | Größe |
|---|---|---|---|---|
| | | Gemarkung (Vermessungsbezirk) Flurstück a/b | Wirtschaftsart und Lage c | m² |
| 1 | 2 | 3 | | 4 |
| 6 | - | 102 | Gebäude- und Freifläche<br>Alte Neußer Landstraße 100 | 910 |
| | | 310 | Gartenland | 200 |
| 7<br>zu 6 | - | 1/10 Miteigentumsanteil an dem Grundstück<br>110 | Weg<br>Alte Neußer Landstraße | 100 |

*Figure 5.3 - 48.: Example of a "to and at relation" (inventory of land register)*

**Katasteramt Fischstadt**
Molchgrottenweg 1
97190 Fischstadt

**Auszug aus dem Liegenschaftskataster**
**Flurstücks- und Eigentumsnachweis**

**Erstellt am 25.03.2004**

**Flurstück 41, Flur 1, Gemarkung Lurchingen**

| | |
|---|---|
| Gebietszugehörigkeit: | Gemeinde Lurchingen<br>Kreis Krötenstett<br>Regierungsbezirk Moorland |
| Lage: | Nähe Mückenweg |
| Fläche: | 275 m² |
| Tatsächliche Nutzung: | 275 m² Wohnbaufläche (Erweiterung, Neuansiedlung) |

**Angaben zu Buchung und Eigentum**

| | |
|---|---|
| Buchungsart: | Grundstück |
| Buchung: | Amtsgericht (Grundbuchamt) Krötenstett<br>Grundbuchbezirk Lurchingen<br>Grundbuchblatt 420<br>Laufende Nummer 1<br>zugeordnet 1/3 Miteigentumsanteil an dem dienenden Grundstück<br>Flurstück 46, Flur 1, Gemarkung Lurchingen<br>mit der laufenden Nummer 2 auf dem gleichen Grundbuchblatt |
| Eigentümer: | 1 Groppe, Gropius<br>Rutenstraße 12<br>97884 Bornhausen |

*Figure 5.3 - 49.: Example for an ALKIS standard output*

In Column 1 of the inventory of land register, reference is made under register number 7 to register number 6 on the same register sheet ("7 to 6"). A "to relation" is therefore created in ALKIS between the two register numbers. One of objectives of ALKIS modelling is the complete reproduction of the inventory of land register and the first section of the land register in order to determine for example all legitimate persons of a cadastral survey. Also for a correct portrayal of an ALKIS standard output the relation "to" must be applied (see figure 5.3 - 49)

The reference “1/10 part of joint ownership part to the real estate….” is also located in Column 3. A relation “to” for a register number on a different register sheet (in this case “fictitious sheet” as split posting) would therefore need to be created here. The relation always shows from the encourage law to the charged registering (e.g. leaseholder has a right on a real estate).

To create the relation, the text in the inventory of land register of the register sheet must always be observed.

***Recursive relation “has predecessor”***

This relation from one register number to another register number can be used to reconstruct a register sheet. It can be created if posting from other postings have occurred and therefore have a “predecessor posting”. The sequence of postings can thus be clearly specified on a register sheet.

***Relation “real estate consists of”***

If the register number refers to posting type “real estate”, a relation to one or several parcels from which the real estate is composed must always be formed. Vice versa, each parcel must be posted to a posting location. In order to express this technical condition, an internal relation type with corresponding cardinalities has been created.

This means that for migration to ALKIS, all parcels must be widely available in digital format, as otherwise the relations to the parcels required to consistently manage the posting data would run out, making it impossible to manage the personal and land register data.

***Relation “refers to”***

This relation, like the “real estate consists of” relation is a relation to the parcel. This has been generally defined as a sequence of postings exists that relate to a parcel (e.g. cooperation forest), which are, however, not the parcel postings. The relation type thus indicates which register number of the inventory of land register, e.g. rights to parcels are entered.

***Relation “relates to”***

In some cases, postings in the land register do not relate to the register sheet to which they are posted, rather to other register sheet s (e.g. for corporations that are posted to other register sheet s). In this case, the “relates to” relation can be created as an option.

# 3 Feature type area “house”

## 3.1 Feature type group “data on the house”

The feature type area building with feature type group “data on the house” consists of the following feature types

- “House”
- “Part of house”
- “Specific house line”
- “Ridge line”
- “Specific house point”

The technical and logical correlations at technical and geometric level with the abstract classes are shown by both the following schematic illustration and the UML model. The schematic illustration highlights by colour the technical correlations existing between technical and geometric level. The obligatory house theme consists of the following feature types: “House”, “part of house”, specific house line”, “ridge line” and also “specific house point”. Real technical objects and abstract objects are highlighted by colour markings. Further details are provided in the explanations below.

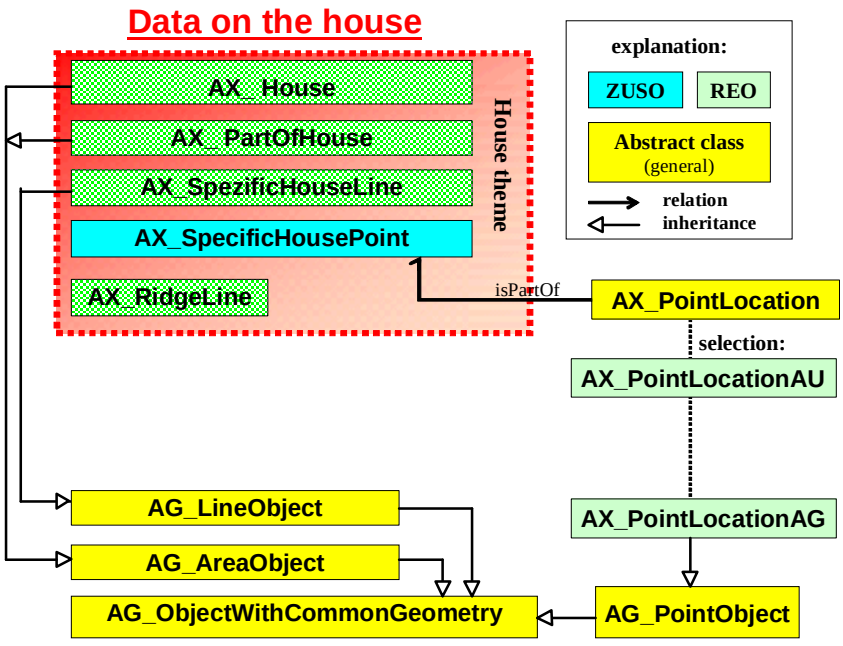



*Figure 5.3 - 50.: Schematic illustration “data on the house”*

### 3.1.1 Feature type "house"

For the technical and geometric description of a house in the defined outline (definition geometry of the house), the house feature type is used as a spatially-referenced elementary object with the corresponding reference to a house function and where applicable to other self-related properties, some of which were taken from the ALB II and HALB concept (management of extensive house data in large cities). The house on the earth's surface is represented through the vertical projection of the house body. The house thus always surrounds all its associated components. One exception is the underground house that is not part of the house area. In addition, the characteristics previously created in ALK such as roofing and inclines are assigned to the structure areas rather than the components (see Section 3.1.2). This basic principle for illustrating the house area is observed for every house and components. Selected self-related and externally-related properties are described in more detail below:

***Attribute type function***

The "function" attribute type describes, according to the dominance principle, the functional meaning of a house that is objectively recognisable at the time of data collection. The code list for the house functions covers exclusively the following three top groups:

- Residential house
- House for business or commercial
- House for public business

Other differentiated house functions are assigned to these top groups. The association to one of the top groups can thus be recognised using the key. One of the main requirements of the electricity supply companies is therefore covered. The top groups belong to the core data inventory of the AdV. As part of migration to ALKIS, the top groups must of course be observed. If the function assignment is not possible, the "not to be specified according to source position" house function may be used. Further the house code of the ALK is set up as a migration attribute type, because the user cannot give up this code for a long period of time. The content of this attribute type is taken over from the current ALK solution. The house code is not derived from the ALKIS data.

***Relation "belongs to"***

The recursive relation "belongs to" with cardinality [0. *] is used if the houses belong together structurally and unlike the component, are of equal significance. This is usually a house complex with several associated house components, which can lie spatially separate from each other. The modelling allows for the fact that the structurally associated houses are

connected together in a ring. For the house complex, the location description including house number is assigned to one house only (usually to the house with the main entrance). No other house carries a location description. Further details are provided in the diagrams below.

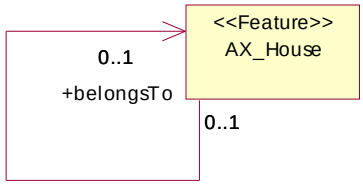



*Figure 5.3 - 51.: Relation type "belongs to" for feature type house from UML*

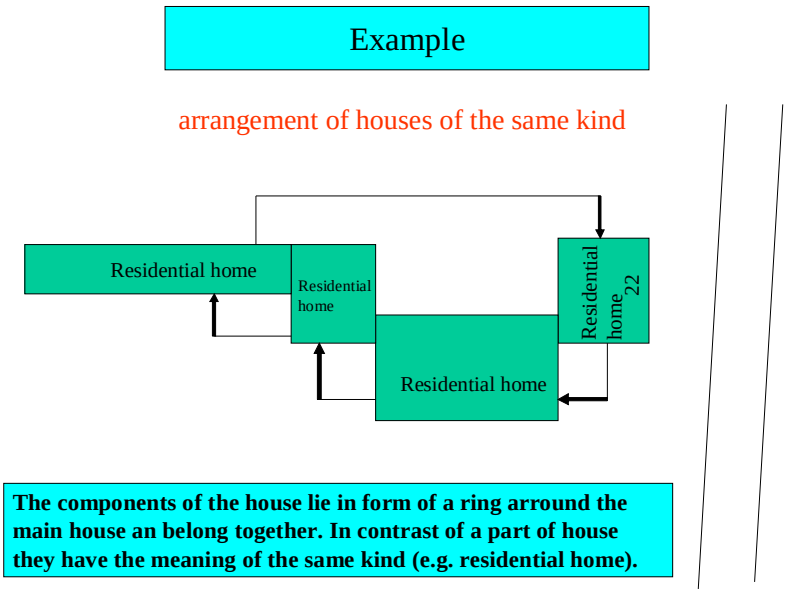



*Figure 5.3 - 52.: Example of equivalent house arrangement*

***Relation "belongs"***

The "house belongs to person" relation is only used, regardless of whether the entries in the land register ("register number with attribute type "posting type") an ownership is justified for the house in accordance with the BGB [German Civil Code].

***Relation "refers to"***

The relation that a house "refers to" one or several objects of feature type "location description with house number" assigns one or several house numbers to the house with the correspondingly encoded location description. The house code present in ALK can thus be restored as and when required.

The spatial reference for a geo-referenced house address can also be derived from this relation, as the relation to the house always provides a geometric reference (see section 1.2.6 feature type “spatial referenced house address”.

**Spatial reference / theme formation**

The house and part of house inherit exclusively properties from basic class AG_Area object. Thus, in accordance with the technical requirements, no topological evaluations can be carried out, as there are no neighbouring relations or dependencies between the individual house objects. The geometry level for these feature types is described through the abstract feature types AG_AreaObject and AG_Object with common geometry, derived from feature type AA_REO of the AAA_BasicSchema. The AG_AreaObject is the basic class for spatially-referenced technical objects, which are represented geometrically by an area and share the same AA_PointLine theme line and point geometry with other spatially-referenced technical objects. This means that the coordinate (GM_Point) of the house points is identical to the coordinates for the starting and end point of a specific house line and the coordinates of the base points of a house area and where applicable the part of housesurface and the ridge line. The common geometry is carried redundancy-free.

The graphic below shows the theme definition for the house with the associated feature types, the type of theme definition containing the statement as to whether it relates to an obligatory theme (type = 1000) or an individual theme (type = 2000). This theme is thus an obligatory theme.

```
<AX_ThemeDefinition>
  <name>house</name>
  <type>1000</type>
  <featureType>AX_house</featureType>
  <featureType>AX_PartOfHouse</featureType>
  <featureType>AX_SpecificHouseLine</ featureType>
  <featureType>AX_RidgeLine</featureType>
  <featureType>AX_PointLocationAG</featureType>
  <modelType>DLKM</modelType>
  <dimension>1000</dimension>
</AX_ThemeDefinition>
```

*Figure 5.3 - 53.: Theme – house in UML*

The individual theme (type = 2000) “parcel and house” also exists, in order to express geometrical identity between a house and parcel line. During the data collection process, the user is at liberty to decide, whether he wishes to express an existing technical identity or not. The following illustrations show the theme formation in the UML model.

```
<AX_ThemeDefinition>
  <name>parcel and house</name>
  <type>2000</type>
  <featureType>AX_Parcel</featureType>
  <featureType>AX_SpecificParcelLine</featureType>
  <featureType>AX_PointLocationTA</featureType>
  <featureType>AX_House</featureType>
  <featureType>AX_PartOfHouse</featureType>
  <featureType>AX_SpecificHouseLine</featureType>
  <featureType>AX_PointLocationAG</featureType>
  <modelType>DLKM</modelType>
  <dimension>1000</dimension>
</AX_ThemeDefinition>
```

*Figure 5.3 - 54.: Theme of parcel and house in UML*

## OCL Code Interpretation

For the technical object house, the following consistency conditions are defined in the OCL Code of the UML reference schema as follows:

```
context AX_House inv:
AX_House.allInstances->forAll (p1, p2 |
  (p1.PositionToEarthSurface <> 'underground'
   p2.PositionToEarthSurface<> 'underground' ) implies
  p1.gposition.intersects(p2.gposition) = false)

context AX_House inv:
self.gposition.oclIsTypeOf(GM_PolyhedralSurface) implies
  self.gposition.boundary().exterior->forAll( r : GM_Ring |
    r->forAll( oc : GM_OrientableCurve |
      oc.primitive.segment->forAll( s : GM_CurveSegment |
        s.interpolation <> 'cubicSpline')))
    and
  self.gposition.boundary().interior->forAll( r : GM_Ring |
    r->forAll( oc : GM_OrientableCurve |
      oc.primitive.segment->forAll( s : GM_CurveSegment |
        s.interpolation <> 'cubicSpline')))

context AX_House inv:
self.gposition.oclIsTypeOf(GM_CompositeSurface) implies
  self.gposition.generator->forAll( os : GM_OrientableSurface |
    os.primitive.boundary().exterior->forAll( r : GM_Ring |
      r->forAll( oc : GM_OrientableCurve |
        oc.primitive.segment->forAll( s : GM_CurveSegment |
          s.interpolation <> 'cubicSpline')))
    and
    os.primitive.boundary().interior->forAll( r : GM_Ring |
      r->forAll( oc : GM_OrientableCurve |
        oc.primitive.segment->forAll( s : GM_CurveSegment |
          s.interpolation <> 'cubicSpline'))))

context AX_House inv:
self.gposition.oclIsTypeOf(GM_MultiSurface) implies
  self.gposition.elements->forAll( os : GM_Surface |
    os.boundary().exterior->forAll( r : GM_Ring |
      r->forAll( oc : GM_OrientableCurve |
        oc.primitive.segment->forAll( s : GM_CurveSegment |
          s.interpolation <> 'cubicSpline')))
    and
    os.boundary().interior->forAll( r : GM_Ring |
      r->forAll( oc : GM_OrientableCurve |
        oc.primitive.segment->forAll( s : GM_CurveSegment |
          s.interpolation <> 'cubicSpline'))))
```

1

2

3

4

*Figure 5.3 - 55.: OCL code for house from UML*

(1) Except for those that are underground, houses do not intersect.

(2) Houses can consist of polyhedral surfaces. This means that the part surfaces of the house are connected along their common boundaries. A partial surface consists of one polygon, the lines of which are oriented and which forms a ring, i.e. returns to the starting point. The oriented structure of an outline of the house is required for clear identification of its sides, in order to create, for example a link to the technical data of an electricity supply company.

(3) Houses can consist of composed surfaces (CompositeSurface), which means that the adjacent surfaces are only partially in contact and form a surface in their entirety.

(4) Houses can consist of several surfaces (MultiSurface), which do not have to be geometrically connected.

### 3.1.2 Feature type "part of house"

Parts of houses that have properties which deviate from the respective "house" feature or which are of a special nature (forming characteristics), e.g. storeys, passageways and arcades that deviate from the dominant house form, belong to the "part of house" feature type as a spatially-referenced elementary object. The "part of house" as part of a house always lies within the outline of the house, provided it does not lie below the earth's surface. The direct reference to the house is realised through the common geometry theme. It is therefore not necessary to carry an explicit relation. The "roofing" and "incline" are contained in feature type "other structure or other facility" and assigned to the house via the "belongs to" relation. Passageways in buildings such as tower or town wall cannot be built with the corresponding part of houses. In these cases the feature type "AX_BiuldingInTrafficArea" (53001) with the building function and the value type "passageway = 1900" is applied.

Parts of house are not part of the core data defined by the AdV and can therefore be carried by the individual states in a state-specific defined scope. If, as part of the migration process, the creation of surface part of house objects is associated with high input, the forming line element of an object present in the ALK can be transferred to the house formation migration object type. It is not, however, permissible to recreate this feature type in ALKIS as part of the update process. Other modelled properties in the house data can be seen in the ALKIS feature catalogue description.

### 3.1.3 Feature type "specific house line"

Attribute type "condition" describes the house in more detail through feature type "specific house line" as spatially referenced elementary object. This should express, for example, the

lining of the house that is “clinkered”. The specific house line belongs to the obligatory “house” theme and thus shares the geometry with the definition geometry of a “house” object.

The feature type “specific house line” is also used to illustrate an open house line (feature type “specific house line”, attribute type “condition”, value type “open house line = 1000”). This is used if the house wall does not come into contact with the earth’s surface. Example:

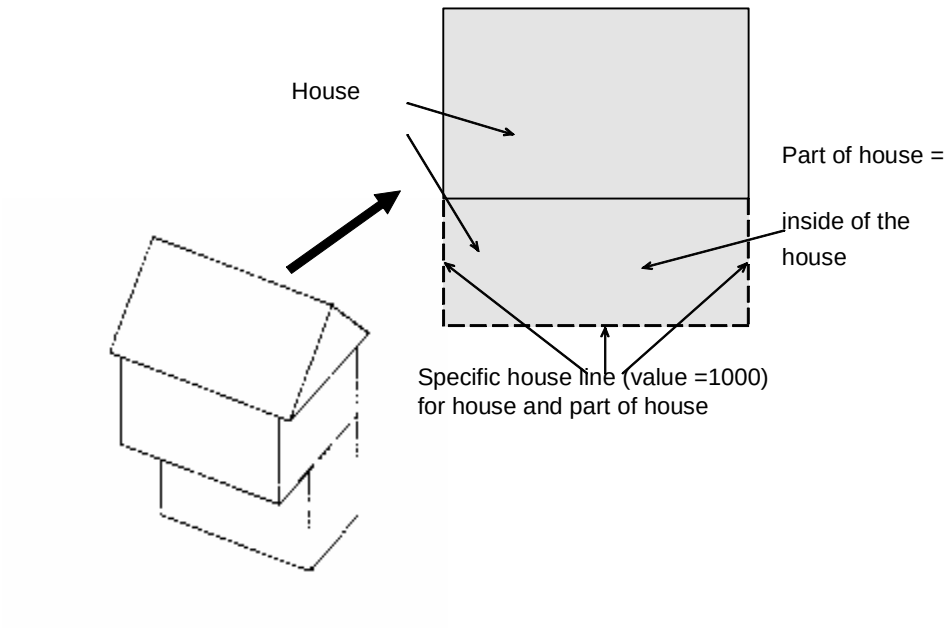



*Figure 5.3 - 56.: Open house line*

Theoretically, the open house line can also be realised by intersecting the house with the part of house. The house sides are open if the intersection creates a situation whereby they are identical with the part of house sides. However, this calls for major calculation input for each graphic set-up, which means that the explicit management of the open house lines is required in ALKIS.

### 3.1.4 Feature type “ridge line”

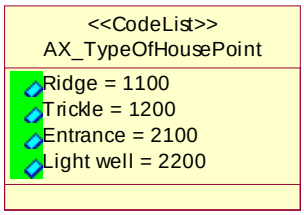
The line feature type “ridge line” is to describe the contour of the roof ridge (spatial reference type “line”) of a house as the forming characteristic. The ridgeline belongs to the common point-line theme “house”.

To be able to illustrate a shed roof, for example, several ridgelines can also be assigned to a house or component.

### 3.1.5 Feature type “specific house point”

The corner point of a house or part of house are alternatively described through the “specific house points”, whereby it is not crucial to assign a point code as an internal cadastre order feature. The feature type “specific house point” is a composed object (ZUSO) and consists of a REO “PointLocationAG” and where applicable a further REO “PointLocationAU”. The feature type ZUSO forms the technical bracket between technical object specific house point and the quality and spatially-referenced properties that are held in the feature type “point location”.

The house points in reference systems other than the official system or in other official reference systems are described using feature type “PointLocationAU” (independent geometry).




Specific house points can be assigned certain information on the position of the house. This enables height data relating to certain points of the house to be carried (e.g. for the purpose of flood water protection or 3D representation).

***Attribute type responsible department***

The responsibility for point maintenance is expressed through attribute type “responsible department”.

**Spatial reference**

The “specific house point” and the “point location” assigned to it, along with attribute type “real estate map” and value type TRUE, contains the spatial reference through a point on the surface or line, that contributes towards determining the spatial reference of the corresponding “house” or “part of house”.

# 4 Feature type area “actual use”

The feature type area “actual use” consists of the abstract top class “actual use” and the following feature type groups

- “Residential area”
- “Traffic”
- “Vegetation”
- “Water”.

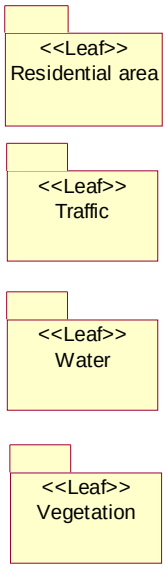



*Figure 5.3 - 57.: Feature type area Actual Use from UML*

The feature type area “actual use” has been harmonised between ALKIS and ATKIS and matched with the ground areas in ATKIS. The semantic correlations and modelling for the features of the actual use of the real estate cadastre and the corresponding feature type areas of DLM (residential area, traffic, vegetation, water) and also for the house and topography of the real estate cadastre and ATKIS were harmonised in particular.

It was possible to achieve complete semantic harmonisation of the feature types for the ground areas (“actual use” feature type area). In terms of geometric expression, however, ATKIS takes account of the line modelling of roads, paths, railways and waters. Due to the degree of abstraction in the basic DLM, these surface objects in ALKIS are in some cases modelled only as line representations of surfaces. During the harmonisation process, particular account was taken of this situation in the designation of feature types (e.g. road axis instead of road).

***The result of harmonisation thus enables information for ALKIS and ATKIS to be recorded only once and mutually interchanged.***

The feature type area “actual use” from 34 feature types, of which 26 common to ALKIS and ATKIS and 8 exclusive to ATKIS are used. These 8 feature types are therefore part of the basic DLM and therefore not part of the ALKIS feature catalogue description. All ALKIS feature types of actual use form as ground area a continuous and non-intersecting covering of the earth’s surface. For specification of the ground areas, the main use of the affected area is generally assumed (dominance principle).

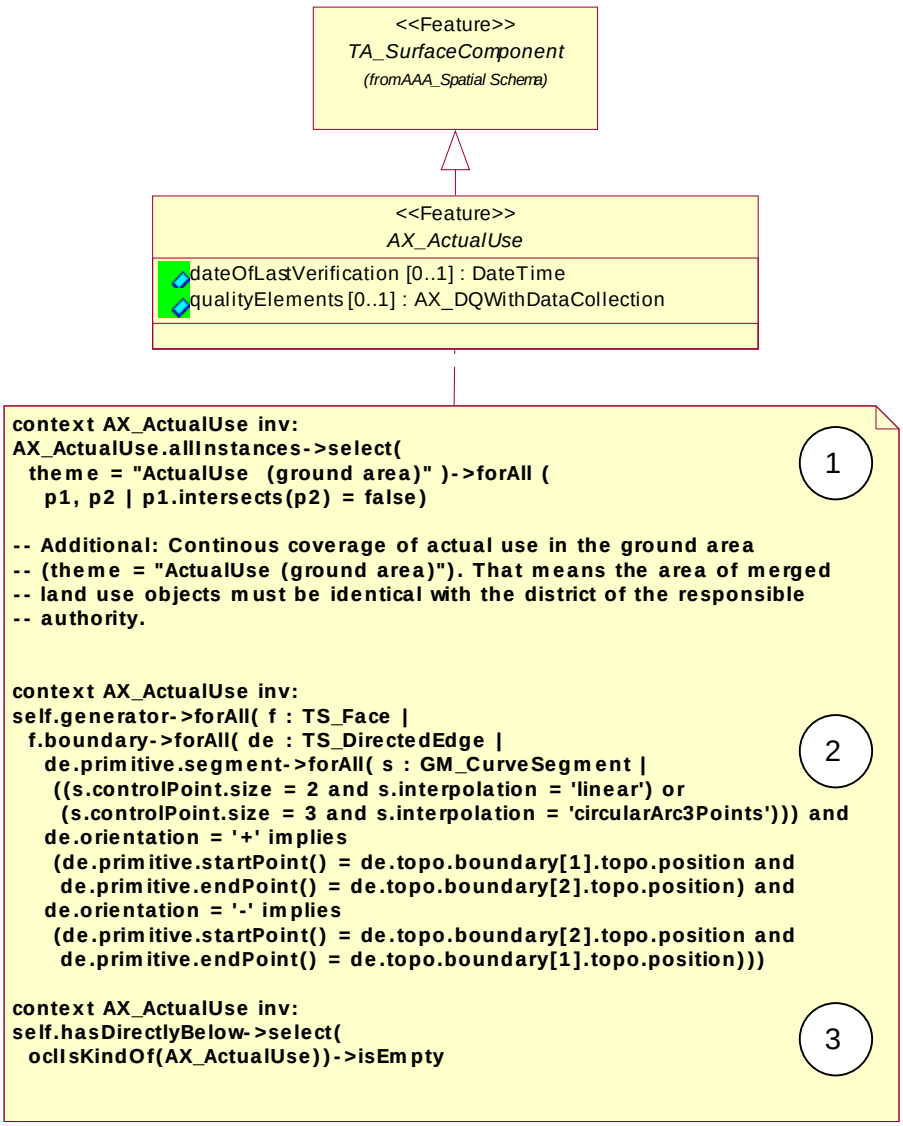



*Figure 5.3 - 58.: Abstract class “AX_ActualUse” from UML*

The abstract class “AX_ActualUse” contains for the feature type area generally valid data that is transferred to all feature types in this area. This class relates to quality data in the form of lineage data (basis of data collection) and the date of the last verification. The OCL code in the UML model indicated above has the following technical significance:

(1) All areas of actual use that are part of the ground area must not intersect.

(2) Data on permissible geometric interpolation types (line, arc).

(3) The area of actual use that is part of the ground area has no “hasDirectlyBelow” relation to a structure.

The previous AdV list of land use (1995) was created hierarchically in line with the level of data recording (100, 10, 1 places). It was therefore possible to record at different levels in the federal states. For the already mentioned derivation of ground areas in ATKIS through actual use of the real estate cadastre, it will be sufficient in the future to carry feature types without further attributive differentiation, i.e. apart from its geometry, the object has no further properties and the attribute types are therefore in principle optionally set. No further distinctions in the real estate cadastre are required. They are, however, possible and can be limited to selected attribute and value types.

This is illustrated by the example below:

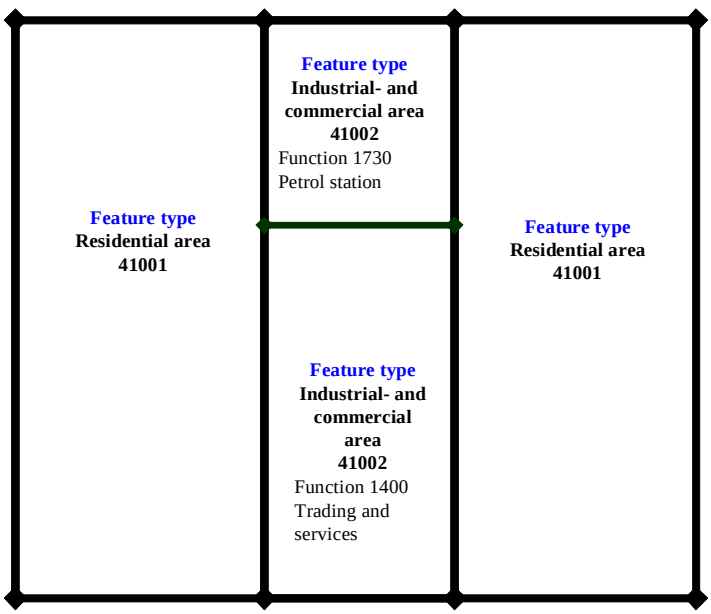



*Figure 5.3 - 59.: Feature type area "actual use"*

To derive the area evaluation in accordance with the agricultural statistic law, the feature type “industrial and commercial area” must carry the industry and commerce function

(value=1700) and also for feature type “sport, leisure and recreational area” the public park function (value=4400).

In the feature type “industrial and commercial area” the following distinctions must also be made in the transition phase until the complete area of ALKIS will be realised:

Trading and services (value=1400)

Supply system (value=2500)

Disposal (value=2600).

Once ALKIS has been introduced throughout Germany, the area evaluation should be prepared without such distinction being drawn.

Previously, the list of land use carried a reservoir “other…” under every tenth place. This reservoir was surrendered. All items previously recorded under “other.” are incorporated and/or transferred exclusively to the corresponding higher hierarchical group.

States that have carried the list of land use in the real estate cadastre at a lower level of differentiation can easily transfer this information by using of the hierarchically structured value types of the attribute types.

The following are to be observed for the conducted assignment:

(1) The assignment table comprises the data of NAV 95 that are to be migrated by indicating the corresponding feature type, feature type code, attribute types and value types.

(2) During the assignment process, the 1 key of NAV 95 is transferred to the corresponding feature types indicating attribute types and value types.

(3) The top groups (100 key) of NAV 95 are generally assigned to the feature types without further differentiation.

(4) Assignment for the technical data indicated under the 1000 key can take place only through differentiation.

(5) In future, it will no longer be necessary to record actual use by differentiation. To derive the ALKIS core data, it is sufficient to hold the actual use feature types without attribute assignment, with the exception of industrial and commercial area (see statements above).

**Note on migration:**

If the previous systems hold information on actual use without spatial reference (i.e. only in the ALB and not in the ALK), this information can be transferred as part of migration (provisional) to attribute type “other properties” of the parcel feature type.

As shown by ALKIS schema, actual use cannot be seen in isolation, rather in interaction with the objects of feature type area “buildings, installations and other data”. The table contains essentially, although not exclusively, the structures with the previous “topography”. It also contains “mirrored” information from actual use, which according to the dominance principle” is not regarded as actual use. The dominance principle, according to which an item is to be regarded as “actual use” or “buildings, installations and other data”, is to be established state-specific as a recording criteria.

All “buildings, installations and other data” overlap rather than intersect the ground area (actual use). This “new” view in the correlation between “actual use” and “buildings, installations and other data” is shown as an example in the diagram below, which also illustrates the state-specific demarcation of feature type area “actual use” (among themselves) or in relation to feature type area “buildings, installations and other data”.

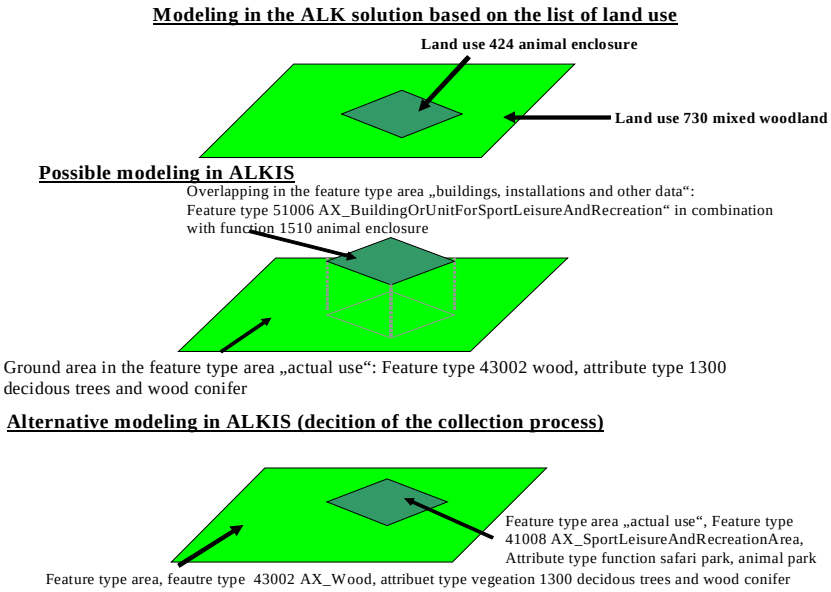



*Figure 5.3 - 60.: Example of feature type area "actual use"*

Due to the diversity of landscape feature forms, the earth’s surface is not to be represented uniquely. The principle already described, that features of the “actual land use” feature type area must not overlap, becomes applicable if the objects lie on the earth’s surface.

### Vertical description of the earth’s surface

In order to model the vertical layer of objects above and below the earth’s surface, the “hasDirectlyBelow” relation is used. The feature situated highest above the earth’s surface contains the “hasDirectlyBelow” relation to the feature situated below it (e.g. street “hasDirectlyBelow” bridge).

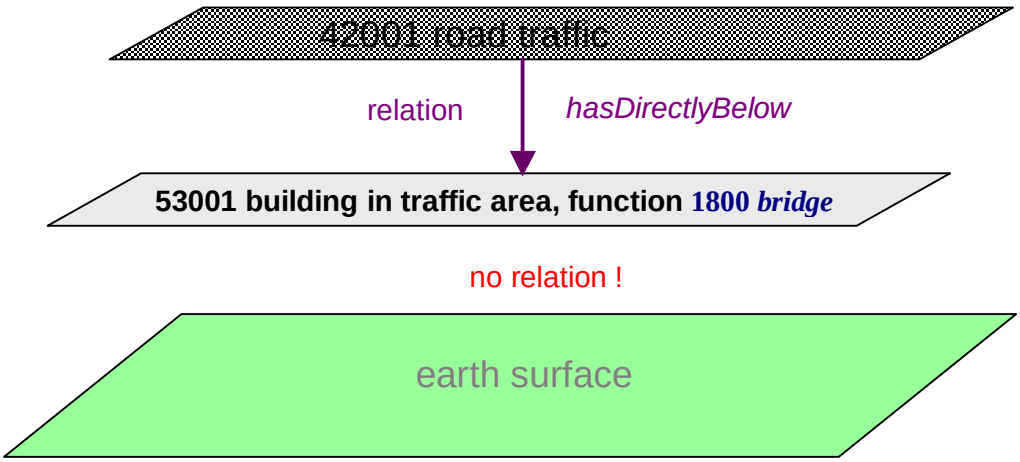



*Figure 5.4 - 61.: Vertical illustration of the landscape above the earth's surface*

No relation is created to objects that lie above the earth's surface (e.g. bridge to the watercourse situated below). For underground features the vertical situation is described from the feature located in the structure (e.g. street "hasDirectlyBelow" tunnel).

No relation is created to objects that lie on the earth's surface.

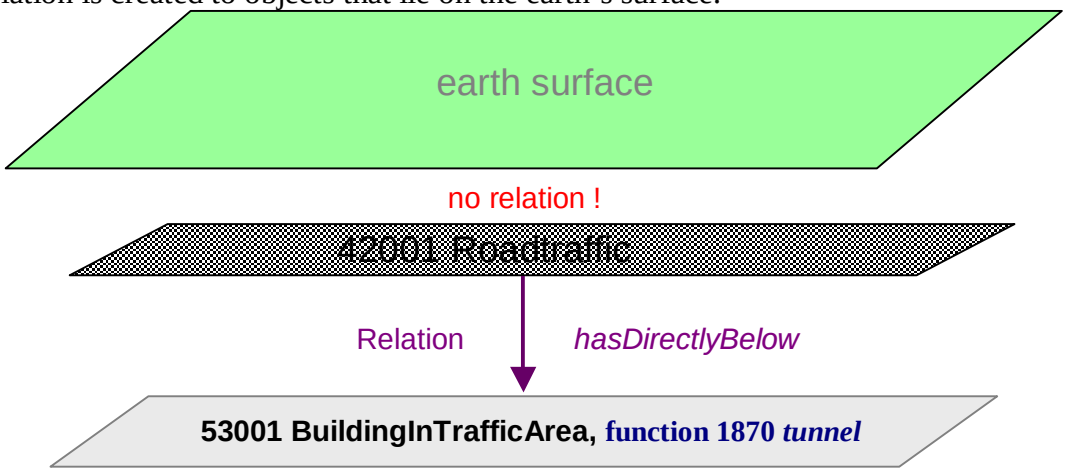



*Figure 5.4 - 62.: Vertical illustration of the landscape below the earth's surface*

The examples below describe how vertical levels are modelled. In the landscape, a street (shown by a green arrow) on a bridge (shown by a red arrow) passes over another street:

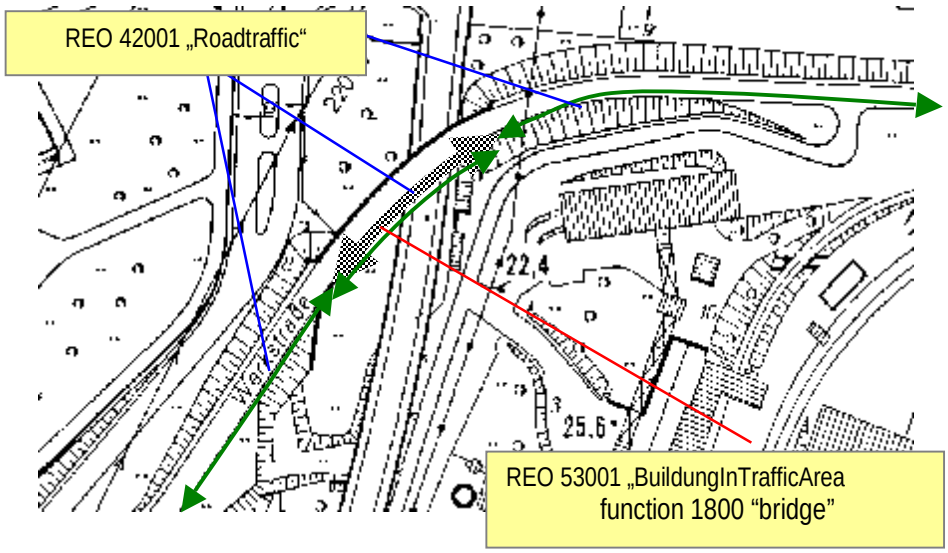



*Figure 5.4 - 63.: Vertical illustration of the landscape with the relation “hasDirectlyBelow”*

The geometry of the bridge and the road traffic area must be identical. The road traffic area has the relation “hasDirectlyBelow” to the bridge building. No further relation to the earth’s surface is created.

The water runs under the motorway in a duct. The geometry of the duct and the piped water are identical. The water surface has the relation “hasDirectlyBelow” to the duct. The water area is not part of the earth’s surface in the area of the duct.

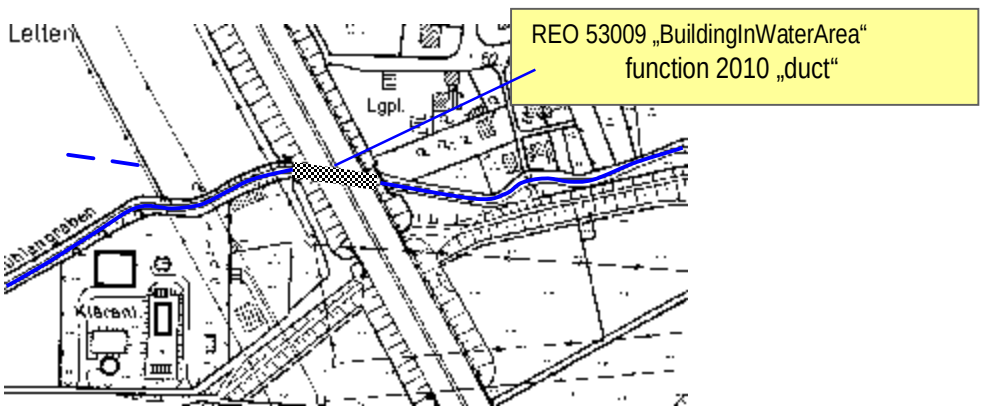



*Figure 5.4 - 64.: Example for the modelling of a duct*

No relation is created from the water area to the objects that lie on the earth’s surface.

The following principles therefore apply:

- Underpass relations never relate to ground areas, rather only to buildings.

- Relations to an area of feature type area “actual use” lying below the building may only be created if the area of feature type area “actual use” located below also lies on a building.
- If an object of feature type “house” or an object of feature type area “buildings, installations and other data” lies on an object 53001 “building in traffic area” and/or 53009 “building in water area”, a relation must be created between them (e.g. a house or track lies on a bridge).
- For the area lying on a bridge or in a tunnel, an independent object is to be formed that has identical geometry to the building. This avoids ambiguity in complex overlap situations (see Example 2).

**Example (1):**

In the landscape, a street on a bridge passes over a wood. As it continues, this bridge then overlaps a street on a bridge (see diagram below). Streets and woods belong to feature types that create the ground areas in ALKIS. In ALKIS, the problem is solved as follows:

Object 42001 “road traffic area” lies on object 53001 “building in traffic area” with attribute “building function” and value type “1800 bridge, general”. The bridge in turn lies over object 43002 “wood” lying on the earth’s surface, to which, however, no relation may be created.

Because, as it continues, the uppermost bridge passes over a further bridge, this fact must also be shown through relations. From the uppermost bridge, a relation is created to object 42001 “road traffic”, which is in turn assigned a relation to the bridge below. No further relation from this bridge to object 44001 “flowing water” is created.

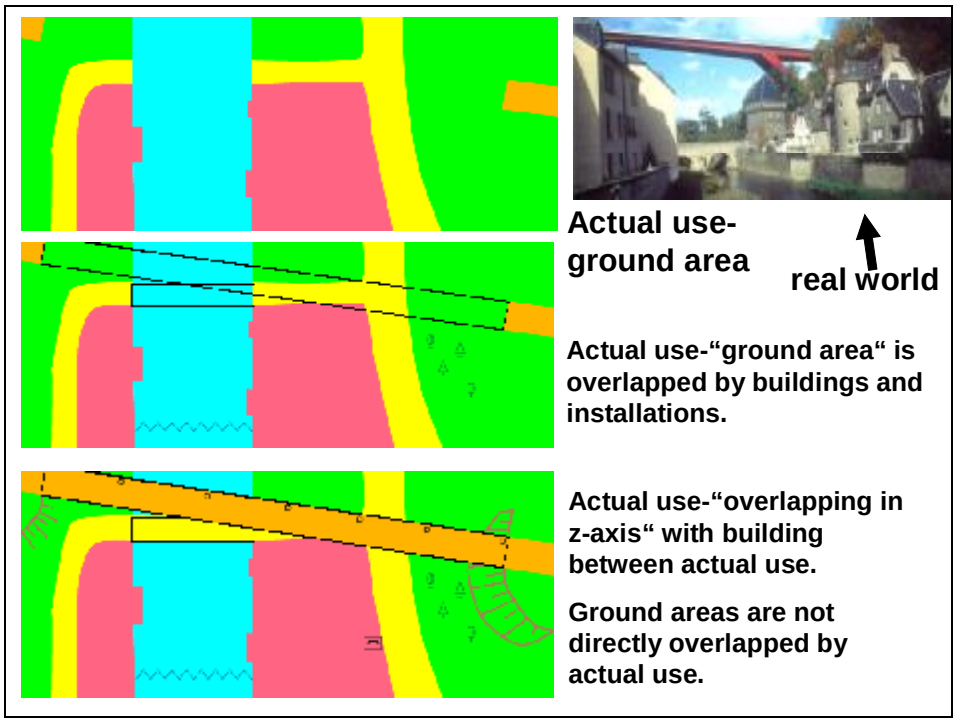



*Figure 5.3 - 65.: Example of actual use ground area overlap*

Direct underpass relations between “actual use” objects must never be created (see last paragraph in the Note on abstract top class “AX_actual use”). An object 53001 “building in traffic area” must always be inserted between. The continuous and non-intersecting coverage (ground area) is realised through the areas of the earth’s surface (i.e. not through actual use areas with “hasDirectlyBelow” relations to the buildings). If a relation from an actual use area leads to a “hasDirectlyBelow” building, this actual use does not take part in the theme formation for illustrating the ground area. An evaluation method must determine which area belongs to the ground area.

This example should illustrate the following theme associations:

(1) The ground areas (e.g. flowing water, wood) are assigned to the topological theme of actual use.

(2) The overlap area (traffic area on bridge) is assigned to the point – line theme of actual use. This means that several areas in the overlapping areas at the same level share the geometry.

(3) The interface between ground area (road traffic area) and overlap area (road traffic area on bridge) must be assigned to the level overlapping point line theme.

**Example (2)**

Within an airport, a street passes under the apron. On the earth's surface is an "air traffic" object that is recorded independently of the underlying buildings and areas.

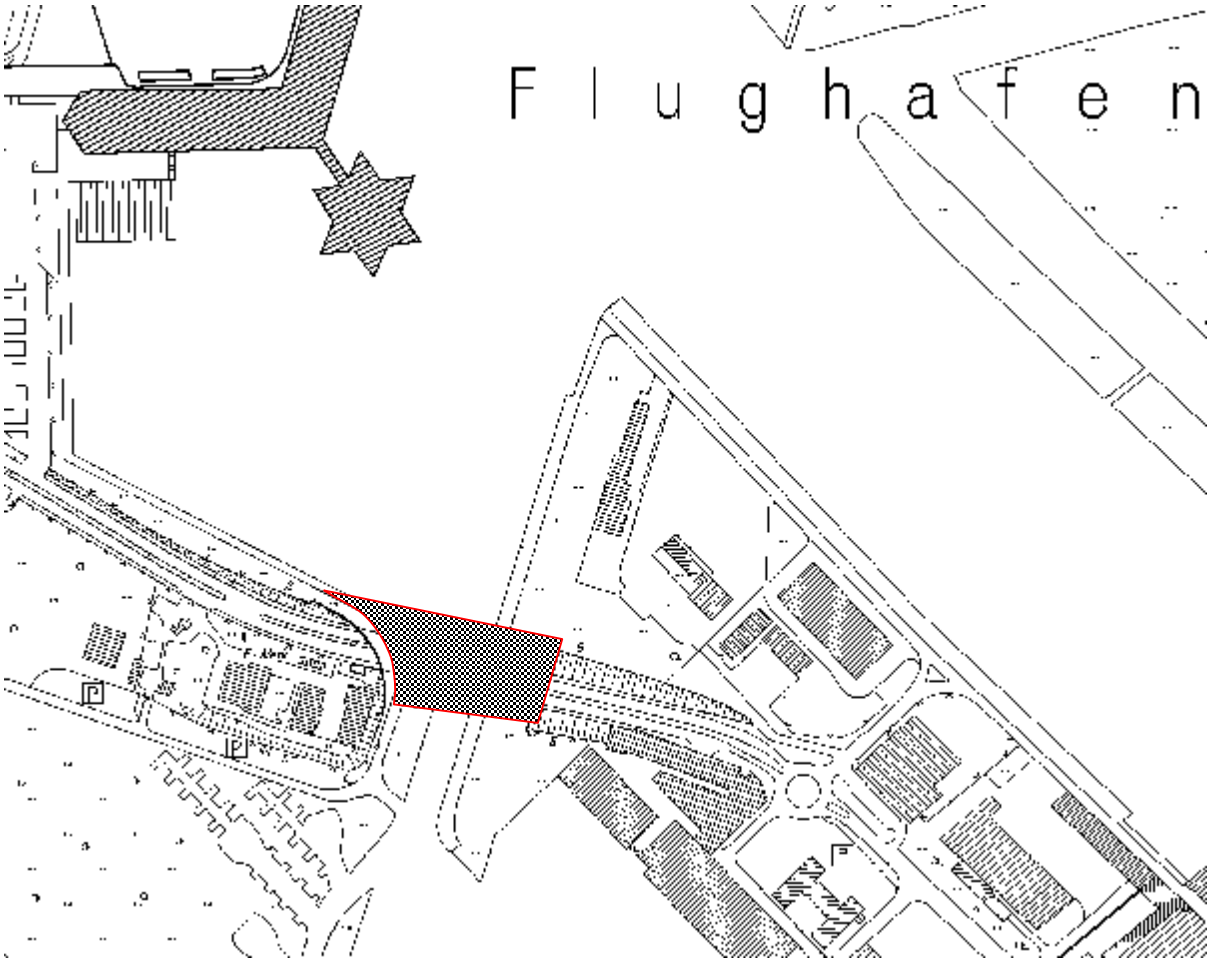



*Figure 5.3 - 66.: Example for the modelling of an underpass*

Object 53001 "building in traffic area" with attribute "building function" and value type "1870 = tunnel, underpass" contains a relation to the road traffic area below. As a result of this relation, the street traffic area does not participate in the planar graphs of actual use. Street traffic area and the building have identical geometries.

**Specific feature types within "actual use"**

**Feature type "opencast mine, pit, quarry"**

The previous actual use "operating area mining land" is migrated to feature type "opencast min, pit, quarry". "Disused mining land", previously a sub-division of actual use "unproductive area" is recorded for this feature type with attribute type status "disused".

**Feature type “unproductive area” – water accompanying area**

An unproductive area is an area that remains permanently unused for agricultural purposes, e.g. rock sections, sand or ice areas that do not project from the terrain relief, bank sections along water and fallow land. It therefore comprises vegetation-free areas and land areas not used for agricultural purposes. The water accompanying areas that are assigned to land rather than water areas are particularly noteworthy.

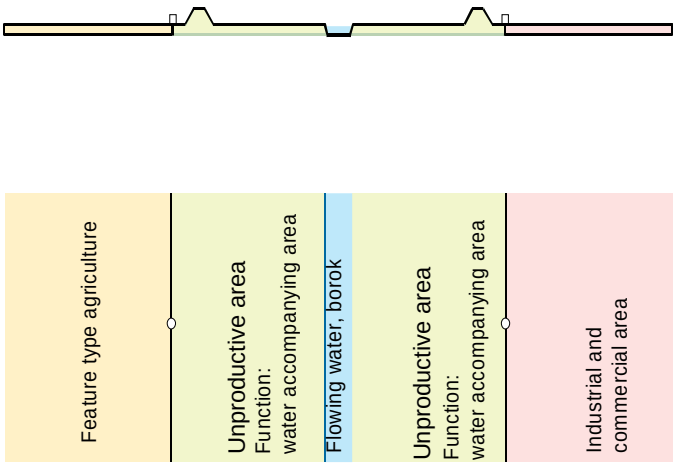



*Figure 5.3 - 67.: Modelling of the water accompanying area*

The areas lying below buildings or structural units on water must be clearly assigned to an “actual use”. The problem was first recognised in respect of the concrete dam. These areas have a close relationship with the waters and their size usually has only a slight influence on the water areas. Therefore, the water accompanying area was introduced for these areas not covered by water (values 1100 to 1120). The original definition of “water accompanying area” thus covered only developed areas. The undeveloped areas along the water that are to be included in the “water accompanying areas” can assume considerable dimensions and are in fact sometimes larger than the water areas themselves. As shown in Figure 5.3 – 67, there are cases in which the water area no longer bears a relation to the size of the “water accompanying area” (approx. 1/6 of the area shown). An indication as “water area” would be incorrect and correspond to proof of a river. Areas along the bank populated with trees, bushes or hedgerows can technically be shown correctly as feature type “copse”. As the water

accompanying areas are not “cultivated” and are neither heath, moor or marsh, they were assigned to feature type “unproductive area”.

The following formation regulations therefore apply: Areas under concrete dams that can be accessed by foot or vehicle are technically assigned to the water accompanying areas and therefore land areas. Areas under concrete dams that are flooded by water and not accessible are considered water areas. The concrete dam overlaps the water area. The decision on whether the bank areas are assigned to an undeveloped water accompanying area or a vegetation area (e.g. wood) is to be taken case by case.

The previous actual use “fallow land” of the list of land use is replaced in the feature type “agriculture” with the attribute type “vegetation” and the codelist “AX_Vegetationcharacteristic_Agriculture” and the value type “fallow” (value=1200).

**List of land use in the real estate cadastre (AdV- list of land use)**

The list of land use of the working committee of the surveying authorities of the States of the Federal Republic of Germany (AdV) shall be guaranteed the section throughout the country and the description of the actual use of the real estate cadastre.

The actual use is hierarchically subdivided. In corresponding of the feature type area actual use of the ALKIS feature type catalogue four sections are distinguished, represented with the thousand numbers:

10000 – residential

20000 – traffic

30000 –-vegetation and

40000 –-water

The actual use section do not belong to the actual use und cannot use for their description. They are used for the technical assignment of the actual use group and their aggregation for analyses

Within the actual use section 26 actual use groups are distinguished. These actual use groups correspond to the feature type of ALKIS and are represented by the thousand number.

11000 – ResidentialAreaSurface
12000 – IndustrialAndCommercialArea
13000 – Dump
14000 – MiningOperation
15000 – OpencastMinePitQuarry
16000 – CombinedUseArea
17000 – AreaWithSpecificFunctionalCharacteristic
18000 – SportLeisureAndRecreationArea

31000 – Agriculture
32000 – Wood
33000 – Copse
34000 – Heath
35000 – Moor
36000 – Marsh
37000 – UnproductiveArea

19000 – Cemetery

21000 – RoadTraffic area
22000 – path area
23000 – Place
24000 – RailTraffic
25000 – AirTraffic
26000 – Navigation

41000 – FlowingWater
42000 – Basin
43000 – StandingWater
44000 – Sea

The subdivision within the actual use group is made by thousand, hundred, ten and one-numbers. The actual use will be presented by the hundred numbers and the subdivded section first step and second step by the ten or one numbers.

For the derivation of the new AdV list of land use the catalogue tool was extended by a XSLT output, so that the list of land use can be automatically created as pdf- document. The elements will be marked in the AAA_Schema. (Tagged Value).

The output contains:

(1) a simple head with the information, that it deals of the AdV list of land use (including logo),

(2) The version number and

(3) A page number.

The text contains the list of land use with number, indented after the level of the land use number, derivated from the tagged value “land use”. The name of the feature type or the name of the value type will be taken as text.

Example:

11000 ResidentialAreaSurface
12000 IndustrialAndCommercialArea
12100 Industrial Commercia
12101 House and Free-area, industrial and commercial
12110 Production
12120 Tradek
12130 Petrol station
12140 Storeplace
12141 Min
12142 BuildingMaterial

# 5 Feature type area “buildings, installations and other data”

The feature type area of “buildings, installations and other data” consists of the following feature type groups:

- “Buildings and installations in residential areas”
- “Specific units in residential areas”
- “Buildings, units and installations for transport”
- “Specific vegetation attributes”
- “Specific features of water”

The features of feature type area “buildings, installations and other data” must always be considered in the technical context with the features of the “actual use” feature type area. The feature type area “buildings, installations and other data” also contains information actually assigned to the actual use area, which, however, according to the dominance principle, is not managed as features of the “actual use” feature type area.

Special features on selected feature types are described below.

**Feature type tower**

In both ALKIS and ATKIS, the tower can be formed either as a free-standing tower or section of a building. As a free-standing tower, the “tower” feature type is retained in feature type group “buildings and installations in residential areas”, while a tower is recorded as part of a building as object 31002 “part of house” with the “style” attribute under value type 2720 “tower in the house”. The previous tower as a building is shown in the feature type tower (e.g. water tower).

**Feature type transport complex**

To further specify the function of the transport complex as a pipeline or pump etc., attribute type “product” is introduced that relieves the catalogue of functions.

**Feature type line and building or complex for industry and commerce**

Lines and masts are modelled in ALKIS as a non-topological network. For this, the masts would have to be modelled as independent feature types. Data users (e.g. EVU) are of course at liberty to interlink a topological network from the transferred data.

Building functions such as “antenna”, “furnace” and “solar cell” can in future be carried in ALKIS provided the corresponding ATKIS objects are to be used.

**Feature type building or unit for sport, leisure and recreation**

A “building or unit for sport, leisure and recreation” object must always be supported by an object 41008 “sport, leisure and recreation area” of feature type “actual use” with the sport unit function (value=4100). Information on the practised sports type is provided through differentiation of feature type 51006 “building or unit for sport, leisure and recreation” in combination with attribute type “sport type” in the form of an overlapping area.

The shooting gallery is no longer carried in ALKIS in the form of an actual use, rather as a building for feature type 51006 in combination with the “shooting unit” building function (value=1480).

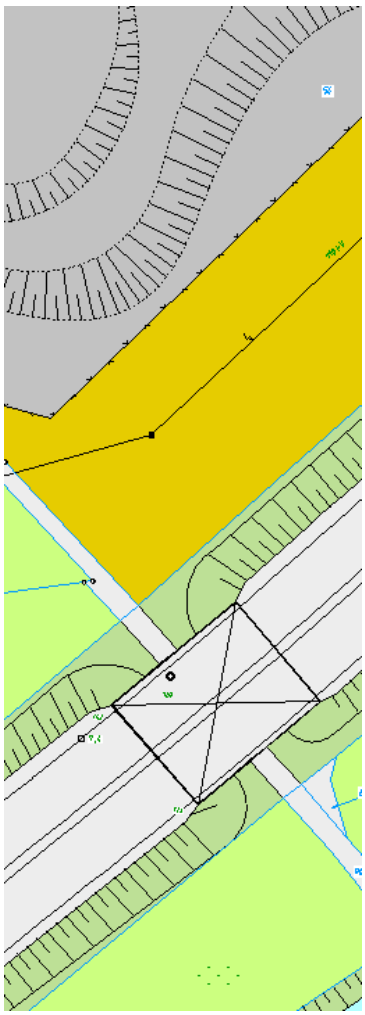
**Feature type subordinate water (e.g. brook, ditch, pond)**

If in accordance with the dominance principle, a brook, ditch or pond is not assigned to the area of the actual use (feature type 44001 “flowing water“, FKT 8400 (ditch) and/or 8500 (brook); or feature type 44006 “standing body of water“, FKT 8620 (pond)), this information on brook, ditch, pond can be recorded as feature type 55002 (AX_Subordinate water) in the area of the “buildings, installations and other data”. Examples would be ponds in cemeteries, “small” ditches in parks etc. These overlapping areas are usually only created if a subordinate water does not occur as an independent parcel.

**Feature type other buildings or other installations**

In this feature type the relation (belongsTo) is used in order to realize the connection to the house. Therefore a carport can be assigned to a concrete house.

# 6 Feature type area “relief”



Ground plan and height information – both separately and in combination – from large-scale, topographical and digital information should, from the users’ point of view, be usable with the same object forming and illustration principles. Relief forms can also easily give users a good impression of the terrain characteristics. In order to take account of these circumstances, characteristic relief forms can be described with the following features types or the ‘relief form’ feature type group (code 61000). “Embankment”, “cliff”, “ground edge”, “dam, wall, dyke”, “cave entrance”, “rocks, lump of rock, needle rock”, “dune”, “conture line” and “specific topographic point”.

***These feature types of the ‘relief forms’ feature type group overlay the ground areas.***

The surface of the land is the boundary between the solid earth’s body, the water and glacial ice on the one hand and air on the other. The surface of the land is modelled two-dimensionally by a representative three-dimensional number of points, the digital land model (DGM) and the landscape features of the “relief forms” feature type group. The feature types of the DGM are not carried in the basic ATKIS DLM but in a separate ATKIS feature catalogue description for the DGM.

**Feature types “embankment, cliff” and “ground edge”**

The ground edge was previously defined in ALK as a part object of the embankment. In ALKIS, the ground edge is modelled as an independent feature type. Geometric conformity between embankment area and the associated ground edge is ensured as both feature types belong to one geometric theme. This is an obligatory (type=1000) point/line theme (dimension=1000).

```
<AX_ThemeDefinition>
  <name>embakement</name>
  <type>1000</type>
  <featureType>AX_ AX_EmbankmentSurface </featureType>
  <featureType>AX_GroundEdge</featureType>
  <modelType>DLKM</modelType>
  <dimension>1000</dimension>
</AX_ThemeDefinition>
```

*Figure 5.3 - 68.: Theme formation for embankment and terrain edge*

To illustrate long-drawn, curved embankments, the dividing hatch can be used as in ALK (in ALKIS “general GroundEdge”), to prevent the formation of “twisted” embankment hatching. The general GroundEdge splits the original surface object into several objects AX_Embankmentsurface.

The topographical different ground structures Embankment and Cliff are modelled as combined object (ZUSO) 61001 AX_EmbankmentCliff. It consists of one or more REO 62040 AX_GroundEdge or one REO 61002 AX_Embankmentsurface and one or more REO 62040 AX_GroundEdge.

The following example shows, how the embankment object of the ALK, as area object, can be transformed to ALKIS. The embankment hatch can be created after the building rules of the portrayal catalogue. This is made automatically by using a special function or interactively in form of several lines.

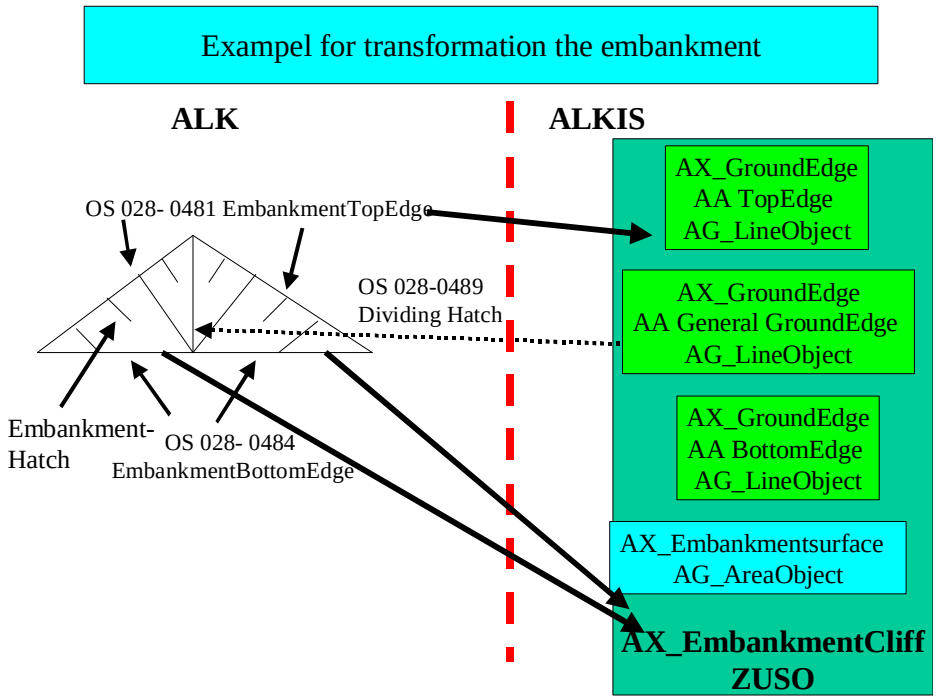



*Figure 5.3 - 69. : Exampel Embankment*

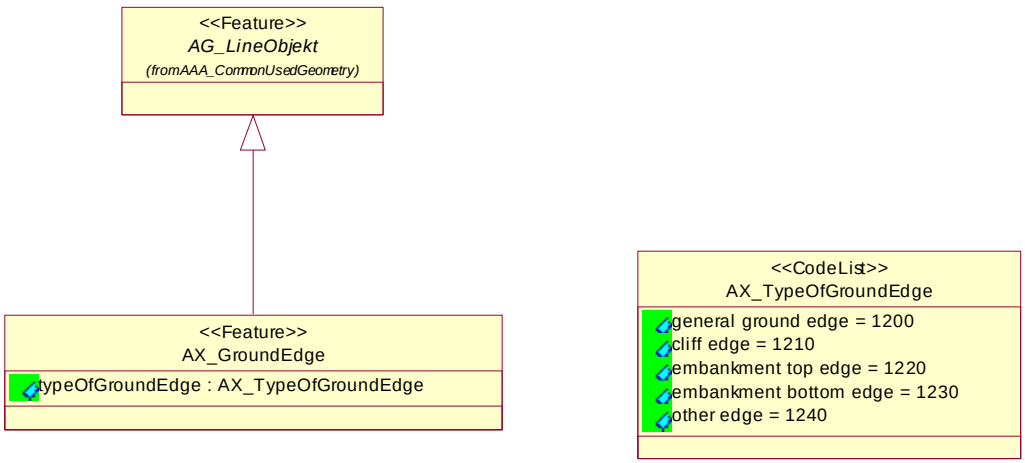



*Figure 5.3 - 70. : Feature type AX_GroundEdge*

As a property for feature type “Ground edge”, the type of ground edge, e.g. general ground edge (dividing hatch), cliff edge, embankment top edge / embankment bottom edge, other edge can be stored.

**Feature type dam, wall, dyke**

"Dam, wall, dyke" is a long bank consisting of earth or other material, which usually consists of a dam crest and the side embankments. To illustrate the embankment, feature type 61001 "embankment cliff" is illustrated in combination with feature type 61002 "ground edge". The obligatory theme "embankment" ensures that geometric conformity exists between the embankment surface and the ground edge.

The previous actual use "dam, dyke" of the list of land use is modelled in overlapping form "dam, wall, dyke" of feature type group "relief forms". Its ground area is recorded in accordance with the dominant use, although usually as feature type 43001 "agriculture" with further differentiation if required.

# 7 Feature type area of "legal stipulations, area units, catalogues"

The feature type area of "legal stipulations, area units, catalogues" consists of the following feature type groups:

- "Stipulations governed by public law and other stipulations"
- "Soil evaluation, assessment"
- "Catalogues"
- "Geographical area units"
- "Administrative area units"

**Information on legal stipulations**

The original database of stipulations subject to public law is justified by the relevant law and is the responsibility of the accountable departments. The official surveying and mapping of the federal states should emphasise public law and other stipulations, which are determined by their position on the earth's surface, identified and described by their most important characteristics. Stipulations governed by to public law are restrictions (e.g. protected areas), encumbrances (e.g. polluted areas) or other properties (e.g. ground evaluation) that are justified by public law. The legal stipulations cover several feature types, in consideration of technical and modelling aspects. The feature types and their properties abstract the real facts and are modelled in both the ALKIS and the ATKIS technical schemas.

The feature type area "legal stipulations, area units, catalogues" is from a real estate point of view semantically coordinated with the geotopographical outlook of the geobasis data at AdV level and harmonised as part of the model accuracy. This guarantees a joint and unified use of the official geobasic data; further coordination with the geodata of the technical authorities is being pursued state and nationwide on the basis of the conceptual AdV basic schema. The transparency generated by the new data modeling enables unified standard presentations in terms of both content and cartography, which can be prepared in the form of information, viewing, output or automated download.

The feature type group "soil evaluation, assessment" is modelled separately from the other stipulations governed by public law, as they have a special significance in the real estate cadastre. Thus, soil evaluation must be illustrated separately for legal reasons and

the evaluation of the land and forestry estate is closely linked to areas that lie within the soil evaluation.

**Legal stipulations without their own spatial reference**

Alternatively, ALKIS provides attributively for stipulations governed by public law a modelling for feature type parcel under "other properties". Land-parcel related stipulations governed by public law may remain for the period of migration from existing procedural solutions. As stipulations may deviate from the geometric contour of a parcel, the technical management of legal stipulations for the parcel is restricted.

## 7.1 Feature type group "stipulations governed by public law and other stipulations"

Reference is made via the feature type group property related the constraints, charges or other characteristics. The material stipulations are based on specific legal regulations. Assignment, classification, dedication and demarcation are the responsibility of the accountable and/or managing departments.

The feature type group is divided by legal areas and includes the following feature types: 71001 "Classification according to road law", 71002 "Other stipulations according to road law", 71003 "Classification according to water law", 71004 "Other stipulations according to water law", 71005 "Protection area according to water law", 71006 "Nature, environmental or soil conservation law", 71007 "Protection area according to nature, environment or soil conservation law", 71008 "Building, space or land regulation law", 71009 "Historical monument protection law", 71010 "Forestry law", 71011 "Other law" and also 71012 "Protection zone".

The diagram below provides an overview of feature types and abstract feature classes used to model feature type group "stipulations governed by public law and other stipulations". Explanations can be found in the text below and in Section 3.3 of GeoInfoDoc: "The AFIS-ALKIS-ATKIS Basic Schema"

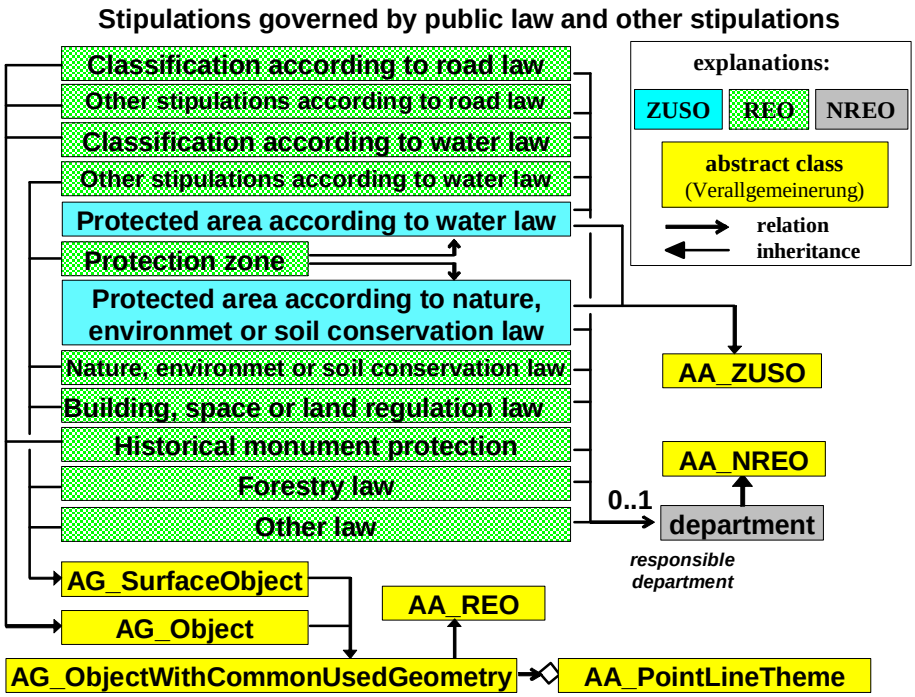



*Figure 5.3 - 71.: Stipulations governed by public law and other stipulations*

For the decision as to whether legal stipulations should be modelled, a requirement analysis in the form of a list of the "types of stipulation governed by public law and other stipulations" first had to be created.

The list currently distinguishes between over 250 types of stipulation. The legal stipulations must be updated in consultation with the technical authorities, particularly in the event of legislative changes. In this respect, a more frequent versioning of the ALKIS-ATKIS technical catalogues can be expected. The stipulations are grouped thematically in the list according to legal areas and a further sub-division was effected according to federal, state or other law. Besides the type of stipulation, other technical characteristics of the legal stipulations are modelled in the ALKIS-ATKIS technical schema as follows:

| **Code**<br>Value | **Attribute type, *Relation type,***<br>Identifier | | **Code**<br>Value | **Attribute type, *Relation type,***<br>Identifier |
|---|---|---|---|---|
| **ADF** | **Type of stipulation**<br>*(71001 to 71011)* | | **ZON** | **Zone**<br>(71012 protection zones) |

| **Code**<br>Value | **Attribute type, *Relation type,***<br>Identifier | | **Code**<br>Value | **Attribute type, *Relation type,***<br>Identifier |
|---|---|---|---|---|
| 1100 ... | Currently over 250 designations | | 1010 | Zone I |
| **BEZ** | **Designation**<br>*(71001, 71003, 71006, 71008-71011)* | | 1020 | Zone II |
| **NAM** | **Name**<br>*(71005 bis 71009, 71011)* | | 1030 | Zone III |
| **NUM** | **Number**<br>*(71002, 71004)* | | 1040 | Zone IIIa |
| **SGN** | **Number of protection zone**<br>*(71005, 71007)* | | 1050 | Zone IIIb<br>Zone IV |
| **FKT** | **Function**<br>*(71005 Protection area near water)* | | 1060 | Core zone |
| 2111 | Public water supply | | 1070 | Maintenance zone |
| 2112 | Ground water enrichment | | 1080 | Development zone |
| 2113 | Prevention of damaging effluent | | 1090 | Regeneration zone |
| **BFU** | **Special function**<br>*(71010 Forest law)* | | **DAN** | **Date-Arrangement** (71008) |
| 1000 | No specific legal binding | | **DBE** | **Date-Owner admission** (71008) |
| 2000 | Protection forest | | **DRK** | **Date-Legal** (71008) |
| 3000 | Recreational forest | | **DAB** | **Date-Submission** (71008) |
| 4000 | Avalance forest | | **VOR** | **Change without consultation** (71008) |
| 6000 | Protection and recreational forest | | | |
| 9000 | Other forestry operation area | | | |
| 9999 | Other | | | |
| ***AFS*** | ***Managing department***<br>*(71001 to 71004, 71006, 71008 to 71011 refers to AX_department_key)* | | | |

*Figure 5.3 - 72.: Technical properties of the legal stipulations*

Encumbrances and restrictions governed by private law are grouped centrally in the land register, significant stipulations governed by public law and other stipulations can be shown by ALKIS-ATKIS in groups. As “attention references”, the over 250 references can on the one hand guarantee that the conditions for real estate quality governed by public law that influence legal relations are easily recognised, i.e. are centrally evident and a high degree of legal certainty is achieved for all concerned; on the other hand, the responsible departments should, through this link, “automatically” be able to understand

changes to the ownership structure. Contrary to the contents of the land register, the stipulations are generally only of an informative and not a constitutive nature.

Technical links to other information systems can alternatively be carried for the "AA_Object" of the conceptual AdV basic schema with the multiple attribute "indicates external" of data type "Set<AA_technical data link". The unilateral or reciprocal link can consist of identifiers or technical code. Object identifiers for technical information systems can be based on an expansion of the encoding reserves of the AdV identifier.

***Attribute type "type of stipulation"***

The attribute type "type of stipulation" describes the type of restriction, encumbrance or other stipulation refering to land and ground.

***Attribute type "managing department"***

The attribute type "managing department" refers to the department that is responsible for the stipulation.

***Spatial reference for stipulations governed by public law and other stipulations***

For the stipulations governed by public law and other stipulations, the "surface" geometric basic form is generally used as a spatial reference basic form, as in accordance with the technical requirements, no topological evaluations need to be conducted. The geometric levels for these feature types are described through the abstract feature type AG_Area object.

The feature types "classification according to street law" and "other stipulations according to street law" are geometrically derived from the abstract feature class "AG_Object". The selection data type "AG_Object" enables sub-classes to be formed for which the concrete type of the geometry type (point, line or surface) is not specified until instance level. This selection option enables the stated feature types to be recorded as surface or line (e.g. cultivation ban) depending on the content of an attribute in ALKIS.

By assigning the objects of feature type "parcel" and all feature types from feature type groups "stipulations governed by public law and other stipulations" to the theme of "parcels and stipulations governed by public law", a point/line theme with theme type "user defined" is specified.

Sectional areas are determined as part of creating standard ALKIS outputs using filter coding by intersecting the parcel area with the corresponding classification and coordinating with the official area.

**Feature type 71008 "Building, space or land regulation law"**

Feature type "building, space or land regulation law" models the stipulations "apportionment", "boundary regulation", "land consolidation", "ground separation law" and "estate assignment law". Intersections are required to obtain the relevant parcels for the legal regulations. Regardless, parcels with a yes, no attribute can be assigned a "deviating legal status".

**Feature type other law**

The feature type "other law" is managed along the lines of the other thematically divided feature types. Stipulations governed by private law are also modelled as the management of the "hunting cadastre".

In the case of "fishing law", a distinction is drawn between a stipulation governed by public law and a stipulation governed by private law to be described in the register sheet . Other encumbrances and restrictions governed by private law, e.g. in Sections II and III of the land register are not carried under "other law". Modelling must be carried out on the basis of the ALKIS personal and land register data of the administration of justice.

Legal stipulations and actual use are independent of each other. Due to their technical association, the former actual uses of "sewage field" and "military training area, location training area" are thus modelled as other law.

The "control point protection area" is assigned protection status either by order of law or at the discretion of the accountable surveying and cadastre authority, depending on the federal state. Fixed points guarantee a link to the state reference system and must be protected from structural, land management changes to ensure that their spatial and material condition is retained. The "control point protection area" with 1, 2, 5, 10 or 30 m radius and the stipulations "surveying and cadastre law", "milestone coverage" and "real estate cadastre renewal" are carried in ALKIS as originals and not for information purposes.

## 7.2 Feature type group “soil evaluation, assessment”

The feature type group “soil evaluation, assessment” defines legal classification of areas according to specific criteria. Assignment, classification, demarcation are the responsibility of the accountable department. The real estate cadastre is original database of the results from the official soil evaluation as defined by § 11 of the soil evaluation law. In the real estate cadastre, the evaluation in accordance with the evaluation law has only informative character.

The feature type group with code 72000 includes the following feature types: 72001 “soil evaluation“, 72002 “Sample, regional sample real estate and comparative section“, 72003 “ditch hole of soil evaluation“ and also 72004 “evaluation“.

The diagram below provides an overview of feature types and abstract feature classes used to model feature type group “soil evaluation, assessment”. Explanations can be found in the text below and in Section 3.3 of GeoInfoDoc: “The AFIS-ALKIS-ATKIS Basic Schema”

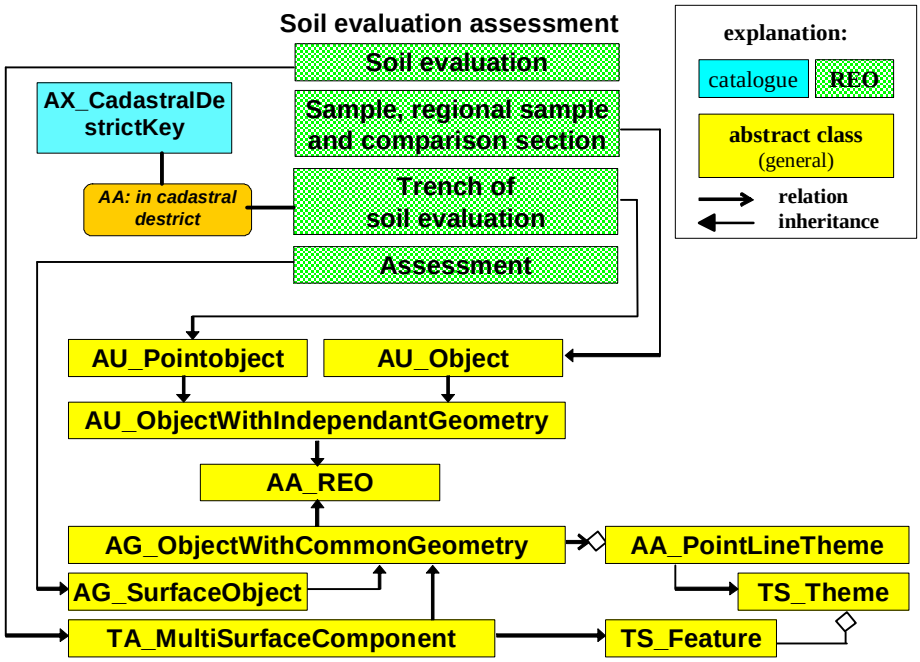



*Figure 5.3 - 73.: Modelling “soil evaluation and assessment”*

## 7.3 Feature type group “catalogues”

The AFIS-ALKIS-ATKIS application schema contains feature types, which exhibit pure catalogue properties and therefore have no spatial reference. These are held in the "catalogue" feature type with code "73000". These feature types inherit from the abstract class “catalogue entry”. Each catalogue entry represents an instance of the corresponding catalogue feature type. The catalogues are used in ALKIS in order to derive the longhand description for encodes information. The codes are required in a series of feature types, e.g. the encoded location description.

The feature type group contains the following feature types:

- “Nation state”
- “Federal state”
- “Government district”
- “District or region”
- “Municipality”
- “Municipality section”
- “Cadastral district”
- “Cadastral district section or fields”
- “Administrative community”
- “Register sheet district”
- “Department”
- “Association”
- “Location description, catalogue entry”
- “Catalogue entry” as abstract class

Each ALKIS database independently carries catalogue entries in conformity with the corresponding technical catalogues.

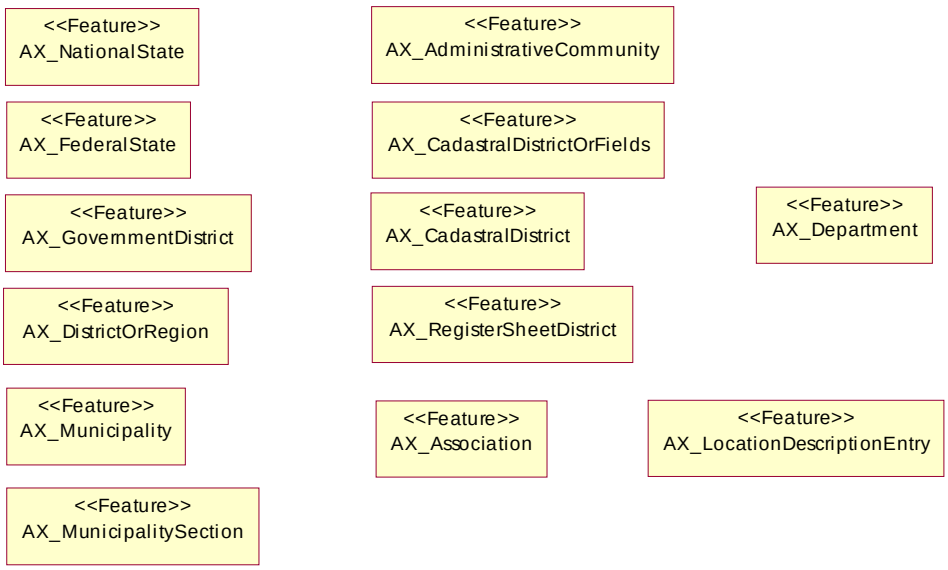



*Figure 5.3 - 74.: Catalogue objects in the ALKIS technical schema*

**Special properties**

Spatial area units, such as cadastral district, government district can be derived from the object geometries that relate to the catalogue entry. This takes place through the 'position()' method. For example, the area of a cadastral district is derived by aggregating the parcels with the same cadastral district number in the parcel code.

**Feature type "department"**

In ALKIS, departments that carry out the official function of administration are modelled. In addition to the department code, the function type, e.g. land registry can be carried attributively. The address of a department is derived via the relation "has" to the feature type address (code: 21003). In ALKIS, a department generally has the function of a technically responsible department for the recording or management of information. It is also provided as an option for a host of feature types.

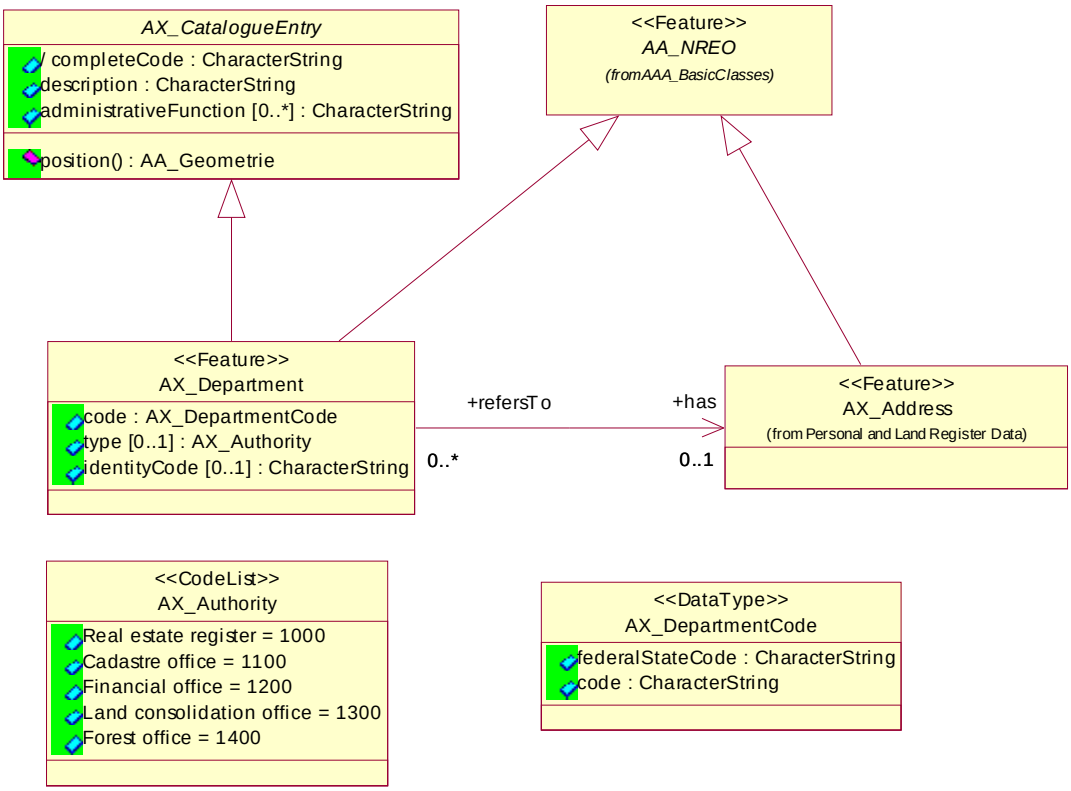



*Figure 5.3 - 75.: Feature type "department"*

Administrative districts can be illustrated in ALKIS if they can be attributed to a cadastral district and/or cadastral district section or fields. The cadastral district of the corresponding department code must be assigned attributively through the attribute type "is administrative district of" (e.g. administrative district of a land registry, which consists of districts). Other administrative districts, e.g. roads departments are not modelled in ALKIS and must be realised by the corresponding technical departments. Furthermore, the department within a federal state is assigned a unique code, which requires a corresponding code catalogue to determine the long name. The department therefore inherits from the abstract class "catalogue entry".

A technical responsibility of a department usually relates to area units. The administrative district of a land registry can always be abstracted from cadastral districts. Individual parcels can also, however, have an independent technical responsibility. The attribute type "responsible agency" for feature type parcel is provided for this purpose, as shown in the diagram below from the UML model. For example, a land registry in Bavaria can

be responsible for a real estate (consisting of parcels) in Hessian. An attributive reference from the parcel to the feature type “department” introduced with the instruction that this relation is approved only for the aforementioned exceptional case.

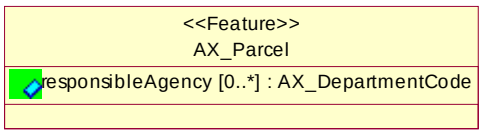



*Figure 5.3 - 76.: Responsible agency for feature type “department”*

For example: The real estate register of Bavarian can be responsible for a real estate (real estate consists of several parcels) in Saxony. For this special case an attributive reference will be created from the parcel to the feature type department.

A modelling of the technical responsibility of a department for specific parcels using an internal feature type “responsibility” and a relation to the parcel has been waived, as for this feature type, a flood of object versions would have to be produced for update of this feature type. As soon as a parcel changes, e.g. through splitting, merging etc., a new version of the corresponding object responsibility would also have to be introduced. Technical responsibilities (administrative districts) for parcels are therefore to be illustrated either through the cadastral districts or in exceptional cases attributively with the parcel.

**Feature type cadastral district**

A cadastral district is a district that comprises a cohesive group of parcels. Information on cadastral districts is therefore described through the feature type cadastral district. A corresponding code catalogue is required to determine the long name. The data required for this purpose are transferred from the abstract top class “catalogue entry” through inheritance. Only a cadastre-carrying authority can be responsible for a district.

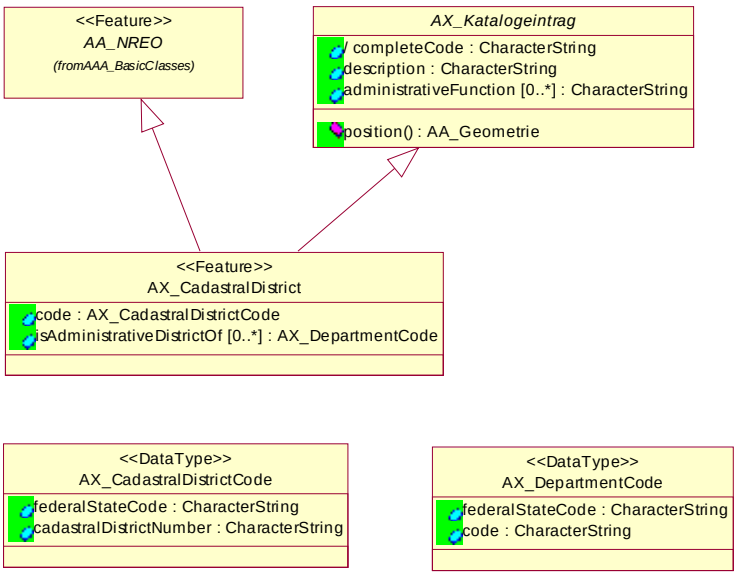



*Figure 5.3 - 77.: Feature type district*

**Feature type administrative community**

Through feature type “administrative community” as a ZUSO, a merger of communities (e.g. association community) can be built that jointly fulfil sovereign functions. This feature type can be used to carry the registry as a merger of several municipalities. In connection with feature type “specific parcel boundary“ and attribute type "type of parcel boundary“ and the definitive identifier "boundary of the administrative community", the registry boundary can be illustrated in the map as a line object.

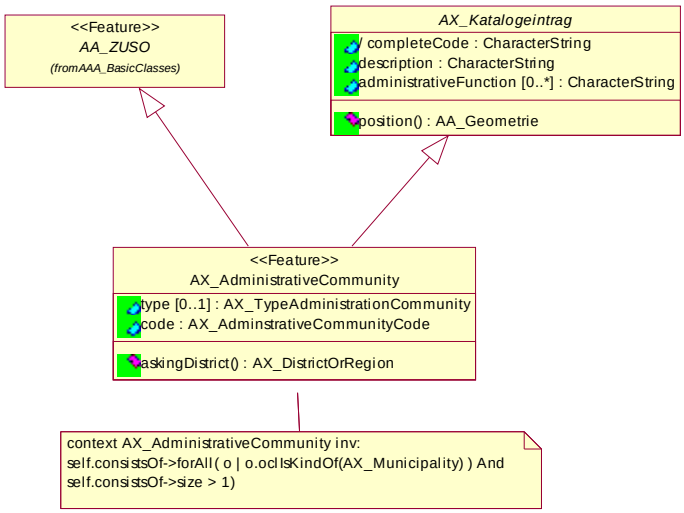



*Figure 5.3 - 78.: Feature type administrative community*

**Feature types “district, region”, “government district”, “federal state”, “national state”**

The area units indicated in the heading are pure catalogue objects without spatial reference, whereby the nation state in ALKIS is to be carried only as an option. They are required to derive the long identifier of the code.

## 7.4 Feature type group “geographical area units”

Except for feature type AX_Domicile, this feature type group contains only ATKIS-specific feature types that are described in Section 5.4 of the GeoInfoDoc. The domicile describes an inhabited area that bears its own name and is used to illustrate place names in the real estate map. The technical object is represented geometrically by an individual point and inherits the properties from the basic class AU_Point object.

## 7.5 Feature type group “administrative area units”

The feature type group “administrative area units” for model type DLKM consists of the spatially-referenced feature types building block, economic unit, municipal area, area

**Feature type municipal area**

In ALKIS, areas that represent the administrative units (e.g. local authorities) are modelled as independent feature types. These feature types inherit from an abstract class “AX_Area”, which contains generally valid properties (overall code).

```
<AX_ThemeDefinition>
  <name>Areas DLKM</name>
  <type>1000</type>
  <featureType>AX_MunicipalArea</featureType>
  <modelType>DLKM</modelType>
  <dimension>2000</dimension>
</AX_ThemeDefinition>
```

*Figure 5.3 - 79.: Theme formation for municipal area*

A municipal area is part of the earth’s surface that is surrounded by a defined boundary line and represents the political jurisdiction of a municipality. The municipal areas are general and non-intersecting. The feature type therefore inherits from the “TA_MultiSurfaceComponent” basic class. An obligatory topological theme is also defined.

# 8 Feature type area “user profile”

Pre-conditions of using and data protection requirements determine a user’s access to ALKIS. Each user has individual access rights for accessing ALKIS data, which are described and specified in the user profile. The access right takes account of personal, content, spatial and time-related aspects and also the function determination. The user profile indicates whether reading or writing (enter, change, delete) access, a regular data interchange or an automated download process are approved. As the user profiles are to be permanently stored, they have been accepted into the ALKIS feature catalogue description. For the feature types of the user profile, an independent “user profile” feature type area with the corresponding feature type group “user profile” is formed.

This feature type group comprises feature types “user group”, “user”, “user group with access monitoring” and “user group NBA”. These relate to feature types without spatial reference. A spatial reference is not required to manage the user profile. The feature types are created for AFIS, ALKIS and ATKIS.

The “user group” feature type holds information regarding access monitoring and selection habits of the users for primary data base data submission. Each user is therefore able to control both the access authority and the NBA process. The “user” feature type contains all individual, user-specific properties used for the delivery of data in primary database. The “user group“ feature type contains information on selection and/or access monitoring that can also apply to several users, enabling these users to be concentrated into user groups.

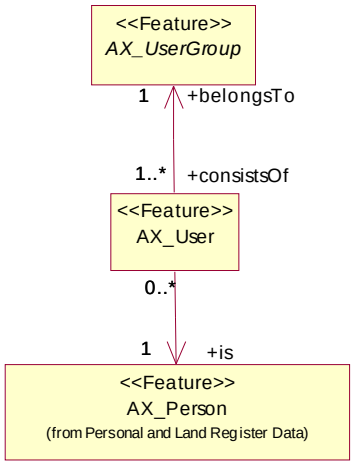



*Figure 5.3 - 80.: Feature type group "user profile" in UML*

**Feature type user**

In the "user" feature type, information on the user is managed, e.g. required data format or time limitation of the access authority. Personal-related properties are created on the relation to the "person" feature type in the "personal and land register data" feature type group. Each user is assigned through relation "belongs to" with cardinality 1 to precisely one user group.

Multiple users who have the same access authorisations are concentrated into user groups. For one person, several "user" feature types are created, which due to different access authorisations can be assigned to various user groups. It is possible, however, for a user to be assigned only one user group.

**Feature type user group**

Information about the user group description, responsible agency, coordinate reference system is held by the feature type "user group" as an abstract class. In the "coordinate reference system" attribute, the preferred coordinate reference system (CRS) can be indicated for coordinate data in the output land register data. The data is optional and if omitted, the "native", i.e. CRS present in the data in primary database is used. The coordinates are then output in the same format, as they are stored.

**Feature type user group with access monitoring**

In the “user group with access monitoring” feature type, information on ALKIS primary database users is managed, which limits the scope of use and update for reasons of data consistency and data protection. The relevant data are held through attribute types “selection criteria” and "access type product code utilisation”, “access type product code management” and “access type update cause”.

**Feature type user group NBA**

The feature type “user group NBA” stores the information relevant to effecting the NBA supply, e.g. the selection criteria to be applied. In this case, access rights are not verified separately and consideration of such is to be guaranteed by the administrator during generation and maintenance of the NBA user groups.

Feature types “user group NBA” and “user group with access monitoring” inherit further properties from feature type “user group” (attribute types “description”, “responsible agency”, “coordinate reference system”).

In both feature types “user group NBA” and “user group with access monitoring”, the selection criteria is assigned to the various levels:

(1) Selection criteria for the user group describe the objects to which access is permitted. For each object type to which access is permitted, a query shall be created in order to specify spatial and technical areas for selection and access authorization. The scope of the objects to be selected from one feature type can be limited through filter ratings (e.g. parcels are selected only from a specific cadastral district). The scope of the permitted ratings is extremely limited, which simplifies processability. Only the following ratings are permitted in a query:

- Spatial operators (act only on REO feature types)
- Operators on attributes “lifetime interval” and “model type”.

(2) The time authorisation is specified in attribute type “area – time” for the NBA process. The form and intervals in which the user group receives changed data is indicated, e.g. revision-related and/or effective date-related delivery including the relevant effective date.

(3) The function authorisation is specified in attribute types “access history, access type product code utilisation”, “access type product code updating" and “access type”

update cause". The reading and writing functions that the user group may perform are stored here. The "access history" attribute type specifies whether access to historical data is also permitted. If the attribute is not occupied, access is permitted only to current land register data. For the utilisation process, the product code (cause type of utilisation job) specifies the output products for which the user group is approved (attribute type "access type product code utilisation"). For the process updating, it is specified via the update cause, which update events the user group may perform (attribute type "access type update cause") and/or for which update events the user group contains update messages or change data records (attribute type "access type product code updating").

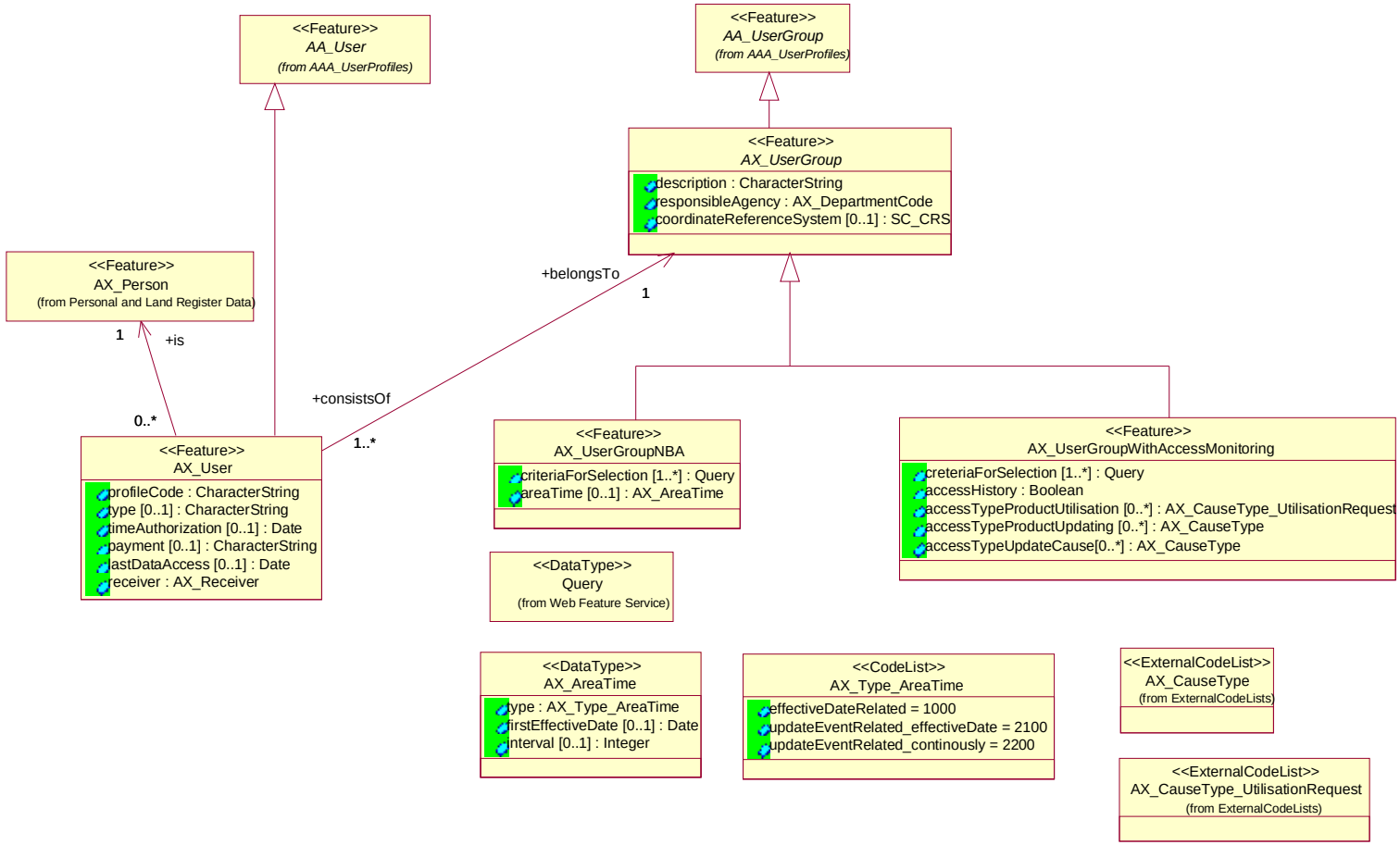



*Figure 5.3 - 81.: Feature type “user group” in UML*

# 9 Feature type area “migration”

Feature type area “migration” consists of feature type group migration objects with the following feature types:

- “House formation”
- “Topographical line”.

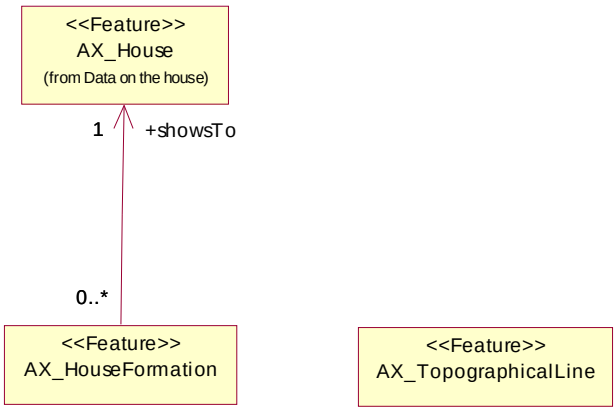



*Figure 5.3 - 82.: Feature type group “migration objects” in UML*

These feature types are valid only for the duration of the migration phase, insofar as the information from the old systems cannot be transferred to a corresponding object logic of the ALKIS technical schema. They must not be formed again following the introduction of ALKIS.

### 9.1.1 Feature type “house formation”

As part of the migration process, the lines of the house formation are to be transferred to the part of house feature type. If a transfer is not initially possible, these line elements can be stored in the house formation feature type for a transition phase.

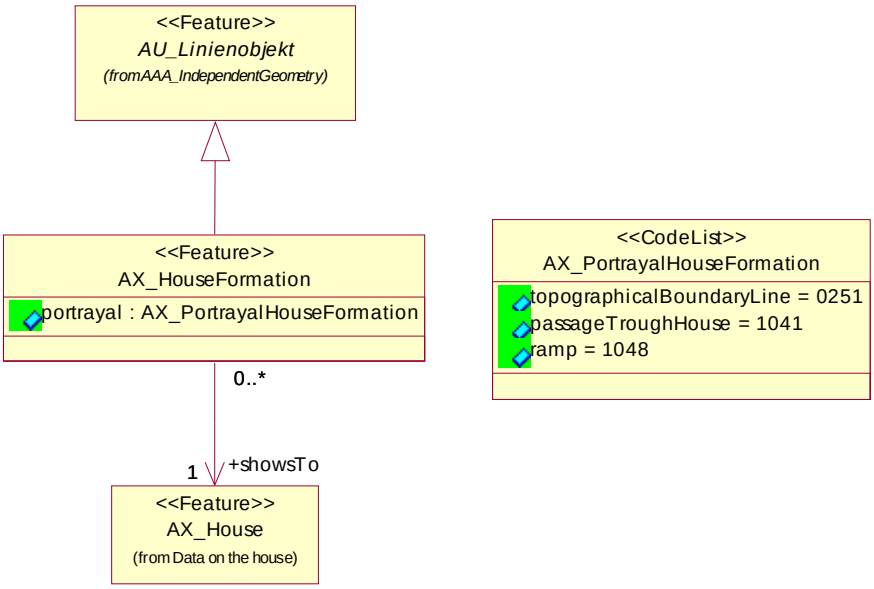



*Figure 5.3 - 83.: Feature type house formation in UML*

### 9.1.2 Feature type “topographical line”

As part of migration, the topographical demarcation line without object significance is transferred from the existing procedural solution to ALKIS in the form of an independent line object. It serves transitionally only to guarantee previously carried information and must not be recreated in ALKIS.

The previous topographical cadastre information, for which an object formation generally under feature type group “buildings, installations and other data” cannot be understood directly or with justifiable input. As part of a post-migration process within ALKIS, the technical objects can be formed retrospectively.

# 10 Metadata

Metadata are “data on data” and describe geodata in terms of user-relevant aspects for evaluating the usability of the data and access to same.

The metadata for ALKIS shall be carried in a metadata information system or in the primary database. On the one hand, this metadata information system notifies interested parties of this data prior to the ALKIS data in primary database being used. On the other, metadata is provided to the user together with these data on submission of land register data. The same applies to the submission of outputs that have been derived from land register data. Update functions are provided for the update of metadata.

Metadata also contain general statements on the quality of the data. Detailed quality data with a specific technical significance are managed by the object itself. For this purpose, quality elements (origin or quality parameters) are indicated in the ALKIS feature catalogue description for the feature types in question. These quality elements can be submitted to and evaluated by the user in conjunction with the land register data.

The structure, terminology and definition of the metadata are derived from ISO 19115. For describing metadata as geoinformation, an object model in the UML language is used in accordance with ISO standard.

The diagram below shows the main classes (see ISO 19115, A.2.1, Status 2000).

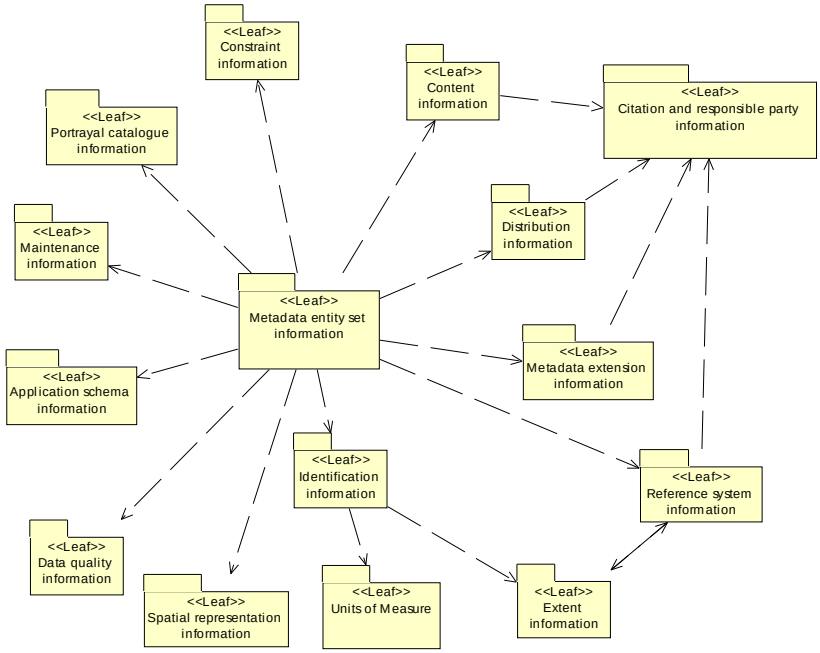



*Figure 5.3 - 84.: ISO main classes*

The core of the metadata is indicated in the corresponding ISO standard. This includes:

- The main classes of meta data, identification, spatial reference and
- Parts of quality and distribution.

The classes are identified below as metadata elements.

# 11 Modelling examples

A summary example is now shown following the previous section to explain the modelling of feature types:

## 11.1 Examples of NREO, REO and ZUSO

In addition to the elementary objects REO (=spatially related elementary object) and NREO (= non spatially-referenced elementary object), the common data model is also familiar with a composed object (AA_ZUSO). This can consist of any number and combination of spatially-referenced elementary objects, non-spatially related elementary objects or composed objects. However, a composed object must consist of at least one elementary object. The correlation is expressed through the relation “is part of”. It is possible through inheritance from the basic schema, although used only for a limited number.

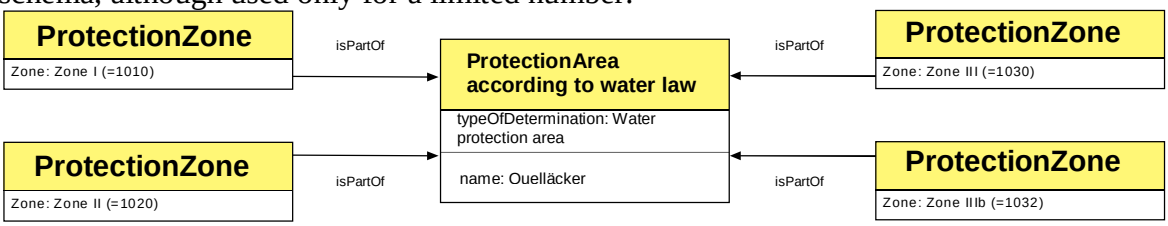



*Figure 5.3 - 85.: Example of a ZUSO*

This modelling is used on the one hand for feature types “boundary point”, “minor control point”, “security point”, “other surveying point”, “specific house point”, “specific building point”, “specific topographical point” and also the “control points” of the state surveying, that are composed from the “point location” in its three variants of “point location”, “point location_AG and “point location_TA”.

Secondly, the feature type “economic unit” consists of “parcels”, the feature type “protected area according to nature, environment or soil conservation law” and “protected area according to the water law” from its “protection zones” and the “administrative community” from the participating “municipalities”.

The relation “is part of” is, through inheritance, part of the technical objects, the respective relations are derived from the OCL strings in the schema.

The relations between the objects are produced through relations, theme formation and geometric intersecting operations. The geometric intersections between objects house and parcel are important criteria for determining the part of the house use of the parcel area using

the common spatial reference and also the intersection of the parcel object with the feature area “actual use” for representing the useful part of the parcel area.

## 11.2 Example of the feature type group “data on location”

The real estate map excerpt below and the subsequent object structure shown by way of example describes the modelling of the house and location with unencoded location description “Jungfernstraße 4” of parcel 148/1. It is evident that the corresponding location object of the type “NREO” is to be formed for all houses and their annexes. The object “location description with house number“ is assigned to the main house. The adjacent house is assigned to the object “location description with pseudo number” (as an attribute of the numerical value, this is identical to the house number) and is sub-divided for further differentiation in “continuous number”. Parcels are assigned to houses and vice versa via a geometric intersection of objects and the spatial reference.

## 11.3 Example of the feature type group “house”

In this example, the house of location description “Jungfernstraße 4” was assigned house function “1000=residential. This house is described in more detailed through attribute type “condition” of feature type “specific house line”. This should express, for example, the lining of the building that is “clinkered”. Both feature types belong to the same obligatory “house” theme. They are thus related through the geometric spatial reference.

The ground plan of the house is described by the “specific house point” that is to express the fact that numbered points exist here. As an additional part of house, an inward-lying loggia (attribute type “type”=2300) is assigned to the house. Both objects are of the type “spatially-referenced elementary object (REO)”. As the part of house also belongs to the “house” geometric theme, the objects are assigned to each other via the spatial reference.

## 11.4 Example of the feature type group “data on the parcel”

A relation “(parcel) is_registered (register number)” to feature type register number from the parcel feature type. This belongs to the feature type group “personal and land register data”. This and other links of the parcel to other features demonstrate that the “parcel” object must be present in digital format for the management of ALKIS. The aforementioned parcel 148/1 has a further special feature, namely the presence of a “controversial boundary”, expressed through feature type “specific parcel boundary” (attribute type “type” = 1000). The parcel, the specific parcel boundary and the boundary point (point location) make up the obligatory topological theme “parcel”. These objects are therefore related through the spatial reference.

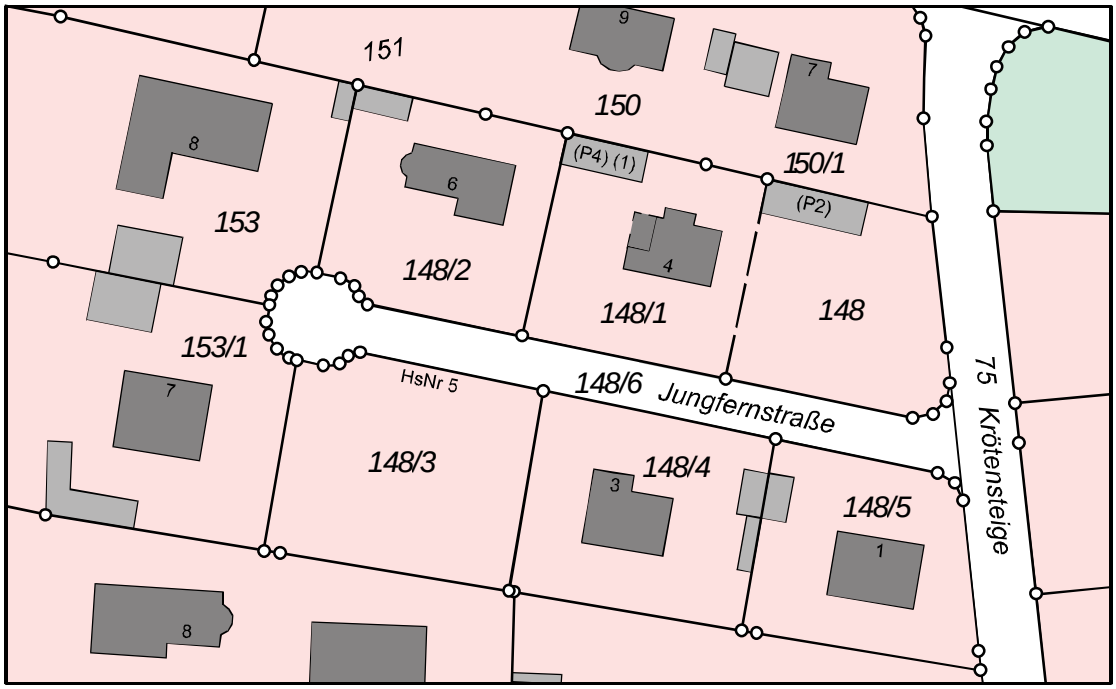



*Figure 5.3 - 86.: Excerpt from the real estate map (typical layout)*

The overview below graphically shows the relations and extracts from the content of the objects.

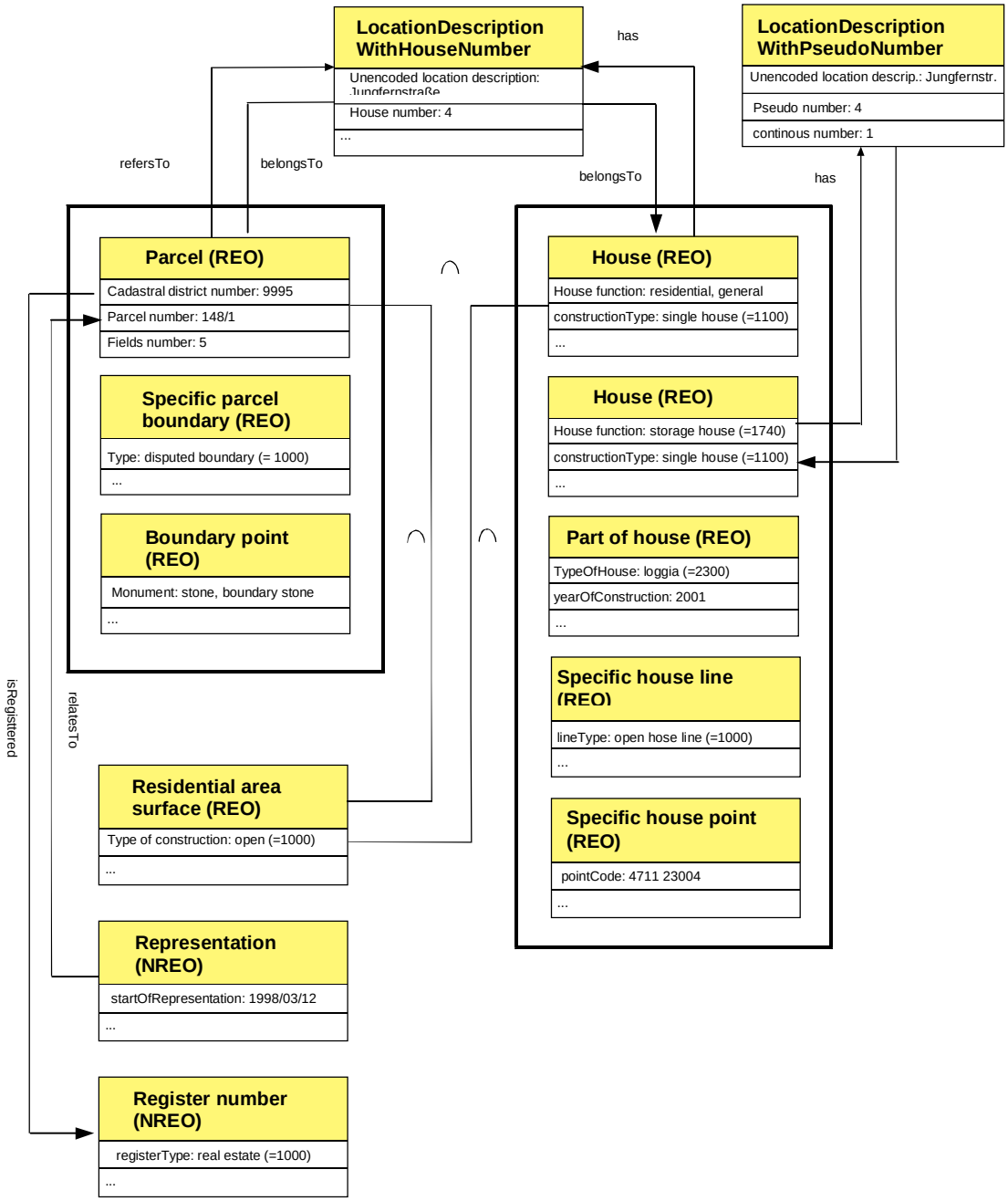



*Figure 5.3 - 87.: Coherent object structure for map section*

The following syntax is used here:

- Arrows show the direction of a relation (for reading direction, see also Annex 1). They also carry the relation description and the corresponding codes from the data model. Dotted arrows represent an attributive relation. This is used predominantly for catalogue data with technical objects (not illustrated here, although in the group of examples for feature type area “owner”).
- The objects surrounded by a thick black line belong to a common theme.

- Relations via geometric intersection are denoted with the symbol ∩.
- The boxes represent an instance of a feature type (object). In addition to the description and the abbreviated feature types, the codes and selected attributes are also shown as examples.

# 12 Processes

## 12.1 Fundamental principles

With the exception of the data collection process, the processes of qualification, updating, utilisation and transfer are described in the technical concept for the modelling of geoinformation by official surveying and mapping. The relevant specifications can be found in Section 3.7 of the main document of the GeoInfoDoc and the statements below.

The overview below illustrates the process chain in ALKIS. The ALKIS-structured collection data generated in the collection process following subsequent qualification are transferred after the update decision in the form of ALKIS update data within the updating process to the ALKIS land register data. Through the utilisation process, the relevant data from the ALKIS data in primary database and the associated metadata are prepared for output in an analogous and/or digital format, where applicable by means of a presentation. Processes can be described and recorded in a formal manner. The updating process including all functionalities and flows is to be recorded as a UML sequence diagram.

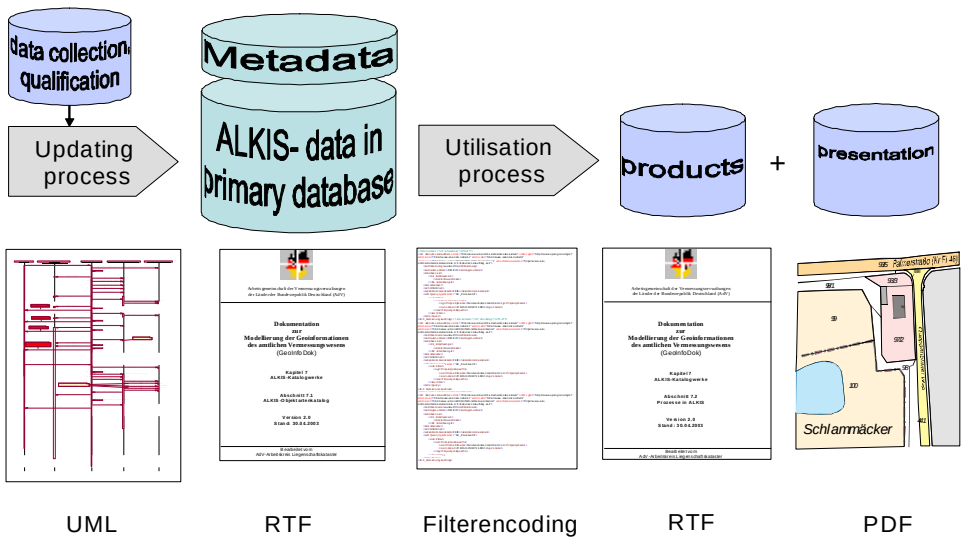



*Figure 5.3 - 88.: Overview for process sequence in ALKIS*

In the utilisation process, so-called filter encoding is used to select and process the required land register data. The data in primary database and output data are created in both UML and MS Word documents (RTF). The ALKIS portrayal catalogue currently exists only as a PDF document.

The processes in AFIS-ALKIS-ATKIS are controlled by special NAS operations such as AX_UpdateJob, AX_SetUpJob, AX_Reservation job, AX_DisableJob and AX_utilisation job.

The jobs are modelled as data types with stereotype <<Request>> (select). The features of these data types exist only until the job is complete. The results are modelled as data types with stereotype <<Response>> (result) and exist only until the results are transferred to a NAS document. For example, all standard ALKIS outputs are created in the utilisation process in this manner.

## 12.2 Project control in the ALKIS-Application schema

The project control is integral part of the work- flow for updating the real estate cadastre. This work- flow can also be described as business process, which also can include the data collection in the field or the bill collection. The project control is only a part of such a business process and controls the workflow for updating the ALKIS database in form of operations and activities. A connection to an external leaded business book will be realised. The updating of the real estate cadastre is structural standardized by implementation the project control. So the quality security and the law security for updating the real estate cadastre can be improved. Factual data of the ALKIS feature can be tested for updating to defined times (production statement). The working steps can be visualized.

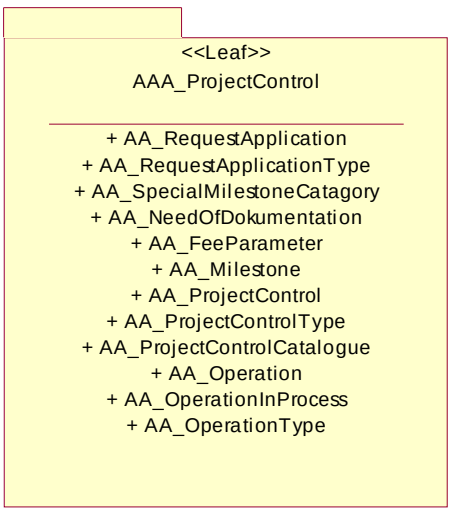



*Figure 5.3 - 89.: Package "Project Control"*

Because of the general validity of the project administration in the AFIS-, ALKIS-, ATKIS application schema the project control is described in the basic schema as factual frame. The essential features of the project control can be used for other factual applications. The factual frame is specified by factual features of every federal state. The AAA- basic schema describes the project control for two different levels:

### 12.2.1 Meta model of the project control

The meta model consists of the principles of execution the processes (e. g. Sequence, Synchronization). A similar frame structure will be used by the modelling of the feature type catalogue in the basic application schema, whereby only the structure and not the technical content are described. The project control of this level is subdivided into request application type, which can be assigned to several project control types. An on the other hand several project control types can be assigned to fixed process types. The process types are described by concrete activities (function) as elementary component of a process. The connections and also the running of the processes will be documented as a rule in form of matrixes or connection catalogues.

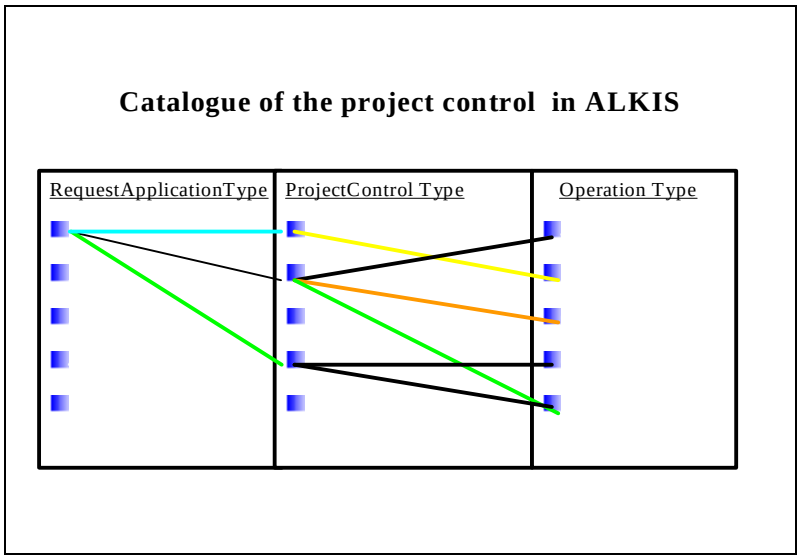



*Figure 5.3 - 90.: Request application – project control - operation*

**Feature Type AA_RequestApplicationType**

The request application type defines a business process in the real estate cadastre. In order to realise the request application type several project control type are assigned. The request application type will be used for the assignment between updating request application and utilisation request application type to several project control types. In the real estate cadastre the following request application are possible to be used:

(1) Updating the real estate cadastre,

(2) Technical revision of real estate cadastre of the method of redistribution of parcels,

(3) Utilisation of the real estate cadastre.

**Feature Type AA_ProjectControlType**

The project control type combines project control feature types with the same characteristics. For a special request application type for example Updating the real estate cadastre, the project control type e.g. “FF- ALKIS” (Updating - ALKIS) will be chosen. This special project control type combines all updating causes und therefore all project control feature types for updating the real estate cadastre, whereby one project control feature type consists of several causes.

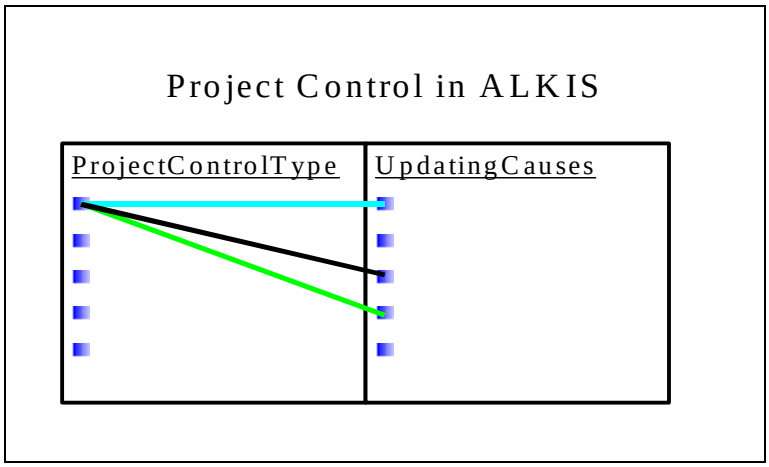



*Figure 5.3 - 91.: Project control – updating cause*

In a project control database the special updating causes are assigned to updating the real estate cadastre, which are executed for a defined project control type. By selection the updating cause splitting or splitting parcels without measurements and marking the allowed combinations are also activated, so that they also can be executed in this process, so merging, changing by reason of the street law, changing by reason of water law, changing by reason of court decision, changing by reason of correction an error of measurement.

The codeliste of the update causes of the AdV of the GeoInfoDoc 5.1 will be used as a technical frame. In context of the implementation in the federal states special feature types must be assigned to the special updating cause, e. g. splitting. These special feature types are allowed to be changed for this special updating cause, so e. g. the feature type AX_Parcel, AX_LocationDescriptionWithoutHouseNumber.

Also it is possible to define not allowed combinations of updating causes as technical necessity. For example it can be defined, that the updating of the owners data can only be executed in a separate project control type and not in the connection with the project control type “splitting”. This fact will be explained by the technical relation “IsNotCombinedWith” of the feature type “AA_ProjectControlType”.

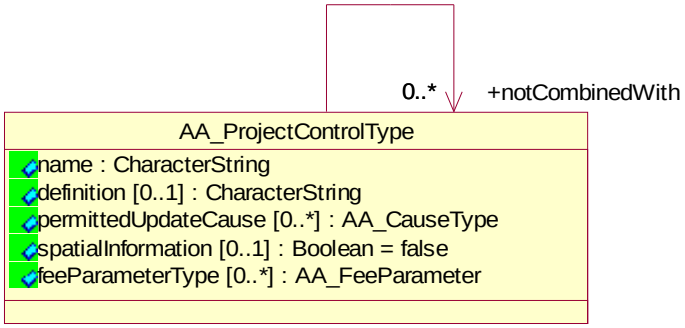



*Figure 5.3 - 92.: Relation "IsNotCombinedWith"*

**Feature type project control catalogue**

The project control catalogue consists of the project control- and operationtype.

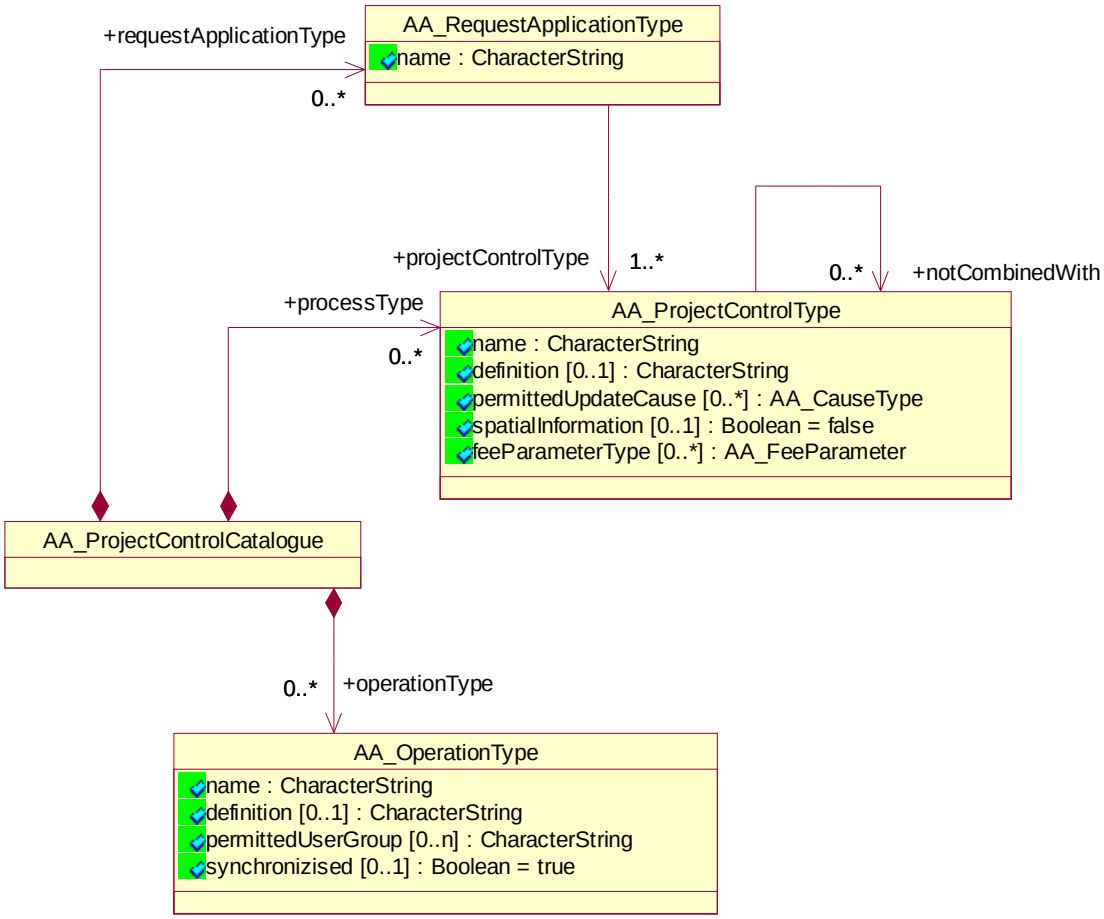



*Figure 5.3 - 93.: Project control catalogue*

**Feature type operation type**

The feature type AA_OperationType combines several operations, which describe a common characteristic. For the updating cause “splitting or splitting parcels without measurement and marking” the following operations as operation types are defined for example:

(1) Preparatory works,

(2) Production statement (confirmation of the technical plausibility of statement marking, documentation the results of the survey, coordinates calculation, parcel area calculation, prerequisite feature creation,

(3) Completion and plausibility,

(4) Qualification,

(5) Updating decision.

Several operations can also be worked parallel (synchronization), in order to realize an optimal workflow. If an equal operation is used in parallel project control types and the operation is closed by the decision of the operator (milestone), this decision is transferred for all parallel working operations. This is only possible, if all operations have the same characteristic.

Such individual operation of a project control type can be assigned concrete activities. These activities can be assigned to an individual operation of a project control type or several operations. Inside of the operation “preparatory works” the following activities are defined:

(1) Preparing an output of data in primary database
Utilisation request is defined for preparing the data if need be preparing the cadastral field sheet,

(2) Carry out a Reservation (point code, parcel code, updating code),

(3) Implementation a project database,

(4) Giving up documents to survey institutions,

(5) Importing of collection data,

(6) Checking the Data of the owner and the register number,

(7) Checking the street code,

(8) Checking the parcel code and the point code,

(9) Checking the reservation of the point code,

(10) Checking the double number,

(11) Creating temporal documents on conveyance of real estate,

(12) ……

The relationship of assignment between the activities and the operation can be shown from the figure above.

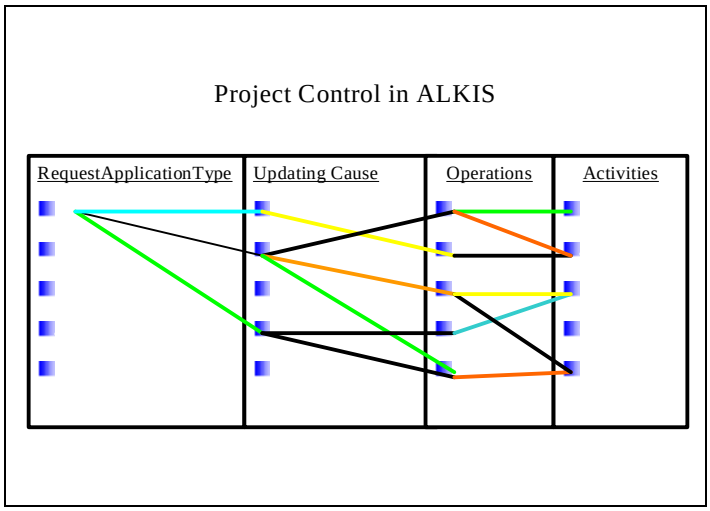



*Figure 5.3 - 94.: Request Application - operation – activities*

The existence of the production statement of the created survey documents (Document: cadastral field sheet, statement of marking) will be documented by the operation “production statement”.

In the operation “Completion and plausibility” the ALKIS structured collection data are taken over in the project database. In the following step the collection data will be completed to ALKIS- concurring features with the following solution of plausibility.

Inside of the operation the following cause types are worked

(1) Updating Cause “Subdivision or splitting parcels without measurements and marking”

(2) Updating Cause “ Updating other data”

(3) Updating cause “Updating Land register”.

In the operation “Qualification” the whole project database will be tested and the result is documented in a protocol of qualification. The correction of the mistakes is made in the operation “Completion and plausibility”. Functions of qualification are: checking the causes, checking the actuality, checking identical point code, checking several calculated point location.

In the operation “updating decision” the available updating request will be set free for the updating the database.

### 12.2.2 Modelling of the project control

The feature types are only modelled, which managed the project control in the ALKIS-database on the level of instances of the feature types. These are corresponding the structure of the meta model: AA_Application, AA_ProjectControl, AA_Operation and AA_Activity. In this process special parameter are defined and analysed (e. g. milestone), which document and lead the concrete workflow.

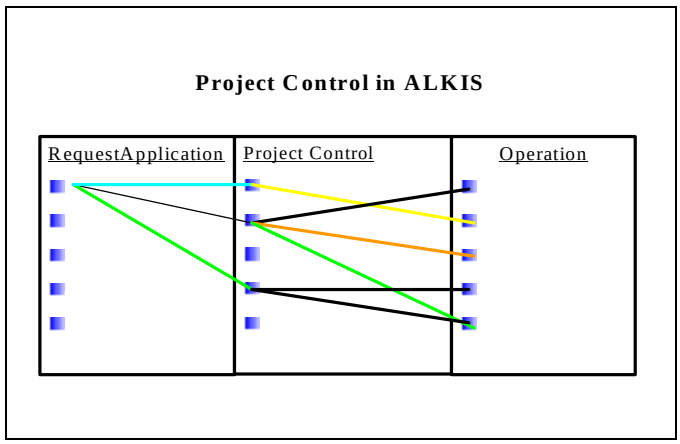



*Figure 5.3 - 95.: Project control – instances*

In the following document the mechanism of the project control for updating the ALKIS-database is described (figure 5.3 – 93) in connection to the example of the splitting survey.

**Feature type AA_RequestApplication**

This feature type realised a “mini administration”, that means an interface to the external request application administration (Business book). So it is possible by an entry in the external request application administration to have a direct connection to this request application in ALKIS (e. g. spatial).

The request application feature type managed also the renewed submission of the request application and supports the controlling of the project control feature type. With the data of the spatial it is possible to search after existing ALKIS- processes, in order to determine competed applications or in order to consider other neighbouring applications by the working. The technical order competed request applications is to be determined by the administrator.

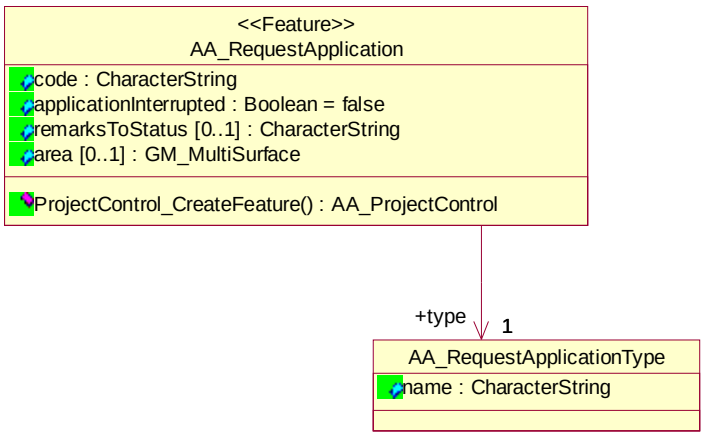



*Figure 5.3 - 96.: AA_RequestApplication*

**Feature type AA_ProjectControl**

The application feature type is combined with the project control feature type (AA_ProjectControl), in order to fix the assignment of an application to one or more project control feature types and in order to control the not allowed combinations. Furthermore the project control feature type manages und controls the concrete workflow of the operations, e. g. in the part of the process “technical qualification”. The update causes and also the causes of utilisation are leaded by the project control feature type.

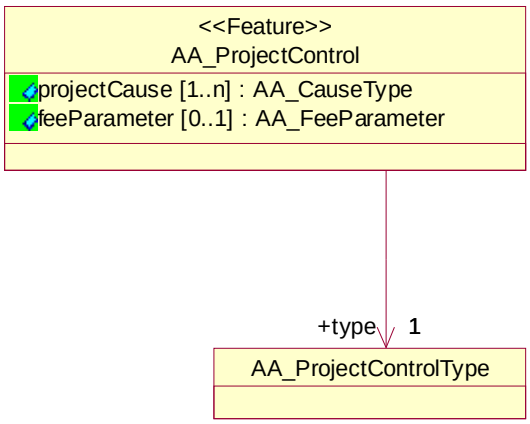



*Figure 5.3 - 97.: AA_ProjectControl*

**Feature type AA_Operation**

The operation is part of the project control and consists of several work steps. The operations are defined as closed work steps. A defined work flow fixed the order und the dependence of the operations and the work steps. The operations are combined into groups and they are

worked in a special order serial or parallel. The decision of the end of an operation is documented by the status (milestone).

The general model of operation of projects distinguishes the following types:

- Project with one or more updating causes with the duty of documentation
- Project with one or more updating causes without the duty of documentation

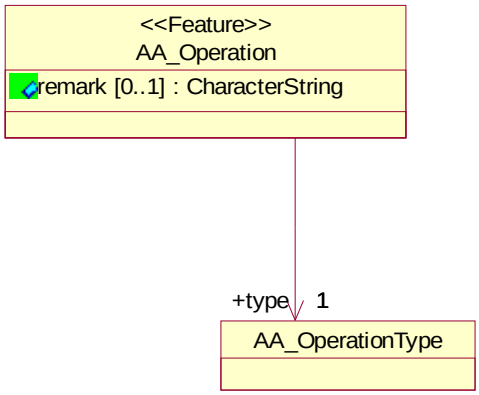



*Figure 5.3 - 98.: AA_Operation*

In the operation the data type AA_Milestone will be occupied for registration the actual status and the responsibility of the operation working with the data of the beginning, finishing, comment etc. This can be seen in the following figure. With a relation the connection is assigned to the defined user profile in the project working, in order to legitimate the right to a concrete operation working.

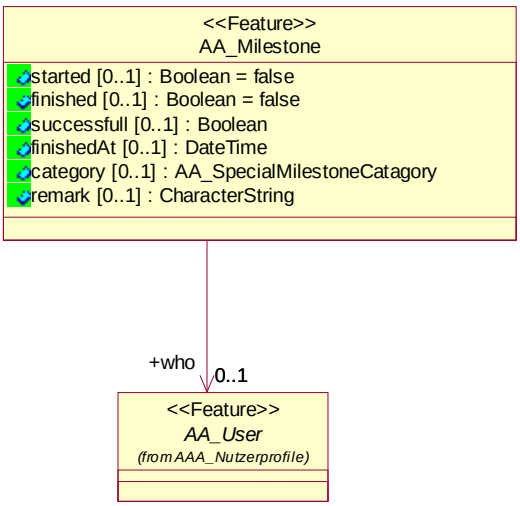



*Figure 5.3 - 99.: AA_Milestone*

A technical program must support the function, that the milestone is only set, if all the necessary activities are executed successfully.

The activities are assigned to the operations, which contains the functions to execute the process. It must to be distinguished, if the activities are necessary for the working, shows a help or is not allowed to be used. This will be managed by using a concrete value of the following codeliste.

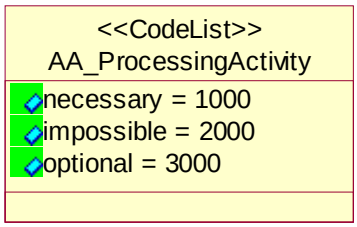



*Figure 5.3 - 100.: Status "Activities"*

**Feature Type "request application area"**

The request applications can be stored and updated as data in primary database in a local update unit (local data management). By using the NBA-method in the AAA_Programm an updating can be managed of the data in primaray database at least daily. The request applications are also managed with the NBA- method. The advantage of this process is, that the request application area can be updated alone and passed on with NAS

With an information and presentation component of the data in primary database it is possible to present request applications. The spatial reference can be expressed by area. In order to get Information of the request application area, the request application code will be presented at the standard position of the area.

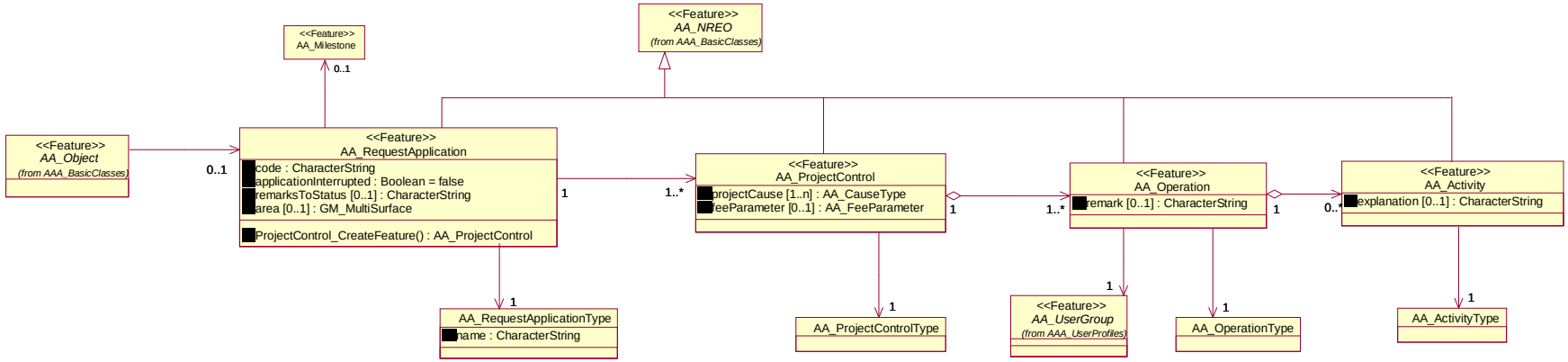
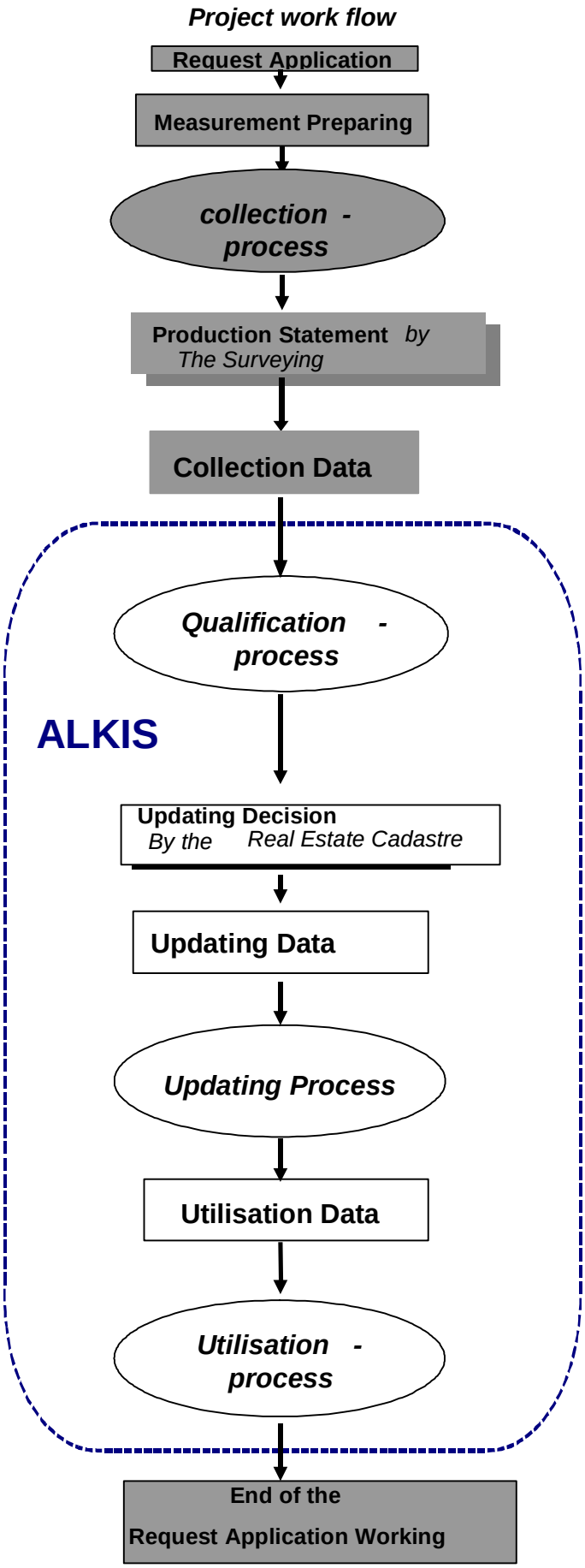



*Figure 5.3 - 101.: Overview of the project Control*

The following figure “process work flow of a real estate cadastre survey” shows the connection of the process control at the abstract business process of the splitting survey / Splitting. The workflow describes in detail the reception of the application, the taking over the new data for the ALKIS- data in primary database and the completion of the application working. The processes, which are running inside of ALKIS only the technical schema, are marked by a frame.


Project work flow
Request Application
Measurement Preparing
collection - process
Production Statement by The Surveying
Collection Data
Qualification - process
ALKIS
Updating Decision By the Real Estate Cadastre
Updating Data
Updating Process
Utilisation Data
Utilisation - process
End of the Request Application Working

## 12.3 Data collection process

Although the data collection process itself is not modelled as part of ALKIS, several aspects of the data collection process that affect the other processes in ALKIS are described below.

The collection data, e.g. surveying results, results of local reconnoitres, digitalised data and external database data are transferred to ALKIS in the form of digital, object-structured data in accordance with the application schema for ALKIS update data. The various data collection processes give rise to both actual data and functions for updating metadata and quality data, which are also transferred in a structured format. State-specific regulations are to be agreed for the collection process. These regulations depend on the technical specifications defined in the AAA technical schema (e.g. obligatory attributes, consistency conditions) and on the technical specifications and options of the implemented procedural solution (e.g. limitation of area sizes, placing of presentation objects).

The result of the collection process is modelled objects in accordance with the criteria of the feature catalogue description.

A characteristic of many collection processes is that they provide digital data that are usually not complete objects as defined by the feature catalogue description. Measuring elements and, if need be, coordinates with some point-related additional data in digital format are standard results of measurements, statements on the geometric form of line and surface objects and their attributes are currently for the most part recorded in analogue accompanying documents.

The existing data are increasingly being provided in the field. This creates the option of carrying out object modelling in the terrain, where applicable supplemented by domestic processing. The collection data are then almost completely structured for update processing in ALKIS.

It is practical and cost-efficient for the results of data collection by external agencies to exist in the data format specified for processing in ALKIS. Conversion to the specified data format must take place beforehand where necessary.

The technically required update sequence must be specified for the data collection process. The collection data are verified and where necessary completed by the cadastre authority. Data from technical information systems of other authorities (e.g. land register, finance authority) is transferred under the control of the cadastre authority in ALKIS.

## 12.4 Qualification process

The technical definitions for the collection data are specified in detail in the federal states' administration instructions. These are not agreed as standard throughout Germany. If the cadastre authority, on the basis of provisions in the federal state-specific administration regulations still accepts non object-structured data, these are to be transferred at the cadastre authority into digital object structured data in accordance with the update data application schema. This transfer takes place during the collection process, which is not part of the ALKIS procedure.

The qualification process presupposes that the production statement exists and that the collection data which may be recorded in analogue surveying records (update fieldsheet, coordinate list, excerpt from the real estate cadastre [database excerpt], area calculation with proposals for the official areas of the new parcels) have been transferred in the object-structured form of the update data application schema. The collection data contains all information required to create ALKIS objects. In addition, data for creating an update certification must also exist. The feature types "update event" "update certification cover sheet" and the "cause" attribute type (cause for creation and expiry) are also carried. The permissible cause types are summarised in the codelist "AA_Cause type".

In the qualification process, the digital, ALKIS object-structured collection data are transferred to update data together with the information on update. This is a method of quality assurance and ensures that the update data satisfy the quality requirements of ALKIS.

The qualification process comprises essentially the following tasks:

- Checking the collection data for suitability for transferring to the real estate cadastre
- Checking the technical sequence of the processing steps in the management process
- Creating a update certification
- Update decision
- Producing the update data for the updating process
- Initiation and control of the update notifications.

As part of the qualification process, the ALKIS data in primary database on which the data collection is based are verified for actuality. The collection data are verified for technical consistency and plausibility using the update certification and other surveying records. The update certification is thus created within the qualification process. Any required additions or adjustments to the collection data (linking data from other locations, e.g. soil evaluation

results, land registry, forestry, etc.) must be made using the tools of the federal state-specific collection components.

If the collection data are not based on the current real estate cadastre, they must be configured during the collection process, update data are not created.

If the suitability check reveals no contradictions, the affected objects in the ALKIS database are blocked for further changes until a change has been accepted; in addition the suitability-tested collection data must be protected from change. This technical blocking guarantees that collection data that has been verified for suitability is available unchanged as update data of the real estate cadastre and no changes to suitable tested collection data can be made between suitability check and update decision. After the update decision, the update data are used unchanged to update the real estate cadastre.

## 12.5 Process of updating

### 12.5.1 Update data

In the updating process, the blocked ALKIS update data are accepted by program control into the ALKIS database and then released for further change by lifting the data block. In this process, ALKIS update data are described by the following characteristics:

- They have an equivalent structure to ALKIS data in primary data base
- They are linked to the corresponding methods to be inserted, deleted and changed.

No explicit consistency checks are modelled in the updating process. The functionalities for checking the consistency conditions formulated in the “ALKIS data in primary database” feature catalogue description must be guaranteed through implementation.

### 12.5.2 Preconditions for carrying out updating

Update processing is based on the qualified collection data. These data are located in the temporary section of a database (“temporary area” feature type) in a structured format. The cause of update is set in the data collection / qualification process and appears as an optional attribute in the new and changed objects. It is only necessary to enter a cause for certain update events (federal state-specific regulations).

In accordance with the federal state-specific regulations, the update conditions can also include reservation of the new technical codes.

### 12.5.3 Creating a reservation request

A reservation request is created outside of the AFIS-ALKIS-ATKIS- data base component (DHK) by the feature type “reservation request” and transferred to the data components. It contains all data required for the reservation of

- Station codes
- Parcel codes and
- FN numbers.

The type of reservation, the type and number of the order numbers to be reserved, the surveying agency for which the reservation is to be carried out and the job and request number are also transferred.

The reservation request results in the corresponding number of objects of “reservation” feature type being created in the data base component. A successful reservation is confirmed by the data base components.

Reserved order numbers that are not required for a surveying issue are released again after the update and remain available for a new reservation. Control is effected through the attribute “implicit_delete_the_reservation” of the “updating request” feature type.

The explicit deletion of reservations (surveying request not received or only partial order) is controlled via a reservation request with reservation type “delete a reservation”.

### 12.5.4 Initiating an update

The update is initiated through process feature type (process feature types are in the UML model classes of stereotype <<Request>>) “updating request”. The feature type groups together the current update events and controls the process of data updating in the ALKIS update component both for parcel objects and other objects in the ALKIS data in primary database. The qualified collection data exist for an updating request.

In the case of parcel related and thus changes subject to notification, the qualified collection data contain 1 to n update events. The updating request groups together the existing update events for the imminent data updating process. The following outputs are also generated as part of a fully automatic sequence processing:

- (where applicable), update certification
- Update notifications
- Revision data records to the administration of justice.

Objects can also occur without a cause within an update event. The cause indicates the reason for the update event can be carried as alternatives for each object. Each update event is usually recorded with 1 to n headings.

**Note:**
*Feature type "update certification cover sheet" is not required for this purely technical process. It is required only for the output feature type that can also be managed in the database as an option (see Section 1.5.1 and the following).*

For a change to the "other feature types" of the ALKIS data in primary database, the update request controls only the process of updating. The qualified collection data contain no "update event" feature types, although they can contain update causes. The meaning of the updating request in ALKIS can be seen in the figure below.

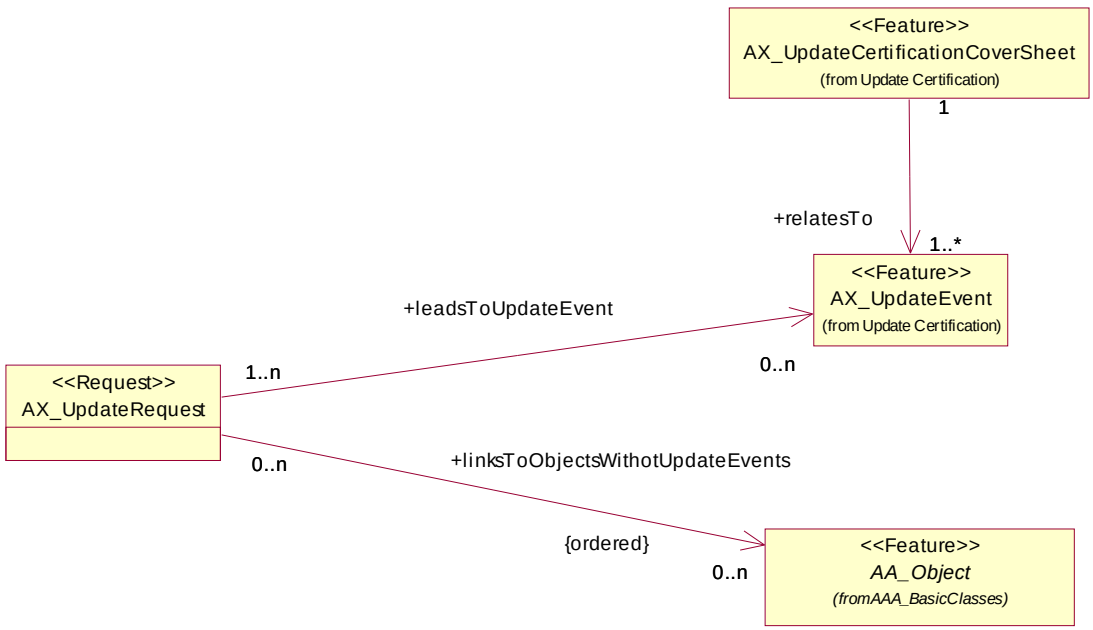



*Figure 5.3 - 102.: Revision case in ALKIS*

### 12.5.5 Implicit functionality

The database in ALKIS is subject to continuous change or updating. As a result of the inserts and the deletion / archiving of technical objects, this can lead to inconsistencies within the database, as the changed technical objects have relations to other technical objects. These are therefore implicitly affected by the changes. The steps resulting from this situation for a data base system are described in "implicit functions". They are used for the current consistency check and maintenance of the database that is carried out after every update event. The

functions are automatically called up by the data base system and without any interaction by a user.

There are two parameters that specify the required steps: the significance of the reference for the respective technical object and the direction of the reference.

(1) The reference can have two meanings for the technical object implicitly affected by the update event: it either represents an existentially required element for this technical object, which has no meaning without satisfied or existing reference – the meaning of the reference can depend on how other references relate to the technical object – or the existence of the technical object is independent of this reference.

(2) A reference represents a legal relation between two technical objects. It starts from the "referencor" and ends at the "referenced". For the "implicit functions" a distinction is drawn for which side of the reference the implicitly affected technical object is located. The reference that has been specified in the AFIS-ALKIS-ATKIS application schema as a preferred reference is referred to here. Implementation specific counter references are not considered, as they are a matter for the accepting system.

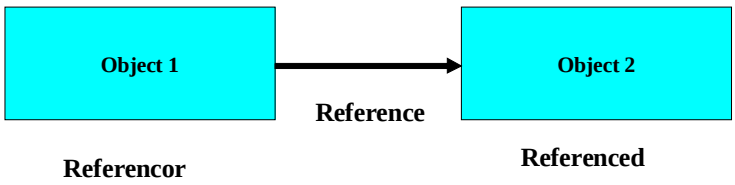
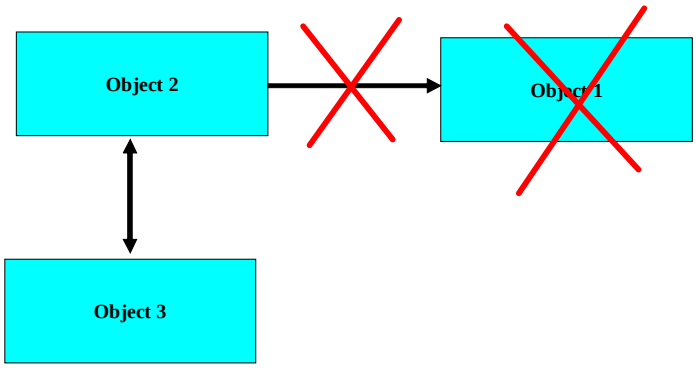



*Figure 5.3 - 103.: Implicit function – referencor / referenced*

When object 1 is modified, the combination of these parameters creates four variants that have different effects on the respective reference partner (object 2):

- **Variant 1:**

The reference has no existential influence on object 2 and object 1 is the "referenced": In this case, the reference issued by object 2 has no meaning. The reference is deleted, object 2 is versioned although continues to exist.




(e.g. object 1 = parcel 1, object 2 = representation, object 3 = parcel 2)

*Figure 5.3 - 104.: Implicit function – Variant 1*

- **Variant 2:**

The reference has no existential influence on object 2 and object 1 is the “referencor”:

In this case, the reference relating to object 2 is absent following the update event. However, this has no influence on this technical object. It remains in this form; the consequence of updating is that the technical implementation counter reference for object 2 is to be implicitly deleted. Object 2 continues to exist although it is not versioned.

(e.g. object 1 = management, object 2 = person, object 3 = name number)

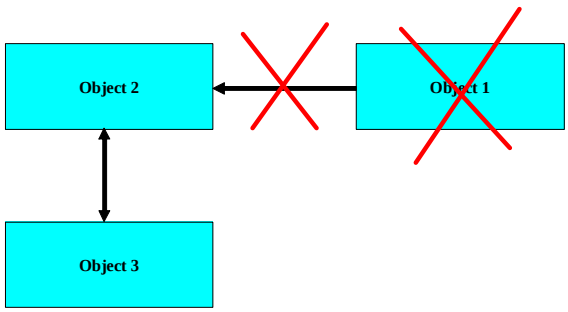
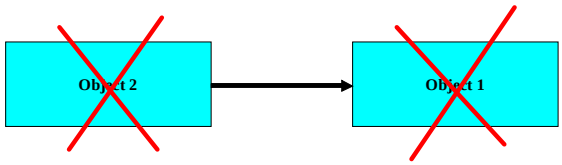



*Figure 5.3 - 105.: Implicit function – Variant 2*

- **Variant 3:**

The reference has an existential influence on object 2 and object 1 is the “referenced”:

The reference issued by object 2 has no meaning, as it remains unsatisfied. Thus, the affected technical object 2 loses its right to exist and demises.




(e.g. object 1 = person, object 2 = management)

*Figure 5.3 - 106.: Implicit function – Variant 3*

- **Variant 4:**

The reference has an existential influence on object 2 and object 1 is the “referencor”:

The consistency conditions for object 2 are no longer satisfied following the update event and demises.

(e.g. object 1 = management, object 2 = person, Objekt 3 = address)

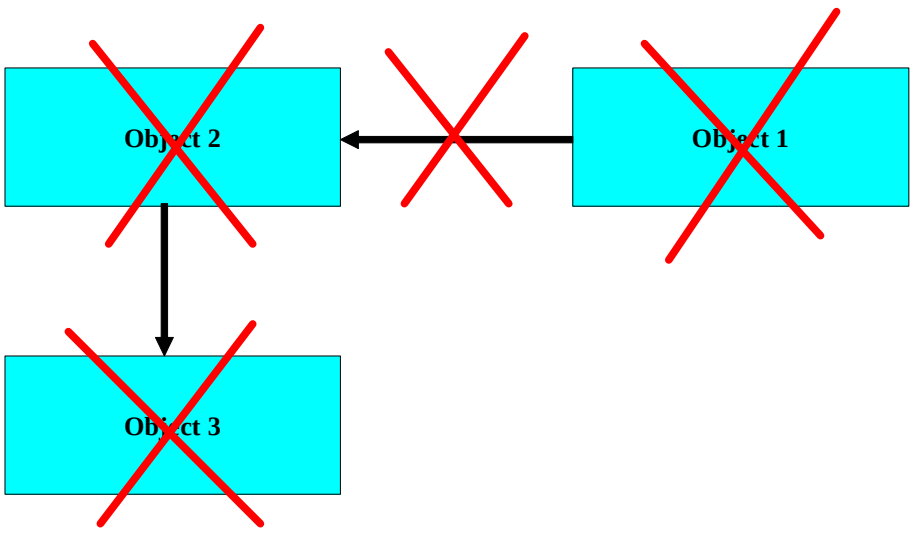



*Figure 5.3 - 107.: Implicit function – Variant 4*

The example in variant 4 shows that an implicit function can also trigger implicit functions in the form of a chain reaction, as in a first step after the “management” technical object, the “person” technical object demises. As the “address” technical object – if it has been

referenced by the demising "person" – is then without meaning, it is also demised. Each update event must therefore be checked for any further required "implicit functions".

In specific cases (e.g. for the relation from the point location to one of the network point feature types), the implicit deletion described in variant 4 may not be technically desirable and is therefore to be checked using a caution reference.

As the "implicit functions" occur during updating of the data base, Section 10.4.1 of the main document of GeoInfoDoc describes in more detail their properties as defined by NAS - the "standard-based data exchange interface. NAS contains the implicit functions expected by the secondary databases, which are jointly valid for the primary databases of AFIS, ALKIS and ATKIS.

### 12.5.6 Geometry handling during the update

There are two distinctly different variants:

(1) Updating with geometric handling

In this case, only the objects directly affected by the change are transferred with the corresponding change operations to the database components. The associated close adjacent changes occur in database through application of geometric operations (geometric comparison with subsequent separation of the lines).

(2) Updating without geometric handling

In addition to the objects directly affected by the change, the affected adjacent objects are also transferred to the database components. The data volume is therefore larger and the required functionalities of the database components thus become simpler.

One of the two variants can be selected by a control parameter in the update request. Further information on the functionality of geometric handling is contained in GeoInfoDoc, Section 3, Item 10.4 of the main document of GeoInfoDoc.

Example:

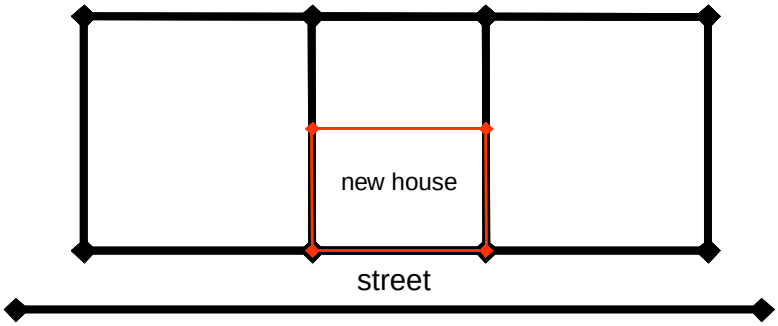



*Figure 5.3 - 108.: Example of geometric handling*

Variant (1) transports only the middle parcel; variant (2) also supplies the two adjacent parcels.

### 12.5.7 Documentation of update

Following successful update processing, the update certification documents the cadastre-relevant changes in ALKIS after the successful update process. It contains one or several update events that are based on one or several update causes. It therefore serves as proof for the update decision and the update notifications to the agencies to be notified of the changes (e.g. owner, land registry). The update certification contains the previous, parcel related perception, i.e. the status of the real estate cadastre before and after the update event are described with indication of the update cause in relation to the affected parcels. At the same time, several self-contained changes to the real estate cadastre can be grouped together in one update certification (e.g. all surveys in one final street survey).

The output of the update database consists of three parts

- Cover sheet
- Descriptive text for each update event number
- And a federal state-specific graphic part.

The cover sheet contains general information on updating. The text part compares the following parcel related data:

| Old | New |
|---|---|
| Land parcel code | Land parcel code |
| Legal area(s) | Legal area(s) |
| Location description (optional) | Location description (optional) |

*Figure 5.3 - 109.: Contents of the update certification*

The graphic part can be generated for example in the qualification process or from the updated data in primary database or from other evidence. The corresponding data are held by the external feature type “F-graphic” as an Annex to the update certification and to the update notifications. A comparison between the old and new databases, in which all changes are highlighted in colour, records the updated database. The format of this external file (e.g. NAS or GeoTiff) is specified through implementation.

### 12.5.8 Initial setup

The process of data migration to the ALKIS update components is controlled through the “request initial setup” feature type and is based on the qualified migration data. These data are located in the temporary database area in a structured format. They consist of precisely one request initial setup that is not sub-divided into events. Data setup is a special update and is controlled via an internal request (request initial setup).

The initial setup differs from the update event as follows:

- The migration data supplied in a job are portioned in such a way so as to be consistent in respect of their self-referenced and externally-referenced properties in the job. In order to achieve this situation, object instances may be formed where required so that references in the order can be satisfied. The subsequent updating process initiated especially for correction purposes is responsible for achieved the technically desired status
- Setup processing gives generates only current object versions (no object versions with demise data)
- There are no further update events (due to initial setup)
- Deletions do not occur
- Changes to objects in the database occur only as implicit functions
- Control through a special order
- The initial setup is also preceded by a qualification process
- Setup processing is based on the qualified migration data. These data are located in the temporary database in a structured format. They consist of precisely one set-up request that is not sub-divided into events.

## 12.6 Utilisation process

For modelling the utilisation process in ALKIS, the detailed study entitled “standard outputs from the official real estate cadastre information system” updated on the basis of various decisions taken by the AK LK is sustained, whereby technical specifications and minimum

content of the standard outputs from ALKIS, the official real estate cadastre information system, is described in the form of primary database records, revision data records and prepared land register data.

### 12.6.1 Outputs and output data

ALKIS outputs are products from the ALKIS database created according to standard output and/or presentation rules that are submitted to external users. They originate on the basis of an utilisation process from the ALKIS data in primary database; in some cases on the basis of a qualification process (see GeoInfoDoc, Section 3.7.4.2 of the main document) from the ALKIS update data. If they correspond to the technical specifications “standard outputs from the official real estate cadastre information system ALKIS”, they are ALKIS standard outputs.

ALKIS outputs in the form of data records usually consist of copies of a range of ALKIS primary database objects defined in the utilisation request. In special cases and according to the requirements of the user they may also, however, contain temporary feature types modified by certain methods.

ALKIS presentation outputs in a legible format comprise in each case a temporary output feature type. This type of modelling enables the ALKIS presentation outputs to be prepared not only on paper but also in the form of prepared data records where required.

ALKIS outputs are described through the following characteristics:

- In accordance with the definition in the ALKIS data model, each ALKIS output comprises one or several data types
- They can contain
  - Objects and/or attributes of the ALKIS data in primary database
  - Objects and/or attributes of the ALKIS data in primary database and/or update data existing on a temporary basis modified by methods
  - External objects that are not formed in accordance with the ALKIS-ATKIS data model (e.g. “federal state heads”)
- They are produced in the utilisation and/or qualification process in accordance with the details of the temporary process feature type “utilisation request” formed in the data collection process
- They are presented as and when required in accordance with the specifications for the portrayal catalogue.

**Feature type “utilisation request”**

An utilisation request prepares all general information for an output. The link to request manager is produced via the application number.

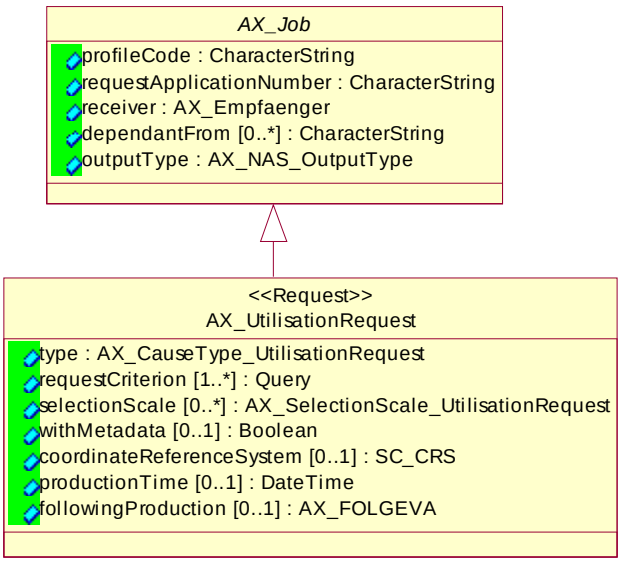



*Figure 5.3 - 110.: Utilization request*

The type of output to be created is specified via the cause type of the utilisation request. Depending on “initiation type” in the utilisation request, various predefined samples are to be used for the selection criteria. The selection criteria are controlled via the “query” data type using the filter encodings.

In the “coordinate reference system" attribute, the requested coordinate reference system (CRS) can be indicated for coordinate data in the output land register data. The data is optional and if omitted, the “native”, i.e. CRS present in the data in primary database is used. The coordinates are then output in the same format, as they are stored. This functionality is feasible only for a very limited number of CRS pairs, which can be strictly mathematically converted inside each other. Other conversions or transformations, which indicate a loss of accuracy for the coordinates are not supported at this point; they can be realised through external processes. The same applies to conversions of 3-D CRS ((X,Y,Z), (width, length, ellipsoidal height),…).

# 13 The Presentation Model

## 13.1 Principles

The presentation objects are described in the basic schema because of the general characteristics. The presentation objects include the portrayal number (SNR) and other characteristics to control the presentation, e. g. priority of presentation and art in the feature type AP_Presentation. Presentation objects must be connected with the corresponding technical objects by the relation “usingForPresentationOf”. The presentation of feature types in graphical and non graphical extracts can be taken out of the illustration above.

**Presentation in the map**

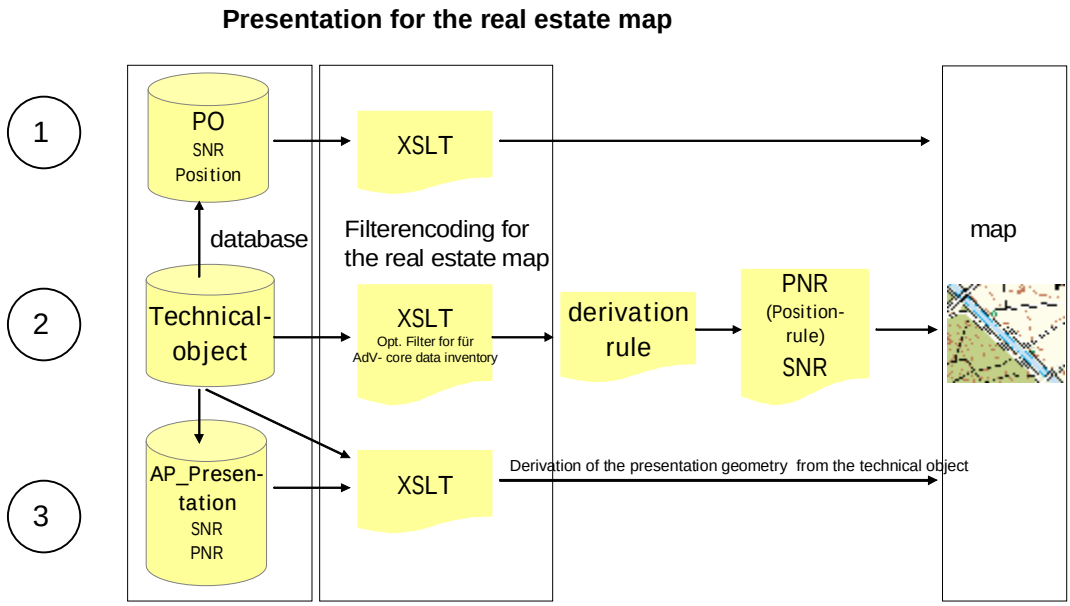



*Figure 5.3 - 111. : Presentation the real estate map*

(1) Presentation in the data in primary database

Presentation objects will be built for all portrayals in form of text, line, symbol, area, which can not be automatically generated and presented for a special map scale. The specific portrayal number, which is presented by a concrete derivation rule, also the position number (PNR), which presents a concrete position rule can be optionally stored in the presentation object. Presentation objects are also built, if the presentation deviates from the standard presentation, stipulated in the portrayal catalogue.

(2) Presentation with derivation rule and position rule

Portrayals of a technical object in form of text, line, symbol, area will be placed at a

define position (standard position) by using the filter encoding and a concrete derivation rule, which represents a concrete portrayal number and position rules, which activate a concrete number of position (see chapter 7.3, ALKIS-SK). In this case a presentation object is not created in the data in primary database. The technical information, which will be presented, is taken from the attribute type of the technical feature type. This way is the standard case, which is not always the most effective way.

(3) Presentation with stored derivation rule and position rule

In order to increase the performance of the standard presentation the concrete portrayal number and also the number of position, which is used to present a technical object, will be stored at a certain time (updating, first insert) under the referenced presentation object AP_Presentation (NREO). The advantage is, that the geometry is redundancy-free, because the presentation geometry of the feature type AP_Presentation is derived by the technical feature type. The presentation will be quickly executed by using the filter encoding in connection with the derivation of the presentation geometry from the technical feature type und the stored rules, portrayal number, number of position. In ALKIS the feature type AP_Presentation is exclusively used to handle the following changes in the real estate map:

- Suppression a presentation in the real estate map
- Creation of a specific presentation of symbols in the real estate map, e.g. arrangement of symbols in an area.

**Presentation of a real estate description**

The presentation of the information concerning the cadastral content, e.g. parcel certification/owner certification, is automatically derived on the fly by using Filter Encoding in order to create the corresponding output data. The output data are presented by using a specific derivation rule. The corresponding positions of the text are not specifically described in the portrayal catalogue, but are shown in a concrete sample (see chapter 7.3, ALKIS-SK)

The non spatial feature type AP_Presentaion is not applied in this context. Additionally there is no creation of presentation objects in the primary database.

**Presentation of a real estate description**

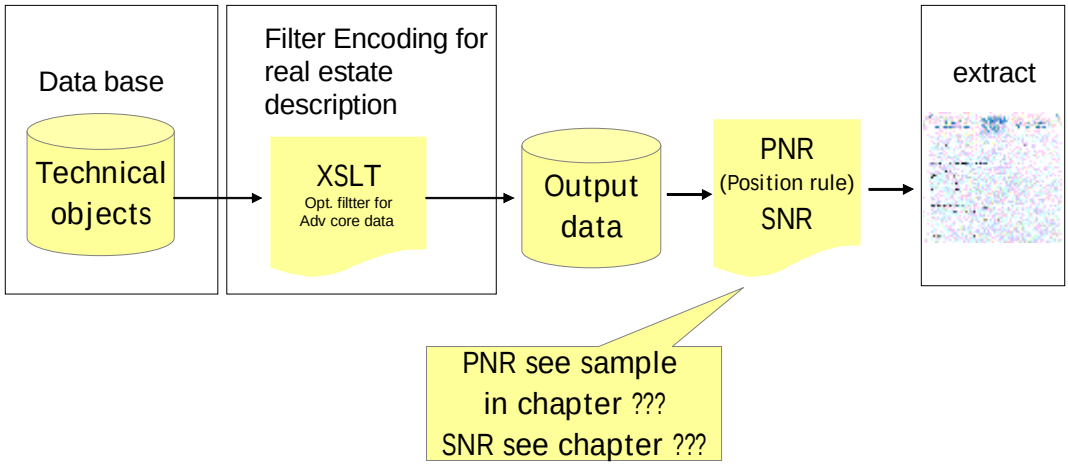



*Figure 5.3 - 112. : Presentation of a real estate description*

**Creation using presentation objects and AP_Presentation for the data in primary database**

In order to get a performant presentation of the technical objects in a cadastral extract, appropriate presentation rules must be defined in time of collecting or updating the data. This way the following three cases have to be destinguished.

**Presentation process during data collection and updating**

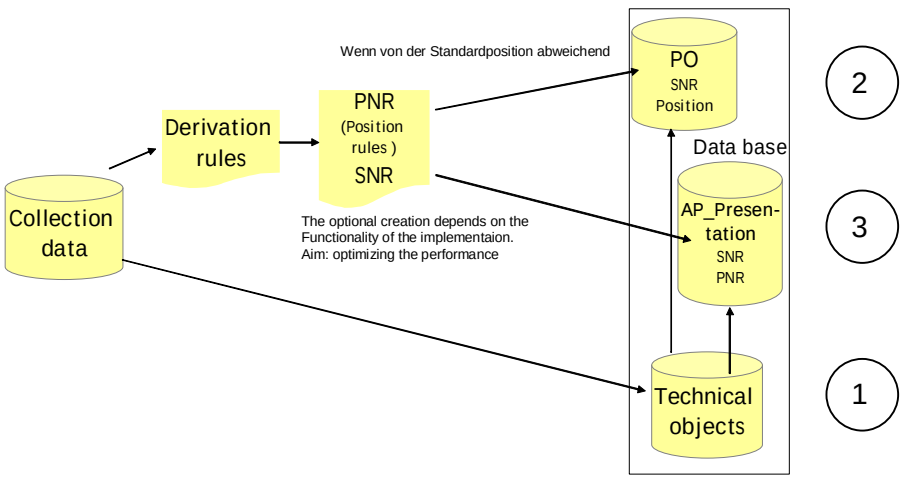


*Figure 5.3 - 113.: Presentation process during data collection and updating*

(1) No determination of presentation rules

Collected or updated data do not need predefined rules to assign a concrete portrayal number and position number in order to realize a performant presentation. The information for presentation can directly be generated on the fly using the 3A data model as well as the ALKIS portrayal catalogue.

(2) Storing the presentation objects in the primary data base

During the collecting or updating process a presentation object is created to present a concrete portrayal, because the positioning of portrayals cannot be automatically generated for a specific map scale. In this case the information about the geometry, optionally a portrayal number and position number are stored in the feature type.

(3) Determination of presentation rules

In order to minimize the runtime of a presentation a non spatial feature type AP_Presentation for a specific technical object can be generated during the data collecting or updating process. In this feature type a concrete portrayal or position number is stored, e.g. an arrangement of symbols in an area. The geometry for the presentation can be derived from the corresponding technical object on the fly using appropriate functions.

## 13.2 Portrayal catalogue

The ALKIS portrayal catalogue includes the rules for presentation of the data of the primary database. If mainly defines the presentation of the ALKIS standard outputs based on the Ad ALKIS core data inventory und the current Ad drawing rules. It also includes portrayal information for conveniently presentable technical content of ALKIS data in primary database. For the presentation of specific outputs of a state the methodology of the portrayal catalogue can be use as a baseline, if the necessary portrayal information has not already been defined.

The kernel of the ALKIS portrayal catalogue consists of a “Portrayal library” (Part A), the “Presentation” (Part C) and the “Position rules” (Part D). Portrayal library and presentation are connected by a portrayal number as well as a position number.

The portrayal library contains all existing drawing information (portrayal), that are separated in four basic types:

1. Area
2. Line
3. Symbol

4. Text.

Each portrayal is described with their specific properties without any redundancies, even it is used for the presentation of different objects.

# 14 Explanation of the NAS by means of an example from December 2004

In the following passage the structure of the NAS will be in extracts explained by a parcel with the parcel number 394 and the existing register type “real estate”. The NAS file below was created by the production of a data in primary database output inside of the utilisation process and documented the NAS- development from December 2004. The example only intends to show the principle structure of the NAS, so that future developments and standardisations are not considered here.


*Figure 5.3 - 114.: Parcel 394 of the fields 1 of the cadastral district „Test“*

The NAS- data is structured in XML and GML coded sequences and therefore it can be good interpreted. The technical information of the data sequence can be used for verification the result of the migration process by application a XML editor, for example XML_NotePad.

The separation between the individual object sequences is made by "<gml:featureMember>". Each object is clearly determined by the object identifier, so for example "<adv:AX_Parcel gml:id="**DEBBAEDA00000KHE**">". Further details about the structure of the identifier can be taken out of the main document of the GeoInfoDoc.

After that general object information follow in accordance with the technical contents of the basic schema. This can be seen at the following UML-figure.

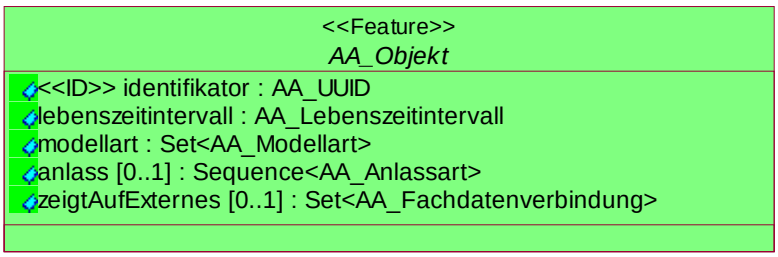



*Figure 5.3 - 115.: General object properties*

In spatial feature types the geometrical base points are listed in the sequence of creating the object in the collection process by using the geometrical base form, for example"<gml:Curve>" with the corresponding interpolation type, so for example "</gml:LineStringSegment>". After the geometrical data the properties of the object will be listed in form of attributes for example "<adv:fields number>**138**</adv:fields number>", and relations, for example "<adv:refersTo xlink:href="urn:adv:oid:**DEBBAEDA00000KRT**" />". The OID , which is mentioned by the relation, illustrate the connection to a concrete object.

Further details can be taken out of the following data sequence of the parcel 394.

In the following NAS data sequence outputs special remarks are mentioned in italic letters in order to improve the interpretation of the sequence for example "***head information of the feature type (Parcel 394)"***.

Remarks:

- Topological elements are not transferred by the NAS, exclusively geometrical elements,
- Not every point in the polygon of the parcel consists of point location or boundary point. The name of the instance theme in the NAS- file (for example parcel and house“) are used in the "Exchange Metadata", that means, they are modelled in the utilisation request and utilisation results objects.

**Feature type AX_Parcel (Code No. 11001)**

***Head information of the feature type (Parcel 394)***

```
<gml:featureMember>
   <adv:AX_Parcel gml:id="DEBBAEDA00000KHE"> (ID_name parcel 394)
     <adv:lifetime interval>
       <adv:AA_LifetimeInterval>
         <adv:started>2004-11-16T00:00:00.0000000+01:00</adv:started>
       </adv:AA_LifetimeInterval>
     </adv:lifetime intervall>
     <adv:model type>
       <adv:AA_ModellType>
```

```
            <adv:advStandardModell>DLKM</adv:advStandardModell>
          </adv:AA_ModellType>
        </adv:model type>
        <adv:position>
          <gml:Polygon srsName="ETRS89_UTM33">
            <gml:exterior>
              <gml:Ring>
                <gml:curveMember>
                  <gml:Curve>  geometrical spatial informations
                    <gml:segments>
                      <gml:LineStringSegment>
                        <gml:pos>33464155.094 5802880.117</gml:pos>
                        <gml:pos>33464128.856 5802884.823</gml:pos>
                      </gml:LineStringSegment>
                    </gml:segments>
                  </gml:Curve>
                </gml:curveMember>
                <gml:curveMember>
                  <gml:Curve>
                    <gml:segments>
                      <gml:LineStringSegment>
                        <gml:pos>33464128.856 5802884.823</gml:pos> this point do
not consist of a Point ……<gml:pos>33464132.276
5802898.920</gml:pos> Location („pseudonode“,
                      </gml:LineStringSegment>                    chap. 0.1.8)
                    </gml:segments>
                  </gml:Curve>
                </gml:curveMember>
                <gml:curveMember>
                  <gml:Curve>
                    <gml:segments>
                      <gml:LineStringSegment>
                        <gml:pos>33464132.276 5802898.920</gml:pos>
                        <gml:pos>33464132.872 5802901.403</gml:pos>
                      </gml:LineStringSegment>
                    </gml:segments>
                  </gml:Curve>
                </gml:curveMember>
                <gml:curveMember>
                  <gml:Curve>
                    <gml:segments>
                      <gml:LineStringSegment>
                        <gml:pos>33464132.872 5802901.403</gml:pos>
                        <gml:pos>33464134.170 5802906.720</gml:pos>
                      </gml:LineStringSegment>
                    </gml:segments>
                  </gml:Curve>
                </gml:curveMember>
                <gml:curveMember>
                  <gml:Curve>
                    <gml:segments>
                      <gml:LineStringSegment>
                        <gml:pos>33464134.170 5802906.720</gml:pos>
                        <gml:pos>33464160.514 5802901.995</gml:pos>
                      </gml:LineStringSegment>
```

```
                    </gml:segments>
                  </gml:Curve>
                </gml:curveMember>
                <gml:curveMember>
                  <gml:Curve>
                    <gml:segments>
                      <gml:LineStringSegment>
                        <gml:pos>33464160.514 5802901.995</gml:pos>
                        <gml:pos>33464155.094 5802880.117</gml:pos>
                      </gml:LineStringSegment>
                    </gml:segments>
                  </gml:Curve>
                </gml:curveMember>
              </gml:Ring>
            </gml:exterior>
          </gml:Polygon>
        </adv:position>
         <adv:cadastral district>   properties of the feature type (attributes)
          <adv:AX_CadastralDistrict_Keyl>
            <adv:land>12</adv:land>
            <adv:cadastral district number>0401</adv: cadastral district number>
          </adv:AX_CadastralDistrict_Key>
        </adv: cadastral district >
        <adv:parcel number>
          <adv:AX_ParcelNumber>
            <adv:numerator>00394</adv:numerator>
          </adv:AX_ParcelNumber>
        </adv:parcel number>
        <adv:parcel code>12040113800394</adv:parcel code>
                          reference of the definition of measure
         <adv:legal area uom="http://www.adv-
online.de/uom/squaremeters">601</adv:legal area>
        <adv:fields number>138</adv:fields number>
        <adv:deviating legal status>false</adv: deviating legal status>
        <adv:law makeshift solution>false</adv: law makeshift solution >
        <adv:object coordinates>
          <gml:Point srsName="ETRS89_UTM33">
            <gml:pos>334641350 58028941</gml:pos>
          </gml:Point>
        </adv:object coordinates>
        <adv: Time of creation>1997-01-01</adv: time of creation>
        <adv:responsible departement>
          <adv:AX_Departement_Code>
            <adv:land>12</adv:land>
            <adv:authority>3061</adv:authority>
          </adv:AX_Departement_Code>
              </adv:responsible departement>
```

***Properties (Relations)***

***(Reference to the feature type Register Number)***

```
        <adv:isregistered xlink:href="urn:adv:oid:DEBBAEDA00000LMC" />
```

***(Reference to the feature type location description with house number)***

```
        <adv:refers to xlink:href="urn:adv:oid:DEBBAEDA00000KRT" />
```

```
    </adv:AX_Parcel>
  </gml:featureMember>
```

**Presentation of the parcel number "394" in the map**

```
<gml:featureMember>
    <adv:AP_PTO gml:id="DEBBAEDA00000OHD">
      <adv:lifetime intervall>
        <adv:AA_LifeTimeIntervall>
          <adv:start>2004-11-16T00:00:00.0000000+01:00</adv:start>
        </adv:AA_LifeTimeIntervall>
      </adv:life time intervall>
      <adv:modell type>
        <adv:AA_ModellType>
          <adv:advStandardModell>DKKM1000</adv:advStandardModell>
        </adv:AA_ModellTpe>
      </adv:modellart>
      <adv:position>
        <gml:Point> (Position of the presentation object with the geometrical form
of a point)
          <gml:pos>33464135.033 5802894.112</gml:pos>
        </gml:Point>
      </adv:position>
      <adv:portrayal number>4111</adv:portrayal number>

(Reference to the feature type AX_Parcel (11001) )

      <adv:usedForPresentationOf xlink:href="urn:adv:oid:DEBBAEDA00000KHE" />
(Presentation instruction after ALKIS-SK)
      <adv:contents of writing>394</adv: contents of writing >
      <adv:fontName>ARIAL</adv:fontName>
      <adv:fontBlocking>0</adv:fontBlocking>
      <adv:fontSize>10</adv:fontSize>
      <adv:scale>1</adv:scale>
      <adv:fontColour>4000</adv:fontColour>
      <adv:fontIncline>kursiv</adv:fontIncline>
      <adv:horizontal alignment>central</adv:horizontal alignment >
      <adv:vertical alignment>Basis</adv:vertical alignment>
      <adv:turning angle>0</adv:turning angle>
    </adv:AP_PTO>
  </gml:featureMember>
```

**Boundary point of the parcel 394**

**Feature type Pont locationTA to the boundary point No.: 41852**

```
gml:featureMember>
    <adv:AX_PointLocationTA gml:id="DEBBAEDA00000BNI">
      <adv:lifetime intervall>
        <adv:AA_LifetimeIntervall>
          <adv:beginnt>2004-11-16T00:00:00.0000000+01:00</adv:start>
```

```
            </adv:AA_ LifetimeIntervall >
          </adv: lifetime intervall >
          <adv:modell type>
            <adv:AA_ModellType>
              <adv:advStandardModell>DLKM</adv:advStandardModell>
            </adv:AA_ ModellType >
          </adv: modell type >
( Refernce to the feature type boundary point )
          <adv:isPartOf xlink:href="urn:adv:oid:DEBBAEDA00000BNG" />
          <adv:position>
            <gml:Point srsName="ETRS89_UTM33">
              <gml:pos>33464155.094 5802880.117</gml:pos>
            </gml:Point>
          </adv:position>
          <adv:map presentation>true</adv: map presentation >
          <adv:Coordinates status>1000</adv: Coordinates status >
          <adv:remarks>489::9973342</adv:remarks>
          <adv:quality information>
            <adv:AX_DQPointLocation>
              <adv:level of accuracy>2100</adv: level of accuracy >
              <adv:realibility of position>false</adv: realibility of position >
            </adv:AX_DQPointLocation>
          </adv: quality information >
        </adv:AX_PointLocationTA>
```

**FeatureType Boundary point (Point Code :34586402 41852)**

```
<gml:featureMember>
        <adv:AX_BoundaryPoint gml:id="DEBBAEDA00000BNG">
          <adv:lifetime intervall>
            <adv:AA_LifeTimeIntervall>
              <adv:start>2004-11-16T00:00:00.0000000+01:00</adv:start>
            </adv:AA_ LifeTimeIntervall >
          </adv: lifetime intervall >
          <adv:modell tpye>
            <adv:AA_ModellType>
              <adv:advStandardModell>DLKM</adv:advStandardModell>
            </adv:AA_ModellType>
          </adv:modell type>
          <adv:point code>3458640241852</adv:point code>
          <adv:responsible agency>
            <adv:AX_Departement_Code>
              <adv:land>12</adv:land>
              <adv:authority>0530</adv:authority>
            </adv:AX_Departement_Code>
          </adv:responsible agency>
          <adv:monument >1000</adv: monument >
          <adv:other properties >0118</adv:other properties>
          <adv:time of creation >2004-08-31</adv:time of creation>
        </adv:AX_BoundaryPoint>
      </gml:featureMember>
```

**Feature type point locationTA to the boundary point with the No.: 41787**

```
<gml:featureMember>
        <adv:AX_PontLocationTA gml:id="DEBBAEDA00000BGA">
          <adv:lifetime intervall>
            <adv:AA_LifeTimeIntervall>
              <adv:beginnt>9999-01-01T00:00:00.0000000+01:00</adv:beginnt>
            </adv: AA_LifeTimeIntervall >
          </adv: lifetime intervall >
          <adv:modell type>
            <adv:AA_ModellType>
              <adv:advStandardModell>DLKM</adv:advStandardModell>
            </adv:AA_ModellType>
          </adv:model type>
```

***( Reference to the feature type boundary point )***

```
          <adv:isPartOf xlink:href="urn:adv:oid:DEBBAEDA00000BG8" />
          <adv:position>
            <gml:Point srsName="ETRS89_UTM33">
              <gml:pos>33464128.856 5802884.823</gml:pos>
            </gml:Point>
          </adv:position>
          <adv:map presentation>true</adv: map presentation >
          <adv:coordinates status>1000</adv: coordinates status >
          <adv:remarks>489::997        </adv:remarks>
          <adv:quality information>
            <adv:AX_DQPointLocation>
              <adv:level of accuracy>2100</adv: level of accuracy >
              <adv: realibility of position >false</adv: realibility of position >
            </adv:AX_DQPointLocation>
          </adv:quality information>
        </adv:AX_PointLocationTA>
      </gml:featureMember>
```

**Feature Type Boundary point (point code: 34586402 41787 )**

```
<gml:featureMember>
        <adv:AX_BoundaryPoint gml:id="DEBBAEDA00000BG8">
          <adv:lifetime intervall>
            <adv:AA_LifeTimeIntervall>
              <adv:start>9999-01-01T00:00:00.0000000+01:00</adv:start>
            </adv:AA_LifeTimeIntervall>
          </adv: lifetime intervall >
          <adv:modell type>
            <adv:AA_ModellType>
              <adv:advStandardModell>DLKM</adv:advStandardModell>
            </adv:AA_ModellType>
          </adv:modell type>
          <adv:point code>3458640241787</adv: point code >
          <adv:responsible agency>
            <adv:AX_Departement_Code>
              <adv:land>12</adv:land>
              <adv:stelle>0530</adv:stelle>
```

```
            </adv:AX_ Departement_Code>
          </adv: responsible agency >
          <adv:monument>9500</adv:monument> (no monument)
          <adv:other properties>0118</adv: other properties > (boundary point with
monument )
          <adv:time of creation >2004-08-31</adv: time of creation >
        </adv:AX_BoundaryPoint>
      </gml:featureMember>
```

**Feature type point location to the boundary point with the No. 18103**

```
<gml:featureMember>
        <adv:AX_PointLocationTA gml:id="DEBBAEDA000007RF">
          <adv:lifetime intervall>
            <adv:AA_LifeTimeIntervall>
              <adv:start>9999-01-01T00:00:00.0000000+01:00</adv:start>
            </adv:AA_ LifeTimeIntervall >
          </adv: lifetime intervall >
          <adv:modell type>
            <adv:AA_ModellType>
              <adv:advStandardModell>DLKM</adv:advStandardModell>
            </adv:AA_ModellType>
          </adv:modell type>
```

***( Reference to the feature type boundary point )***

```
          <adv:isPartOf xlink:href="urn:adv:oid:DEBBAEDA000007RE" />
      <adv:position>
            <gml:Point srsName="ETRS89_UTM33">
              <gml:pos>33464132.872 5802901.403</gml:pos>
            </gml:Point>
          </adv:position>
          <adv:map presentation>true</adv: map presentation>
          <adv:coordinates status>1000</adv: coordinates status>
          <adv:remarks>489::998        </adv:remarks>
          <adv:quality information>
            <adv:AX_DQPointLocationt>
              <adv:level of accuracy>2100</adv: level of accuracy>
              <adv: realibility of position >false</adv: realibility of position>
            </adv:AX_DQPointLocation >
          </adv:quality information >
        </adv:AX_PointLocationTA >
      </gml:featureMember>
```

**Feature type boundary point (point code : 34586402 18103)**

```
<gml:featureMember>
        <adv:AX_BoundaryPoint gml:id="DEBBAEDA000007RE">
          <adv:lifetime intervall >
            <adv:AA_LifeTimeIntervall>
              <adv:start>2004-11-16T00:00:00.0000000+01:00</adv:start>
            </adv:AA_ LifeTimeIntervall >
          </adv: lifetime intervall >
          <adv:modell type >
```

```
            <adv:AA_ModellType >
              <adv:advStandardModell>DLKM</adv:advStandardModell>
            </adv:AA_ModellType >
          </adv:modell type >
          <adv:point code >3458640218103</adv:point code >
          <adv:responsible agency>
            <adv:AX_Departement_Code >
              <adv:land>12</adv:land>
              <adv:authority >0530</adv: authority >
            </adv:AX_ Departement_Code >
          </adv: responsible agency >
          <adv:monument>1000</adv: monument >
          <adv:other properties >0118</adv: other properties >
          <adv:time of creation >2004-08-31</adv: time of creation >
        </adv:AX_BoundaryPoint>
      </gml:featureMember>
```

**Feature type Point locationTA to the boundary point with the No. 41758**

```
<gml:featureMember>
        <adv:AX_PointLocationTA gml:id="DEBBAEDA00000BD2">
          <adv:lifetime intervall>
            <adv:AA_LifeTimeIntervall>
              <adv:start>2004-11-16T00:00:00.0000000+01:00</adv:start>
            </adv:AA_ LifeTimeIntervall >
          </adv: lifetime intervall >
          <adv:modell type>
            <adv:AA_ModellType>
              <adv:advStandardModell>DLKM</adv:advStandardModell>
            </adv:AA_ModellType>
          </adv:modell type>
***( Reference to the boundary point )***
          <adv:isPartOf xlink:href="urn:adv:oid:DEBBAEDA00000BD0" />
          <adv:position>
            <gml:Point srsName="ETRS89_UTM33">
              <gml:pos>33464134.170 5802906.720</gml:pos>
            </gml:Point>
          </adv:position>
          <adv:map presentation >true</adv: map presentation>
          <adv:coordinates status >1000</adv: coordinates status>
          <adv:remarks >489::997</adv:remarks>
          <adv:quality information>
            <adv:AX_DQPointLocation>
              <adv:level of accuracy >2100</adv: level of accuracy >
              <adv:realibility of position >false</adv: realibility of position >
            </adv:AX_DQPointLocation>
          </adv:quality information >
        </adv:AX_PointLocationTA >
      </gml:featureMember>
```

**Feature type boundary point with point code 34586402 41758**

```
<gml:featureMember>
```

```
        <adv:AX_BoundaryPoint gml:id="DEBBAEDA00000BD0">
          <adv:lifetime intervall>
            <adv:AA_LifeTimeIntervall>
              <adv:start>2004-11-16T00:00:00.0000000+01:00</adv:start>
            </adv:AA_ LifeTimeIntervall >
          </adv: lifetime intervall >
          <adv:modell type>
            <adv:AA_ModellType>
              <adv:advStandardModell>DLKM</adv:advStandardModell>
            </adv:AA_ModellTypet>
          </adv:modell type>
          <adv:point code >3458640241758</adv:point code >
          <adv:responsible agency >
            <adv:AX_Departement_Code>
              <adv:land>12</adv:land>
              <adv:authority >0530</adv:authority>
            </adv:AX_Departement_Code>
          </adv: responsible agency>
          <adv:monument >9500</adv: monument>
          <adv:other properties >0118</adv:other properties>
          <adv:time of creation >2004-08-31</adv: time of creation>
        </adv:AX_BoundaryPoint >
      </gml:featureMember>
```

**Feature type Point locationTA to the boundary point with the No.: 41755**

```
<gml:featureMember>
        <adv:AX_PointLocationTAgml:id="DEBBAEDA00000BCQ">
          <adv:lifetime intervall>
            <adv:AA_Life Time Intervall >
              <adv:start>2004-11-16T00:00:00.0000000+01:00</adv:start>
            </adv:AA_ Life Time Intervall >
          </adv: lifetime intervall >
          <adv:modell type>
            <adv:AA_ModellType>
              <adv:advStandardModell>DLKM</adv:advStandardModell>
            </adv:AA_ModellType>
          </adv:modell type>
( Refernce to the boundary point )
          <adv:isPartOf xlink:href="urn:adv:oid:DEBBAEDA00000BCO" />
           <adv:position>
            <gml:Point srsName="ETRS89_UTM33">
              <gml:pos>33464160.514 5802901.995</gml:pos>
            </gml:Point>
          </adv:position>
          <adv:map presentation >true</adv: map presentation>
          <adv:coordinates status >1000</adv: coordinates status>
          <adv:remarks >489::9973342</adv:remarks>
          <adv:quality information >
            <adv:AX_DQPointLocation>
              <adv:level of accuracy>2100</adv: level of accuracy>
              <adv:realibility of position >false</adv: realibility of position>
            </adv:AX_DQPointLocation>
          </adv:quality information>
```

```
    </adv:AX_PointLocationTA>
  </gml:featureMember>
```

**Feature type boundary point with the point code : 34586402 41755**

```
<gml:featureMember>
    <adv:AX_BoundaryPoint gml:id="DEBBAEDA00000BCO">
      <adv:lifetime intervall >
        <adv:AA_LifeTimeIntervall >
          <adv:start >2004-11-16T00:00:00.0000000+01:00</adv:start >
        </adv:AA_ LifeTimeIntervall >
      </adv: lifetime intervall >
      <adv:modell type>
        <adv:AA_ModellType >
          <adv:advStandardModell>DLKM</adv:advStandardModell>
        </adv:AA_ModellTypet>
      </adv:modell type>
      <adv:point code >3458640241755</adv:point code >
      <adv:responsible agency>
        <adv:AX_Departement_Code>
          <adv:land>12</adv:land>
          <adv:authority >0530</adv:authority>
        </adv: AX_Departement_Code>
      </adv: responsible agency >
      <adv:monument >1000</adv:monument>
      <adv:other properties>0118</adv: other properties>
      <adv:time of creation>2004-08-31</adv: time of creation>
    </adv:AX_BoundaryPoint>
  </gml:featureMember>
```

**Data on location to the parcel 394 " Am Mühlenfließ "**

**Feature type AX_LocationDiscriptionWithHouseNumber (12002)**

```
<gml:featureMember>
<adv:AX_LocationDiscriptionWithHouseNumber gml:id="DEBBAEDA00000KRT">
(ID_Name_LocationDiscription)
      <adv:lifetime intervall>
        <adv:AA_LifeTimeIntervall>
          <adv:start>2004-11-16T00:00:00.0000000+01:00</adv:start>
        </adv:AA_ LifeTimeIntervall>
      </adv: lifetime intervall>
      <adv:modelltype>
        <adv:AA_ModellType>
          <adv:advStandardModell>DLKM</adv:advStandardModell>
        </adv:AA_ModellType>
      </adv:modelltype>
      <adv:location description>
        <adv:AX_LocationDiscription>
          <adv:encoded>
```

```
                <adv:AX_EncodedLocation Discription>
                  <adv:land>12</adv:land>
                  <adv:government district>0</adv: government district>
                  <adv:district>53</adv:district>
                  <adv:municipallity>000</adv: municipallity>
                  <adv:location>00497</adv: location>
                </adv:AX_ EncodedLocation Discription>
              </adv:encoded>
            </adv:AX_LocationDiscription>
          </adv:location discription>
          <adv:house number>0026</adv:house number>
        </adv:AX_LocationDiscriptionWithHouseNumber>
      </gml:featureMember>
```

**Presentation the house number 26 for the parcel 394**

```
<gml:featureMember>
        <adv:AP_PTO gml:id="DEBBAEDA00000O4S">
          <adv:lifetime intervall>
            <adv:AA_LifeTimeIntervall>
              <adv:start>2004-11-16T00:00:00.0000000+01:00</adv:start>
            </adv:AA_ LifeTimeIntervall>
          </adv: lifetime intervall>
          <adv:modelltype>
            <adv:AA_ModellType>
              <adv:advStandardModell>DKKM1000</adv:advStandardModell>
            </adv:AA_Modell Type>
          </adv:modelltype>
          <adv:position>
            <gml:Point> ( Position of the house number )
             <gml:pos>33464152.250 5802891.548</gml:pos>
            </gml:Point>
          </adv:position>
          <adv:portrayal number>4070</adv:portrayal number> (Portrayl nummber for
the house number)
```

***( Refernce to the feature typet AX_LocationDiscriptionWithHouseNumber )***

```
                <adv:usedForPresentationOf
      xlink:href="urn:adv:oid:DEBBAEDA00000KRT" />
                <adv:contents of writing>0026    </adv: contents of writing>
                <adv:fontName>ARIAL</adv:fontName>
                <adv:fontBlocking>0</adv:fontBlocking>
                <adv:fontSize>7</adv:fontSize>
                <adv:scale>1</adv:scale>
                <adv:fontColour>4000</adv:fontColour>
                <adv:fontIncline>vertical</adv:fontIncline>
                <adv:horizontalAlignment>central</adv: horizontalAlignment>
                <adv:verticalAlignment>Basis</adv:verticalAlignment>
                <adv:turning angle>76.10282377</adv: turning angle>
              </adv:AP_PTO>
            </gml:featureMember>
```

**Modelling of the register type „real estate“ of the feature type register number**

**Feature type AX_RegisterNumber (code 21008)**

**Register type : Real estate**

```
<gml:featureMember>
<adv:AX_RegisterNumber gml:id="DEBBAEDA00000LMC"> (ID_Name register number with the register type „real estate“ for the parcel 394)
<adv:lifetime intervall>
<adv:AA_LifeTimeIntervall>
<adv:start>2004-11-16T00:00:00.0000000+01:00</adv:start>
</adv:AA_ LifeTimeIntervall>
</adv: lifetime intervall>
<adv:modell type>
<adv:AA_ModellType>
<adv:advStandardModell>DLKM</adv:advStandardModell>
</adv:AA_ModellType>
</adv:modell type>
<adv:register type>1100</adv: register type>
<adv:continous number>0062</adv: continous number>
( Rewference to the feature type AX_RegisterSheet )
<adv:is part of xlink:href="urn:adv:oid:DEBBAEDA00000L10" />
</adv:AX_RegisterNumber>
</gml:featureMember>
```

**Faeture type AX_RegisterSheet (code 21007)**

```
<gml:featureMember>
<adv:AX_RegisterSheet gml:id="DEBBAEDA00000L10"> ( ID_Name for register sheet registry )
<adv:lifetime intervall>
<adv:AA_LifeTimeIntervall>
<adv:start>2004-11-16T00:00:00.0000000+01:00</adv:start>
</adv:AA_ LifeTimeIntervall>
</adv: lifetime intervall>
<adv:modell type>
<adv:AA_ModellType>
<adv:advStandardModell>DLKM</adv:advStandardModell>
</adv:AA_ModellType>
</adv:modell type>
<adv:register sheet code>12040110800 </adv: register sheet code>
<adv:register sheet district>
<adv:AX_RegisterSheetDistrict_Code>
<adv:land>12</adv:land>
<adv:district>0401</adv: district>
</adv:AX_ RegisterSheetDistrict_Code>
</adv:register sheet district>
<adv:register sheet number with letter extension>10800>
</adv: register sheet number with letter extension>
<adv:sheet type>1000</adv: sheet type > (Land register sheet)
```

```
            </adv:AX_RegisterSheet>
        </gml:featureMember>
```

**Feature type AX_NameNumber (code 21006)**

```
<gml:featureMember>
        <adv:AX_NameNumber gml:id="DEBBAEDA00000MQO"> ( ID_Name for name number register type real estate_)
            <adv:lifetime intervall>
              <adv:AA_LifeTimeIntervall>
                <adv:start>2004-11-16T00:00:00.0000000+01:00</adv:start>
              </adv:AA_ LifeTimeIntervall>
            </adv: lifetime intervall>
                  <adv:modell type>
              <adv:AA_ModellType>
                <adv:advStandardModell>DLKM</adv:advStandardModell>
              </adv:AA_ModellType>
            </adv:modell type>
            <adv:continous number after DIN1421>0002.00.00.00.00</adv: continous number after DIN1421>
( Reference to the feature type AX_RegisterSheet )
            <adv:is part of xlink:href="urn:adv:oid:DEBBAEDA00000L10" />
( Reference to the feature type AX_Person )
            <adv:appoint xlink:href="urn:adv:oid:DEBBAEDA00000MQN" />
          </adv:AX_NameNumber>
        </gml:featureMember>
```

**Feature type AX_Person (code 21001)**

```
<gml:featureMember>
        <adv:AX_Person gml:id="DEBBAEDA00000MQN"> ( ID_Name for Person of the register type real estate )
            <adv:lifetime intervall>
              <adv:AA_LifeTimeIntervall>
                <adv:start>2004-11-16T00:00:00.0000000+01:00</adv:start>
              </adv:AA_ LifeTimeIntervall>
            </adv: lifetime intervall>
            <adv:modell type>
              <adv:AA_ModellType>
                <adv:advStandardModell>DLKM</adv:advStandardModell>
              </adv:AA_ModellType>
            </adv:modell type>
            <adv:surnamae or company>Evangelische Kirchengemeinde</adv: surnamae or company >
          </adv:AX_Person>
        </gml:featureMember>
```

# 15 List of figures

# 16 Vocabulary and reference list

| **Objektartenbereich**<br>**Objektartengruppe**<br>Objektart<br>Attributart<br>Bezeichner<br>Relationsart | **Feature type area**<br>**Feature type group**<br>Feature type<br>Attribute type<br>Name<br>Relation type |
|---|---|
| **Objektartenbereich „Flurstücke, Lage, Punkte“** | **Feature type area "parcels, location, points"** |
| | |
| **Angaben zum Flurstück** | **Data on the parcel** |
| AX_Flurstueck | AX_Parcel |
| Land | State |
| Gemarkungsnummer | Cadastral district number |
| Flurstücksnummer | Parcel number |
| Flurstückskennzeichen | Parcel code |
| Amtliche Fläche | Legal area |
| Flurnummer | Fields number |
| Zeitpunkt der Entstehung | Time of creation |
| Objektkoordinaten | object coordinates |
| Zuständige Stelle | Responsible department |
| Abweichender Rechtszustand | Deviating legal status |
| Sonstige Eigenschaften | Other properties |
| zeigt_auf | Points_out |
| ist_gebucht | Is_registered |
| Bezieht_sich_auf_Flurstück | refersToParcel |
| Gehört_anteilig_zu | belongsProportionateTo |
| Grundstück_besteht_aus | realEstateConsitsOf |
| AX_BesondereFlurstuecksgrenze | AX_SpecificParcelBoundary |
| Art der Flurstücksgrenze | Type of parcel boundary |
| Strittige Grenze | Disputed boundary |
| Grenze der Flur | Fields boundary |
| Grenze der Gemarkung | Cadastral district boundary |
| Grenze der Gemeinde | Municipality boundary |
| Grenze des Landkreises | District boundary |
| Grenze des Regierungsbezirks | Administrative region boundary |
| Grenze des Bundeslandes | State boundary |
| Grenze der Bundesrepublik Deutschland | Germany boundary |
| AX_Grenzpunkt | AX_BoundaryPoint |
| Punktkennung | Point code |
| Abmarkung (Marke) | Monument |
| Marke, allgemein | Monument, general |
| Stein, Grenzstein | Stone, boundary stone |
| Ohne Marke | No monument |
| Nach Quellenlage nicht zu spezifizieren | Not to be specified according to the source |
| Bemerkung zur Abmarkung | Remarks to monument |
| Festgestellter Grenzpunkt | Accepted boundary point |
| | |
| AX_Flurstueck_Kerndaten | AX_Parcel_coreData |
| | |
| AX_Flurstuecksnummer | AX_ParcelNumber |
| AX_SonstigeEigenschaften_Flurstueck | AX_OtherProperties_parcel |
| | |
| **Angaben zur Lage** | **Data on location** |
| AX_LagebezeichnungOhneHausnummer | AX_LocationDescriptionWithoutHouseNumber |
| Verschlüsselte Lagebezeichnung | Encoded location description |
| Unverschlüsselte Lagebezeichnung | Uncoded location description |
| gehört_zu | Belongs_to |
| AX_LagebezeichnungMitHausnummer | AX_LocationDescriptionWithHouseNumber |
| Verschlüsselte Lagebezeichnung | Encoded location description |
| Unverschlüsselte Lagebezeichnung | Uncoded location description |

| **Objektartenbereich**<br>**Objektartengruppe**<br>Objektart<br>Attributart<br>Bezeichner<br>Relationsart | **Feature type area**<br>**Feature type group**<br>Feature type<br>Attribute type<br>Name<br>Relation type |
|---|---|
| Hausnummer | House number |
| gehört_zu | Belongs_to |
| Bezieht_sich_auf | Relates_to |
| AX_LagebezeichnungMitPseudonummer | AX_LocationDescriptionWithPseudoNumber |
| AX_Lagebezeichnung | AX_LocationDescription |
| AX_Lage | AX_Location |
| AX_Georeferenzierte Gebäudeadresse | AX_SpatialReferencedAddress of the hause |
| Datensatznummer | Data sequence code |
| Qualitätsangaben | Quality information |
| Land | Federal state |
| Regierungsbezrik | Government District |
| Kreis | DistrictOrRegion |
| Gemeinde | Municipality |
| Ortsteil | Place section |
| Strassenschlüssel | Street Code |
| Hausnummer | House number |
| Adressierungszusatz | Address Addition |
| Postalische Adresse | Post Address |
| AX_Qualität_Hauskoordinate | AX_Quality_Housecoordinate |
| Gebäudeumring | Ring of the house |
| Innerhalb Flurstück (B) | Within parcel (B) |
| Interpoliert (C ) | Interpolated ( C ) |
| AX_Post | AX_Post |
| Postleitzahl | Post code |
| Ortsname Post | Place name post |
| zusatzOrtsname | additionPlacename |
| Strassenname | Name of the street |
| | |
| **Angaben zum Netzpunkt** | **Data on the network point** |
| AX_Aufnahmepunkt | AX_MinorControlPoint |
| AX_Sicherungspunkt | AX_SecurityPoint |
| hat | has |
| Gehört_zu | Belongs_to |
| AX_SonstigerVermessungspunkt | AX_OtherSurveyingPoint |
| Bezieht_sich_auf | Relates_to |
| AX_Netzpunkt | AX_NetworkPoint |
| Vermarkung_Marke | Geodetic mark |
| Relative Höhe | Relative height |
| Horizontfreiheit | Horizontal visibility |
| Zuständige Stelle | responsible agency |
| Punktkennung | Point code |
| Sonstige Eigenschaften | Other properties |
| **Angaben zum Punktort** | **Data on the point location** |
| AX_Punktort | AX_PointLocation |
| Kartendarstellung | Map presentation |
| Koordinatenstatus | Coordinate status |
| Hinweise | Remarks |
| Überprüfungsdatum | Date of checking |
| Qualitätsangaben | Quality information |
| AX_PunktortAG | AX_PointLocationAG |
| AX_PunktortAU | AX_PointLocationAU |
| AX_PunktortTA | AX_PointLocationTA |
| AX_DQPunktort | AX_DQPointLocation |
| Genauigkeitsstufe | Level of accuracy |
| Vertrauenswürdigkeit | Trustworthiness |
| Lagezuverlääsigkeit | Reliability of position |
| | |
| **Fortführungsnachweis** | **Update certifcation** |

| **Objektartenbereich**<br>**Objektartengruppe**<br>Objektart<br>Attributart<br>Bezeichner<br>Relationsart | **Feature type area**<br>**Feature type group**<br>Feature type<br>Attribute type<br>Name<br>Relation type |
|---|---|
| AX_FortfuehrungsnachweisDeckblatt | AX_UpdateCertifcationCoverSheet |
| AX_Fortfuehrungsfall | AX_UpdateEvent |
| Fortführungsfallnummer | update event number |
| AX_Fortfuehrungsnummer | AX_UpdateNumber |
| AX_Privatauszug | AX_PrivateExtract |
| | |
| **Angaben zur Reservierung** | **Data on reservation** |
| AX_Reservierung | AX_Reservation |
| Art | type |
| Vermessungsstelle | Surveying authority |
| Ablauf der Reservierung | End of reservation |
| Antrag | application |
| Antragsnummer | Application number |
| Auftrag | request |
| Auftragsnummer | request number |
| Nummerierungsbezirk | Code district |
| Gebietskennung | Area code |
| | |
| AX_PunktkennungUntergegangen | AX_PointIdentifierDeclined |
| AX_PunktkennungVergleichend | AX_PointIdentifierComparative |
| | |
| **Angaben zur Historie** | **Data on history** |
| AX_HistorischesFlurstueck | AX_HistoricalParcel |
| Buchung historisches Flurstück | Register historical parcel |
| Nachfolgerflurstückskennzeichen | Successor parcel code |
| AX_HistorischesFlurstueckALB | AX_HistoricalParcelALB |
| Buchung historisches Flurstück ALB | Registering historical parcel ALB |
| Vorgängerflurstückskennzeichen | Predecessor parcel code |
| AX_HistorischesFlurstueckOhneRaumbezug | AX_HistoricalParcelWithoutSpatialReference |
| AX_Buchung_HistorischesFlurstueck | AX_Register_HistoricalParcel register |
| AX_Buchung_HistorischesFlurstueckALB | AX_Register_HistoricalParcelALB |
| | |
| **Angaben zu Festpunkten der Landesvermessung** | **Data on the Control Points of State Surveying** |
| AX_Lagefestpunkt | AX_HorizontalControlPoint |
| AX_Höhenfestpunkt | AX_VerticalControlPoint |
| AX_Schwerefestpunkt | AX_GravityControlPoint |
| AX_Referenzstationspunkt | AX_RefererenceStationPoint |
| **Objektartenbereich „Eigentümer“** | **Feature type area "owner"** |
| | |
| **Personen- und Bestandsdaten** | **Personal and land register data** |
| AX_Person | AX_Person |
| Nachname oder Firma | Surname or company |
| Vorname | Christian name |
| Namensbestandteil | Name component |
| Akademischer Grad | Academic degree |
| Geburtsname | Birth name |
| Geburtsdatum | Date of birth |
| weist_auf | Refers_to |
| hat | Has |
| Hängen an | Hang on |
| Zeigt auf | Shows at |
| AX_Personengruppe | AX_GroupOfPersons |
| Name der Personengruppe | Name of group of persons |
| besteht_aus | Consists_of |
| AX_Anschrift | AX_Address |
| Bestimmungsland | Destination |
| Ort (Post) | Town/City |
| Postleitzahl – Postzustellung | Post code – mail delivery |

| **Objektartenbereich**<br>**Objektartengruppe**<br>Objektart<br>Attributart<br>Bezeichner<br>Relationsart | **Feature type area**<br>**Feature type group**<br>Feature type<br>Attribute type<br>Name<br>Relation type |
|---|---|
| Postleitzahl – Postfach | Post code – PO Box |
| Straße | Street |
| Hausnummer | House number |
| Ort (Amtliches Ortsnamensverzeichnis) | Town/City (official name directory) |
| Postfach | PO Box |
| gehört_zu | Belongs_to |
| AX_Verwaltung | AX_Management |
| Benennt | appoint |
| AX_Vertretung | AX_Representation |
| AX_Namensnummer | AX_NameNumber |
| Laufende Nummer nach DIN 1421 | Continuous number in accordance with DIN 1421 |
| Nummer | Number |
| Anteil | Proportion |
| benennt | appoint |
| ist_Bestandteil_von | Is_part_of |
| besteht_aus_Rechtsverhältnissen_zu | Consits_of_legal relationship_with |
| AX_Buchungsblatt | AX_RegisterSheet |
| Buchungsblattkennzeichen | Register sheet code |
| AX_Buchungsblattbezirk_Schlüssel | AX_RegisterSheetDistrict_Code |
| Blattart | Sheet type |
| Grundbuchblatt | Land register sheet |
| Katasterblatt | Cadastre sheet |
| Pseudoblatt | Pseudo sheet |
| Erwerberblatt | Purchaser sheet |
| Fiktives Blatt | Fictitious sheet |
| Buchungsblattnummer mit Buchstabenerweiterung | Register sheet number with letter extension |
| besteht_aus | Consists_of |
| AX_Buchungsstelle | AX_RegisterNumber |
| Buchungsart | Register type |
| Grundstück | Real estate |
| Aufgeteiltes Grundstück nach dem Wohnungseigentumsgesetz | split real estate according to the flat ownership law |
| Aufgeteiltes Grundstück nach §3 Abs. 4 der GBO | split real estate in accordance with § 3, subsection 4 of the land register act |
| Wohnungs-/Teileigentum | Flat / partial ownership of property |
| | |
| Miteigentum nach § 3 Abs. 4 GBO | Co-ownership in accordance with § 3, subsection 4 of the GBO |
| Erbbaurecht | Leasehold |
| Untererbbaurecht | Secondary Leasehold |
| Aufgeteiltes Erbbaurecht | Divided Leasehold |
| Wohnungs-/Teilerbbaurecht | Flat / partial leasehold |
| Wohnungs-/Teiluntererbbaurecht | Flat / partial secondary leasehold |
| Anliegerweg | Residents path |
| Anliegergraben | Residents moat |
| Anliegerwasserlauf | Residents stream |
| Laufende Nummer | Continuous number |
| Anteil | Proportion |
| Buchungstext | Register text |
| ist_Bestandteil_von | Is_part_of |
| Grundstück_besteht_aus | Real_estate_consists_of |
| verweist_auf | Refers_to |
| zu | To |
| | |
| AX_Anteil | AX_Proportion |

| **Objektartenbereich**<br>**Objektartengruppe**<br>Objektart<br>Attributart<br>Bezeichner<br>Relationsart | **Feature type area**<br>**Feature type group**<br>Feature type<br>Attribute type<br>Name<br>Relation type |
|---|---|
| AX_DQOhneDatenerhebung | AX_DQNoDataCollection |
| | |
| **Objektartenbereich „Gebäude“** | **Feature type area "house"** |
| | |
| **Angaben zum Gebäude** | **Data on the house** |
| AX_Gebaeude | AX_House |
| Gebäudefunktion | House function |
| Wohngebäude | Residential house |
| Wohnheim | Residential home |
| Gebäude für öffentliche Zwecke | House für public business |
| Gebäude für Wirtschaft und Gewerbe | House for Business or commercial |
| Gebäudekennzeichen | House code |
| Gehört_zu | belongsTo |
| AX_Bauteil | AX_PartOfHouse |
| AX_BesondereGebaeudelinie | AX_SpecificHouseLine |
| Beschaffenheit | |
| AX_Firstlinie | AX_RidgeLine |
| AX_BesondererGebaeudepunkt | AX_SpecificHousePoint |
| AX_Nutzung_Gebaeude | AX_Use_House |
| | |
| **Objektartenbereich „Tatsächliche Nutzung“** | **Feature type area "actual use"** |
| AX_TatsaechlicheNutzung | AX_ActualUse |
| | |
| **Siedlung** | **Residential area** |
| AX_Wohnbauflaeche | AX_ResidentialAreaSurface |
| AX_IndustrieUndGewerbeflaeche | AX_IndustrialAndCommercialArea |
| Funktion | Function |
| Industrie und Gewerbe | Industrial and commercial |
| AX_Halde | AX_Dump |
| AX_Bergbaubetrieb | AX_MiningOperation |
| AX_TagebauGrubeSteinbruch | AX_OpencastMinePitQuarry |
| AX_FlaecheGemischterNutzung | AX_CombinedUseArea |
| AX_FlaecheBesondererFunktionalerPraegung | AX_AreaWithSpecificFunctionalCharacteristic |
| AX_SportFreizeitUndErholungsflaeche | AX_SportLeisureAndRecreationArea |
| Funktion | Function |
| Grünanlage | Public park |
| Wildgehege | Animal enclosure |
| Safaripark, Wildpark | safari park, animal park |
| AX_Friedhof | AX_Cemetery |
| | |
| **Verkehr** | Traffic |
| AX_Strassenverkehr | AX_RoadTraffic |
| AX_Strasse | AX_Street |
| AX_Strassenachse | AX_StreetAxis |
| AX_Fahrbahnachse | AX_RoadwayAxis |
| AX_Weg | AX_Way |
| AX_Wegachse | AX_WayAxis |
| AX_Platz | AX_Place |
| AX_Bahnverkehr | AX_RailTraffic |
| AX_Flugverkehr | AX_AirTraffic |
| AX_Bahnstrecke | AX_RailLine |
| AX_Schiffsverkehr | AX_ShippingTraffic |
| | |
| **Vegetation** | **Vegetation** |
| AX_Landwirtschaft | AX_Agriculture |

| **Objektartenbereich**<br>**Objektartengruppe**<br>Objektart<br>Attributart<br>Bezeichner<br>Relationsart | **Feature type area**<br>**Feature type group**<br>Feature type<br>Attribute type<br>Name<br>Relation type |
|---|---|
| AX_Wald | AX_Wood |
| Laub- und Nadelwald | Decidous trees and wood conifer |
| AX_Gehoelz | AX_Copse |
| AX_Heide | AX_Heath |
| AX_Moor | AX_Moor |
| AX_Sumpf | AX_Marsh |
| AX_UnlandVegetationsloseFläche | AX_UnproductiveArea |
| Gewässerbegleitfläche | water accompaning area |
| AX_FlaecheZurZeitUnbestimmbar | AX_CurentlyUndeterminedAera |
| | |
| **Gewässer** | **Water** |
| AX_Fliessgewaesser | AX_FlowingWater |
| AX_Wasserlauf | AX_Watercourse |
| AX_Kanal | AX_Canal |
| AX_Gewaesserachse | AX_WaterCentreLine |
| AX_Hafenbecken | AX_Basin |
| AX_StehendesGewaesser | AX_StandingWater |
| AX_Meer | AX_Sea |
| | |
| **Objektartenbereich „Bauwerke, Einrichtungen und sonstige Angaben“** | **Feature type area “buildings, installations and other data”** |
| AX_DQMitDatenerhebung | AX_DQWithDataCollection |
| Aus Katastervermessung ermittelt | Determined from cadastre surveys |
| Aus Katasterkarten digitalisiert | Digitalized from cadastre maps |
| Aus sonstigen Unterlagen | From other documents |
| Nach Quellenlage nicht zu spezifizieren | Not to be specified according to the source |
| **Bauwerke und Einrichtungen in Siedlungsflächen** | **Buildings and installations in residential areas** |
| AX_BauwerkeEinrichtungenUndSonstigeAngaben | AX_BuildngsInstallationsAndOtherData |
| AX_Turm | AX_Tower |
| AX_BauwerkOderAnlageFuerIndustrieUndGewerbe | AX_BuildingOrUnitForIndustryAndCommerce |
| AX_VorratsbehaelterSpeicherbauwerk | AX_ReservoirStorageBuilding |
| AX_Transportanlage | AX_TransportUnit |
| AX_Leitung | AX_Line |
| AX_BauwerkOderAnlageFuerSportFreizeitUndErholung | AX_BuildingOrUnitForSportLeisureAndRecreation |
| Schießanlage | Schooting unit |
| Spielfeld | Game reserve |
| AX_HistorischesBauwerkOderHistorischeEinrichtung | AX_HistoricalBuildingOrHistoricalInstallation |
| AX_HeilquelleGasquelle | AX_MedicinalSpringGasSource |
| AX_SonstigesBauwerkOderSonstigeEinrichtung | AX_OtherBuildingOrOtherInstallation |
| AX_EinrichtungInOeffentlichenBereichen | AX_InstallationInPublicAreas |
| AX_BesondererBauwerkspunkt | AX_SpecificBuildingPoint |
| | |
| **Besondere Anlagen auf Siedlungsflächen** | **Specific units in settlerment areas** |
| | |
| AX_Ortslage | AX_Location |
| AX_Hafen | AX_Port |
| AX_Schleuse | AX_Lock |
| AX_Grenzuebergang | AX_CheckPoint |
| AX_Testgelaende | AX_TestArea |
| | |
| **Bauwerke, Anlagen und Einrichtungen für den Verkehr** | **Buildings, units and installations for transport** |
| AX_BauwerkImVerkehrsbereich | AX_BuildingInTrafficArea |
| Brücke | Bridge |
| Tunnel | Channal |
| Durchlass | Duct |
| | |

| **Objektartenbereich**<br>**Objektartengruppe**<br>Objektart<br>Attributart<br>Bezeichner<br>Relationsart | **Feature type area**<br>**Feature type group**<br>Feature type<br>Attribute type<br>Name<br>Relation type |
|---|---|
| AX_Strassenverkehrsanlage | AX_RoadTrafficUnit |
| AX_WegPfadSteig | AX_RoadPathSteepTrack |
| AX_Bahnverkehrsanlage | AX_RailTrafficUnit |
| AX_SeilbahnSchwebebahn | AX_CableRailwaySuspensionRailway |
| AX_Gleis | AX_Track |
| AX_Flugverkehrsanlage | AX_AirTrafficUnit |
| AX_EinrichtungenFuerDenSchiffsverkehr | AX_InstallationsForNavigation |
| AX_BauwerkImGewaesserbereich | AX_BuildingInWaterArea |
| | |
| **Besondere Vegetationsmerkmale** | **Specific vegetationCharacteristic** |
| AX_Vegetationsmerkmal | AX_VegetationCharacteristc |
| | |
| **Besondere Eigenschaften von Gewässern** | **Specific features of water** |
| AX_Gewaessermerkmal | AX_WaterAttribute |
| AX_UntergeordnetesGewaesser | AX_SubordinateWater |
| Bach | brook |
| Graben | ditch |
| Teich | pond |
| **Besondere Angaben zum Verkehr** | **Specific data on traffic** |
| AX_Netzknoten | AX_NetworkNodes |
| AX_Nullpunkt | AX_ZeroPoint |
| AX_Abschnitt | AX_Section |
| AX_Ast | AX_Branch |
| | |
| **Besondere Angaben zum Gewässer** | **Specific data on water** |
| AX_Wasserspiegelhoehe | AX_WaterLevel |
| AX_SchifffahrtslinieFaehrverkehr | AX_ShippingLineFerryTransport |
| AX_Gewaesserstationierungsachse | AX_WaterStationingCentreLine |
| | |
| **Objektartenbereich „Relief“** | **Feature type area "relief"** |
| | |
| Reliefformen | Relief forms |
| AX_BoeschungKliff | AX_EmbankmentCliff |
| AX_Gelaendekante | AX_GroundEdge |
| AX_DammWallDeich | AX_DamWallDyke |
| AX_Hoehleneingang | AX_CaveEntrance |
| AX_Einschnitt | AX_Cleft |
| AX_FelsenFelsblockFelsnadel | AX_RocksLumpOfRockNeedleRock |
| AX_Duene | AX_Dune |
| AX_Hoehenlinie | AX_ContourLine |
| AX_BesondererTopographischerPunkt | AX_SpecificTopographicPoint |
| | |
| **Objektartenbereich „Gesetzliche Festlegungen, Gebietseinheiten, Kataloge“** | **Feature area “legal stipulations, area units, catalogues”** |
| | |
| **Öffentlich-rechtliche und sonstige Festlegungen** | **Stipulation governed by public law and other stipulations** |
| AX_KlassifizierungNachStrassenrecht | AX_ClassificationAccordingToRoadLaw |
| Art der Festlegung | Definition type |
| Bundesautobahn | Federal motorway |
| Bundesstraße | Federal road |
| Landes- oder Staatsstraße | Country or state road |
| Kreisstraße | District road |
| Gemeindestraße | Municipality road |
| Sonstige öffentliche Straße | Other official roads |
| AX_AndereFestlegungNachStrassenrecht | AX_OtherStipulationsAccordingToRoadLaw |
| AX_KlassifizierungNachWasserrecht | AX_ClassificationAccordingToWaterLaw |
| Art der Festlegung | Definition type |
| Gewässer I. Ordnung | Waters of I. Order |

| **Objektartenbereich**<br>**Objektartengruppe**<br>Objektart<br>Attributart<br>Bezeichner<br>Relationsart | **Feature type area**<br>**Feature type group**<br>Feature type<br>Attribute type<br>Name<br>Relation type |
|---|---|
| - Bundeswasserstraße | - Federal waterway |
| Gewässer I. Ordnung<br>- nach Landesrecht | Waters of II. Order<br>- According to national law |
| Gewässer II. Ordnung | Waters of II. Order |
| Gewässer III. Ordnung | Waters of III. Order |
| AX_AndereFestlegungNachWasserrecht | AX_OtherStipulationsAccordingToWaterLaw |
| AX_SchutzgebietNachWasserrecht | AX_ProtectedAreaAccordingToWaterLaw |
| AX_NaturUmweltOderBodenschutzrecht | AX_NatureEnvironmentOrSoilConservationLaw |
| AX_SchutzgebietNachNaturUmweltOderBodenschutzrecht | AX_ProtectedAreaAccordingToNatureEnvironmentOrSoilConservationLaw |
| AX_BauRaumOderBodenordnungsrecht | AX_BuildingSpaceOrLandRegulationLaw |
| Art der Festlegung | Definition type |
| Umlegung | Regrouping of parcels |
| Sanierung | Redevelopment |
| Flurbereinigung | Land consolidation |
| Ausführende Stelle | Responsible department |
| Name | Name |
| Bezeichnung | Description |
| AX_Denkmalschutzrecht | AX_HistoricalMonumentProtection |
| AX_Forstrecht | AX_ForestryLaw |
| AX_SonstigesRecht | AX_OtherLaw |
| Schutzfläche Festpunkt | Control point protection area |
| AX_Schutzzone | AX_ProtectionZone |
| | |
| **Bodenschätzung, Bewertung** | **Soil evaluation, assessment** |
| AX_Bodenschaetzung | AX_SoilEvaluation |
| AX_MusterLandesmusterUndVergleichsstueck | AX_SampleRegionalSampleAndComparisonSection |
| AX_GrablochDerBodenschaetzung | AX_TrenchOfSoilEvaluation |
| AX_Bewertung | AX_Assessment |
| AX_KennzifferGrabloch | AX_IndexTrench |
| | |
| **Kataloge** | **Catalogues** |
| AX_Nationalstaat | AX_NationalState |
| Schlüssel | Key |
| Bezeichnung | Description |
| AX_Bundesland | AX_FederalState |
| AX_Regierungsbezirk | AX_GovernmentDistrict |
| AX_KreisRegion | AX_DistrictOrRegion |
| AX_Gemeinde | AX_Municipality |
| AX_Gemeindeteil | AX_MunicipalitySection |
| AX_Gemarkung | AX_CadastralDistrict |
| AX_GemarkungsteilFlur | AX_CadastralDistrictSectionOrFields |
| AX_Verwaltungsgemeinschaft | AX_AdministrativeCommunity |
| AX_Buchungsblattbezirk | AX_RegisterSheetDistrict |
| AX_Dienststelle | AX_Department |
| AX_Behörde | AX_Authority |
| AX_Verband | AX_Association |
| AX_LagebezeichnungKatalogeintrag | AX_LocationDescriptionCatalogueEntry |
| AX_Gemeindekennzeichen | AX_MunicipalityCode |
| AX_Katalogeintrag | AX_CatalogueEntry |
| AX_Buchungsblattbezirk_Schluessel | AX_RegisterSheetDistrictCode |
| AX_Dienststelle_Schluessel | AX_DepartmentCode |
| AX_Bundesland_Schluessel | AX_FederalStateCode |
| AX_Gemarkung_Schluessel | AX_CadastralDistrictCode |
| AX_GemarkungsteilFlur_Schluessel | AX_CadastralDistrictSectionOrFieldsCode |
| AX_Regierungsbezirk_Schluessel | AX_GovernmentDistrictCode |
| AX_Kreis_Schluessel | AX_DistrictCode |
| AX_VerschluesselteLagebezeichnung | AX_CodedLocationDescription |

| **Objektartenbereich**<br>**Objektartengruppe**<br>Objektart<br>Attributart<br>Bezeichner<br>Relationsart | **Feature type area**<br>**Feature type group**<br>Feature type<br>Attribute type<br>Name<br>Relation type |
|---|---|
| | |
| **Geographische Gebietseinheiten** | **Geographical area units** |
| AX_Wohnplatz | AX_Domicile |
| AX_Landschaft | AX_Landscape |
| AX_KleinraeumigerLandschaftsteil | AX_SmallAreaLandscapeSection |
| AX_Gewann | AX_NamedPlace |
| AX_Insel | AX_Island |
| | |
| **Administrative Gebietseinheiten** | **Administrative area units** |
| AX_Baublock | AX_BuildingBlock |
| AX_WirtschaftlicheEinheit | AX_EconomicUnit |
| AX_KommunalesGebiet | AX_MunicipalArea |
| AX_Gebiet | AX_Area |
| AX_Gebiet_Nationalstaat | AX_Area_NationState |
| AX_Gebiet_Bundesland | AX_Area_FederalState |
| AX_Gebiet_Regierungsbezirk | AX_Area_GovernmentDistrict |
| AX_Gebiet_Kreis | AX_Area_District |
| AX_Kondominium | AX_Condominium |
| AX_Gebietsgrenze | AX_AreaBorder |
| | |
| | |
| | |
| **Objektartenbereich „Nutzerprofile“** | **“User profile” feature type area** |
| | |
| Nutzerprofile | User profile |
| AX_Benutzer | AX_User |
| Gehört_zu | belongsTo |
| ist | is |
| AX_Benutzergruppe | AX_UserGroup |
| Bezeichnung | Description |
| Zuständige Stelle | ResponsibleAgency |
| Koordinatenreferenzsystem | CoordinateReferenceSystem |
| | |
| Besteht_aus | consistsOf |
| AX_BenutzergruppeMitZugriffskontrolle | AX_UserGroupWithAccessMonitoring |
| Selektionskriterium | Selection criteria |
| ZugriffsartProduktKennungBenutzung | AccessTypeProductCodeUtilisation |
| ZugriffsartProduktkennungFuehrung | AccessTypeProductCodeManagement |
| ZugriffsartFortführungsanlass | AccessTypeUpdateCause |
| AX_BenutzergruppeNBA | AX_UserGroupNBA |
| ZugriffHistorie | accessHistory |
| ZugriffsartProduktkennungBenutzung | accessTypeProductCodeUtilisation |
| ZugriffsartProduktKennungFührung | accessTypeProductCodeUpdating |
| ZugriffsartFortführungsanlass | accessTypeUpdateCause |
| AX_BereichZeitlich | AX_TemporalRange |
| | |
| **Objektartenbereich „Migration“** | **“Migration” feature type area** |
| | |
| Migrationsobjekte | Migration objects |
| AX_Gebäudeausgestaltung | AX_HouseFormation |
| zeigtAuf | ShowsAt |
| AX_TopographischeLinie | AX_TopographicalLine |
| | |
| **Basisschema** | |
| AU_ObjektMitUnabhängigerGeometrie | AU_ObjectWithIndependantGeometry |
| | |
| | |
| Relationsbezeichnungen | |

| **Objektartenbereich**<br>**Objektartengruppe**<br>Objektart<br>Attributart<br>Bezeichner<br>Relationsart | **Feature type area**<br>**Feature type group**<br>Feature type<br>Attribute type<br>Name<br>Relation type |
|---|---|
| gehört_zu | BelongsTo |
| Grundstück_besteht_Aus | estateConsistsOf |
| istTeilVon | isPartOf |
| | |
| **Metadaten** | |
| Raumbezug | ReferenceSystem |
| Darstellungsart | SpatialRepresentation |
| Qualität | Quality |
| Vertrieb | Distribution |
| Informationsinhalt | ContentInformation |
| Signaturenkatalog | PortrayalCatalogue |
| Anwendungsschema | ApplicationSchema |
| Zugriffs- und Nutzungsbeschränkungen | Constraints |
| Identifikation | Identification |
| Datenpflege | MaintenanceInformation |
| Erweitere Metainformationen | MetadataExtensionInformation |
| | |
| **Sonstige Begriffe** | |
| lückenlos | continous |
| überschneidungsfrei | intersection-free |
| Flächendeckung | covering |
| Bodenrichtwerte | Record of past transactions |
| Körperschaftswald | Cooperation forest |
| | |
| Flurstückszerlegung | Parcel subdivision |
| Flächenberichtigung | Correction of area |
| Flurstücksverschmelzung | Parcel merging |
| Reservierungsauftrag | Reservation request |
| Fortführungsauftrag | Update request |
| Fortführungsanlass | Update cause |
| Fortführungsnachweis | Update certifiction |
| Benutzungsauftrag | Utilization request |
| Grundstückseigentümer | Real estate owner |
| Grundbuchordnung | Land Register Act |
| Bestandsverzeichnis | Inventory of land register |
| Abteilung I | First section |
| Grundbuch | Land register |
| **Projektsteuerung** | |
| Antrag | RequestApplication |
| Antragsart | RequestApplicationType |
| Besondere Meilensteinkategorie | SpecialMilestoneCategory |
| Dokumentationsbedarf | NeedOfDocumentation |
| Gebührenparameter | FeeParameter |
| Meilenstein | Milestone |
| Projektsteuerung | ProjectControl |
| Projektsteuerungsart | ProjectControlType |
| Projektsteuerungskatalog | ProjectControlCatalogue |
| Vorgang | Operation |
| Vorgang im Prozess | OperationInProcess |
| Vorgangsart | OperationType |