**MSC Forecast Location Polygon Package**

**(Based on MSC Geography V6.0.0beta)**

**1.0 Introduction**

The Information Strategy Unit (ISU) of the Service Strategies and Standard Section (SSS), part of the National Programs and Business Development Divisionunder the and Prediction Services Directorate of the Meteorological Services of Canada (MSC), is responsible for maintaining a standardized package of GIS (Geographical Information System) based forecast location shape files and polygons.

The current package is version 6.0.0beta and corresponds to the operational environment **expected to be in place in May 2018.** The exact date and time will be known closer to the time of implementation as the data and time are all based on a number of factors including the state of the weather across the country. No implementations occur during times of extreme weather.

Since the version 4 of the Geography package, a significant number of issues related to polygon boundaries and attribute fields were identified and addressed. In version 5 these updates were completed. Since version 5, an errata file (see section on “Errata File” in this document) has been maintained; and starting with version 5.0.1, it is available as part of the package. This Errata file is a living file and lists issues and errors that have been addressed since the previous version 5.0.3 and will list other known issues and errors that will be addressed going forward. These errata include missing polygon boundaries; corrections to existing polygon boundaries; and, on the attribute side, missing attributes; and corrections to existing attributes.

In addition, when advancing from version 4 to version 5, a need for many new attributes was also identified. As a result, work was carried out to update the existing polygon attribute information. The package now includes a number of shape files and polygon sets, categorized by several layers, all with their associated attribute information. The section below is a short description of the content of the polygon package.

Back in early 2014, version 5.1.0 was released with a number of boundary changes along with attribute metadata updates. Version 5.2.0 was released shortly after version 5.1.0 to meet the operational requirements for July, 2014 reference implementation. The release of version 5.3.0 in early 2015 was to introduce a number of new derived polygon sets and a set of coverage map images, along with a few boundary and attribute metadata changes which are listed in the errata file.

Since the release of version 5.3.0, changes to a number of polygon boundaries were introduced in many regions in Manitoba resulting in new zones along with updates to various metadata and attributes. The version 5.4.0 was released in August, 2015 to include these boundary changes and also to introduce new exaggerated digital sets (for both land and water) that were based on different technique to generate all exaggerated derived sets. The release of current version, 5.4.1 is an attempt to make metadata corrections that were discovered in 5.4.0 and also to go back to the original exaggerated digital set but with a significant reduction of the number of vertices in each polygon. A brief description of the method used in generating the new exaggerated set with a reduced number of vertices is discussed in 2.3.

Version 5.4.2 is another quick attempt to make a few metadata corrections that were discovered in 5.4.1. In addition to that, a significant number of overlapping polygons that were found in version 5.4.1 exaggerated sets have been redrawn. Also, this package contains a few KML (KMZ) files due to requests received from some of the packager users. The available KML files are listed in the section 6.0. In the future, more KML files may be available.

The main objective of the release of version 5.5.0 was two-fold. It was first, to introduce a new derived set and then to update some existing derived sets with some additional sites. As usual, any outstanding metadata corrections/issues found in the errata file were also addressed in this version as well as in the Version 5.5.1 which was released immediately after the 5.5.0.

In November 2016, the version 5.6.0 which contained various minor boundary changes, a few metadata corrections and a new addition (Vanderhoof) to the existing Air Quality derived set was released. Most boundary changes are associated with removal of small slivers or gaps between polygons. In addition to that, correcting of some self-intersected polygons and some small boundary adjustments were also addressed. Metadata corrections only include some English and French polygon name changes. As usual, any outstanding metadata corrections/issues found in the errata file were also addressed.

Version 5.7.0 was released in February 2017 to include some major boundary changes in British Columbia and a few boundary changes in Alberta. Also, in the AQStd set, the location that represented Marystown had been removed and a new location (Bruin) had been added. Another significant change in that version was the use of Topology rules/analysis to find gaps and overlaps in both land and water polygon sets. This effort significantly improved the polygon boundaries, especially by giving a reduced number of vertices in most polygons in the exaggerated base sets.

The purpose of releasing the version 5.8.0 is two-fold, first to add four new Air Quality sites and then to introduce a new dataset associated with Common Alerting Protocol (CAP), Canadian Profile (CP). Public Alerting in Canada uses a CAP-CP geo-coded set and Environment and Climate Change Canada (ECCC) references this CAP-CP in our CAP products. Presently ECCC maps to CAP-CP version 0.4 beta with the anticipation of the version 1.0 being used as the reference of near future. In addition to these changes, most metadata corrections listed in the errata file was also addressed.

When moving forward from version 5 to version 6, a need for more update underlying basemap was more apparent. The polygon boundary files in both versions 4 and 5 were created and used for the shorelines for the forecast regions was the Digital Chart of the World (DCW) 1:1,000,000 dataset. In 2011, they were updated by the GeoSpatial office and handed over to the group for further editing. Datasets in both versions show some degree of a misalignment in some areas along the shoreline and provincial boundaries, likely due to the scale and projection of the underlying dataset. In order to minimize the misalignment, research was carried out to find a more up to-date base map to replace the current underlying base map that was used in creating the existing polygon boundary files. Through consultation with the National Resources Canada (NRCan), using one of their product known as “CanVec” was recommended in adjusting the polygon boundaries in version 5, to regenerate the shorelines for the forecast regions in version 6 of the geography package.

CanVec is a digital cartographic reference product of Natural Resources Canada (NRCan). It originates from the best available data sources covering Canadian territory, offers quality topographical information in vector format, and complies with international geomatics standards. CanVec is a multi-source product coming mainly from the National Topographic Data Base (NTDB), the Mapping the North process conducted by the Canada Center for Mapping and Earth Observation (CCMEO), the Atlas of Canada data, the GeoBase initiative, and the data update using satellite imagery coverage (e.g. Landsat 7, Spot, Radarsat, etc). CanVec contains more than 60 topographic entities organized into 8 distribution themes (Transport Features, Administrative Features, Hydro Features, Land Features, Man-Made Features, Elevation Features, Resource Management Features, and Toponymic Features).

Along with this new underlying base map, a number other modification have been applied to this latest version. In addition to the three polygon base sets (exaggerated digital, cartographic coarse and cartographic detailed) in previous versions, another set, known as “Hybrid” has been added to the package. Boundaries of the forecast regions of this hybrid set are derived from the polygon boundaries of both the exaggerated digital, and the cartographic detailed set. Polygon boundaries along the shoreline of this set follow the exaggerated boundaries while the inland boundaries follow the detailed lines. This change reflects in both water and land, resulting two more new base polygon sets, but only “land\_basezone\_hybrid” is available in version 6.0.0beta

Another change in this latest version from the previous version is includes introduction of a number of inland water bodies. These new waterbodies range from new lakes to major rivers across the country.

Modifications to the attribute fields of polygon sets is another development found in this version 6.0.0beta. These changes include renaming of the existing attribute field “CLC\_V5” and introducing a new field, “FEATURE\_ID” to uniquely identify any given forecast zone across any polygon set.

Finally, in this version, the derived sets are grouped into two categories, ‘internal” and “external”. The reason for this is that in the past some of these sets had been identified incorrectly as derived which are actually not derived but are worked on directly, and the details of which are controlled by organizations external to MSC. Detailed explanation of this categorization can be found in Section 3.0.

**2.0 Classification**

Within this GIS polygon package 6.0.0beta, there are 180 individual polygon sets available. All sets except one are classified across several Business defined MSC “Layers” of information. The layers are categorized based on business need and are defined as follows…

1. **Business Usage** “ (public standard zones, marine standard zones, tsunami standard zones, etc….),
2. “**Kind**” (land or water),
3. “**Coverage Depiction**” (exaggerated digital, cartographic coarse and cartographic detailed, hybrid), and
4. “**Projection**” (projected and unprojected).

Shape file sets have been constructed for each intersection of these layers. Every possible intersection, such as “water\_MarStdZone\_detail\_proj”, has a corresponding set and users can therefore choose the necessary set, or sets, for their needs based on the layers listed above and defined below. Figure 1 below illustrates the intersection of three of these layers (Kind, Coverage Depiction and Business Usage) within the projected layer, representing the “water\_MarStdZone\_detail\_proj” set. This includes the water locations of interest that are part of the Marine program standard areas, in a high resolution (detailed) depiction. The government of Canada standard projection layer used here is the Lambert Conformal Conic projection. There are equivalent sets that are unprojected.



Figure 2.1 – Polygon set – water\_MarStdZone\_detail\_proj

The exceptional layer that refers to the CAP-CP Geo-Coded set is defined and derived using the following criteria.

1. **No Business Usage** “ (public standard zones, marine standard zones, tsunami standard

 zones, etc….),

2. “**Kind**” (land and water),

3. “**Coverage Depiction**” (only cartographic detailed), and

4. “**Projection**” (only unprojected).

**2.1 MSC Referenced Business Usages**

Starting from our own **base** polygon sets, business usage sets are derived and will be kept up to date and made available through new versions of the package. Our **base** set is a collection of polygons where each distinctive polygon represents the smallest defined location where a business need can be addressed or fulfilled without making the location any smaller. Polygons for all MSC business usages can be constructed from one or more of these base layer polygons. Using what the MSC business program defines as distinct forecast locations, sets of polygons are generated by merging (dissolving) one or more base polygons.

Each business usage may involve one or both of the following types of forecast locations…

1. “**Zone**” (bounded with measureable area within the closed boundaries),
2. “**Site** “ (un-bounded with no measureable area as the boundaries are not closed)

The Business usage name will include either “Zone” or “Site” in the name.

Table 1 below lists all the different business usage layers with their usages described in this package.

|  |  |  |
| --- | --- | --- |
| **Business Usage**  | **MSC Reference** | **Description** |
| CLCBaseZone | Services Standard | All geographically defined locations of interest at the base[[1]](#footnote-1) level of “location” encoding for Dissemination interests within MSC. This Set includes both land and water encoded base zone “locations” that have a defined area (i.e. where a closed polygon exists with a measurable bounded area) |
| CLCBaseSite | Services Standard | All geographically defined locations of interest at the base1 level of “location” encoding for Dissemination interests within MSC. This Set includes only land base site “locations” as no water sites are yet defined |
| PubStdZonePubStdSiteL | Public Program Standard | Public program forecast locations at the Public program standard[[2]](#footnote-2) level; used in most forecasts, warnings, watches, advisories and special weather statements. |
| PubMesoZone | Public Program Mesoscale | Public program forecast locations at the Public program meso[[3]](#footnote-3) level; used in some warnings where smaller locations are preferred when describing the subject event of the warning. The meso level division is regionally dependent |
| PubCovZone(Replaces all three public coverages- PubWO, PubWW and PubWUF) | Public Program Coverages | Defined geographical coverages[[4]](#footnote-4) for Public program WW alerting products (most warnings, watches and some advisories) by province. |
| MarStdZone | Marine Program Standard | Marine program forecast locations at the Marine program standard2 above level; used in most Marine forecasts, warnings, watches, advisories and special marine weather statements. |
| MarSubZone | Marine Program SubAreas | Marine program forecast locations at the subarea3 level; used in some Marine program warnings. |
| TsuStdZone | Tsunami Program Standard | Tsunami program forecast locations at the Tsunami program standard2 level; used in Tsunami program warnings, watches, and advisories. |
| UGCStdZone | UGC Standard | Tsunami program forecast locations at the Tsunami program sub region[[5]](#footnote-5) level; used in Alaskan Tsunami Centre warnings, watches and advisories. |
| AQStdZoneAQStdSitePAQStdSiteL | Air Quality ProgramStandard | Air Quality program forecast locations at the Air Quality program standard2 level; used in Air Quality program forecasts, warnings and advisories. |
| CAPCPStdZone | CAP CP Standard | CAP (Common Alerting Protocol) – CP (Canadian Profile) reference locations at the standard2 level; used in some CAP Alert messages. NOTE: this set presently contains only the forthcoming marine CAP-CP version 1.0 locations. |
| HurStdZone | Hurricane Program Standard | Hurricane program forecast locations at the Hurricane program standard2 level; used in all Hurricane program warnings and watches. |
|  |  |  |
| IceStdZone | Ice Program Standard | Ice program forecast locations at the Ice program standard2 level; used in all Ice program warnings.  |
| IceSubZone | Ice Program Sub Areas | Ice program forecast locations at the Ice program subarea3 level; used in some Ice program warnings.  |
| MarMACanZone(previously known as MarMAStdZone) | Marine Program MetArea Standard | Marine program forecast locations at the Marine program MetArea standard2 level; used in Marine program MetArea warning and forecast products.  |
| IceMAStdZone | Ice Program MetArea Standard | Ice program forecast locations at the Ice program MetArea standard2 level; used in Ice program MetArea forecast products.  |
| MarMAUSZone | Marine Program MetArea US | Marine program forecast locations at the Marine program MetArea standard2 level; may be used in contingency forecasting with our U.S. partners in the future regarding MetAreas.  |
| MarMADenZone | Marine Program MetArea Danish | Marine program forecast locations at the Marine program MetArea standard2 level; may be used in contingency forecasting with our Danish partners in the future regarding MetAreas.  |
| TsuBPCanSite(Previously known as TsuBPCSite) | Tsunami Program  | Tsunami breakpoint locations used in the Canadian Tsunami alerting program. |
| TsuBPUSite | Tsunami Program | Tsunami breakpoint locations from the Alaskan Tsunami Centre used in the Canadian Tsunami program. |
| TsuWACanSite(Previously known as TsuWACSite) | Tsunami Program | Tsunami wave arrival locations used in the Canadian Tsunami program. |
| TsuWAUSite | Tsunami Program | Tsunami wave arrival locations from the Alaskan Tsunami Centre used in the Canadian Tsunami program. |
| TSUCov(Previously known as TsuWECovZone) | Tsunami Program | Defined geographical coverages4 above for Tsunami program WE alerting products (warnings, watches and advisories) by province. |
| MarCov(Previously known as MarWHCovZone) | MarineProgram | Defined geographical coverages4 above for Marine program WH alerting products (warnings) by waterbody. |
| AQHICov(previously known as AQHIWOCovZone) | Air Quality Program | Defined geographical coverages4 above for Air Quality program WO alerting products (Special Air Quality Statements) |
| AQICov(previously known as AQIWLCovZone) | Air Quality Program | Defined geographical coverages4 above in Southern Quebec for Air Quality program WL alerting products (AQI smog warnings) |

Table 2.1 – Business Usages for forecast products within MSC programs

**2.2 Kind**

Business programs within MSC are often constrained to a mainly “land only” or “water only” operation. Therefore the sets for those Business usages primarily include only land or water polygons with a few minor exceptions. Below is a table that indicates this primary usage.

|  |  |
| --- | --- |
| **Business Usage** | **Kind** |
| CLCBaseZone | Land  |
| CLCBaseZone | Water |
| CLCBaseSiteL | Land |
| CLCBaseSiteP | Land |
| PubStdZone | Land |
| PubStdSiteL | Land |
| PubMesoZone | Land |
| PubCov | Land |
| MarStdZone | Water |
| MarSubZone | Water |
| TsuStdZone | Land |
| UGCStdZone | Land |
| AQStdZone | Land |
| AQStdSiteP | Land |
| AQStdSiteL | Land |
| CAPCPStdZone | Water |
| HurStdZone | Land |
| IceStdZone | Water |
| IceSubZone | Water |
| MarMACanZone | Water |
| IceMAStdZone | Water |
| MarMAUSZone | Water |
| MarMADenZone | Water |
| TsuBPCanSite | Land |
| TsuBPUSite | Land |
| TsuWACanSite | Land |
| TsuWAUSite | Land |
| TSUCov | Land |
| MarCov | Water |
| AQHICov | Land |
| AQICov | Land |

Table 2.2 – Business Usages and the Kind for forecast products within MSC programs

**2.3 Coverage Depiction**

Coverage Depictions represent the amount of boundary detail that is provided in the sets of polygons available in the layer. In the Cartographic detailed and coarse depictions, each location can be represented by one or more polygons. The detailed depiction shapes have the most polygons and are the most accurate and visually correct representation of the identified location. The coarse depiction shapes will generalize the shape boundaries down to a coarse representation. In the detailed sets, small and large islands will be present whereas in the coarse sets, only the larger islands will be present. In other cases, such as when a river divides a location, multiple polygons will exist in both the detailed and coarse sets.

In earlier versions, the base exaggerated polygon set that we used to generate the derived exaggerated usage sets was created by extending the shoreline boundary out to fully envelope any terrestrial-based (island or otherwise) polygons. Conversely, this was also done inland for marine based polygons. Consequently, this resulted in a polygon that, at times, grossly exaggerated the shoreline areas.

As mentioned earlier, the hybrid depiction shapes are composed of exaggerated and detail, using exaggerated boundaries for shorelines while inland boundaries are drawn from the detail polygon out lines. In this version, since work is still continuing to finalize the water hybrid base set, only land based hybrid derived sets are included in the package.

**2.4 Projection**

In this polygon package, sets of polygons are presented based on two coordinate systems, “Projected” and “Unprojected”. Below is a short description of the projection of each of them.

These, like all the other classifications of the polygons, are known as layer within this package.

A geodetic datum is a spatial reference system that describes the shape and size of the earth, and establishes an origin for coordinate systems while projection metadata describe the characteristics of the spatial reference system that was used to geo-reference a particular dataset.

* Projected Coordinated System
	+ Two-dimensional planar surface. three dimensional earth’s surface /space is transformed to two-dimensional surface-projection)
	+ Two axis – x-axis representing east-west and y-axis representing north-south
	+ Datum is D\_North\_American\_1983
	+ Additional components include;
		- projection - Lambert\_Conformal\_Conic
		- False\_easting (a linear value applied to the origin of the x-coordinates ) – 620000000.000000
		- False\_Northing (a linear value applied to the origin of the y-coordinates) – 30000000.000000
		- Central meridian - -91.866666667
		- Standard\_parallel 1 -49.00000000
		- Standard\_parallel\_2 – 77.00000000
* Unprojected Coordinate System - Geographical Coordinated System (GCS)
	+ Three-dimensional reference system
	+ The unit of measure is decimal degrees
	+ Point has two coordinate values: latitude and longitude measured in angles
	+ Prime meridian is Greenwich
	+ Datum is D\_North\_American\_1983

Table 2.3 and Table 2.4 list the 180 polygon sets by name that is available in 6.0.0beta.

|  |  |
| --- | --- |
| **Program/Business Usage** | **Projected** |
| Services CLCBaseZone | land\_CLCBaseZone\_coarse\_projland\_CLCBaseZone\_detail\_projland\_CLCBaseZone\_exag.projland\_CLCBaseZone\_hybrid.projwater\_CLCBaseZone\_coarse\_projwater\_CLCBaseZone\_detail\_projwater\_CLCBaseZone\_exag\_proj |
| PublicPubStdZone PubMesoZonePubStdSiteLPubCov | land\_PubStdZone\_coarse\_projland\_PubStdZone\_detail\_projland\_PubStdZone\_exag\_projland\_PubStdZone\_hybrid\_projland\_PubMesoZone\_coarse\_projland\_PubMesoZone\_detail\_projland\_PubMesoZone\_exag\_projland\_PubMesoZone\_hybrid\_projland\_PubStdSiteL\_coarse\_projland\_PubStdSiteL\_detail\_projland\_PubStdSiteL\_exag\_projland\_PubCov\_detail\_proj |
| MarineMarStdZone MarSubZoneCAPCPStdZoneMarCov | water\_MarStdZone\_coarse\_projwater\_MarStdZone\_detail\_projwater\_MarStdZone\_exag\_projwater\_MaSubZone\_coarse\_projwater\_MarSubZone\_detail\_projwater\_MarSubZone\_exag\_projwater\_CAPCPStdZone\_coarse\_projwater\_CAPCPStdZone\_detail\_projwater\_CAPCPStdZone\_exag\_projwater\_MarCov\_detail\_proj |
| Marine - MetAreaMarMACanZone IceMAStdZoneMarMAUSZone MarMADenZone | water\_MarMACanZone\_coarse\_projwater\_MarMACanZone\_detail\_projwater\_MarMACanZone\_exag\_projwater\_IceMAStdZone\_coarse\_projwater\_IceMAStdZone\_detail\_projwater\_IceMAStdZone\_exag\_projwater\_MarMAUSZone\_coarse\_projwater\_MarMAUSZone\_detail\_projwater\_MarMAUSZone\_exag\_projwater\_MarMADenZone\_coarse\_projwater\_MarMADenZone\_detail\_projwater\_MarMADenZone\_exag\_proj |
| TsunamiTsuStdZoneUGCStdZoneTsuBPCanSiteTsuBPUSiteTsuWACanSiteTsuWAUSiteTsuCov | land\_TsuStdZone\_coarse\_projland\_TsuStdZone\_detail\_projland\_TsuStdZone\_exag\_projland\_TsuStdZone\_hybrid\_projland\_UGCStdZone\_coarse\_projland\_UGCStdZone\_detail\_projland\_UGCStdZone\_exag\_projland\_TsuBPCanSite\_coarse\_projland\_ TsuBPCanSite \_detail\_projland\_ TsuBPCanSite \_exag\_projland\_TsuBPUSite\_coarse\_projland\_ TsuBPUSite \_detail\_projland\_ TsuBPUSite \_exag\_projland\_TsuWACanSite\_coarse\_projland\_ TsuWACanSite \_detail\_projland\_ TsuWACanSite \_exag\_projland\_TsuWAUSite\_coarse\_projland\_ TsuWAUSite \_detail\_projland\_ TsuWAUSite \_exag\_projland\_ TsuCov \_detail\_proj |
| Air QualityAQStdZoneAQStdSitePAQStdSiteLAQHICovAQICov | land\_AQStdZone\_coarse\_projland\_AQStdZone\_detail\_projland\_AQStdZone\_exag\_projland\_AQStdZone\_hybrid\_projland\_AQStdSiteP\_coarse\_projland\_AQStdSiteP\_detail\_projland\_AQStdSiteP\_exag\_projland\_AQStdSiteL\_coarse\_projland\_AQStdSiteL\_detail\_projland\_AQStdSiteL\_exag\_projland\_AQHICov\_detail\_projland\_AQICov\_detail\_proj |
| HurricaneHurStdZone | land\_HurStdZone\_corase\_projland\_HurStdZone\_detail\_projland\_HurStdZone\_exag\_projland\_HurStdZone\_hybrid\_proj |
| IceIceStdZoneIceSubZone | water\_IceStdZone\_corase\_projwater\_IceStdZone\_detail\_projwater\_IceStdZone\_exag\_projwater\_IceSubZone\_corase\_projwater\_IceSubZone\_detail\_projwater\_IceSubZone\_exag\_proj |

Table 2.3 – Projected Shape files for each program

|  |  |
| --- | --- |
| **Program/Business Usage** | **Unrojected** |
| Services CLCBaseZone | land\_CLCBaseZone\_coarse\_unprojland\_CLCBaseZone\_detail\_unprojland\_CLCBaseZone\_exag\_unprojland\_CLCBaseZone\_hybrid\_unprojwater\_CLCBaseZone\_coarse\_unprojwater\_CLCBaseZone\_detail\_unprojwater\_CLCBaseZone\_exag\_unproj |
| PublicPubStdZone PubMesoZonePubStdSiteLPubCov | land\_PubStdZone\_coarse\_unprojland\_PubStdZone\_detail\_unprojland\_PubStdZone\_exag\_unprojland\_PubStdZone\_hybrid\_unprojland\_PubMesoZone\_coarse\_unprojland\_PubMesoZone\_detail\_unprojland\_PubMesoZone\_exag\_unprojland\_PubMesoZone\_hybrid\_unprojland\_PubStdSiteL\_coarse\_unprojland\_PubStdSiteL\_detail\_unprojland\_PubStdSiteL\_exag\_unprojland\_PubCov\_detail\_unproj |
| MarineMarStdZone MarSubZoneCAPCPStdZoneMarCov | water\_MarStdZone\_coarse\_unprojwater\_MarStdZone\_detail\_unprojwater\_MarStdZone\_exag\_unprojwater\_MaSubZone\_coarse\_unprojwater\_MarSubZone\_detail\_unprojwater\_MarSubZone\_exag\_unprojwater\_CAPCPStdZone\_coarse\_unprojwater\_CAPCPStdZone\_detail\_unprojwater\_CAPCPStdZone\_exag\_unprojwater\_MarCov\_detail\_unproj |
| Marine - MetAreaMarMACanZone IceMAStdZoneMarMAUSZone MarMADenZone | water\_MarMACanZone\_coarse\_unprojwater\_MarMACanZone\_detail\_unprojwater\_MarMACanZone\_exag\_unprojwater\_IceMAStdZone\_coarse\_unprojwater\_IceMAStdZone\_detail\_unprojwater\_IceMAStdZone\_exag\_unprojwater\_MarMAUSZone\_coarse\_unprojwater\_MarMAUSZone\_detail\_unprojwater\_MarMAUSZone\_exag\_unprojwater\_MarMADenZone\_coarse\_unprojwater\_MarMADenZone\_detail\_unprojwater\_MarMADenZone\_exag\_unproj |
| TsunamiTsuStdZoneUGCStdZoneTsuBPCanSiteTsuBPUSiteTsuWACSiteTsuWAUSiteTsuCov | land\_TsuStdZone\_coarse\_unprojland\_TsuStdZone\_detail\_unprojland\_TsuStdZone\_exag\_unprojland\_TsuStdZone\_hybrid\_unprojland\_UGCStdZone\_coarse\_unprojland\_UGCStdZone\_detail\_unprojland\_UGCStdZone\_exag\_unprojland\_TsuBPCanSite\_coarse\_unprojland\_ TsuBPCanSite \_detail\_unprojland\_ TsuBPCanSite \_exag\_unprojland\_TsuBPUSite\_coarse\_unprojland\_ TsuBPUSite \_detail\_unprojland\_ TsuBPUSite \_exag\_unprojland\_TsuWACanSite\_coarse\_unprojland\_ TsuWACanSite \_detail\_unprojland\_ TsuWACanSite \_exag\_unprojland\_TsuWAUSite\_coarse\_unprojland\_ TsuWAUSite \_detail\_unprojland\_ TsuWAUSite \_exag\_unprojland\_ TsuCov \_detail\_unproj |
| Air QualityAQStdZoneAQStdSitePAQStdSiteLAQHICovAQICov | land\_AQStdZone\_coarse\_unprojland\_AQStdZone\_detail\_unprojland\_AQStdZone\_exag\_unprojland\_AQStdZone\_hybrid\_unprojhland\_AQStdSiteP\_coarse\_unprojland\_AQStdSiteP\_detail\_unprojland\_AQStdSiteP\_exag\_unprojland\_AQStdSiteL\_coarse\_unprojland\_AQStdSiteL\_detail\_unprojland\_AQStdSiteL\_exag\_unprojland\_AQHICov\_detail\_unprojland\_AQICov\_detail\_unproj |
| HurricaneHurStdZone | land\_HurStdZone\_corase\_unprojland\_HurStdZone\_detail\_unprojland\_HurStdZone\_exag\_unprojland\_HurStdZone\_hybrid\_unproj |
| IceIceStdZoneIceSubZone | water\_IceStdZone\_corase\_unprojwater\_IceStdZone\_detail\_unprojwater\_IceStdZone\_exag\_unprojwater\_IceSubZone\_corase\_unprojwater\_IceSubZone\_detail\_unprojwater\_IceSubZone\_exag\_unproj |

Table 2.4 – Unprojected Shape files for each program

**3.0 Internal and External sets**

As mentioned in section 1.0, the polygons sets are grouped into two main categories, referred to as “Internal and “External”. The derived polygons sets that are known as “Internal” are generated based on predefined geographical locations that are identified by each MSC programs to meet their business needs. The “External” polygon sets are not derived but are worked on them directly and the details of which are controlled by organizations external to MSC. These external sets are included in our package since MSC program have a business need for them. The shapefiles and their metadata of these external sets are included in our geography package since the values are either used or reported in some business activities within MSC. If the external zones match identically with the MSC zones within any MSC program then the polygon set can be derived using the external information but in this situation set is internal. An example of this is UGC standard set, Tsunami program forecast locations at the Tsunami program sub region level, used in Alaskan Tsunami Centre warnings, watches and advisories.

We accredit the actual owners of this information and indicate that MSC is only a user/partner.

The actual owners of this information are accredited with an indication to the reader that we are only a user/partner ourselves. Furthermore, the shapes and metadata align with our internal polygon sets and if users want a consistent look across all ECCC alert products, they can get that look from us as one source.

The table 3.1 and 3.2 list the Internal and external polygon sets within the geography package.

|  |  |
| --- | --- |
| Program | Polygon Set |
| Services | CLABaseZone - land and waterCLCBaseSiteLCLCBaseSiteP |
| Public | PubStdZonePubMesoZonePubstdsiteLPubCov |
| Marine | MarStdZoneMarSubZoneMarMACanZoneCAPCPStdZoneMarCov |
| Air Quality | AQStdZoneAQStdSitePAQStdSiteLAQHICopvAQICov |
| Hurricane | HurSTdZone |
| Ice | IceStdZoneIceSubZoneIceMAStdZone |
| Tsunami | TsuStdZoneTsuCovTsuBPCanSiteTsuWAcanSite |

Table 3.1 – Internal polygon sets

|  |  |
| --- | --- |
| Program | Polygon Set |
| Marine | CAP-CPMarMADenZoneMarMAUSZone |
| Tsunami | TsuBPUSiteTsuWAUSiteUGCStdZone |
| All | North\_America\_boundary |

Table 3.2 – External polygon sets

**4.0 CAP-CP geo-coded set**

As previously described, the CAP-CP geo-coded set is derived for both land and water together. The coverage depiction has been chosen as cartographic detailed where projection is in Geographical Coordinated System (unprojected). In the current package, this dataset is available in two formats, as a shapefile and also in EXCEL format.

**5.0 Geometry Files**

Additional CSV-files (geometry files) exist in the package, and contain the geometry information for each location in CSV form, for both land and water as well as for all business usages. The geometry file is extracted from the exaggerated layer since that is the only layer where single polygons exist and the ability to extract the geometry can be done without complications.

The geometry file is derived from the unprojected (Geographical coordinated system, CGS) layer and the resulting text file in ASCII format is referred to as “geometry.txt”. Each zone of the derived polygon set is listed with its POLY\_ID[[6]](#footnote-6), PRIME\_ID, NAME[[7]](#footnote-7), NOM[[8]](#footnote-8) and the CLC[[9]](#footnote-9) FEATURE\_ID10 attribute values followed by the latitude and longitude in decimal degrees of each vertex of the polygon it is made of.

These geometry files are named using the business usage as the prefix. For example, the geometry file for the PubStdZone polygon set would be PUBSTDZONE\_geometry .csv.

**6.0 KML (KMZ) files**

Due to a noticeable demand, generating KML (Keyhole Markup Language) files for some selected polygon sets were considered. It is a geographic Information system format. As a start, two derived sets, projected, Public standard and Public Meso were chosen, hoping to have a complete set of KML/KMZ files in future versions. The files are available in KMZ format which is a compressed form of the KML that can be opened by Google Earth and Google Maps, two Google applications that deal with geographic images.

**7.0 Polygon Package Locations**

All 180 polygon sets make up version 6.0.0beta of the Forecast Location polygon package and are available in zip files broken down by the most commonly requested subsets of the whole. The files and where they can be found are listed below.

FTP site

The following files can be found in “version\_6\_0\_0\_final” folder. The user can decide on the files they need by choosing between projected and unprojected land and water based zip files.

|  |  |
| --- | --- |
| **File name (.ZIP)** | **Business Usage** |
| Documentation | Appendice\_Emplacements\_de\_Previsions\_V6\_0\_0beta.docAppendix\_Forecast\_Locations\_V5\_6\_0.docForecast\_Locations\_Emplacements\_de\_Previsions\_V\_6\_0\_0beta.xlsxMSC\_GIS\_Polygon\_Package\_Errata\_V\_6\_0\_0beta.docMSC\_GIS\_Readme\_V\_6\_0\_0beta\_E.docMSC\_GIS\_Readme\_V\_6\_0\_0beta\_F.docCAP-CP\_GEOCODES\_V\_6\_0\_0beta.xlsx |
| MSC\_ GIS\_ Polygon\_ Pkg\_V6\_0\_0beta\_Land\_Geometry | Land geometry - CLCBASEZONE\_LAND, CLCBASESITEL, CLABASESITEP, PubStdZone, PubStdSiteL, PubMesoZone, TsuStdZone, UGCStdZone, AQStdZone, AQStdSiteP, AQStdSiteL, HurStdZone, , TsuBPCanSite, TsuBPUSite, TsuWACanSite, TsuWAUSite |
| MSC\_ GIS\_ Polygon\_ Pkg\_V6\_0\_0beta\_Water\_Geometry | Water geometry – CLCBASE\_WATER, MarStdZone, MarSubZone, CAPCPStdZone, IceStdZone, IceSubZone, MarMAStdZone, IceMACanZone, MarMAUSZone, MarMADenZone,  |
| MSC\_ GIS\_ Polygon\_ Pkg\_V6\_0\_ 0beta\_Land\_ProjMSC\_ GIS\_ Polygon\_ Pkg\_V6\_0\_0beta\_ Land\_Unproj | CLCBaseZone(land), PubStdZone, PubStdSiteL, PubMesoZone, PubCov, TsuStdZone, UGCStdZone, AQStdZone, AQStdSiteP, AQStdSiteL, HurStdZone, TsuBPCanSite, TsuBPUSite, TsuWACanSite, TsuWAUSite, TsuCov, , AQHICov, AQICov |
| MSC\_ GIS\_ Polygon\_ Pkg\_V6\_0\_0beta\_ Water\_ProjMSC\_ GIS\_ Polygon\_ Pkg\_V6\_0\_0beta\_ Water\_Unproj | CLCBaseZone (water), MarStdZone, MarSubZone, CAPCPStdZone, IceStdZone, IceSubZone, MarMACanZone, IceMAStdZone, MarMAUSZone, MarMADenZone, MarCov,  |
| MSC\_ GIS\_ Polygon\_ Pkg\_V6\_0\_ 0beta\_Land\_KMZ | land\_PubStdZone\_coarse.kmz,land\_PubStdZone\_detail.kmz,land\_PubStdZone\_exag.kmz, land\_PubMesoZone\_coarse.kmz, land\_PubMesoZone\_detail.kmz, land\_PubMesoZone\_exag.kmz |
| MSC\_ GIS\_ Polygon\_ Pkg\_V6\_0\_0beta\_ Water\_KMZ | water\_MarStdZone\_coarse.kmz,water\_MarStdZone \_detail.kmz,water\_MarStdZone \_exag.kmz, water\_MarSubZone\_coarse.kmz,water\_MarSubZone \_detail.kmz, water\_MarSubZone \_exag.kmz |
| MSC\_GIS\_Polygon\_Pkg\_V6\_0\_0beta\_NA\_Boundary.zip | north\_america\_boundary\_proj.shpnorth\_america\_boundary.shp |
| MSC\_GIS\_Polygon\_Pkg\_V6\_0\_0beta\_CAP-CP\_detail\_unproj.zip | CAP CP Geocodes (land and water) |

Table 7.1 – File names of Polygon sets/ files and other documentation on the FTP site

**8.0 Errata File**

When metadata or polygon boundary issues are discovered, they need to be gathered and recorded in order to address and fix them through a change management process. Boundary issues include creating a new polygon boundary, deleting an existing polygon boundary, or updating/adjusting an existing boundary while metadata issues involve applying a correction to existing metadata values or entering any missing metadata values. For this, an errata file, is created. The document contains two main sections, “current” and “resolved” issues. Under these two sections, both metadata and boundary issues are arranged in a chronological order from newest to oldest from date of discovery. Once issues in the current metadata or current boundary sheets are addressed, they are moved to the resolved section for tracking purposes.

The errata file will be periodically updated as new issues are discovered or reported to us. A copy of the latest version of the errata file will accompany every package release. Resolved issues will remain on file for at least one version update before being removed. Keeping a full history of issues is the responsibility of the user.

**9.0 Polygon Package Versioning**

The polygon Package uses 3 node versioning. The latter 2 nodes are based mainly on the two types of issues mentioned in the Errata File section.

The first node of the versioning is associated with major changes. The current number 5 was changed from 4 due to not only to the significant number of boundary and metadata issues but also due to the introduction of the new Met Areas that were incorporated in Canada’s Arctic. The second node is associated with versioning boundary issues. It is changed incrementally whenever changes are applied to boundary issues. Similarly, the incremental change in third node is an indication of updates to metadata and attributes. Therefore, versions 5.0.1, 5.0.2, 5.0.2a and 5.0.3 only contain attribute or business metadata (values) changes from the version 5.0.0. The version 5.1.0 was then released with a number of boundary changes along with attribute metadata updates. The version 5.2.0 was released shortly after version 5.1.0 to meet the operational requirements for the July, 2014 reference implementation. In early 2015, the polygon package was upgraded to version 5.3.0 with the addition of new derived sets and coverage maps. In August 2015, the version 5.4.0 was released to introduce Manitoba boundary changes and the new exaggerated digital sets generated using the convex hull technique. As mentioned in section 1.0, the minor release of the current version 5.4.1 was to update the polygon package with some attribute metadata issues listed in the errata file and also to produce with the original exaggerated base set (from version 5.3.0) with less vertices. As stated before, the version 5.4.2 is an attempt, just to capture the few metadata corrections along with some exaggerated overlapping boundary corrections found in version 5.4.1. Version 5.5.0 was released shortly after the version 5.4.2 to meet additional operational needs requested by some MSC business programs that was mentioned in section 1.0. Version 5.6.0 released to address various boundary issues, metadata corrections and to add the latest Air Quality Health Index site (Vanderhoof) to the existing AQ standard set. The purpose for generating the version 5.7.0 was to accommodate several BC boundary changes, minor AB boundary changes, AQSTD location update and other boundary adjustments along with the overall improvements to boundaries using the topology rules/analysis. As usual, this version also addressed metadata updates/corrections listed in the errata file at that time. The version 5.8.0 was released to include a new dataset which is used in Public Alerting in Canada (CAP-CP). It is geo-coded based and contains both land and water forecast zones. In addition to that, four new Air Quality locations were introduced in this version. Also this package contains a few metadata corrections that was listed in the errata file from the previous version. The latest version 6.0.0beta is a major release with several significant changes to the package which includes an attempt to redraw base polygons , both land and water using a more recent basemap, an introduction to the forth coverage depiction, “hybrid” and metadata updates. More details of these major and minor changes can be found in the errata file.

1. Each individual shape (polygon, point or line) defines a location that has no requirement for a smaller sub-division of the location to address the needs of the business. Base shapes may or may not be part of any other program but are necessary to assign a unique Canadian Location Code (CLC) to every location of interest to MSC. [↑](#footnote-ref-1)
2. Each individual shape defines a location that is considered “standard” by the referenced business Program of MSC. Standard locations represent the common forecast locations used by MSC in all, or the majority of the standard products issued by the Program. Standard locations are made up of 1 or more base locations as defined by the Program [↑](#footnote-ref-2)
3. Each individual shape defines a location that is considered either a sub division of the “standard”, or a duplicate of the “standard” where no sub division is defined, and is used in the referenced business Program for smaller scale event based warnings. [↑](#footnote-ref-3)
4. Each individual shape defines a location, known as a coverage that is considered the union of all possible locations within the identified product identified in the business usage name. [↑](#footnote-ref-4)
5. Each individual shape defines a location that is considered either a sub division of the “standard”, or a duplicate of the “standard” used in the U.S. Tsunami program using UGC (Universal Geographic Codes) extended to Canadian areas to provide continuity of service for tsunami watches, warning and advisory products. [↑](#footnote-ref-5)
6. A unique 6-digit ID that is assigned automatically when creating polygons using a predefined range. [↑](#footnote-ref-6)
7. Name of the location/zone, the most common location references used for weather and environmental information within MSC products. [↑](#footnote-ref-7)
8. French translation of the location name described above. [↑](#footnote-ref-8)
9. six-digit Canadian Location Code (CLC) that is used to index and reference MSC forecast locations.

10 A unique id that is used in identifying a single feature across all business usages.. [↑](#footnote-ref-9)