AFRICA-BB-MAPS DATA STANDARDISATION PACK

Physical Implementation Guide and Workbooks

Component 4 · Volume 3 and the domain workbooks · Quick Reference Guide

At a glance

What it defines. How a country builds, populates, validates, operates and verifies a database that conforms to Volume 1. It does this through 23 numbered procedures (P-01 to P-23) and six workbooks that specify every object, column, code list, relationship, constraint and index.

What it does not do. Add requirements. Every requirement is in Volume 1 or Volume 2; Volume 3 states how to meet them (clause 3.1).

How to use it. Follow the procedures in order, generate database objects from the workbooks rather than typing them, and prove conformance with tests T-01 to T-17.

Approved title: Physical Database Implementation Guide (Volume 3, ABBM-GD-VOL3), with the Main Domain Register Workbook and five domain workbooks. Reading time for this guide: about 15 minutes.

1 The implementation sequence

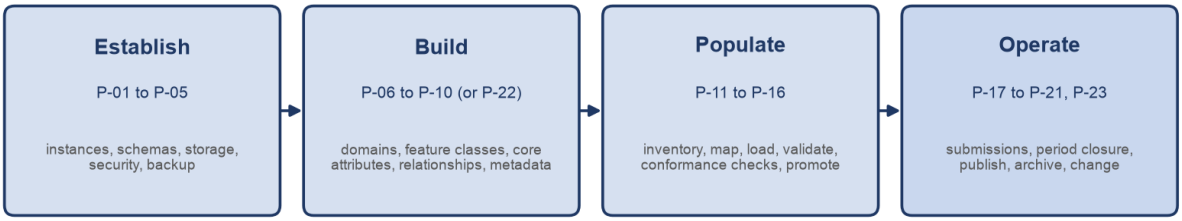

Figure 1 The four stages (Volume 3, clause 4.2). A procedure starts only when its entry criteria are met; the order reflects what the database will permit.

Procedures	Purpose	Principal role (Volume 1, clause 10.2)
P-01 to P-05	Create six instances bbm_<country>_<env> with EPSG:10592 and UTF-8; create the eight schemas; configure storage and indexing; create roles and grants; configure backup and prove recovery.	Database Administrator, System Administrator
P-06 to P-10	Create attribute domains first, then feature classes and tables, core attributes and identifiers, relationships and topology rules, and the metadata catalogue. P-22 performs P-06 to P-09 by generation from a workbook.	Database Administrator with Domain Custodians
P-11 to P-16	Inventory existing holdings; map and transform them; load into Working; validate (ISO 19157 elements); run conformance checks; promote to Production with an approval record.	Data Manager, Quality Assurance Lead; Database Administrator promotes on the Domain Custodian's approval (P-16)
P-17 to P-21, P-23	Register submissions; close reporting periods and supersede records; publish; archive; apply structural change; load the link capacity reporting series.	Data Manager, Publisher; Database Administrator for P-20 and P-21 (with Programme Manager approval)

The most common failure is loading data before the build stage is complete. P-13 and P-16 guard against it in their entry criteria (clause 4.2).

2 The workbooks

Workbook	Content	Provenance	Objects / columns
Main Domain Register	Pack-wide registers: metadata and administration objects, every code list index, Appendix D.1 domains, naming reference, platform mapping, national settings	Derived from Volume 1	~~6 / 73~~7 / 80
Infrastructure	Node, Link, Operator, NetworkContainer, NetworkConnection, specialisation and capacity tables	Projected from Component 1; management attributes Derived	~~22 / 296~~22 / 301
Service	Reporting grids, mobile submission tables, thresholds and metadata	Projected from Component 1; management attributes Derived	12 / 210

Workbook	Content	Provenance	Objects / columns
Reference	Administrative tiers, locality register, settlements, statistical, transport, physical, base mapping	Mixed: Derived and Template	15 / 251
Demand	Population, households, institutions, economy, inclusion, indicators (optional domain)	Derived from Volume 1; two layers Projected	15 / 255
Investment	Zone register, intentions, progress, threshold profile, phases, contracts, wayleaves, analytical layers	Mixed: Derived and Template	22 / 409

Precedence (clause 13.4): Component 1 governs content, Volume 1 governs names and structure, and Volume 3 governs procedure. A workbook that conflicts with any of them is corrected at source and regenerated, never edited locally. The Infrastructure Submission Template is a separate intake form for operators.

2.1 Worksheets (Appendix G)

Sheet	Use it to	Sheet	Use it to
01 Read Me	Read purpose, colour key, column meanings and sequence	07 Code lists	See each list, closed or extensible, its width and where its values are held
02 Contents	Jump to any sheet or object	08 Code values	Load permitted values: code, label, definition, status, in force from
03 Document control	Confirm version, status and authority	09 Relationships and rules	Create foreign keys or relationship classes; record validation rules
04 Domain register	See the governing instrument, unit of record, CRS	10 Indexes and constraints	Create keys, checks, indexes and triggers or attribute rules
05 Objects	List tables and feature classes, schema, geometry, dataset	11 Name mapping	Map physical names to conceptual names
06 Attributes	Define every column for both platforms	12 Examples	See illustrative records (not specifications)

The Main Domain Register adds 13 Shared registers, 14 Naming reference, 15 Core attributes, 16 Platform mapping and 17 National settings, an input sheet with drop-down lists.

3 Reading 06 Attributes

Column	Meaning
Logical type · PostgreSQL type, Length, Precision, Scale	Conceptual type, and the exact Family B column definition.
Esri field type	The Family A equivalent, with its length in brackets, for example Text (64).
Multiplicity · Obligation · Nullable	[1], [0..1] or [0..*]. Obligation is what a submission must carry; Nullable is what the database accepts. Voidable values may be null and are omitted from exchange files.
Default · Key · References	Default value or generation rule; PK, FK or UK; the referenced object.column.
Code list · List enforcement	Bound attribute domain. Closed lists refuse other values (foreign key or coded domain); extensible lists are checked at validation and reported as warnings.
Validation and constraints · Indexed by	Check constraints and validation rules; indexes covering the column.
Source · Provenance	Governing clause. **Projected:** reproduced from Component 1, not editable. **Derived:** follows from a named provision. **Template:** national template; confirm or replace before use.

Colour key: blue cell for a mandatory attribute, amber for conditional, green for a key column, cream rows for illustrative examples, and yellow cells (17 National settings only) for national input.

4 Types, code lists and rules

PostgreSQL/PostGIS (Family B)	Esri enterprise geodatabase (Family A)
varchar(n) · text	Text, length n · Text, length 2000
integer · bigint · numeric(p,s)	Long Integer · Big Integer (ArcGIS Pro 3.2+) or Double · Double (p,s)
boolean	Short Integer with coded domain 0 = false, 1 = true
date · timestamptz	Date Only (Pro 3.2+) or Date · Timestamp Offset (Pro 3.2+) or Date held in UTC

PostgreSQL/PostGIS (Family B)	Esri enterprise geodatabase (Family A)
text[] (multivalued)	Text, length 1000, values separated by ";", or a related table; record the substitution
geometry(Point | LineString | Polygon, 10592)	Point, polyline or polygon feature class, spatial reference 10592
Lookup table metadata.domain_* with foreign key	Coded value domain of the same name
Foreign key · CHECK constraint · trigger	Relationship class · attribute rule (constraint) · attribute rule (calculation)
Trigger writing metadata.meta_record_history_tbl	Geodatabase archiving

- Never add a national value to a published attribute domain. Request it as a change under Volume 1, clause 40.4. A nationally required new domain is recorded as a national extension (P-06).
- Code values are never deleted or reused; they are retired by status (clause 16.4).
- Topology rules are run at validation (P-14), never as insert-time constraints, because provider data will fail them on arrival (P-09).
- Every feature class uses EPSG:10592 (P-07) and should receive a spatial index when it is created (recommended, P-03).
- Before use, a workbook is validated: cited lists exist and hold values, field widths fit the longest code, relationships resolve, all sheets are present, every row has a provenance value (clause 16.2).

5 Recommended sequence for using the workbooks

#	Action	Workbook sheets	Procedure
0	Complete the national settings: country code, platform family, identifier limit, EPSG:10592 registration, aggregation threshold and others. Copy them into the Implementation Plan.	Main 17	P-01
1	Create the six instances and register EPSG:10592; create the eight schemas; create roles and grants.	Main 14, 17	P-01, P-02, P-04
2	Create the attribute domains, starting with the Main Domain Register.	07, 08	P-06
3	Create objects and columns: Reference first, then Infrastructure, Services, Demand and Investment.	05, 06	P-07, P-08
4	Add relationships, then constraints, indexes and triggers.	09, 10	P-09
5	Create the metadata catalogue (P-10) and publish the name mapping (Volume 1, clause 26.5; P-22 step 6).	Main; 11	P-10, P-22
6	Run the conformance tests and record every result.	—	P-15

Steps 2 to 4 may be done by generation under P-22. The reference script `01_ddl_family_b_postgis.sql`, issued with Volume 3, implements every workbook row for PostgreSQL 15+ with PostGIS 3.3+, and `02_conformance_tests.sql` implements Appendix B. Both are non-normative: Volume 1 governs, and a generated script is never edited by hand (clause 8.2).

6 Walkthrough: building the national locality register

The locality register is the unit of record of the Investment domain. Here is how an implementer reads it from the Reference Domain Workbook and builds it.

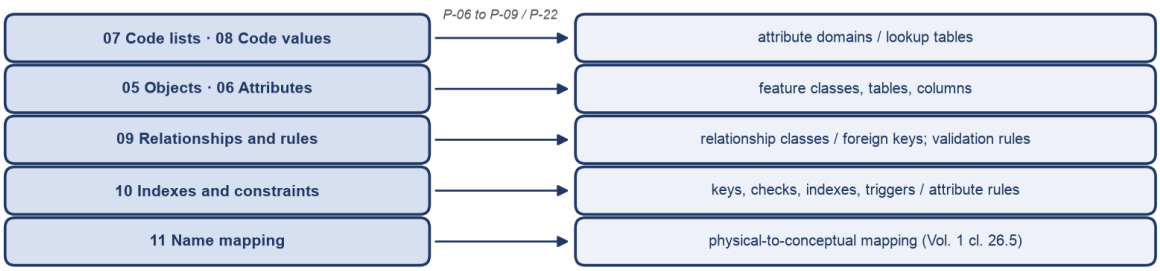

Figure 2 Which worksheet produces which database object.

Step	Worksheet	What the implementer reads	What it produces
1	05 Objects, OBJ-06	reference · ref_locality_register_pt · Feature class · Point · EPSG:10592 · dataset locality · key feature_id · Required · Derived	Point feature class in schema reference, feature dataset locality (Family A) or table with geometry column (Family B)
2	06 Attributes, A-095 to A-118	24 columns: the 10 core attributes, external_id and external_id_source, locality_id (Mandatory, UK), administrative_unit_id (Mandatory), counts such as population and schools, road_access, geom	Columns with the stated types, lengths and nullability
3	06, 07 and 08	validation_status and classification: closed lists, foreign key. road_access: extensible list domain_road_access, warning at P-14	Foreign keys to metadata.domain_* or coded value domains; a validation query for road_access
4	09 Relationships (Investment workbook)	REL-14 and others: inv_locality_zone_register_tbl.locality_id → ref_locality_register_pt.locality_id, M:1, Restrict	Foreign keys or relationship classes; deleting a referenced locality is refused
5	10 Indexes and constraints	pk_locality_register, uq_locality_register_locality_id, validity and feature_id checks, GiST and validity indexes, trigger trg_locality_register_core	Keys, checks and indexes; the trigger (Family B) or attribute rules and archiving (Family A)

Result for Family B (abridged from the reference script):

```
CREATE TABLE reference.ref_locality_register_pt (
  feature_id          varchar(64)  NOT NULL,
  feature_name        varchar(255) NOT NULL,
  ...                                      -- remaining core attributes, external_id, external_id_source
  locality_id         text NOT NULL,
  administrative_unit_id text NOT NULL,
  population          integer,
  ...                                      -- households to road_access
  geom                geometry(Point, 10592),
  CONSTRAINT pk_locality_register PRIMARY KEY (feature_id),
  CONSTRAINT uq_locality_register_locality_id UNIQUE (locality_id),
  CONSTRAINT ck_locality_register_validity
    CHECK (record_valid_to IS NULL OR record_valid_to >= record_valid_from));
CREATE INDEX ix_locality_register_geom ON reference.ref_locality_register_pt USING gist (geom);
CREATE TRIGGER trg_locality_register_core BEFORE INSERT OR UPDATE OR DELETE
  ON reference.ref_locality_register_pt FOR EACH ROW EXECUTE FUNCTION metadata.fn_core_attributes('ref');
```

Result for Family A: a point feature class with spatial reference 10592 in the locality feature dataset. Fields use the Esri types in 06, for example feature_id Text (64), collection_date Date Only, electricity_available Short Integer with a 0/1 domain. Coded value domains serve validation_status and classification, relationship classes serve the Investment links, attribute rules serve the checks and identifier, and archiving is enabled for record history.

Check: run T-01 to T-17. For this object, an update of feature_id is refused (T-11), an inverted validity period is rejected (T-13), and the name passes the naming tests (T-01 to T-07).

7 Verifying conformance

Tests	What passes	Volume 1
T-01 to T-07	Names: character set, length ≤ 45, domain prefix, geometry code matching the declared type, theme, abbreviations, reserved and prohibited words	cl. 21 to 33
T-08, T-09	Core attributes present, named and typed as Table 20.1 assigns; domain-bound columns refuse out-of-domain values	cl. 20.5, 29.1
T-10, T-11	feature_id present, unique, of the form <country>-<domain>-<uuid>, and cannot be updated	cl. 28.4
T-12 to T-15	Metadata record complete; validity periods consistent with one valid record per object; classification populated; no tmp_ objects or extra schemas in Production	Ch. 36, cl. 39.3, 41.2, 24.2
T-16, T-17	Ownership roles resolve to the operator register; capacity series records resolve to one link and a registered period, without duplicates	cl. 16.5, Table B.2

Run the tests at the end of the build, before every promotion, after every structural change, at each compliance assessment and before acceptance. Record every result, passes included, and correct the implementation, not the test (P-15, Chapter 11). The Programme Manager accepts a deployment in writing against the evidence in Appendix E. Grounds for withholding acceptance include any unremediated test failure, a recovery test that never succeeded, a privilege granted to a named account, an authoritative object without conforming metadata, content in Production that has not passed P-14 and P-16, and unrecorded substitutions (clause 12.3).

Where to find the detail

Sequence and stages: Chapter 4 · Platform families: Chapter 6 and Appendix D · Procedures: P-01 to P-23 · Procedure register: Appendix A.

Tests: Appendix B · Acceptance: Chapter 12 and Appendix E · Records and where they are filed: Appendix F · Workbooks: Part IX and Appendix G · Platform mapping: Main Domain Register, sheet 16.