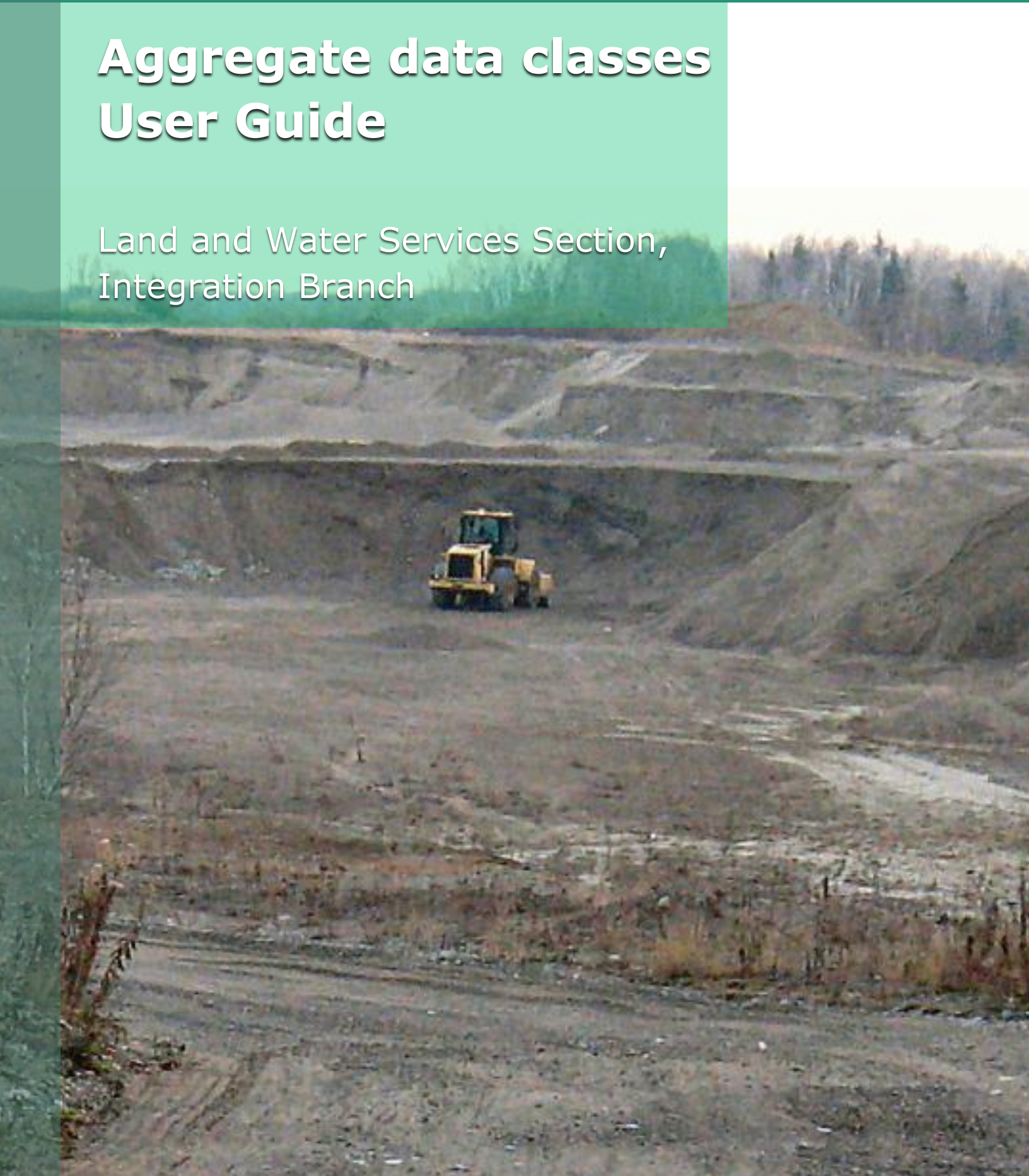


Natural. Valued. Protected.

Aggregate data classes User Guide

Land and Water Services Section,
Integration Branch



Drafted: December 3, 2013

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For more information about this guide, please contact:

LIO Support, Email: lio@ontario.ca Phone: 705-755-1878

Please report any mistakes, omissions or website links that need updating. Recommendations and ideas to improve this document are welcome.

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1.0 Document Scope

This guide provides information about the series of Aggregate data classes stored and maintained in the LIO Editor and LIO Warehouse databases. It will describe the context in which spatial and attribute data in these layers should be interpreted, used and updated by Ministry of Natural Resources (MNR) staff.

The series of Aggregate data classes described in [Section 3.0](#) of this document include the following (by topic order):

- Aggregate Site Authorized (AGGAUTH)
- Aggregate Inspection Jurisdiction (AGGINSPJ)
- Aggregate Designated Area (AGGDESAR)
- Aggregate Extraction Area (AGGEXTRA)
- Aggregate Site Unrehabilitated (AGGUNREH)
- Aggregate Category 14 Site (AGGCAT14)

The confirmed Information Ownership (IO) for these layers fall under the responsibility of The Ontario Ministry of Natural Resources, Regional Operations Division, Integration Branch and overseen by the Provincial Lands Specialist working with the Aggregate Resources Section and MNR District Aggregate Inspector Officers. Information Owner responsibilities are summarized in [Appendix 3](#) of this guide.

Data class maintenance roles vary between data classes and are addressed individually for each layer in [Section 3.0](#).

2.0 MNR Aggregates GIS Mapping History

MNR interest for GIS mapping of aggregate site information officially began in 1996 with the "Pit or Quarry" layer maintained by Districts in the Natural Resources Values Information System (NRVIS). This layer was originally loaded with boundaries gleaned from the now-defunct digital Ontario Base Map (OBM) PITQUARRY layer. However, the information in this data class had severe limitations:

- The data was outdated, with most information originating from digitized hardcopy OBM maps from the early-mid 1980s.
- The layer contained minimal attributes which were not useful to the aggregates program other than identifying a location.

- Without proper subject business area guidelines, new information was entered inconsistently by MNR Districts across the province into this layer, resulting in the presence of many unsupported features in the data.

In the late 1990s the MNR's aggregates program developed the Aggregate and Licence Permit System (ALPS), an ORACLE database used by the MNR for managing and overseeing information about aggregate permits, licences and wayside permits (collectively called "Authorities") in the Province of Ontario. Generally speaking, every single aggregate permit or licence issued in Ontario will be documented in ALPS and maintained throughout its lifecycle.

In 2003, the NRVIS "Pit or Quarry" data class was replaced by a new spatial layer: "Aggregate Site Authorized". The new layer was defined and approved by the MNR's aggregates program to meet its business requirements, and to compliment the tabular-only ALPS database with two basic precepts in mind:

- 1) Accuracy: each mapped feature (polygon) in the Aggregate Site Authorized layer MUST be associated to an existing Aggregate Licence or Permit ID.
- 2) Usefulness: combining the data class' spatial information with ALPS delivers an enhanced product that is infinitely more usable and valuable to the user.

Aggregate Site Authorized (AGGAUTH) and other associated subject data classes are described in more detail in [Section 3.0](#).

3.0 Aggregate Classes Overview

This section describes the context and provides guidelines for the intended collection, use and maintenance of the information stored in each of the aggregate data classes.

The chart below summarizes editing access rights to these layers.

Data Class Name	Edited/Checked-in by
Aggregate Site Authorized (AGGAUTH)	MNR District GIS Tech ALPS: Aggregate Officer
Aggregate Inspection Jurisdiction (AGGINSPJ)	Main Office: Provincial Lands Specialist
Aggregate Designated Area (AGGDESAR)	Main Office: Provincial Lands Specialist
Aggregate Extraction Area (AGGEXTRA)	MNR District GIS Tech
Aggregate Site Unrehabilitated (AGGUNREH)	MNR District GIS Tech
Aggregate Category 14 Site (AGGCAT14)	MNR District GIS Tech

3.1 Aggregate Site Authorized (AGGAUTH)

Aggregate Site Authorized is the official data class for describing the mapped extent of aggregate extraction licences and permits as regulated under Ontario's [Aggregate Resources Act](#). This layer is "Authorized" as it ONLY contains aggregate sites that have been issued a licence or permit by the OMNR. All spatial features in this layer are referenced by a licence or permit ID (ALPS_ID) to a corresponding record in the OMNR's Aggregate Licencing and Permitting System (ALPS) application and database.

The boundaries in this layer should reflect the extent of the approved site plan.



Figure 1: This example shows an Aggregate Site Authorized feature near Sowerby, Ontario (ALPS_ID: 612281) in the LIO Mapper. Note the posted sign identifying the pit's name, licence # (ALPS_ID) and operator. Photo credit: J. Gratton, Nov. 15 2013

3.1.1 Attributes

The following attributes are collected for Aggregate Site Authorized via the LIO Editor (bolded text = mandatory entries):

Table Name: **AGG_SITE_AUTHORIZED_FT**

This is the main feature class table (FT) for the spatial features found in the Aggregate Site Authorized data class. To prevent data duplication between the spatial data and the core attributes maintained in the MNR's tabular Aggregate Licensing and Permitting System (ALPS), only the business identifier: ALPS_ID is carried to link the two databases. As such, the FT attributes are exclusively used to compliment the spatial features.

COLUMN NAME	DATA TYPE	DESCRIPTION
*OGF_ID (PK)	NUMBER(13)	A unique numeric identifier assigned to each feature by the LIO Editor.
ALPS_ID	NUMBER(10,0)	This business identifier is used to associate a G.I.S. mapped aggregate site to a matching record in the Aggregate Licensing and Permitting System (ALPS). This number is assigned to each aggregate licence and permit in ALPS. Source (ALPS): AUTHORITIES.ID
LOCATION_ACCURACY	VARCHAR2(25)	A user-assigned value that represents the locational accuracy of a mapped feature to its actual location on the ground. For example, a value of "Within 10 metres" means that a person out in the field should be able to locate the feature within 10 m of its mapped location. Permissible values are chosen from the Lookup Table: LOCATION ACCURACY LIST
SOURCE_DETAIL	VARCHAR2(254)	A brief description about the source of mapped aggregate site e.g. "G.P.S.", "mapped from imagery".
*GEOMETRY_UPDATE_DATETIME	DATE	Date/time the geometry was created or last modified in the source database.
*EFFECTIVE_DATETIME	DATE	Date/time the record was created or last modified in the source database.
*SYSTEM_DATETIME	DATE	Date/time the record was created or last modified in the LIO database. The value usually reflects the date and time that the data was published to the LIO Warehouse database.

* = system-populated, no manual input required.

Table Name: **AGGAUTH_ALPS**

This non-editable table view is populated with values imported directly from the Aggregate Licencing and Permitting System (ALPS) via the ALPS_ID (business identifier). It is updated in the LIO Warehouse and Editor databases on a nightly basis.

COLUMN NAME	DATA TYPE	DESCRIPTION
ALPS_ID (PK)	NUMBER(10,0)	A unique numeric identifier assigned to each aggregate licence and permit by the OMNR's Aggregate Licencing and Permitting System (ALPS). Source (ALPS): AUTHORITIES.ID
CURRENT_STATUS	VARCHAR2(11)	The status of the Aggregate Site described as follows with regards to the codes stored in the Aggregate Licensing and Permitting System (ALPS) : Active: An aggregate operation, dependent on a licence or permit issued by MNR that is active. Active means that the site is legally active, and does not necessarily mean that aggregate extraction operations are taking place. Corresponding ALPS Codes: - IS (Issued) - AM (Amended) - TR (Transferred) - RE (Renewed) - SS (Suspended) - RI (Reinstated) - PA (Pending Approval) Application: An aggregate operation that is in the planning stage and dependent on a licence or permit issued by MNR. The Application status in ALPS means that a Licence or Permit has not yet been issued for the site as it is in the application process. Corresponding ALPS Code: - AP (Apply For) Revoked: A Licence or Permit that has been revoked by the crown due to a lack of compliance with the Aggregate Resources Act. Corresponding ALPS Code: - RV (Revoked) Surrendered: A permit or licensed aggregate operation that has been surrendered voluntarily by the owner, and has completed

		final rehabilitation. Corresponding ALPS Code: - SR (Surrendered) Source (ALPS): AUTHORITIES.CURRENT_STATUS_CODE
CLIENT_NAME	VARCHAR2(75)	The registered name of the client who is authorized by permit or licence to extract aggregates from a pit or quarry. The client may represent a private individual, company, corporation, and government agency etc. Note: The Ontario Privacy Commissioner decreed in Dec. 2009 that storing a client name where an individual is identified for business transaction purposes does not conflict with Freedom of Information and Protection of Privacy Act (FIPPA) guidelines. Source (ALPS): CLIENT_NAMES.NAME
OPERATION_TYPE	VARCHAR2(21)	Indicates what type of extraction activity the aggregate operation allows with the following permissible values: - Pit - Quarry - Both Pit and Quarry - Underwater Examples and context for the above values are detailed HERE. Source (ALPS): AUTHORITIES.OPERATION_TYPE_CODE
AUTH_TYPE_DESCR	VARCHAR2(40)	The extraction authority type assigned to an aggregate site with permissible values defined as follows: CLASS A LICENCE > 20000 TONNES CLASS B LICENCE <= 20000 TONNES An aggregate licence is required for aggregate extraction on private land in designated areas (areas that are identified in regulation). The two class categories listed above reflect the amount of extracted material in metric tonnes that are permitted under the terms of the licence. AGGREGATE PERMIT Aggregate permits are required for aggregate extraction on Crown land or where the Crown owns the aggregate, and all extraction from

		land under natural water bodies. WAYSIDE PERMIT A wayside permit is issued for aggregate extraction on private land in designated areas, where the aggregate is to be used by a public authority (MTO, municipality) for temporary road construction or road maintenance projects. Source (ALPS): AUTHORITY_TYPES.DESCRPTION
UNLIMITED_TONNAGE_IND	VARCHAR2(3)	A Yes or No indicator if an unlimited amount of material can be extracted from an aggregate licence. If "Yes" then the Maximum Tonnage Limit field is null. If "No" then a value must be entered in the Maximum Tonnage Limit field. Source (ALPS): AUTHORITIES.UNLIMITED_TONNAGE_IND
MAX_TONNAGE	NUMBER(8,0)	The maximum amount of material allowed for extraction from an aggregate licence measured in metric tonnes. If the value is <null>, there is no limit to the amount of material that may be extracted. Source (ALPS): AUTHORITIES.MAX_TONNAGE
LICENCED_AREA	NUMBER(9,2)	The calculated total area required and provided by the aggregate site plan measured in hectares (ha). The site plan is a legal document describing the spatial extent of an aggregate extraction operation. It is typically filed with the application for an aggregate licence or permit. Source (ALPS): AUTHORITIES.LICENCED_AREA
LOCATION_NAME	VARCHAR2(35)	The name that the aggregate site is known by, for example "Anopha Quarry". Source (ALPS): AUTHORITIES.LOCATION_NAME
*EFFECTIVE_DATETIME	DATE	Date/time the record was created or last modified in the source database.

* = system-populated, no manual input required.

OPERATION TYPE Permissible Values (from [previous section](#))

Pit: an operation that excavates loose materials (e.g. clay, sand and gravel).



Figure 2: Example of a Pit. Photo courtesy Ryan Lenethen

Quarry: an operation that excavates solid bedrock through the use of blasting or mechanical separation (e.g. crushing or splitting)



Figure 3: Example of a Quarry. Photo courtesy Ryan Lenethen

Both Pit and Quarry: an operation where both loose materials and solid bedrock resources are excavated from the same site.

Underwater: an operation where loose material is dredged from the bed of a waterway. This type of operation is carried out mainly near the mouths of rivers and harbour fronts where claws/excavators clear out ship navigation lanes of accumulated sediment and dump the material onto floating barges.

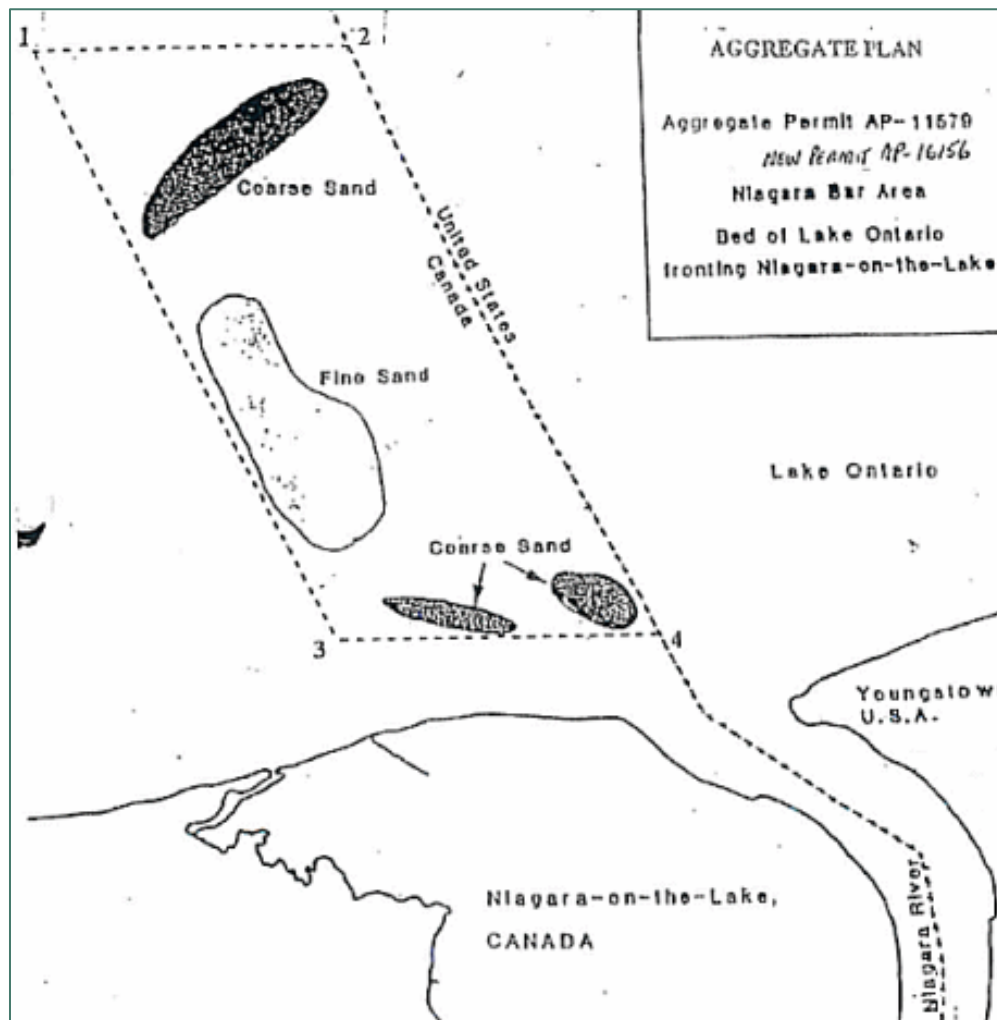


Figure 4: Example of Underwater operation site plan near the mouth of the Niagara River in Lake Ontario. Graphic courtesy Ryan Lenethen.

3.1.2 Data Collection Guidelines

New aggregate site locations:

In order of preference, Aggregate Site Authorized boundaries should originate from:

1. GPS: Using the site plan as a guide, accurate boundary corner locations of the licence or permit area can be captured on site by Aggregate Officers using Global Positioning System (GPS) devices. The captured coordinates can then be later converted into a polygon back in the office and imported into the Aggregate Site Authorized layer with the LIO Editor.
2. SITE PLAN: Site plans for a licensed area are mostly authored by external engineering firms. Depending on the base accuracy of the drafted site plan, a scanned image(s) ¹ of the site can be orthorectified and used as a background layer in ARCGIS by the District GIS Technician to digitize the aggregate licence or permit boundary. Alternatively, where convenient use base data reference (i.e. roads, township, lot, concession boundaries etc.) to digitize the site plan boundary. It may be more practical to prepare the boundary externally to ensure topology, and later import the feature into the LIO Editor.

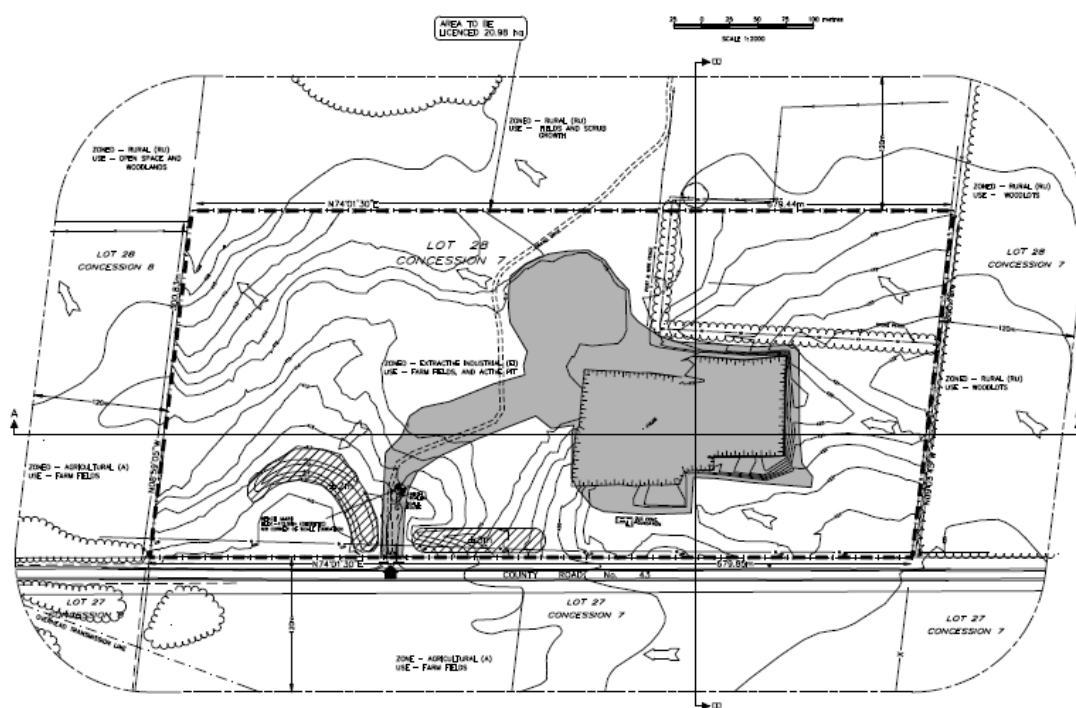


Figure 5: Example the licence boundary (heavy dashed line) sketch from the approved site plan. This licence extent should be represented in the Aggregate Site Authorized (AGGAUTH) layer. Graphic courtesy Ryan Lenethen.

¹ Site Plans for larger Class A Licences (> 20,000 tonnes) may span several pages.

NOTE: The Aggregate Officer must first create/update a record for the licence or permit site in ALPS before the spatial data is imported into the LIO Editor version of the Aggregate Site Authorized layer. An ALPS record is typically created at the Licence/Permit application stage for a site.

There will often be a time delay between the ALPS record creation for a new aggregate licence or permit application and the site plan being approved and its boundaries ready to be represented in the Aggregate Site Authorized data class.

3.1.3 Data Maintenance Guidelines

Spatial Data:

The spatial data for Aggregate Site Authorized is maintained in the LIO Editor by OMNR District GIS Technicians with input from the local District Aggregate Officer. At minimum, the authorized licence or permit number must be entered to link to a corresponding existing record in ALPS.

Spatial data prepared and described in Section 3.1.2 can be imported directly into the Aggregate Site Authorized layer using the LIO Editor's import tools.

While the majority of aggregate business area attributes are maintained in ALPS, a few data management guidelines are described in the scenarios provided below.

3.1.3.1 ALPS records without matching spatial boundary in AGGAUTH layer.

This scenario covers where an ALPS record for an aggregate site exists, but there is no matching spatial boundary in the Aggregate Site Authorized (AGGAUTH) data class. For dataset completeness, every attempt should be made to ensure that there is a 1:1 ALPS record match to every feature in the AGGAUTH layer.

The Provincial Lands Specialist will periodically run a comparison report to find ALPS_ID mismatches between ALPS and the AGGAUTH spatial features. This report is forwarded the MNR Regional Operations Division (ROD) GIS Officers and MNR District Aggregate Officers for remedial action. The process to obtain and digitize the approved site plan boundaries is described in section [3.1.2](#) above.

3.1.3.2 Spatial Refinement of Legacy OBM Pit/Quarry boundaries

For the most part, the spatial boundaries loaded into the original (1996) NRVIS "Pit or Quarry (PITQUARRY)" data class were gleaned from the digital Ontario Base Map (OBM) pit and quarry versions of the layer. The spatial boundaries were later imported into the new Aggregate Site Authorized (AGGAUTH) data class in 2003.

While an attempt has been made over the years to replace these outdated and often inaccurate legacy features with proper site plan boundaries, many can still be found in the AGGAUTH layer. Where they are discovered, these old boundaries

should be replaced with the proper approved site plan boundaries. The process to obtain and digitize the approved site plan boundaries is described in section [3.1.2](#) above.



Figure 6: (LEFT) an example of an OBM Pit/Quarry feature that was loaded by default in the original NRVIS version of the layer. (RIGHT) the same site in the current AGGAUTH layer with corrected geometry reflecting the approved licensed aggregate site plan boundaries.

3.1.3.3 ALPS vs. AGGAUTH area discrepancies.

There may be instances where the system calculated area for an aggregate site's spatial feature is proportionally much larger or smaller than the LICENCED_AREA value documented in ALPS.

The Provincial Lands Specialist will periodically run a comparison report to find AGGAUTH spatial vs. ALPS entered area mismatches. This report is forwarded the MNR Regional Operations Division (ROD) GIS Officers and MNR District Aggregate Officers for remedial action. Reported discrepancies should be prioritized as follows for evaluation and correction depending on the site's size and order of importance:

- 1) Class A Licence (> 20,000 tonnes m)
- 2) Class B Sites (<= 20,000 tonnes m)
- 3) Permits

It should be noted that each site should be evaluated on a case by case basis. The GIS area and the ALPS area values should be close and not be off by a large degree. It's important to judge the area variance relative to the site's size e.g. a large site of 99 hectares that is off by a hectare or 2 vs. a small 10 ha site with the same area offset.

One reason for a major area variance is the scenario described in section [3.1.3.2](#) above. Once corrected, the areas between the spatial and ALPS data should approximately match one another.

Another reason may be an incorrect value entered into the ALPS LICENCED_AREA. For example, the GIS calculated area for a site in the Aggregate Site Authorized Layer may read 227 ha whereas the value in the ALPS LICENCED_AREA field reads 22.5 ha. Where applicable, errors of this nature should be reported to the local Aggregate Officer for correction in ALPS.

Attribute Data:

For spatial data, identify the boundary's source (digitized site plan, GPS) in the SOURCE_DETAIL field, along with the associated positional position in the LOCATION_ACCURACY field (i.e. 2m for G.P.S. derived boundaries).

As mentioned previously, the majority of Aggregate Site Authorized business area attribute data are maintained in ALPS by the resident Aggregate Officer.

3.1.4 General Data Access and Viewing

Aggregate Site Authorized (AGGAUTH) data is unclassified (non-sensitive) and available for access and viewing via:

- LIO Mapper: Read-only view of the data class is available to all OPS staff account holders.
- NDD: a distributed cut of the data (geodatabase) is provided to all MNR District servers on a regular basis. This version provides direct access to the data to all District MNR staff. The format was formerly known as the NRVIS Data Distribution (NDD) which will likely be given a new reference acronym in the near future.
- Archive: Archival cuts of this data (schedule will vary) can be downloaded directly from the LIO Warehouse through the LIO Metadata Record (links provided in [APPENDIX 2](#)).
- DDS: Data Class data can be downloaded by subscribers through the LIO Data Distribution System (DDS) from the suite of structured products.
- MNR's [Pits and Quarries Online](#) (map application)

Note:

Though maintained as a single layer in the LIO Editor, Aggregate Site Authorized data is split into two definition query categories based on status as a group layer in the LIO Mapper as follows:

- 1) Aggregate Site Authorized - Active: Only displays aggregate site features whose current status is "Active" or "Application".
- 2) Aggregate Site Authorized - Inactive: Only contains aggregate site features whose current status is "Surrendered" or "Revoked".

By default, the view for the 'Inactive' layer is turned off in the LIO Mapper.

Users have the option of customizing the symbology for each layer as they see fit.

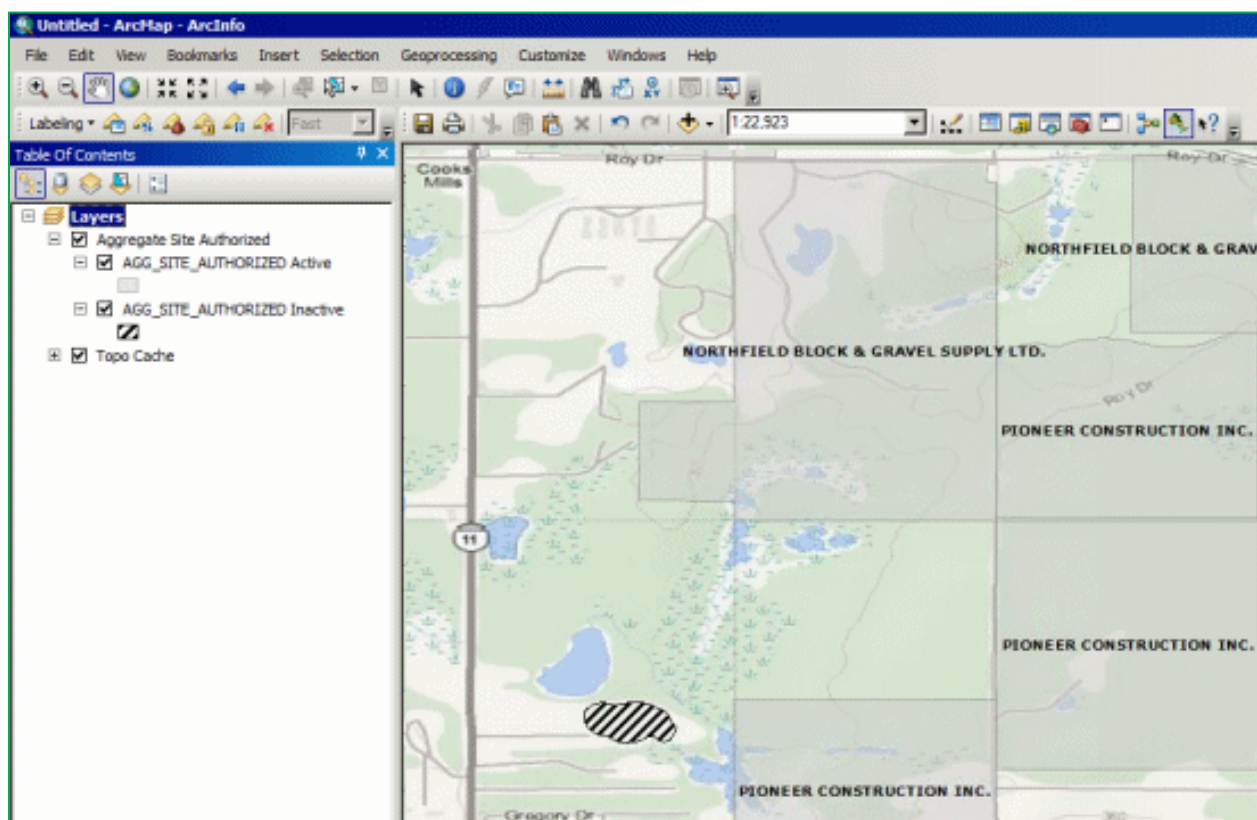


Figure 7: LIO Mapper view of Aggregate Site Authorized data drawn on top of topographic data.

By default, the view for the 'Inactive' layer is turned off in the LIO Mapper. Users have the option of customizing the symbology for each layer as they see fit.

Aggregate Site Authorized data is similarly split into two separate products (active and inactive sites) from the LIO Warehouse Data Distribution System (DDS) in the listing of structured data products.

A data life cycle summary diagram can be found in [Appendix 4](#) of this document.

3.2 Aggregate Inspection Jurisdiction (AGGINSPJ)

The geographical area within which an OMNR aggregate inspector/officer is responsible in matters pertaining to aggregate authorities and their enforcement.

This layer is used by the Aggregate Resources section to coordinate aggregate site inspections carried out by OMNR Aggregate Officers. The geographical extents of inspection jurisdictions in organized areas of the province are mostly defined by township boundaries, while inspection jurisdictions in unorganized areas of the province are for the most part defined by OMNR District boundaries. This township level of data granularity is by design to ease data maintenance when Aggregate Officers are hired or reassigned to a different inspection jurisdiction.

Aggregate Inspector Jurisdictions are represented as non-overlapping polygon features covering the entire province in the LIO Editor and LIO Warehouse databases.

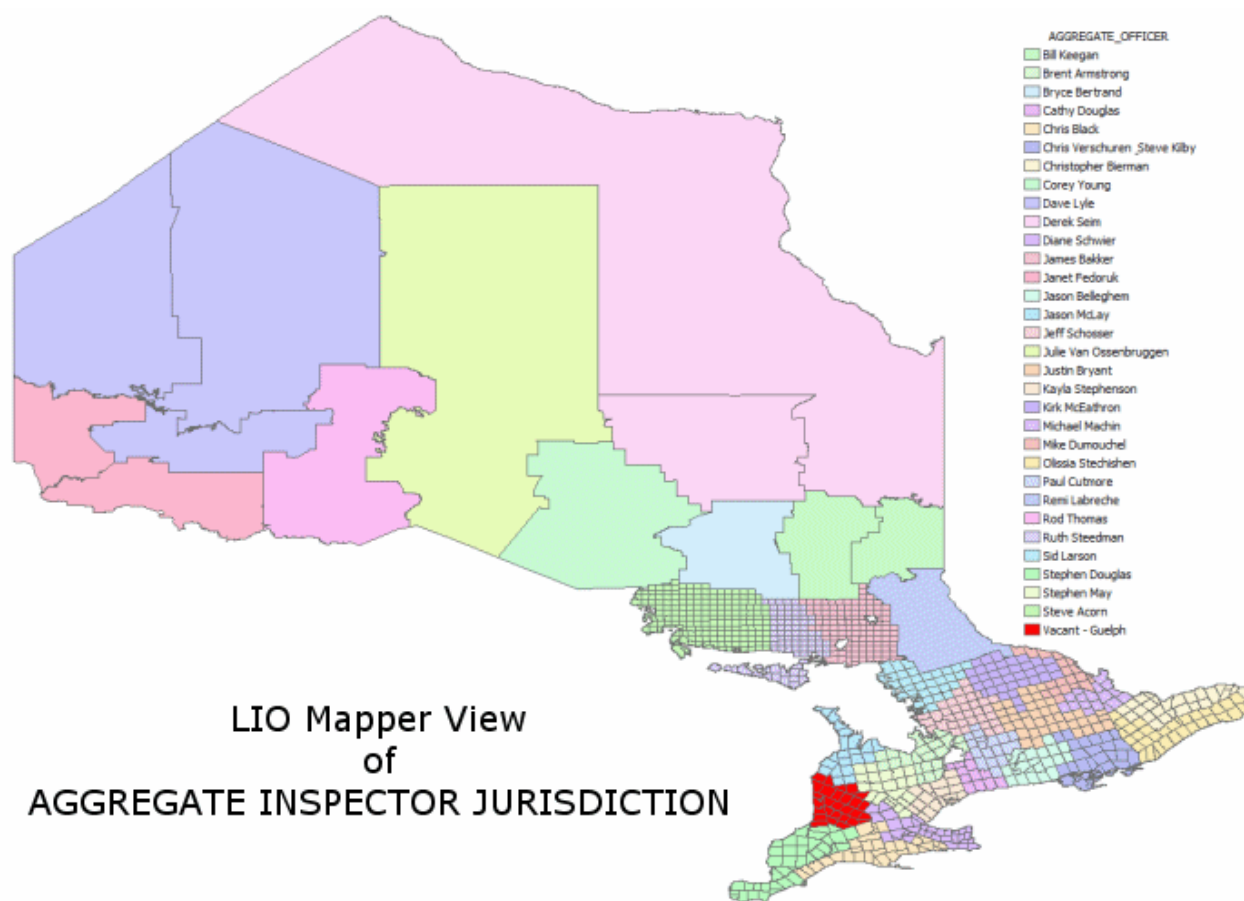


Figure 8: LIO Mapper view of the Aggregate Inspector Jurisdiction data class, symbolized according to the Aggregate Officer responsible for a particular area. Note how the same Aggregate Officer may be sometimes responsible for more than one area, while in other cases two officers may be assigned to the same area.

3.2.1 Attributes

The following attributes are collected for Aggregate Inspector Jurisdiction via the LIO Editor (bolded text = mandatory entries):

Table Name: **AGG_INSPECTOR_JURIS_FT**

The geographical area within an OMNR aggregate inspector is responsible in matters pertaining to aggregate authorities and their enforcement.

COLUMN NAME	DATA TYPE	DESCRIPTION
*OGF_ID (PK)	NUMBER(13)	A unique numeric identifier assigned to each feature by the LIO Editor.
OFFICIAL_NAME	VARCHAR2(100)	The documented name that the jurisdiction is known by. In the many cases, especially in organized parts of the province, it will be a township name (represented by the polygon). In Northern Ontario the defined jurisdiction may be the entire OMNR District identified by name e.g. "FORT FRANCES DISTRICT" The values in this field should always be UPPER CASE e.g. "KINLOSS"
ADMIN_NUMBER	NUMBER(5,0)	The administration number assigned to the aggregates inspector jurisdiction by the OMNR Aggregate and Petroleum Resources Section. This number is used internally by the business area as a quick reference for keeping track of inspectors in the event that jurisdictions are exchanged, assigned or re-allotted.
AGGREGATE_OFFICER	VARCHAR2(100)	The full name of the OMNR aggregate officer. The value in this field must be chosen from an existing value in the AGGREGATE_OFFICER_INFO table.
*GEOMETRY_UPDATE_DATETIME	DATE	Date/time the geometry was created or last modified in the source database.
*EFFECTIVE_DATETIME	DATE	Date/time the record was created or last modified in the source database.
*SYSTEM_DATETIME	DATE	Date/time the record was created or last modified in the LIO database. The value usually reflects the date and time that the data was published to the LIO Warehouse database.

* = system-populated, no manual input required.

Table Name: **AGGREGATE_OFFICER_INFO**

A non-spatial class editable table listing known OMNR Aggregate Officers and the OMNR District they are based out of and includes basic contact information.

COLUMN NAME	DATA TYPE	DESCRIPTION
AGGREGATE_OFFICER (PK)	VARCHAR2(100)	The full name of the OMNR Aggregate Officer. <u>Note</u> : Where inspection duties are shared by two officers for the same jurisdiction, identify both names in this field. e.g. "Chris Stone & Jill Rock". Where there is no officer currently assigned to a jurisdiction, identify the area as being vacant in the following manner: "Vacant -" & OMNR District Name e.g. "Vacant - Guelph"
DISTRICT_NAME	VARCHAR2(50)	The name of the OMNR District that the Aggregates Officer is based out of. Values in this field must be chosen from the Lookup Table: MNR_DISTRICT_LIST
INSPECTOR_ADDRESS_FULL	VARCHAR2(120)	The full mailing address of the OMNR District that the Aggregates Officer can be contacted by.
PHONE_NUMBER	VARCHAR2(20)	The OMNR District telephone number of the Aggregate Officer including Area Code and extension where applicable. Format: NNN-NNN-NNNN (+ extension)
FAX_NUMBER	DATE	The OMNR District FAX number that the Aggregate Officer can be contacted by, including Area Code and extension where applicable. Format: NNN-NNN-NNNN (+ extension)
*EFFECTIVE_DATETIME	DATE	Date/time the record was created or last modified in the source database.
*SYSTEM_DATETIME	DATE	Date/time the record was created or last modified in the LIO database. The value usually reflects the date and time that the data was published to the LIO Warehouse database.

* = system-populated, no manual input required.

3.2.2 Data Collection Guidelines

Field data collection is not required for this data set.

3.2.3 Data Maintenance Guidelines

The Aggregate Inspector Jurisdiction data class is maintained in the LIO Editor at the main office level (Peterborough) by the Provincial Lands Specialist. Data updates are made on an ad hoc basis and only as required.

Spatial Data:

The spatial extents of Aggregate Inspector Jurisdictions are accounted for in entirety for Ontario. Where spatial adjustments are required to be made to this layer in the LIO Editor, the following authoritative LIO data class sources should be used to define jurisdiction boundaries.

- Geographic Township
- MNR District

There should not be any inspector jurisdiction polygon overlaps in this layer.

Attribute Data:

Scenario 1: A new Aggregate Officer is hired by an OMNR District

Prior to assigning an aggregate officer to a jurisdiction, the staff member's details need to first exist in the Aggregate Officer Information table. This involves creating a record in this non-spatial class through the LIO Editor.

1. In the LIO Editor, call up the non-spatial editor and choose the Aggregate Officer Information class to edit.
2. After confirming that the staff member is not listed in the existing data, create a new record using the guidelines outlined in the [Aggregate Officer Information](#) table in this guide.
3. Once the record is created and saved, make the Aggregate Inspector Jurisdiction data class the active edit layer, select the jurisdiction(s) that the aggregate officer will be assigned to, then choose his/her name from the Aggregate Officer picklist. Validate, save and post your edits.

3.2.4 General Data Access and Viewing

Aggregate Inspector Jurisdiction (AGGINSPJ) data is unclassified (non-sensitive) and available for access and viewing via:

- LIO Mapper: Read-only view of the data class is available to all OPS staff account holders.

- NDD: a distributed cut of the data (geodatabase) is provided to all MNR District servers on a regular basis. This version provides direct access to the data to all District MNR staff. The format was formerly known as the NRVIS Data Distribution (NDD) which will likely be given a new reference acronym in the near future.
- Archive: Archival cuts of this data (schedule will vary) can be downloaded directly from the LIO Warehouse through the LIO Metadata Record (links provided in [APPENDIX 2](#)).
- DDS: Data Class data can be downloaded by subscribers through the LIO Data Distribution System (DDS) from the suite of structured products.

A data life cycle summary diagram can be found in [Appendix 4](#) of this document.

3.3 Aggregate Designated Area (AGGDESAR)

An area designated under the Aggregate Resources Act where aggregate extraction on private land cannot proceed without a license.

Aggregate Designated Area features are represented in the LIO Editor as polygon (area) features. The geographical extent covered by these features is quite large as seen in the following LIO Mapper screenshot.

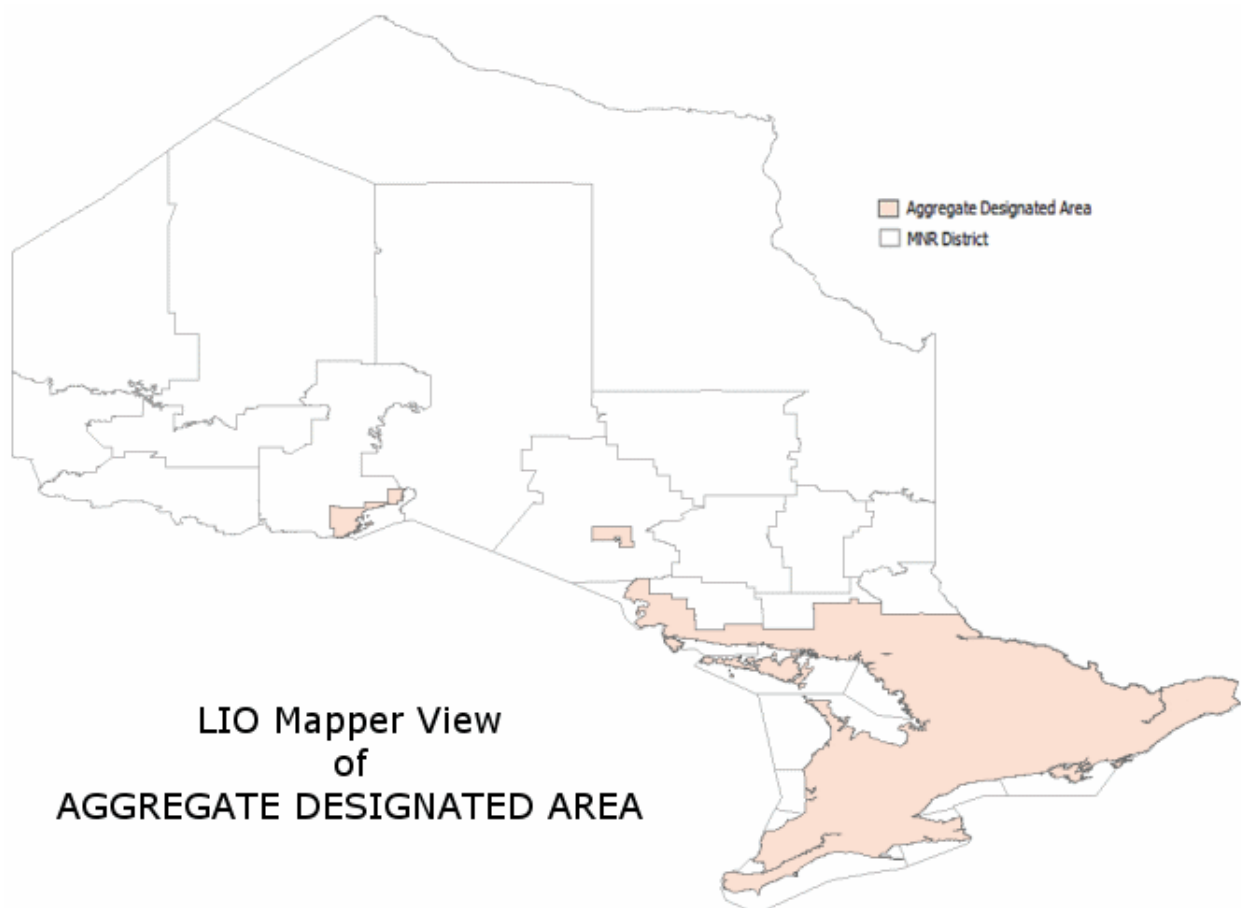


Figure 9: LIO Mapper view of Aggregate Designated Area (shaded) using OMNR District boundaries (gray lines) as a background layer for reference purposes.

3.3.1 Attributes

Other than the site's spatial location, no other business area attributes about the feature are collected for Aggregate Designated Area. The following basic LIO System attributes are present (bolded text = mandatory entries):

Table Name: **AGG_DESIGNATED_AREA_FT**

COLUMN NAME	DATA TYPE	DESCRIPTION
*OGF_ID (PK)	NUMBER(13)	A unique numeric identifier assigned to

		each feature by the LIO Editor.
*GEOMETRY_UPDATE_DATETIME	DATE	Date/time the geometry was created or last modified in the source database.
*EFFECTIVE_DATETIME	DATE	Date/time the record was created or last modified in the source database.
*SYSTEM_DATETIME	DATE	Date/time the record was created or last modified in the LIO database. The value usually reflects the date and time that the data was published to the LIO Warehouse database.

* = system-populated, no manual input required.

3.3.2 Data Collection Guidelines

Aggregate Designated Area boundaries are described in the regulation appendices in the Aggregate Resources Act, which identifies affected organized municipalities and townships by name.

The Ontario Aggregate Resources Corporation provides a comprehensive historical listing of Aggregate Designated Areas on their [website](#).

3.3.3 Data Maintenance Guidelines

The Aggregate Designated Area data class is maintained in the LIO Editor at the main office level (Peterborough) by the Provincial Lands Specialist. Data updates are made on an ad hoc basis and only as required to adjust boundaries or to expand the layer's geographic area if there are revisions made to the Aggregate Resources Act for Designated Areas.

Spatial Data:

The spatial extents of Aggregate Designated Areas only include areas where aggregate licenses and permits are required for operations on private land and represent the greater dissolved extents of where these areas are found i.e. municipalities (and Southern Ontario). Where spatial adjustments are required, the following authoritative LIO data class source should be used to define boundaries.

- Municipal Boundary layers
- Geographic Township

Attribute Data:

Other than the perimeter of the greater Designated Areas, no other information is collected.

3.3.4 General Data Access and Viewing

Aggregate Designated Area (AGGDESAR) data is unclassified (non-sensitive) and available for access and viewing via:

- LIO Mapper: Read-only view of the data class is available to all OPS staff account holders.
- NDD: a distributed cut of the data (geodatabase) is provided to all MNR District servers on a regular basis. This version provides direct access to the data to all District MNR staff. The format was formerly known as the NRVIS Data Distribution (NDD) which will likely be given a new reference acronym in the near future.
- Archive: Archival cuts of this data (schedule will vary) can be downloaded directly from the LIO Warehouse through the LIO Metadata Record (links provided in [APPENDIX 2](#)).
- DDS: Data Class data can be downloaded by subscribers through the LIO Data Distribution System (DDS) from the suite of structured products.

A data life cycle summary diagram can be found in [Appendix 4](#) of this document.

3.4 Aggregate Extraction Area (AGGEXTRA)

An aggregate extraction area is where aggregate resources are produced or obtained. The mapped feature is the actual representation of an extraction area and should fall inside the perimeter of the parent Aggregate Site Authorized feature that it is associated to.

Aggregate Extraction Area features are represented in the LIO Editor as polygon (area) features.

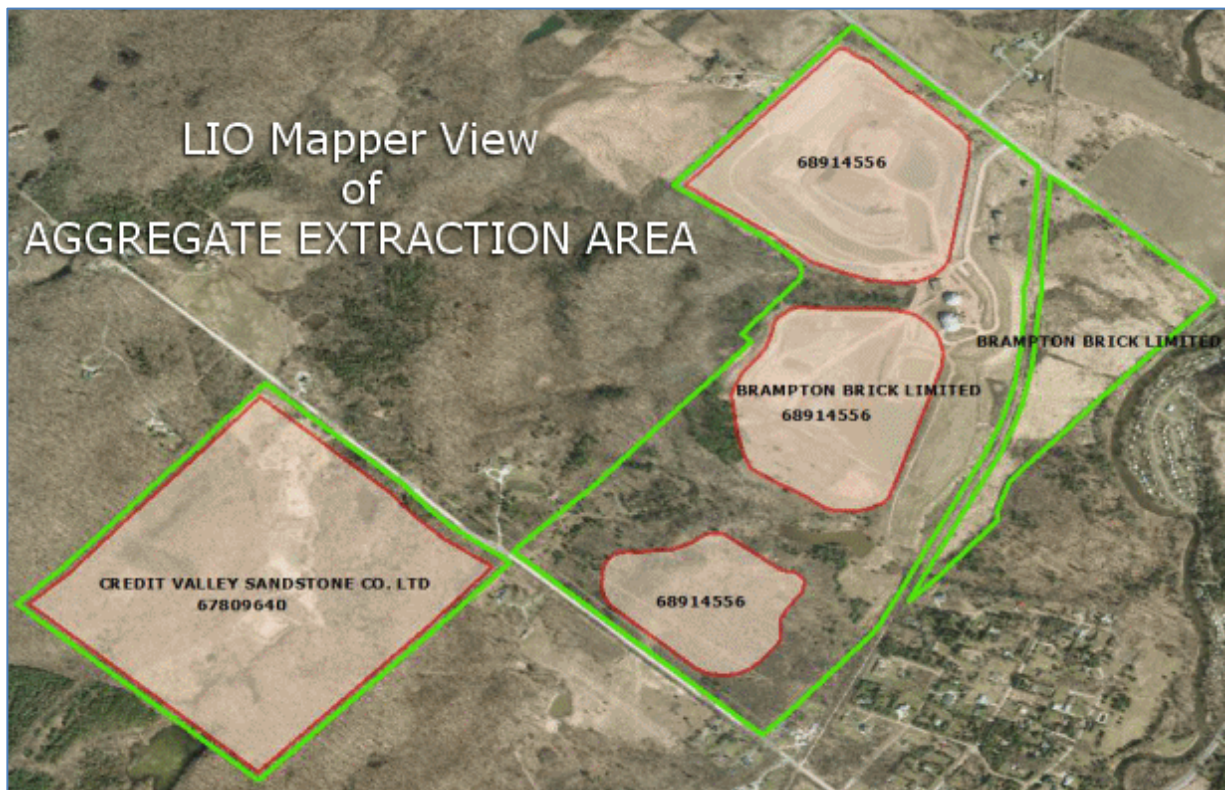


Figure 10: Example of Aggregate Extraction Area (shaded with operator name) features nested within the Aggregate Site Authorized features (green outline) that they are associated to (OGF_ID label). Comparing the underlying imagery, note that several of the mapped extraction areas reflect the actual area where aggregates are being extracted.

Aggregate Extraction Area features are often used by MNR Districts during Forest Management and Land Use Planning exercises as the boundaries need to be evaluated for potential impact on nearby values.

Aggregate Officers sometimes use the features for comparing the amount of material being extracted where aggregate extraction categories i.e. "Class A" and "Class B" sites are adjacent to one another, and where there is a discrepancy in reported aggregate volume being extracted from the site.

3.4.1 Attributes

The following attributes are collected for Aggregate Extraction Area via the LIO Editor (bolded text = mandatory entries):

Table Name: **AGG_EXTRACTION_AREA_FT**

COLUMN NAME	DATA TYPE	DESCRIPTION
*OGF_ID (PK)	NUMBER(13)	A unique numeric identifier assigned to each feature by the LIO Editor.
EXTRACTION_TYPE	VARCHAR(10)	Identifies the type of aggregate extraction operation. Permissible values: • Pit • Quarry
AGG_SITE_AUTHORIZED_ID	NUMBER(13)	Foreign Key to AGG_SITE_AUTHORIZED_FT. OGF_ID The Aggregate Extraction Area feature must be associated to an existing Aggregate Site Authorized layer feature through its OGF_ID. Use the LIO Editor's spatial picker tool to populate this field with the OGF_ID of a selected Aggregate Site Authorized feature.
*GEOMETRY_UPDATE_DATETIME	DATE	Date/time the geometry was created or last modified in the source database.
*EFFECTIVE_DATETIME	DATE	Date/time the record was created or last modified in the source database.
*SYSTEM_DATETIME	DATE	Date/time the record was created or last modified in the LIO database. The value usually reflects the date and time that the data was published to the LIO Warehouse database.

* = system-populated, no manual input required.

3.4.2 Data Collection Guidelines

Data collection will be left up to the discretion of Aggregate Officers for deciding whether to collect field GPS coordinates for an extraction area, using an approved authorized aggregate site plan as a guide, or using recent imagery to represent the extraction area to digitize the boundary.

3.4.3 Data Maintenance Guidelines

The Aggregate Extraction Area data class is maintained in the LIO Editor at the MNR District level by District GIS Technicians with input from Aggregate Officers. It may

be more practical to digitize boundaries (e.g. converted from GPS) externally using ARCGIS tools prior to importing them into the LIO Editor.

Spatial Data:

Externally prepared digital data for Aggregate Extraction Areas can be imported directly into the LIO editor by using the shapefile import tools.

Alternatively, the extraction area can be digitized directly in the LIO editor using imagery as a background reference layer with input from the resident Aggregate Officer.

The Aggregate Site Authorized (AGGAUTH) should also be used as a reference to ensure that the new extraction area feature's boundary does not overlap or go beyond the layer's aggregate site plan boundaries.

Attribute Data:

Using the attribute editor, identify the proper EXTRACTION_TYPE (either Pit or Quarry). Use the LIO Editor's identity to on the corresponding feature in Aggregate Site Authorized (AGGAUTH) background layer to determine this.

The parent Aggregate Site Authorized (AGGAUTH) feature that the aggregate extraction area polygon falls within must be associated with that feature's OGF_ID. Use the LIO Editor spatial picker tool to make the association. When you select an AGGAUTH feature with the tool, it's OGF_ID value will be copied into the Aggregate Extraction Area's AGG_SITE_AUTHORIZED_ID field.

3.4.4 General Data Access and Viewing

Aggregate Extraction Area (AGGEXTRA) data is unclassified (non-sensitive), but is intended for internal MNR business use only. The data is available for access and viewing via:

- LIO Mapper: Read-only view of the data class is available to all OPS staff account holders.
- NDD: a distributed cut of the data (geodatabase) is provided to all MNR District servers on a regular basis. This version provides direct access to the data to all District MNR staff. The format was formerly known as the NRVIS Data Distribution (NDD) which will likely be given a new reference acronym in the near future.

A data life cycle summary diagram can be found in [Appendix 4](#) of this document.

3.5 Aggregate Site Unrehabilitated (AGGUNREH)

A location where aggregate extraction has occurred that has not been returned to a good natural state (i.e. filled/levelling, trees planted). Such a site on crown land that is in a hazardous state raises liability issues for the MNR. This data class also stores pit and quarry locations for which a licence or permit was not enforced at any time after December 31, 1989.

The locations of unrehabilitated aggregate sites are captured as point features in the LIO Editor.



Figure 4: Example of an unrehabilitated aggregate site north of Blind River along High Road, Cobden TWP., and the mapped feature viewed in the LIO Mapper (OGF_ID 67517832) over imagery. Note the natural regeneration that is reclaiming the site's irregular terrain. Photo Credit: James Gratton, November 16, 2013.

The management of unrehabilitated aggregate sites is mainly of OMNR District interest only. The only concern that the Aggregate Resources section (main office, Peterborough) has for these sites are where:

- Steep embankments, deep holes or flooding present a liability issue.
- Where illegal aggregate extraction is taking place without a permit

Any of the above concerns should be brought to the attention of the resident Aggregate Officer.

3.5.1 Attributes

The following basic attributes are collected for Aggregate Site Unrehabilitated via the LIO Editor (bolded text = mandatory entries):

Table Name: **AGG_SITE_UNREHABILITATED_FT**

COLUMN NAME	DATA TYPE	DESCRIPTION
*OGF_ID (PK)	NUMBER(13)	A unique numeric identifier assigned to each feature by the LIO Editor.
HAZARD_COMMENT	VARCHAR(2000)	When applicable, detailed description or additional notes about the sources of danger present at this unrehabilitated aggregate site (e.g. flooding, steep embankments, falling rock.)
*GEOMETRY_UPDATE_DATETIME	DATE	Date/time the geometry was created or last modified in the source database.
*EFFECTIVE_DATETIME	DATE	Date/time the record was created or last modified in the source database.
*SYSTEM_DATETIME	DATE	Date/time the record was created or last modified in the LIO database. The value usually reflects the date and time that the data was published to the LIO Warehouse database.

* = system-populated, no manual input required.

3.5.2 Data Collection Guidelines

Where possible, GPS boundaries of unrehabilitated aggregate sites should be captured by District Area Technicians where practical to do so. For the most part, sites presenting a safety hazard should be represented in this layer.

3.5.3 Data Maintenance Guidelines

The Aggregate Site unrehabilitated (AGGUNREH) data class is maintained in the LIO Editor by OMNR District GIS Technicians.

Spatial Data:

Externally prepared digital data (i.e. GPS perimeter) for unrehabilitated aggregate sites can be imported directly into the LIO editor by using the shapefile import tools.

Attribute Data:

Where applicable, populate the HAZARD_COMMENT field with information about the potential hazard(s) present at a site, along with any notes about remedial action taken (e.g. warning signs, fencing)²

3.5.4 General Data Access and Viewing

Aggregate Site Unrehabilitated (AGGUNREH) data is unclassified (non-sensitive), but is intended for internal MNR business use only. The data is available for access and viewing via:

- LIO Mapper: Read-only view of the data class is available to all OPS staff account holders.
- NDD: a distributed cut of the data (geodatabase) is provided to all MNR District servers on a regular basis. This version provides direct access to the data to all District MNR staff. The format was formerly known as the NRVIS Data Distribution (NDD) which will likely be given a new reference acronym in the near future.

A data life cycle summary diagram can be found in [Appendix 4](#) of this document.

² The MNR Sign Site data class can be used to store the locations and wording of warning signs posted at applicable hazardous unrehabilitated aggregate sites.

3.6 Aggregate Category 14 Site (AGGCAT14)

Since 2010, Aggregate Category 14 Sites are now referred to as “[Forestry Aggregate Pits](#)”. These sites are where forestry companies are allowed to extract aggregates without a permit for forest access road construction and maintenance. Aggregate extraction is allowed within the access road’s corridor (primary roads, for example, have a 1 km corridor) over a ten year period (prior to 2010, it was a two year span); after that, the forest companies should apply for a permit.

Aggregate Resources of Ontario Provincial Standards have since been incorporated into the Forest Management Planning Manual to outline the rules for these pits. Forest companies using these pits are required to submit their locations to their local MNR District. Since they do not have a licence or permit, they are not recorded in the Aggregate Licensing and Permitting System (ALPS).

The Aggregate Resources section (main office, Peterborough) no longer has a business requirement to maintain or track these sites. They are, however of interest to the Ministry’s Forest Management Planning and Aviation, Forest Fire and Emergency Services (*AFFES*) programs.

Because of their relatively small size, Category 14 Sites are mapped as point locations in the LIO Editor.



Figure 11: Aggregate Category 14 Site on a forest access road near Pembroke, Ontario. Photo Credit: Lindsay McLean

3.6.1 Attributes

The following basic attributes are collected for Forestry Aggregate Pit sites via the LIO Editor (bolded text = mandatory entries):

Table Name: **AGG_CATEGORY_14_SITE_FT**

COLUMN NAME	DATA TYPE	DESCRIPTION
*OGF_ID (PK)	NUMBER(13)	A unique numeric identifier assigned to each feature by the LIO Editor.
FOREST_ROAD_AGG_OPERATOR	VARCHAR(200)	The name of the company extracting aggregates from this site for forest access road construction. Companies must identify aggregate operation site locations to the local MNR District.
START_OF_OPERATION_DATE	DATE	The calendar date that the aggregate extraction operation began.
*GEOMETRY_UPDATE_DATETIME	DATE	Date/time the geometry was created or last modified in the source database.
*EFFECTIVE_DATETIME	DATE	Date/time the record was created or last modified in the source database.
*SYSTEM_DATETIME	DATE	Date/time the record was created or last modified in the LIO database. The value usually reflects the date and time that the data was published to the LIO Warehouse database.

* = system-populated, no manual input required.

3.6.2 Data Collection Guidelines

The locations of Forestry Aggregate Pits are documented and inspected by MNR Forest operations compliance inspectors. The site locations should be captured by GPS whenever it is practical to do so along with the attribute information listed in section 3.6.1 above. The collected data will be later loaded into the LIO Editor.

3.6.3 Data Maintenance Guidelines

This data class is maintained in the LIO Editor by OMNR District GIS Technicians with input from MNR Forest operations compliance inspectors.

Spatial Data:

Externally prepared digital data (i.e. converted GPS point) for new sites can be imported directly into the LIO editor by using the shapefile import tools.

Depending on its source, the locations of pre-GPS captured sites in the LIO Editor can be manually adjusted against imagery to introduce greater positional accuracy by 'moving' the points to their correct locations as seen in the example below.



Figure 3 Using imagery as a LIO Editor background layer to adjust the spatial locations of Aggregate Category 14 Sites

Attribute Data:

The required attributes for new sites should be passed on to the MNR GIS Technician by the Forest operations compliance inspectors. Every effort should be made to identify FOREST_ROAD_AGG_OPERATOR field values in a standard and consistent manner (i.e. avoid spelling variations) for data querying and grouping purposes.

3.6.4 General Data Access and Viewing

Aggregate Site Unrehabilitated (AGGUNREH) now known as Forestry Aggregate Pit data is unclassified (non-sensitive), but is intended for internal MNR business use only. The data is available for access and viewing via:

- LIO Mapper: Read-only view of the data class is available to all OPS staff account holders.
- NDD: a distributed cut of the data (geodatabase) is provided to all MNR District servers on a regular basis. This version provides direct access to the data to all District MNR staff. The format was formerly known as the NRVIS Data Distribution (NDD) which will likely be given a new reference acronym in the near future.

A data life cycle summary diagram can be found in [Appendix 4](#) of this document.

4.0 Glossary

A glossary of terms and acronyms found in this document.

<u>Term</u>	<u>Description</u>
ALPS	Aggregate and Licence Permit System
Category 14	A term formerly used to categorize aggregate pits used for the construction and maintenance of forest access roads. Since 2010, they are now known as Forestry Aggregate Pits.
DDS	The LIO Warehouse Data Distribution System
GIS	Geographic Information System
GPS	Global Positioning System
LIO	Land Information Ontario
LIO Editor	The MNR's corporate editing tool for its geospatial data
LIOW	Land Information Ontario Warehouse
MNR	Ontario Ministry of Natural Resources
NDD	A distributed cut of the data (geodatabase) is provided to all MNR District servers on a regular basis. This version provides direct access to the data to all District MNR staff. The format was formerly known as the NRVIS Data Distribution (NDD) which will likely be given a new reference acronym in the near future.
NRVIS	Natural Resources Values Information System (replaced by the LIO Editor in June, 2012)
OBM	Ontario Base Map program (now retired)
ROD	The Regional Operations Division of the Ontario Ministry of Natural Resources

Appendix 1: Lookup Table Values

The following lookup tables are used by the LIO Editor and LIO Warehouse databases to control data entry for data class columns with a list of permissible values.

LOCATION_ACCURACY_LIST

A list permissible location accuracy values.

LOCATION_ACCURACY	EXPIRY_DATETIME
Not Applicable	
Over 10,000 metres	
Within 1 metre	
Within 10 metres	
Within 10,000 metres	
Within 100 metres	
Within 1000 metres	
Within 2 metres	
Within 20 metres	
Within 200 metres	
Within 2000 metres	
Within 5 metres	
Within 50 metres	
Within 500 metres	
Within 5000 metres	

MNR_DISTRICT_LIST

A list of administrative OMNR Districts and Regions

DISTRICT_NAME	DISTRICT_CODE	REGION_NAME	EXPIRY_DATETIME
Algonquin Park	AP	Southern	
Aurora	AU	Southern	
Aylmer	AY	Southern	
Bancroft	BA	Southern	
Chapleau	CH	Northeast	
Cochrane	CO	Northeast	
Dryden	DR	Northwest	
Fort Frances	FF	Northwest	
Guelph	CA	Southern	
Hearst	HE	Northeast	
Kemptville	KV	Southern	
Kenora	KE	Northwest	
Kirkland Lake	KL	Northeast	
Midhurst	MH	Southern	
Nipigon	NG	Northwest	
North Bay	NB	Northeast	
Parc Algonquin	AP	Southern	

Parry Sound	PS	Southern	
Pembroke	PE	Southern	
Peterborough	PB	Southern	
Red Lake	RL	Northwest	
Sault Ste. Marie	SM	Northeast	
Sioux Lookout	SL	Northwest	
Sudbury	SB	Northeast	
Thunder Bay	TB	Northwest	
Timmins	TM	Northeast	
Wawa	WW	Northeast	

Appendix 2: Additional Resources

Links to where additional information about the subject matter can be found online are listed below:

1. MNR's [Aggregate Resources Website](#)
2. MNR's [Pits and Quarries Online](#) (map application)
3. Ontario E-Laws: [Aggregate Resources Act](#).
4. [The Ontario Aggregate Resources Corporation](#) – Trustee for the Aggregate Resources Trust (website with useful information about aggregate resources in Ontario)
5. Forest Management Directives and Procedures memo re: [Forestry Aggregate Pits](#) (formerly known as Aggregate Category 14 Sites).
6. As this guide contains time-stamped information from the time of authoring, it is recommended that the official LIO Metadata records for the Aggregates data classes be consulted for up-to-date dataset and business area contact information. Links to the LIO Metadata records are provided below:
 - a. [Aggregate Site Authorized](#)
 - b. [Aggregate Inspector Jurisdiction](#)
 - c. [Aggregate Designated Area](#)
 - d. [Aggregate Extraction Area](#) ³
 - e. [Aggregate Site Unrehabilitated](#) ³
 - f. [Aggregate Category 14 Site](#) ³ (Forestry Aggregate Pit)
7. LIO Support – LIO Support staff will provide assistance and field any questions about any of the aggregate data classes, LIO Warehouse and [LIO Editor](#). Email: lio@ontario.ca or Telephone: 705-755-1878

³ Internal-facing MMT record: you must be signed into MMT account to view record.

Appendix 3: Responsibilities of a LIO Data Class Information Owner

When (re)designing and implementing a data class in the LIO and/or LIO Editor databases, the Information Owner (IO) will be required to provide input or approvals along the way.

General responsibilities of an Information Owner

- Looks after the health and standards for a particular data set
- Responsibility for the data generally resides with one business area
- Information Owner may delegate day-to-day tasks to other organizations

Information Management Life Cycle

The following steps are often followed when designing a new or re-designing an existing data class: Project identification and management, Data analysis & design, Database implementation, Data compilation, Data loading, Data access, Data maintenance, and Database changes (aka enhancements).

Specific Information Owner Tasks

1. a) For an enhancement (small change) provide input to steps 2 to 7
b) For projects (major change or new data set) write or assist the data analyst in the writing of a project justification, charter, plan and close out documentation and approve final documents. Proceed to steps 2 to 7.

2. Data Analysis & Design

Provide access to business experts for the analysis process. Approve final design.

3. Database Implementation

- Review and sign off on the LIO physical model (data description document).
- Review the LIO Editor implementation, before rollout, if required.

4. Data Compilation

- Create a data package (i.e. file geodatabase) to be loaded into LIO and LIO editor databases. When applicable, an IO's business area can also load their data directly using the LIO Editor's import tools. Proceed to step 5

5. Data loading

- Load the data into the LIO Editor. If the dataset is very large (thousands of features) and/or complex (many child tables), assist the LIO database load team with any file geogatabase load issues.

6. Data Access

- Create and later regularly maintain metadata record via the LRC's Metadata Management Tool (MMT).
- Test data export from LIO warehouse via the Data Distribution System (DDS).

7. Data maintenance

- Maintain the data, if applicable.
- Ensure data entry standards are met (via user-guides, training).
- Update the MMT record to reflect data's current status and geographic extent.

8. Database Changes

- For small changes (aka *enhancements*) – contact LIO support line and submit request. Once approved and assigned to a data analyst, steps 1a to 6 are followed.
- For larger changes requiring new data models – contact your Information Management Coordinator or the GIS Data Services Section Manager. Projects need to be submitted to the GIB Project Management Office for review and approval. Once approved follow step 1b to 6

9. Engaging and Keeping Communications Open with the User Community

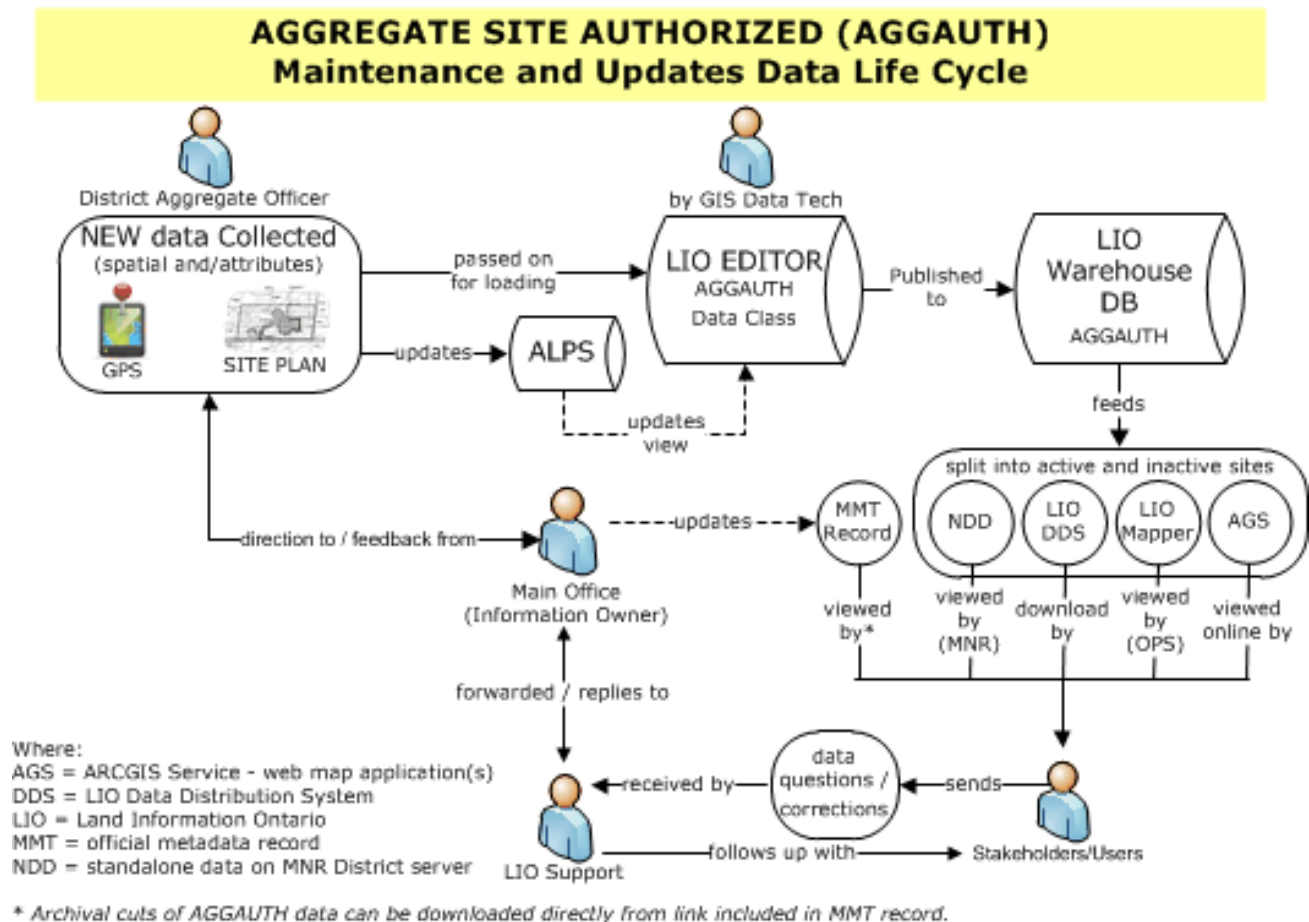
This is very important for a data owner to keep in mind when tackling steps 1to 8. Informing and engaging the user-community of any changes that may impact how they access or use the data will have beneficial spin-off.

Appendix 4: Aggregate Data Classes Life Cycle

A visual data maintenance and update summary of the Aggregate data classes.

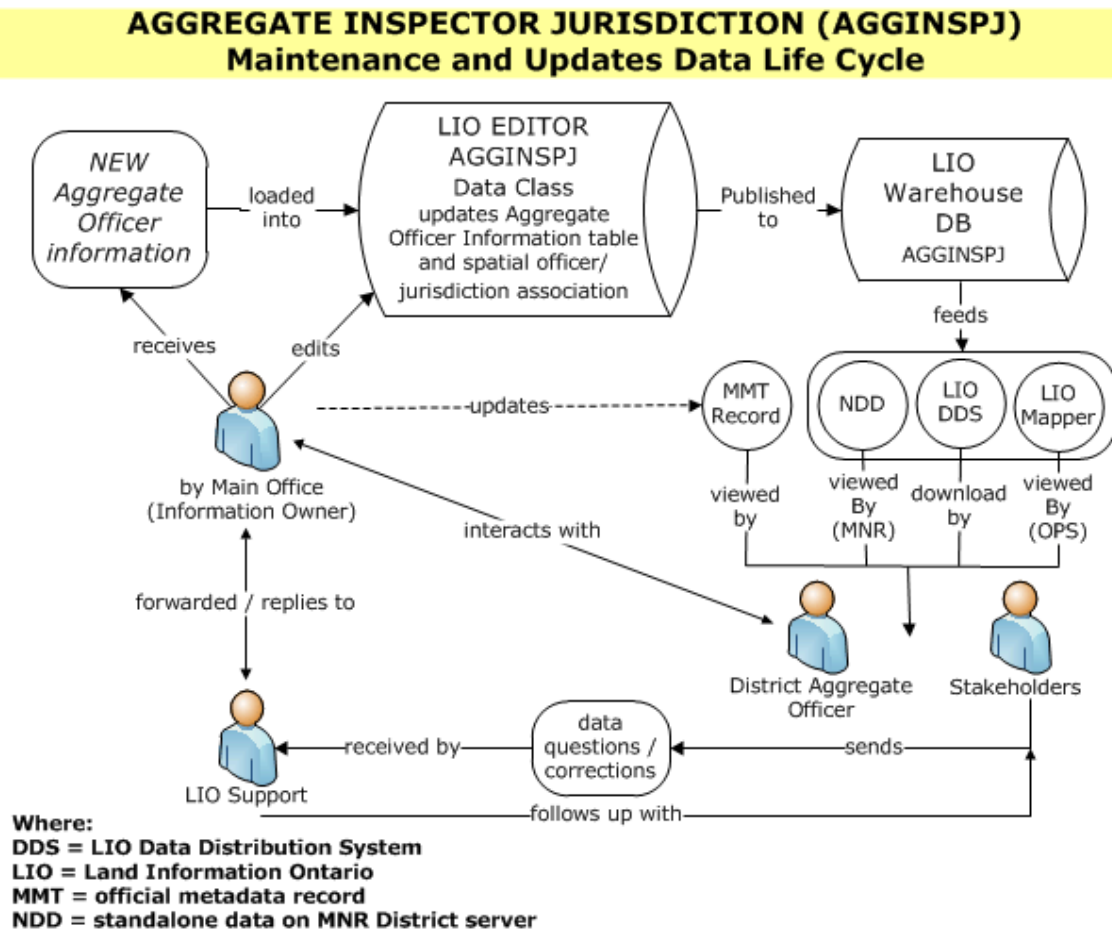
Life Cycle Diagram for: Aggregate Site Authorized

The diagram below summarizes the data maintenance and update process for the Aggregate Site Authorized data class described in Sections [3.1.2](#) , [3.1.3](#) and [3.1.4](#) of this document.



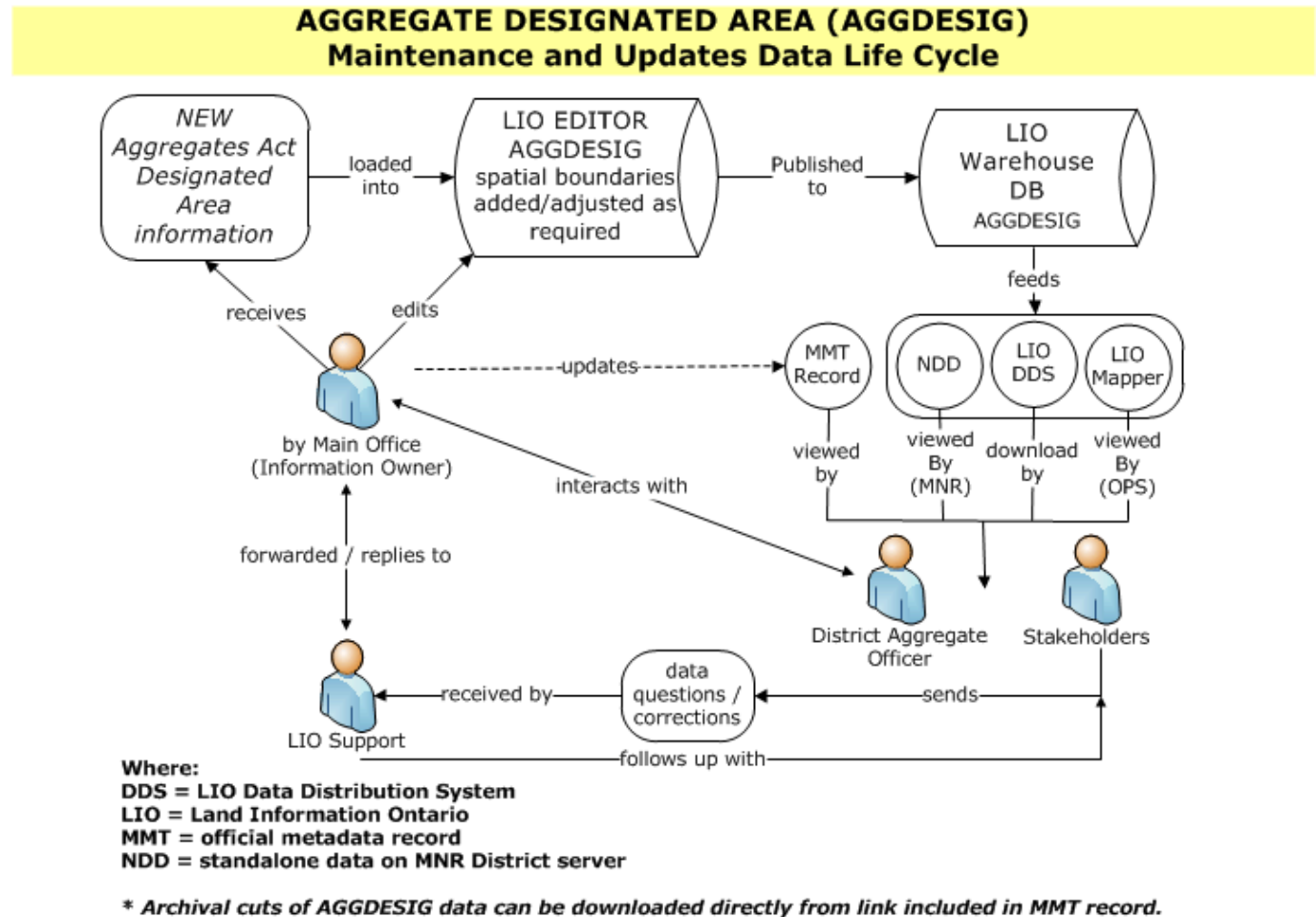
Life Cycle Diagram for: Aggregate Inspector Jurisdiction

The diagram below summarizes the data maintenance and update process for the Aggregate Inspector Jurisdiction data class described in Sections [3.2.2](#) , [3.2.3](#) and [3.2.4](#) of this document.



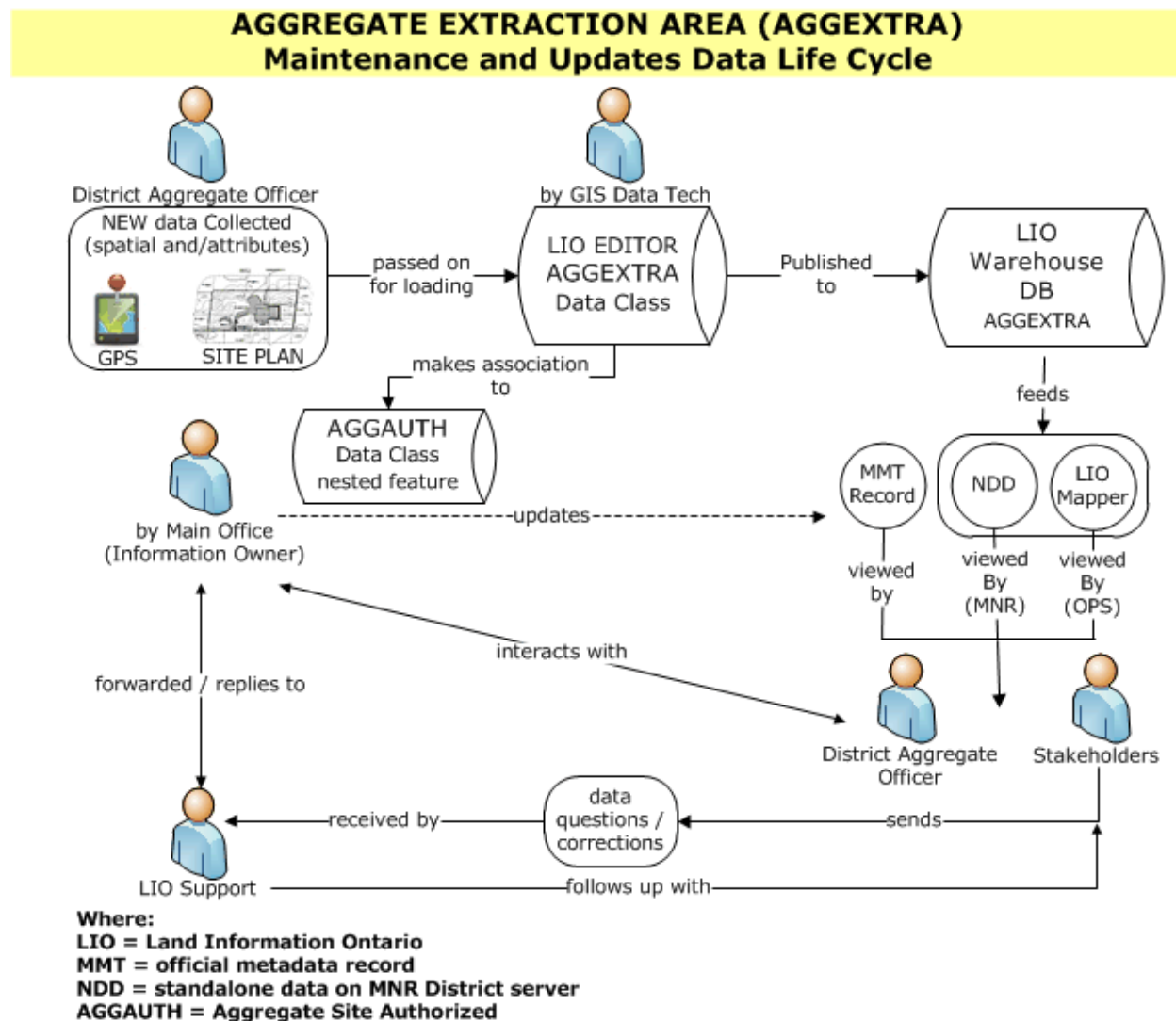
Life Cycle Diagram for: Aggregate Designated Area

The diagram below summarizes the data maintenance and update process for the Aggregate Designated Area data class described in Sections [3.3.2](#) , [3.3.3](#) and [3.3.4](#) of this document.



Life Cycle Diagram for: Aggregate Extraction Area

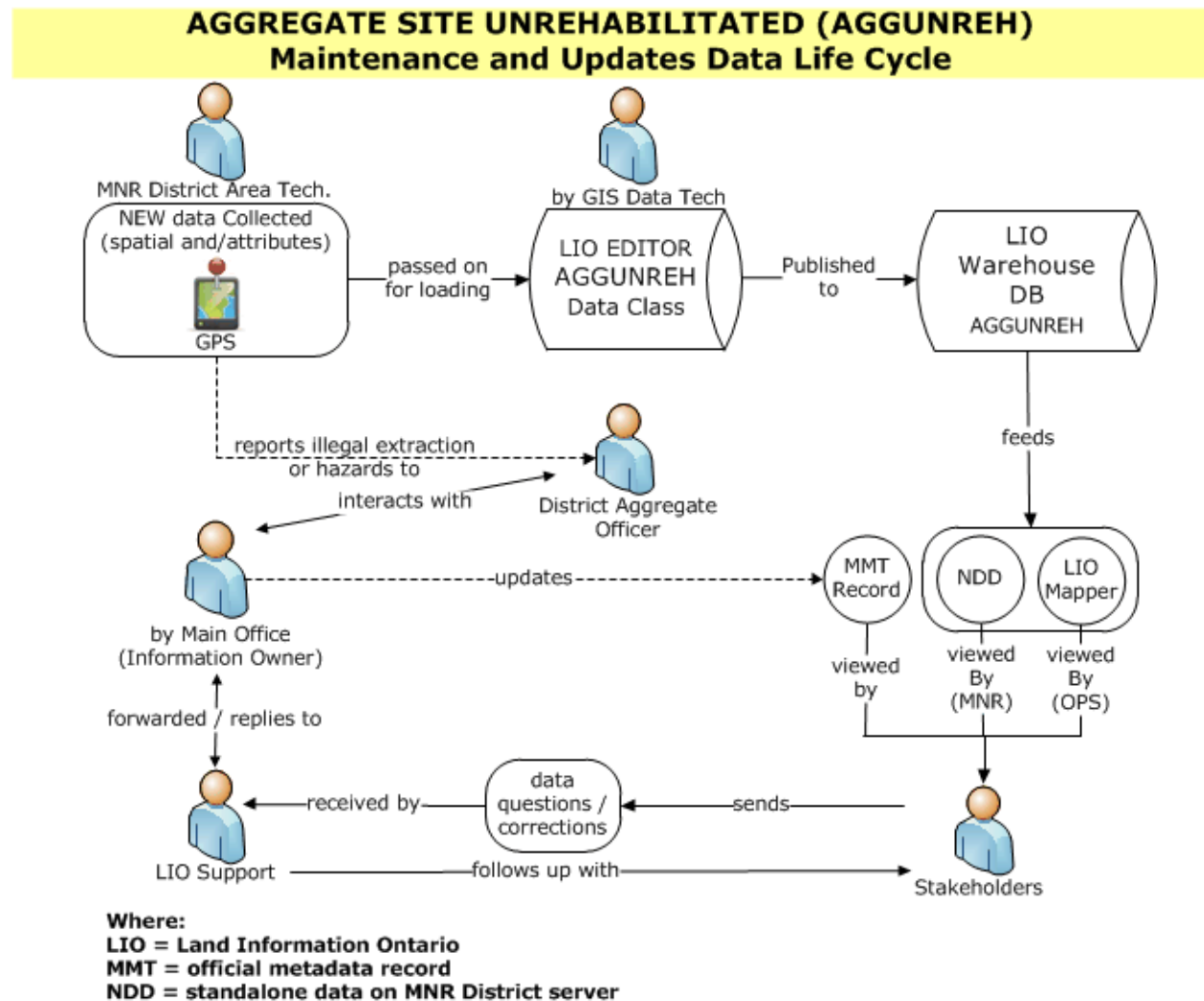
The diagram below summarizes the data maintenance and update process for the Aggregate Extraction Area data class described in Sections [3.4.2](#) , [3.4.3](#) and [3.4.4](#) of this document.



Note: Aggregate Extraction Area data are intended for internal MNR use only.

Life Cycle Diagram for: Aggregate Site Unrehabilitated

The diagram below summarizes the data maintenance and update process for the Aggregate Site Unrehabilitated data class described in Sections [3.5.2](#) , [3.5.3](#) and [3.5.4](#) of this document.



Life Cycle Diagram for: Aggregate Category 14 Site (Forestry Aggregate Pit)

The diagram below summarizes the data maintenance and update process for the Aggregate Category 14 Site data class (now known as Forestry Aggregate Pit) described in Sections [3.6.2](#) , [3.6.3](#) and [3.6.4](#) of this document.

