

National Underground Asset Register (NUAR)

NUAR Data Model Publication

Requirements and Conventions for the Representation of Identifiers in NUAR

Publication History

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|------------|---------|--|
| 12/08/2024 | 0.1 | First publication of the NUAR Data Model |
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Purpose of this document

This document provides requirements and conventions for the representation of entity identifiers in the NUAR Harmonised Data Model and its implementation.

This document sets out the types of identifiers, their definitions and characteristics whilst the data specification will detail ID requirements on the input data and how Identifiers will be processed and assigned in the data transformation process.

These requirements are dictated by the purposes which may be fulfilled by different types of identifiers and aligned to relevant sections of the Geospatial Commission's best practice guidance for linked identifiers and underpin the integrity of the data assets held in NUAR.

Geospatial Commission Best Practice Guide

The Geospatial Commission published guidance entitled “Linked identifier schemes: Best practice guide” in October 2019 (<https://www.gov.uk/government/publications/linked-identifier-schemes-best-practice-guide/linked-identifier-schemes-best-practice-guide>).

The representation of identifiers in the NUAR Data Model aligns with this best practice guide.

The key principles in the Linked Identifier best practice guide of relevance to this document can be summarised as follows:

- **Uniqueness (Principle 1).** The scope of uniqueness for each type of identifier is described below.
- **Persistence (Principles 2 & 3).** The persistence of each type of identifier is described below.
- **Single Preferred Representation with no mutable information (Principles 4 & 5).** The identifiers outlined below are mandated as or recommended to be in the form of Universally-unique identifiers (UUIDs) which do not contain any mutable information.
- **Documentation of the identifier scheme (Principle 9).** Identifier requirements and constraints will be documented in the relevant Data Specifications and in the Data Model descriptions.

Purposes of Identifiers in NUAR

Identifiers in the NUAR ecosystem fulfil the following purposes:

- Feature-level conformance reporting during data ingestion
- Traceability of individual features through the full data journey
- Support for incremental updates
- Representation of links between features, including observations
- Asset lifecycle management and representation
- Asset lookup
- External references to other systems and processes to enable interoperability



Definitions

| Term | Definition |
|------------------------|---|
| Data Record | A collection of related fields treated as a single unit of information about an entity in the <i>NUAR Platform</i> . |
| Feature | <p>An abstraction of a real world phenomenon (ISO19109). In NUAR, a <i>Feature</i> is a representation of an asset or other relevant data object defined in the NUAR data model. A feature can be subject to lifecycle management resulting in different versions of the feature. Each version constitutes a <i>Data Record</i> in the NUAR Platform.</p> <p>A feature requires a geometry component to be plotted in a real world location on a map.</p> |
| Feature Version | An instance of a <i>Feature</i> distinguished from other instances of the same <i>Feature</i> by distinct values of the System ID attribute and metadata values representing the date and time when the instance was created for use in the NUAR platform. A <i>Feature Version</i> is represented by a single <i>Data Record</i> . |
| NUAR Platform | The entirety of the NUAR service, including the ingestion subsystem, the user interface and the <i>NUAR Database</i> . |
| NUAR Database | A central database in the <i>NUAR Platform</i> representing the physical implementation of the NUAR Data Model. The <i>NUAR Platform</i> user interface may present data from the NUAR Database or from APIs exposed by data providers. |

Types of Feature-level Identifier in NUAR

There are five main categories of identifiers in the NUAR data model:

- **System ID.** A mandatory, auto-generated ID which is globally unique within the NUAR database, and persistent for the lifespan of a data record representing a Feature Version.
- **Data Provider Assigned Unique ID.** A mandatory ID which expresses persistence of an ID in the source data across the feature lifecycle via a composite identifier made up of the Data Provider Organisation, the source unique persistent ID and the Source Dataset. This is globally unique and persistent for the managed lifecycle of a feature and *may be* persistent for an asset/object feature depending on the identifier policy of the provider organisation.
Will be auto-generated (as a globally unique id within the NUAR database) if the data provider is unable to supply unique, persistent identifiers. This will preclude opportunities for change-only updates and enduring Observation relationships as the lifecycle is not managed by the Data Provider.
- **Object Owner Assigned ID.** An identifier which may be assigned to the asset or object by the owner of that asset or object.
- **Data Owner Assigned ID.** An identifier which may be assigned to a feature associated with an asset or object by the owner of the dataset containing that feature.
- **Object Operator Assigned ID.** An identifier which may be assigned to the asset or object by the operator of that asset or object.

Each of these is described in more detail below.

1. System ID

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| Definition | <p>A unique identifier for a Data Record within NUAR representing a Feature Version.</p> <p>The NUAR System ID is a mandatory identifier for any data record which is globally unique within the NUAR platform as a whole (including any data stores hosted by asset data providers).</p> |
| Data Model Representation | NUARObject:systemID |
| Scope of Uniqueness | Unique within the NUAR platform including the main database. |



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| Persistence | <p>Once assigned, the NUAR system ID can't be changed and is therefore persistent for the versioned record in perpetuity (including after "retirement" if appropriate).</p> <p>Note that any successor data record version ingested into the database, even without change compared to the previous ingestion, will be assigned a new NUAR System ID. This enables opportunities for maintaining a "history" of feature versions within the NUAR Database, with associated opportunities for temporal data presentation and data rollback facilities.</p> |
| Assignment | Auto-assigned during feature ingestion. |
| Presentation | It is not anticipated that this ID will routinely be reported to standard "data consumer" users, although it may be surfaced in reports and logs presented to data provider users. |
| Purposes | <ul style="list-style-type: none">• Single unique data record version identifier across the NUAR platform• Allows unique identification of a Feature Version independently of feature/version lifecycle management• Debugging and referencing Features with different versions at defined points in time |
| Format | CharacterString (mandated as a UUID) |

2. Data Provider Assigned Unique ID

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| Definition | <p>A mandatory identifier for a feature which is persistent over the managed lifecycle of that feature.</p> <p>The Data Provider Assigned Unique ID may be assigned by the provider of that feature to the NUAR platform. It is the Data Providers's responsibility to manage the feature lifecycle.</p> <p>If the data provider is able to supply comprehensive, unique and persistent IDs within the scope of a source dataset, in the NUAR database Data Provider Assigned Unique ID will consist of a composite ID with the following elements:</p> <ul style="list-style-type: none">• NUARActor:systemID - the ID of the organisation responsible for feature lifecycle management (typically the asset owner, but may be a third party service provider or a data custodian)• The unique, persistent ID value as supplied• MUDDIObjct:sourceFeatureClass - the name of the source dataset |
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| | <p>Each element of the composite ID will be separated by a “.” character. This composite ID will be globally unique within the NUAR database and will persist for the lifetime of the feature within the database. This composite ID may persist for the lifetime of the associated asset/object depending on the ID policy of the data provider.</p> |
| Data Model Representation | MUDDIObjct::dataProviderAssignedUniqueID |
| Scope of Uniqueness | <p>Should uniquely identify a single feature within a source dataset from a NUAR data provider. In other words, a composite ID made up of the Data Provider Assigned Unique ID, the Data Provider Organisation ID and the source dataset should be globally unique within the NUAR database.</p> |
| Persistence | <p>Provides an opportunity to express persistence in the source data of an ID across the feature lifecycle in NUAR.</p> <p>At a minimum should persist for the lifetime of that <i>feature</i> in the database. If the data provider is able to assign IDs to features that persist for the lifetime of the associated asset or object, the composite ID of Data Provider Assigned Unique ID, Data Provider Organisation ID and Source Dataset should also persist for the lifetime of the associated asset or object. If an ID assigned by the Data Provider is not guaranteed to persist in this way, this field should be auto-assigned as a globally unique ID (either during ingestion, or during transformation if being carried out by an intermediary) and persist for the lifetime of the feature version only.</p> <p>This lack of persistence across the full lifecycle of the feature in the source data means that Change Only Updates are not available for the containing dataset, and that asset-linked Observations will be effectively orphaned after a data refresh. A full data refresh for datasets without persistent IDs will need to include links and relationships to documentation and other features as these will not persist across data refreshes without a reliable persistent ID.</p> |
| Assignment | <p>May be assigned during the data transformation process, either as a unique, persistent composite ID for a feature and its underlying asset/object for a given Data Provider and Source Dataset, or as a traceable ID employed by a transformation intermediary.</p> <p>If there are multiple unique, persistent, universally-populated IDs within the chain of ownership/operation of a feature or data item, the ID element of the composite ID should be assigned in the following priority order:</p> |



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| | <ul style="list-style-type: none">• Object Owner Assigned ID• Data Owner Assigned ID• Object Operator Assigned ID <p>If this ID is not assigned before ingestion, it will be auto-assigned as a non-persistent globally unique identifier within the NUAR database (and the dataProviderassigneduniqueidautoassigned flag set). In this circumstance, there may be an opportunity to expose an auto-generated identifier to the data provider as part of ingestion reporting, with a view to adopting a persistent identifier at source and for subsequent data updates.</p> <p>Where a dataProviderAssignedUniqueID is available from the source dataset, the ID element of the feature should also be assigned to the appropriate Assigned ID (e.g. objectOwnerAssignedID/dataOwnerAssignedID/operatorOwnerAssignedID), which will be subsequently presented to end users.</p> |
| Presentation | It is not anticipated that this ID will routinely be reported to standard “data consumer” users, although it may be surfaced in reports and logs presented to data provider users. |
| Purposes | <ul style="list-style-type: none">• Is used as the key for relationships between features submitted to the database by data providers (e.g. relating guidance documents to assets, assigning assets to subordinate networks etc)• Object lifecycle management and representation• Feature-level compliance and conformance reporting during data ingestion• Traceability of individual features through the full data journey• Support for change-only updates (if supplied by the data provider)• Observations and user reporting (if genuinely persistent for a feature)• Asset lifecycle management and representation |
| Format | CharacterString (should be mandated as a UUID if auto-generated during ingestion or by a data transformation intermediary). |

3. Object Owner Assigned ID

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| Definition | <p>An identifier assigned by the owner of an asset or object, as represented by a feature in NUAR.</p> <p>If this is certified by the object owner as unique and persistent for a single asset or object within a source dataset, this can be used to form</p> |
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| | part of the composite Data Provider Assigned Unique ID and provide persistence for the lifetime of the asset or object representation within NUAR. If this is not possible, this ID will be used simply as an attribute to be presented to end users. |
| Data Model Representation | MUDDIObject:objectOwnerAssignedUniqueID |
| Scope of Uniqueness | An Object Owner Assigned ID should uniquely identify a single object within a dataset for a given Asset Owner, otherwise it should not be assigned. It may be assigned if the values in this field are not fully populated, as long as populated values are unique within that dataset. (If this is not the case, the MUDDIObject:objectName field may be used). |
| Persistence | If an Object Owner Assigned ID is guaranteed to be persistent (and unique and universally applied) for a given asset or object as represented by a feature in a dataset, it may be used as part of the composite Data Provider Assigned Unique ID. If this level of persistence is not guaranteed, the Object Owner Assigned ID may still provide useful information to end users. |
| Assignment | Assigned during data transformation. May also be assigned as part of the composite Data Provider Assigned Unique ID if uniqueness, persistence and universality constraints are demonstrably satisfied. |
| Presentation | If populated, this may be displayed to end users. |
| Purposes | <ul style="list-style-type: none">• Feature-level compliance and conformance reporting during data ingestion• Object lifecycle management and representation (via the Data Provider Assigned Unique ID)• Presentation of information to end users |
| Format | CharacterString (should be recommended as a UUID) |

4. Data Owner Assigned ID

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| Definition | <p>An identifier assigned by the owner of a data record relating to an asset or object, as represented by a feature in NUAR.</p> <p>If this is certified by the data owner as unique and persistent for a single asset or object within a source dataset, this can be used to form part of the composite Data Provider Assigned Unique ID and provide persistence for the lifetime of the asset or object representation within NUAR. If this is not possible, this ID will be used simply as an attribute to be presented to end users.</p> |
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| | <p>This should only be assigned if the ownership of data is different from the ownership of the physical asset or object (e.g. in the case of a Local Authority effectively being the data “custodian” for NRSWA Section 50, without ownership of the installed assets, and may have their own ID strategy distinct from the asset owner).</p> <p>For example: in the case of assets installed by a private operator under a NRSWA Section 50 licence, the as-laid drawings for those assets will be submitted to the Local Authority which issued the licence. In this scenario, the Local Authority may be the data provider, and any identifier that they assign to this data should be considered as the <i>Data Owner ID</i> (as opposed to any identifier assigned by the <i>Asset Owner</i> which is the organisation that installed the assets).</p> |
| Data Model Representation | MUDDIOBJECT:dataProviderAssignedUniqueID |
| Scope of Uniqueness | A Data Owner Assigned ID should uniquely identify a single object within a dataset for a given Data Owner, otherwise it should not be assigned. It may be assigned if the values in this field are not fully populated, as long as populated values are unique within that dataset. (If this is not the case, the MUDDIOBJECT:objectName field may be used). |
| Persistence | If a Data Owner Assigned ID is guaranteed to be persistent (and unique and universally applied) for a given asset or object as represented by a feature in a dataset, it may be used as part of the composite Data Provider Assigned Unique ID (if there is not an Object Owner Assigned ID which satisfies the same constraints). If this level of persistence is not guaranteed, the Data Owner Assigned ID may still provide useful information to end users. |
| Assignment | Assigned during data transformation, only if distinct from the Object Owner Assigned ID. May also be assigned as part of the composite Data Provider Assigned Unique ID if uniqueness, persistence and universality constraints are demonstrably satisfied. |
| Presentation | If populated, this may be displayed to end users. |
| Purposes | <ul style="list-style-type: none">• Feature-level compliance and conformance reporting during data ingestion• Object lifecycle management and representation (via the Data Provider Assigned Unique ID)• Presentation of information to end users |
| Format | CharacterString (should be recommended as a UUID) |



5. Object Operator Assigned ID

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| Definition | <p>An identifier assigned by the operator of an asset or object to a feature in NUAR.</p> <p>If this is certified by the operator as unique and persistent for a single asset or object within a source dataset, this can be used to form part of the composite Data Provider Assigned Unique ID and provide persistence for the lifetime of the asset or object representation within NUAR. If this is not possible, this ID will be used simply as an attribute to be presented to end users.</p> <p>This should only be assigned if the operation of a physical asset or object is different from the ownership of that asset or object.</p> <p>For example: responsibility for day-to-day operation and maintenance of an asset (e.g. a pipeline) may lie with an organisation other than the asset <i>owner</i>. In this scenario, it is possible that data related to the asset may be “mastered” and maintained by the operator organisation, in which case they would be the likely data provider for NUAR. Any identifiers that the Asset <i>Operator</i> assigns to data, as distinct from identifiers assigned by the Asset <i>Owner</i>, should be reflected in this type of identifier.</p> |
| Data Model Representation | MUDDIObject:operatorAssignedUniqueID |
| Scope of Uniqueness | <p>An Object Operator Assigned ID should uniquely identify a single object within a dataset for a given Operator, otherwise it should not be assigned. It may be assigned if the values in this field are not fully populated, as long as populated values are unique within that dataset. (If this is not the case, the MUDDIObject:objectName field may be used).</p> |
| Persistence | <p>If an Object Operator Assigned ID is guaranteed to be persistent (and unique and universally applied) for a given asset or object as represented by a feature in a dataset, it may be used as part of the composite Data Provider Assigned Unique ID (if there is not an Object Owner Assigned ID or a Data Owner Assigned ID which satisfies the same constraints). If this level of persistence is not guaranteed, the Object Operator Assigned ID may still provide useful information to end users.</p> |
| Assignment | <p>Assigned during data transformation, only if distinct from the Object Owner Assigned ID and Data Owner Assigned ID. May also be assigned as part of the composite Data Provider Assigned Unique ID if</p> |

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| | uniqueness, persistence and universality constraints are demonstrably satisfied. |
| Presentation | If populated, this may be displayed to end users. |
| Purposes | <ul style="list-style-type: none"> • Feature-level compliance and conformance reporting during data ingestion • Object lifecycle management and representation (via the Data Provider Assigned Unique ID) • Presentation of information to end users |
| Format | CharacterString (should be recommended as a UUID) |

6. Non-Feature level identifiers in NUAR

These are identifiers on data artefacts that are not abstractions of real world phenomena (following the feature definition in (ISO 19109:2015 - Rules for application schema).

This section is currently a placeholder for identifiers not relating to features and can include identifiers for items such as feature concepts, conformance classes, codelists, etc.

These will be managed as system-managed unique identifiers in the NUAR database implementation.

Summary

The information above is summarised in the table below.

| | System ID | Data Provider Assigned Unique ID | Object Owner Assigned ID | Data Owner Assigned ID | Object Operator Assigned ID |
|--------------------|--|---|---|---|--|
| Description | Unique auto-generated feature identifier | Composite Identifier built from Data Provider Organisation, ID supplied by the data provider and Source Dataset (if ID element is suitable) | An identifier which may be assigned to the asset or object by the owner of that asset or object | An identifier which may be assigned to a feature associated with an asset or object by the owner of the dataset containing that feature | An identifier which may be assigned to the asset or object by the operator of that asset or object |

| | System ID | Data Provider Assigned Unique ID | Object Owner Assigned ID | Data Owner Assigned ID | Object Operator Assigned ID |
|------------------------|---|---|---|---|---|
| Source | Auto-generated | Data Provider or Auto-generated | Asset Owner | Data Owner | Asset Operator |
| Mandatory? | Yes | Yes | No | No | No |
| Unique in NUAR? | Yes | Yes | No | No | No |
| Persistence | Feature Version lifetime | Feature lifetime (possibly asset lifetime) | Asset lifetime | Feature lifetime | Asset lifetime |
| Presentation | Data Provider reports | Data Provider reports | Data Viewers; Data Provider reports | Data Viewers; Data Provider reports | Data Viewers; Data Provider reports |
| Purpose | <ul style="list-style-type: none"> • Single unique feature identifier across the NUAR platform | <ul style="list-style-type: none"> • Entity Relationships • Object lifecycle management and representation • Feature-level compliance and conformance reporting • Traceability through the full data journey • Support for change-only updates • Asset lifecycle management and representation • Observations and user reporting | <ul style="list-style-type: none"> • Feature-level compliance and conformance reporting • Object lifecycle management and representation (via the Data Provider Assigned Unique ID) • Presentation of information to end users | <ul style="list-style-type: none"> • Feature-level compliance and conformance reporting • Object lifecycle management and representation (via the Data Provider Assigned Unique ID) • Presentation of information to end users | <ul style="list-style-type: none"> • Feature-level compliance and conformance reporting • Object lifecycle management and representation (via the Data Provider Assigned Unique ID) • Presentation of information to end users |

| | System ID | Data Provider Assigned Unique ID | Object Owner Assigned ID | Data Owner Assigned ID | Object Operator Assigned ID |
|---------------|--|--|---|---|---|
| Format | Character String (UUID mandated) | Character String (UUID if auto- generated) | Character String (UUID recommended) | Character String (UUID recommended) | Character String (UUID recommended) |