



Schweizerische Eidgenossenschaft  
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Uffizi federal d'ambient UFAM

## Geobasisdaten des Umweltrechts

# INTERLIS- Anpassungen Version 1.3

## Datenmodell Gefahrenkartierung

Identifikator 166.1

Version **1.3:** **1. März 2020**

## Versionen

Version	Datum	Beschreibung / Ursache	Art der Änderungen
1.0	1.5.2013	Erstfassung des Datenmodells	---
1.1	1.5.2015	Technische Überarbeitung	Technische Anpassungen am Datenmodell aufgrund der Erfahrungen verschiedener Pilotprojekte zur Umsetzung der MGDM in den Kantonen
	28.7.2015/ 11.8.2015		Wenige, einzelne Berichtigungen im Text sowie in Abb. 10 (UML-Diagramm)
1.2	23.6.2017	Berichtigung INTERLIS-Modell	Kennwerte und Intensitäten: Falls ein Extremszenario vorliegt, ist die Angabe der Jährlichkeit nicht obligatorisch.  Teilprozesse Lawinen: „Schneerutsch (inkl. Schneegleiten)“ [a_snow_slide] durch „Schneegleiten“ [a_gliding_snow] ersetzt.  Modelldokumentation: Aktualisierung der Materialien (Anhang B1) und der Links.
1.3	1.3.2021	Ergänzung des Darstellungsmodells; kleine Anpassungen am Modell	Darstellungsmodell in Modelldokumentation ergänzt sowie als Datei «Darstellungskatalog Hazard_Mapping_LV03 V1_3.xlsx» und «Darstellungskatalog Hazard_Mapping_LV03 V1_3.xlsx» zur Verfügung gestellt.  Modellanpassung in der Klasse Gefahrenhinweisgebiete Attributnamen Anpassungen in der Klasse Kennwert Überschwemmung v mal h  kleiner Fehler in Übersetzungsliste korrigiert (Hazard_Mapping_V1_3_translation.xlsx)  kleine Fehler in Modelldokumentation behoben  Einzelne Begriffsklärungen in der Modelldokumentation

### Vorbemerkungen zur Version 1.1

Im Rahmen von Pilotstudien zur Umsetzung der minimalen Geodatenmodelle in den Kantonen zeigte sich, dass bei der Modellversion 1.0 einerseits in manchen Teilen Klärungsbedarf bestand, zum anderen die Umsetzung erleichtert werden kann, wenn gewisse technische Anpassungen am Datenmodell erfolgen. Diesem Anliegen wurde mit der vorliegenden Version 1.1 entsprochen. Die fachlichen Inhalte blieben im Vergleich zur Version 1.0 unverändert.

### Vorbemerkungen zur Version 1.2

Bei der Umsetzung wurde noch ein fachlicher Fehler im INTERLIS-Modell und dem zugehörigen UML-Diagramm und Objektkatalog festgestellt. Die Anpassungen wurden an den entsprechenden Stellen vorgenommen. Die semantische Beschreibung war richtig und musste nicht angepasst werden:

Bei den Kennwerten und Intensitäten waren in Version 1.1 war die Angabe der Jährlichkeit in jedem Fall verpflichtend. Analog zur Realität muss neu die Jährlichkeit nicht angegeben werden, wenn es sich beim betrachteten Szenario um ein Extremereignis handelt. Constraints mussten als Folge davon neu formuliert werden.

Diese Modellanpassung beinhaltet nur eine punktuelle Lockerung gegenüber der Version 1.1.

Des weiteren **wurde** beim Hauptprozess „Lawine“ die Einteilung in Teilprozesse korrigiert. Anstelle von „Schneerutsch (inkl. Schneegleiten)“ [a\_snow\_slide] **wurde** neu der Teilprozess „Schneegleiten“ [a\_gliding\_snow] verwendet.

### **Vorbemerkungen zur Version 1.3**

Am 1. März 2021 wurde das Darstellungsmodell erstmalig definiert und in der Modelldokumentation ergänzt.

Beim Modell wurde in der Klasse „Gefahrenhinweisgebiete“ ein zusätzliches Attribut eingeführt, so dass auch ausgestanzte Gefahrenhinweiskarten darstellbar sind. Ausserdem wurden bei der Klasse „Kennwerte Überschwemmung  $v$  mal  $h$ “ die Namen von zwei Attributen fachlich korrigiert.

In der Übersetzungstabelle (Hazard\_Mapping\_V1\_3\_translation.xlsx) wurde ein kleiner Fehler korrigiert.

In der Modelldokumentation wurden kleine sprachliche Anpassungen und Korrekturen vorgenommen. Ausserdem wurden an wenigen Stellen Begriffsklärungen vorgenommen.

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# 1 Datenmodell als INTERLIS-2-Code

In der ili-Datei sind zwei – bis auf den Bezugsrahmen – identische Modelle des Datenmodells Gefahrenkartierung enthalten (LV03 und LV95). An dieser Stelle ist nur die Version LV95 notiert. Die entsprechenden Bausteine für LV03 sind im Anschluss als Auszug dokumentiert.

Im Anhang C.1 ist noch eine Umsetzungsanweisung für die Auflösung der Vererbung zu finden.

Da das Modell nur in englischer Sprache vorliegt, findet sich die Übersetzung sämtlicher Fachbegriffe und die Angabe sprechender Namen anstelle der INTERLIS-Namen im Kap. 6.2. Diese Begriffe sind bei einer allfälligen Darstellung der Daten von Bedeutung und dort dementsprechend zu verwenden.

Bei Abweichungen zwischen dem in dieser Modelldokumentation aufgelisteten Modell und dem im Model Repository gilt das Modell im Model Repository.

## 1.1 Modell-Code

```
INTERLIS 2.3;
```

```
/* DATA MODEL HAZARD MAPPING (ID 166.1), version 1.32
de: Gefahrenkartierung
fr: cartographie des dangers
it: cartografia dei pericoli

This data model (MODEL Hazard Mapping LV95_V1_32 (en) resp.
MODEL Hazard Mapping LV03_V1_32 (en)) contains a minimum part according to
the Federal Act on Geoinformation and an extended part.
The following classes belong to the MINIMUM DATA MODEL:
- assessment_area
- synoptic_intensity
- hazard_area
The following classes belong to the EXTENDED DATA MODEL:
- par_flooding_depth
- par_flooding_velocity
- par_flooding_v_x_h
- par_debris_flow_depth
- par_debris_flow_velocity
- intensity_by_source
- synoptic_hazard_area
- indicative_hazard_area
- special_indicat_hazard_area
The different classes are correspondingly commented.

This model calls the following different submodels:
-- from http://models.interlis.ch/
  -- CONTRACTED TYPE MODEL Units (en)
  -- REFSYSTEM MODEL CoordSys (en) (implicitly; called by CHBase model)
-- from https://models.geo.admin.ch/CH/
  -- MODEL Geometry CHLV03_V1;  !! Part I of CHBase
  resp.
  -- MODEL Geometry CHLV95_V1;  !! Part I of CHBase

The following definition is further taken over from CHBase and
explicitly integrated (see https://models.geo.admin.ch/CH/):
  definition of CHCantonCode from:
  -- MODEL CHAdminCodes_V1;  ____!! Part IV of CHBase

The ili-file contains two models that are identical except for the
coordinate system. One model is built in LV95, the other in LV03. */
```

```
!!@ IDGeoIV=166.1
!!@ technicalContact=mailto:gis@bafu.admin.ch
!!@ furtherInformation=https://www.bafu.admin.ch/geodatenmodelle
```

```
MODEL Hazard_Mapping_LV95_V1_32 (en)
  AT "https://models.geo.admin.ch/BAFU/" VERSION "0.4721-0603-2301" =
  IMPORTS Units;
  IMPORTS GeometryCHLV95_V1;

  DOMAIN
    CHCantonCode (FINAL) = (ZH,BE,LU,UR,SZ,OW,NW,GL,ZG,FR,SO,BS,BL,SH,AR,AI,SG,
                             GR,AG,TG,TI,VD,VS,NE,GE,JU,FL);

  DOMAIN
    haz_map_oid = OID TEXT*120;    !! for OID
    surface_without_arcs = SURFACE WITH (STRAIGHTS)
      VERTEX GeometryCHLV95_V1.Coord2 WITHOUT OVERLAPS > 0.001; _!! areal type
    /* surface_without_arcs is the data type for all areal geometry types in the
       data model except of the class "assessment_area". arcs are not allowed.*/

    area_without_arcs = AREA WITH (STRAIGHTS)
      VERTEX GeometryCHLV95_V1.Coord2 WITHOUT OVERLAPS > 0.001; _!! areal type
    /* area_without_arcs is the data type for the class "assessment_area".
       arcs are not allowed. */

  TOPIC hazard_mapping =

  OID AS haz_map_oid;

  UNIT
    v_x_h [m2s] = (INTERLIS.m*INTERLIS.m/INTERLIS.s);

  DOMAIN
    main_process_type (FINAL) = (
      water,
      landslide,
      rockfall,
      avalanche);
    !! enumeration type declaration
    !! process classification

    indicative_process_type (FINAL) = (
      water,
      w_flooding,
      w_debris_flow,
      landslide,
      l_permanent_landslide,
      l_sudden_landslide_proc,
      rockfall,
      avalanche);
    !! process classification
    !! contains also overbank sedimentation
```

```
detailed_process_source_type (FINAL) = (                !! process classification
    w_flooding,
    w_debris_flow,
    w_bank_erosion,
    l_permanent_landslide,
    l_sud_spontaneous_landslide,
    l_sud_hillslope_debris_flow,
    r_rock_fall,
    r_rock_slide_rock_avalanche,
    r_ice_fall,
    ss_sinkhole,
    ss_subsidence,
    a_flowings_avalanche,
    a_powder_avalanche,
    a_gliding_snow);

detailed_process_synop_type (FINAL) = (                !! process classification
    water,
    w_flooding,
    w_debris_flow,
    w_bank_erosion,
    landslide,
    l_permanent_landslide,
    l_sudden_landslide_proc,
    l_sud_spontaneous_landslide,
    l_sud_hillslope_debris_flow,
    rockfall,
    r_rock_fall,
    r_rock_slide_rock_avalanche,
    r_ice_fall,
    sinkhole_or_subsidence,
    ss_sinkhole,
    ss_subsidence,
    avalanche,
    a_flowings_avalanche,
    a_powder_avalanche,
    a_gliding_snow);

special_indicat_process_type (FINAL) = (                !! process classification
    overland_flow,
    groundwater_table_rise);
!! --- --- --- end process type declaration

assessment_simple_type (FINAL) = MANDATORY (                !! assessment criteria
    not_assessed,
    assessment_not_necessary,
    assessed);
/* The use of the attribute value "assessment_not_necessary" should be
   avoided, if possible. See chapter 3.3.2 for details. */

assessment_complex_type (FINAL) = (                !! assessment criteria
    not_assessed,
    assessment_not_necessary,
    assessed_and_complete,
    assessed_and_not_complete,
    assessed_and_not_recognizable,
    assessed_and_to_be_clarified);
/* The use of the attribute value "assessment_not_necessary" should be
   avoided, if possible. See chapter 3.3.2 for details. */
```

```

completeness_type (FINAL) = (                                !! assessment criteria
    complete,
    not_complete,
    not_recognizable,
    to_be_clarified);

assessment_method_type (FINAL) = ( !! assessment criteria (for parameters)
    not_reconstructible,
    model_evaluation,
    expertise);

intensity_type (FINAL) = (                                    !! intensities (magnitudes)
    no_impact,
    existing_impact,
    low,
    mean,
    high);

hazard_level_type (FINAL) = (                                !! hazard levels
    not_in_danger,
    residual_hazard,
    slight,
    mean,
    substantial);

DOMAIN                                                        !! definition of the range of co-domains
flooding_depth_type = MANDATORY 0.00 .. 10.00 [INTERLIS.m];    !! m

flooding_velocity_type = MANDATORY 0.00 .. 30.00 [Units.ms];    !! m/s

flooding_v_x_h_type = MANDATORY 0.00 .. 50.00 [m2s];           !! m^2/s

debris_flow_depth_type = MANDATORY 0.00 .. 10.00 [INTERLIS.m];    !! m

debris_flow_velocity_type = MANDATORY 0.00 .. 10.00 [Units.ms];    !! m/s

probability_type = 0.00 .. 1.00;                                !! probabilities

return_period_type = 1 .. 10000;                                !! return periods; in years

/* Comments:
    The return period is mandatory for most subprocesses except for
    - l_permanent_landslide: must always be undefined, because it makes no
      sense
    - a_gliding_snow, r_ice_fall: optional
    - sinkhole_or_subsidence, ss_sinkhole, ss_subsidence: optional, if
      assessed only on the indicative level.

    Generally, the values for the return period are between 1 and 300
    inclusively (except for the extreme event).
    If a scenario is used as the decisive extreme event, the attribute
    extreme_scenario must be set to 'TRUE', in any other case to 'FALSE' -
    regardless whether it is based on a clearly specified return
    period in years or not.
    If the decisive extreme scenario is based on a specific return period,
    a value between 301 and 10000 is also set as the attribute value of the
    return_period_in_years.
    Additional events with a lower probability between 301 and 10000 that
    are not the decisive extreme scenario, are also possible. */

```



Anhang **Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.**

```
!! MINIMUM DATA MODEL
CLASS assessment_area =
  area: MANDATORY area_without_arcs;
  /* The assessment area consists conceptually of the area covering the
     entire area of the canton, whereas no overlapping subareas are
     possible.
     Border line properties need not to be assigned (as it is foreseen for
     the encoding of the INTERLIS-type "AREA"). */
  data_responsibility: MANDATORY CHCantonCode;
  fl_state_flooding: MANDATORY assessment_complex_type;
  df_state_debris_flow: MANDATORY assessment_complex_type;
  be_state_bank_erosion: MANDATORY assessment_complex_type;
  pl_state_permanent_landslide: MANDATORY assessment_complex_type;
  sl_state_spontaneous_landslide: MANDATORY assessment_complex_type;
  hd_state_hillslope_debris_flow: MANDATORY assessment_complex_type;
  rf_state_rock_fall: MANDATORY assessment_complex_type;
  rs_state_rock_slide_rock_aval: MANDATORY assessment_complex_type;
  if_state_ice_fall: MANDATORY assessment_simple_type;
  sh_state_sinkhole: MANDATORY assessment_simple_type;
  su_state_subsidence: MANDATORY assessment_simple_type;
  fa_state_flooding_avalanche: MANDATORY assessment_complex_type;
  pa_state_powder_avalanche: MANDATORY assessment_complex_type;
  gs_state_gliding_snow: MANDATORY assessment_complex_type;
  comments: TEXT*250;
END assessment_area;
/* The assessment_area gives information about the state of detailed
   hazard assessment in space. It is not applicable for the description of
   hazard assessment on an indicative level. */

CLASS basic_object (ABSTRACT) =
  impact_zone: MANDATORY surface_without_arcs;
  data_responsibility: MANDATORY CHCantonCode;
  comments: TEXT*250;
END basic_object;

CLASS parameter (ABSTRACT) EXTENDS basic_object =
  return_period_in_years: return_period_type;
  extreme_scenario: MANDATORY BOOLEAN;
  subsenario_probability: MANDATORY probability_type;
  /* If subsenario_probability = 1.00, it is a total scenario, otherwise
     a subsenario. */
  scenario_description: TEXT*400;
  process_source: MANDATORY TEXT*50;
  method_of_assessment: assessment_method_type;
  process_cantonal_term: TEXT*50;
  MANDATORY CONSTRAINT
    /* Extreme scenarios with return periods smaller than or equal to 300
       years are not allowed. */
    NOT ((extreme_scenario) AND (return_period_in_years <= 300));
  MANDATORY CONSTRAINT
    !! The scenario_description is mandatory for subsenarios.
    (subsenario_probability == 1.00) OR
    DEFINED (scenario_description);
END parameter;

/* Comments regarding the systematization of parameters:
   - return period: see DOMAIN "return_period_type"
   - The values are described both by a lower limit (_lower) and an upper
     limit (_upper).
   - Predefinition: If no impact on a specific area within the assessed
     area exists (as a result of the corresponding process and source of
     the process), the values for the lower and the upper limit are set
     to 0, i.d. xxx_lower = 0 and xxx_upper = 0.
   - "Parameters" exist only for the subprocesses "w_flooding" and
```

```

        "w_debris_flow".
    - If subscenario_probability = 1.00, it is a total scenario, otherwise
      a subscenario. */

!! EXTENDED DATA MODEL
    CLASS par_flooding_depth EXTENDS parameter =
        fl_h_lower_m: MANDATORY flooding_depth_type;
        fl_h_upper_m: MANDATORY flooding_depth_type;
        MANDATORY CONSTRAINT
            fl_h_lower_m <= fl_h_upper_m;
    END par_flooding_depth;

!! EXTENDED DATA MODEL
    CLASS par_flooding_velocity EXTENDS parameter =
        fl_v_lower_m_s: MANDATORY flooding_velocity_type;
        fl_v_upper_m_s: MANDATORY flooding_velocity_type;
        MANDATORY CONSTRAINT
            fl_v_lower_m_s <= fl_v_upper_m_s;
    END par_flooding_velocity;

!! EXTENDED DATA MODEL
    CLASS par_flooding_v_x_h EXTENDS parameter =
        fl_vxh_lower_m2_s2: MANDATORY flooding_v_x_h_type;
        fl_vxh_upper_m2_s2: MANDATORY flooding_v_x_h_type;
        MANDATORY CONSTRAINT
            fl_vxh_lower_m2_s2 <= fl_vxh_upper_m2_s2;
    END par_flooding_v_x_h;

!! EXTENDED DATA MODEL
    CLASS par_debris_flow_depth EXTENDS parameter =
        df_h_lower_m: MANDATORY debris_flow_depth_type;
        df_h_upper_m: MANDATORY debris_flow_depth_type;
        MANDATORY CONSTRAINT
            df_h_lower_m <= df_h_upper_m;
    END par_debris_flow_depth;

!! EXTENDED DATA MODEL
    CLASS par_debris_flow_velocity EXTENDS parameter =
        df_v_lower_m_s: MANDATORY debris_flow_velocity_type;
        df_v_upper_m_s: MANDATORY debris_flow_velocity_type;
        MANDATORY CONSTRAINT
            df_v_lower_m_s <= df_v_upper_m_s;
    END par_debris_flow_velocity;

    CLASS intensity (ABSTRACT) EXTENDS basic_object =
        intensity_class: MANDATORY intensity_type;
        process_cantonal_term: MANDATORY TEXT*50;
    END intensity;

!! EXTENDED DATA MODEL
    CLASS intensity_by_source EXTENDS intensity =
        return_period_in_years: return_period_type;
        /* mandatory for most of the subprocesses in case of being not the
           extreme scenario (see constraints below resp. DOMAIN
           "return_period_in_years" above) */
        extreme_scenario: MANDATORY BOOLEAN;
        /* Predefinition:
           - For permanent landslides,
             (subproc_intensity_by_source == #1_permanent_landslide), the
             attribute "extreme_scenario" is always set to "FALSE".
           - For the 'additional' processes (such as "r_ice_fall",
             "ss_sinkhole", "ss_subsidence" or "a_gliding_snow"), the
             attribute "extreme_scenario" is set to "FALSE" in those cases,
             where it cannot be defined (see also the first MANDATORY
             CONSTRAINT of this CLASS */

```

Anhang **Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.**

```
process_source: MANDATORY TEXT*50;
subproc_intensity_by_source: MANDATORY detailed_process_source_type;
subscenario_probability: MANDATORY probability_type;
/* If subscenario_probability = 1.00, it is a total scenario,
   otherwise a subscenario. */
scenario_description: TEXT*400;
MANDATORY CONSTRAINT
/* An overview over the possible resp. invalid combinations between
   the subprocesses, the extreme scenario, and the return period is
   shown by a matrix scheme in the model documentation within this
   chapter 6.1, below the INTERLIS model.
   - In case of 'standard' processes (all 'additional' subprocesses
     except for the listed processes below), the
     return_period_in_years is mandatory for all events that are not
     the decisive extreme scenario
     (i.e. extreme_scenario == #false).
   - No return period must be specified for the subprocess
     "l_permanent_landslide".
   - For the 'additional' processes "r_ice_fall", "ss_sinkhole",
     "ss_subsidence" or "a_gliding_snow", the attribute
     "return_period_in_years" does not need to be specified.
     (This option can be used for "ss_sinkhole" or "ss_subsidence"
     in those cases, where the assessment was made only on an
     indicative level.) */
!! for 'standard' processes:
((extreme_scenario) OR DEFINED (return_period_in_years)) AND
(subproc_intensity_by_source != #l_permanent_landslide)
OR !! for the "l_permanent_landslide" process:
(subproc_intensity_by_source == #l_permanent_landslide) AND
NOT (extreme_scenario) AND NOT (DEFINED (return_period_in_years))
OR !! for 'additional' processes:
(subproc_intensity_by_source == #r_ice_fall) OR
(subproc_intensity_by_source == #ss_sinkhole) OR
(subproc_intensity_by_source == #ss_subsidence) OR
(subproc_intensity_by_source == #a_gliding_snow);
MANDATORY CONSTRAINT
/* Extreme scenarios with return periods smaller than or equal to
   300 years are not allowed. */
NOT ((extreme_scenario) AND (return_period_in_years <= 300));
MANDATORY CONSTRAINT
!! The scenario_description is mandatory for subscenarios.
(subscenario_probability == 1.00) OR
DEFINED(scenario_description);
MANDATORY CONSTRAINT
/* For return periods between 1 und 300 years inclusively,
   intensities must be specified in detail.
   (--> "no_impact", "low", "mean", "high" -> corresponds to the
   attribute type "intensity_class" -> i.e. the value
   "existing_impact" is not allowed in this case.) */
(return_period_in_years > 300) OR
NOT (intensity_class == #existing_impact);
END intensity_by_source;
```

```

!! MINIMUM DATA MODEL
CLASS synoptic_intensity EXTENDS intensity =
    return_period_in_years: return_period_type;
    /* mandatory for most of the subprocesses in case of being not the
       extreme scenario (see constraints below resp. DOMAIN
       "return_period_in_years" above) */
    extreme_scenario: MANDATORY BOOLEAN;
    /* Predefinition:
       - For permanent landslides,
         (subproc_synoptic_intensity == #l_permanent_landslide), the
         attribute "extreme_scenario" is always set to "FALSE".
       - For the 'additional' processes (such as "r_ice_fall",
         "sinkhole_subsidence", "ss_sinkhole", "ss_subsidence" or
         "a_gliding_snow"), the attribute "extreme_scenario" is set to
         "FALSE" in those cases, where it cannot be defined (see also the
         first MANDATORY CONSTRAINT of this CLASS */
    subproc_synoptic_intensity: MANDATORY detailed_process_synop_type;
    sources_in_subprocesses_compl: MANDATORY completeness_type;
MANDATORY CONSTRAINT
    /* An overview over the possible resp. invalid combinations between
       the subprocesses, the extreme scenario, and the return period is
       shown by a matrix scheme in the model documentation within this
       chapter 6.1, below the INTERLIS model.
       - In case of 'standard' processes (all 'additional' subprocesses
         except for the listed processes below), the
         return_period_in_years is mandatory for all events that are not
         the decisive extreme scenario
         (i.e. extreme_scenario == #false).
       - No return period must be specified for the subprocess
         "l_permanent_landslide".
       - For the 'additional' processes "r_ice_fall",
         "sinkhole_or_subsidence", "ss_sinkhole", "ss_subsidence" or
         "a_gliding_snow", the attribute "return_period_in_years"-
         does not need to be specified.
         (This option can be used for "sinkhole_or_subsidence",
         "ss_sinkhole" or "ss_subsidence" in those cases, where the
         assessment was made only on an indicative level.) */
    !! for 'standard' processes:
    (((extreme_scenario) OR DEFINED (return_period_in_years)) AND
     (subproc_synoptic_intensity != #l_permanent_landslide))
OR !! for the "l_permanent_landslide" process:
    (subproc_synoptic_intensity == #l_permanent_landslide) AND
    NOT (extreme_scenario) AND NOT (DEFINED (return_period_in_years))
OR !! for 'additional' processes:
    (subproc_synoptic_intensity == #r_ice_fall) OR
    (subproc_synoptic_intensity == #sinkhole_or_subsidence) OR
    (subproc_synoptic_intensity == #ss_sinkhole) OR
    (subproc_synoptic_intensity == #ss_subsidence) OR
    (subproc_synoptic_intensity == #a_gliding_snow);
MANDATORY CONSTRAINT
    /* Extreme scenarios with return periods smaller than or equal to
       300 years are not allowed. */
    NOT ((extreme_scenario) AND (return_period_in_years <= 300));
MANDATORY CONSTRAINT
    /* For return periods between 1 und 300 years inclusively,
       intensities must be specified in detail.
       (--> "no_impact", "low", "mean", "high" -> corresponds to the
       attribute type "intensity_class" -> i.e. the value
       "existing_impact" is not allowed in this case.) */
    (return_period_in_years > 300) OR
    NOT (intensity_class == #existing_impact);
END synoptic_intensity;

```

Anhang **Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.**

```
!! MINIMUM DATA MODEL
CLASS hazard_area EXTENDS basic_object=
    main_process: MANDATORY main_process_type;
    hazard_level: MANDATORY hazard_level_type;
    subprocesses_complete: MANDATORY completeness_type;
    sources_complete: MANDATORY completeness_type;
END hazard_area;

!! EXTENDED DATA MODEL
CLASS synoptic_hazard_area EXTENDS basic_object =
    assessment_complete: MANDATORY completeness_type;
    !! with respect to subprocesses AND process sources
    water: hazard_level_type;
    landslide: hazard_level_type;
    rockfall: hazard_level_type;
    avalanche: hazard_level_type;
    /* The hazard level for the particular main processes should be stated
       either for all or for no main process. */
    max_hazard_level: MANDATORY hazard_level_type;
END synoptic_hazard_area;

!! EXTENDED DATA MODEL
CLASS indicative_hazard_area EXTENDS basic_object =
    indicative_process: MANDATORY indicative_process_type;
    hazard_indication: MANDATORY BOOLEAN;
    method: TEXT*400;
    hazard_area_existing: MANDATORY BOOLEAN;
END indicative_hazard_area;

!! EXTENDED DATA MODEL
CLASS special_indicat_hazard_area EXTENDS basic_object =
    special_process: MANDATORY special_indicat_process_type;
    hazard_indication: MANDATORY BOOLEAN;
    method: TEXT*400;
END special_indicat_hazard_area;

END hazard_mapping;

END Hazard_Mapping_LV95_v1_32.
```

## Bausteine für die Modellversion mit Bezugsrahmen LV03

```
MODEL Hazard_Mapping_LV03_V1_23 (en)
  AT "https://models.geo.admin.ch/BAFU/" VERSION "004921-0603-4201" =
  IMPORTS Units;
  IMPORTS GeometryCHLV03_V1;

  DOMAIN
    CHCantonCode (FINAL) = (ZH,BE,LU,UR,SZ,OW,NW,GL,ZG,FR,SO,BS,BL,SH,AR,AI,SG,
                           GR,AG,TG,TI,VD,VS,NE,GE,JU,FL);

  DOMAIN
    haz_map_oid = OID TEXT*120;    !! for OID
    surface_without_arcs = SURFACE WITH (STRAIGHTS)
      VERTEX GeometryCHLV03_V1.Coord2 WITHOUT OVERLAPS > 0.001; !! areal type
    /* surface_without_arcs is the data type for all areal geometry types in the
       data model except of the class "assessment_area". arcs are not allowed.*/

    area_without_arcs = AREA WITH (STRAIGHTS)
      VERTEX GeometryCHLV03_V1.Coord2 WITHOUT OVERLAPS > 0.001; !! areal type
    /* area_without_arcs is the data type for the class "assessment_area".
       arcs are not allowed.*/

  [...]

END Hazard_Mapping_LV03_V1_23.
```