**MSC Geography Package V6.9.0**

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# **1.0 Introduction**

The Meteorological Services of Canada (MSC) maintains a standardized package of GIS (Geographical Information System) based forecast location shapefiles and polygons. This package is available for partners and clients wishing to have GIS information representing the forecast locations used in MSC alerts and forecasts.

The current package is version 6.9.0 and corresponds to the environment that is expected to be operational in **November 2023**. Each internal service group schedules these changes on their own time table, and while the majority of these service groups will implement the changes on the date above, a number of factors, including the state of the weather across the country, may affect the scheduled changes. For example, no implementations occur during times of extreme weather. For details on the deployment dates of any individual group, please contact the service group of interest or the MSC National Services for more information.

Since version 4.0.0 of the Geography Package in 2012, a significant number of major and minor versions to the package were released between 2012 and 2018. This was due to continuous and ongoing updates and improvements to the package. The package currently includes a number of shapefiles and polygon sets, categorized by several layers, all with their associated attribute information. Since version 5, an errata file (see section on “Errata File” in this document) has been maintained; and starting with minor 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 were identified between versions. Below are some major highlights of various major releases of version 5. In 2014, versions 5.1.0 and 5.2.0 were released to update the packages with boundary changes and metadata corrections. Version 5.3.0 was released to introduce a significant number of boundary changes in various regions in Manitoba.

The release of version 5.4.0 is not only to address the newly discovered issues but also an attempt to reduce the number of exaggerated vertices in both land and water sets using a special technique. Both these versions were released in 2015. Also, a set KML (KMZ) files were added to the later versions of the package due to requests received from some of the package users. The available KML files are listed in the section 6.0. In the future, more KML files may be available. During the year of 2016, the next version 5.5.0 was to introduce a new set and as well as to introduce new Air Quality sites while the version 5.6.0 was a result of regular maintenance of the package and also to introduce more new Air Quality sites. 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.

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 at some point in the 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 a more updated 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 our unit 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 zone 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). Please note, the Canvec shapefile used for digitizing the MSC Geography Package was published in June 2016. Natural Resource Canada releases updated Canvec shapefiles on an unpredictable schedule; therefore, some zone boundaries might vary between each release.

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 the interim version 6.0.0beta. Another change in this interim 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 the 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.

In version 6.0.0, the sets were 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.

The complete Version 6.0.0 is the release with some additional changes to the interim 6.0.0 beta version. Among these changes, the most significant change is the introduction of the complete hybrid set which includes both land and water.

Version 6.1.0 was released in early March 2019 with some new boundary changes in British Columbia. The changes were made to both Public and Air Quality forecast regions. (e.g. Prince George). Another significant change includes in this version is the vertex reduction in land exaggerated polygon sets. This is to meet the CAP guideline of having the number of vertices in land exaggerated forecast zone polygons below 150 or less. The CAP-CP geocode set is derived using the land exaggerated set and the some polygons of exaggerated land set in the previous version (6.0.0) seemed to have more than the minimum number of vertices. Finally, as usual, corrections to any outstanding metadata that were listed in the “Errata and Planned Changes” were also made.

Since the 6.1.0 release, a minor update to the package (6.1.0A) needed to be released to resolve another CAP related issue. The amendment was comprised of revised coordinates of some exaggerated polygons in order to avoid duplicated coordinates caused by the truncation of decimal places on CAP (Common Alerting Protocol) XML files that were derived using the geometry files of land exaggerated data sets. This release only contained the geometry files of the affected land exaggerated sets along with the appropriate readme documentation.

Version 6.2.0 is the release of the package based on version 6.0.0. This release includes many updates. Among them are to introduce two new BC highway segments and two new Air Quality Health Index (AQHI) sites. In addition, the amendment that was made in version 6.1.0A to remove duplicate coordinate pairs in land exaggerated set was repeated for water exaggerated data sets. Furthermore, this version presents a series of coverage maps based on the business usages and the corrections to issues related to some existing boundaries and metadata listed in “Errata and Planned Change” document.

The release of version 6.3.0 is mainly dedicated to the attribute data and marine boundary updates. The name of some shapefile sets (e.g. AQStdAlertZone, MarMACanSubZone) also got updated to reflect their usage more accurately. Along with the program coverage maps included in the last release, this version also introduces a set of alert type coverage maps. In addition, the “Errata and Planned Changes” document opens a new section for the WeatherCAN mobile app PubMeso boundary adjustment for improving the accuracy of geolocating app users. Subsequent releases would include more PubMeso boundary adjustments.

Later, version 6.4.0 is created in response to the RI26 implementation. The main changes in the package include the addition of nine new air quality forecast sites, name changes for the two Nunavut locations in PubMesoZone and AQStdAlertZone, French name changes for the metro Vancouver zones in BC, and five public zones boundary adjustment for improving the WeatherCAN mobile app geolocation service, as well as other attribute data and zone boundary corrections documented in the “Errata and Planned Changes” document. In addition to the existing sub-packages, such as External and CAP-CP packages, a new “Internal” sub-package is included in version 6.4.0, which contains the air quality standard forecast zones (i.e. AQStdFcstZone) used by WeatherCAN mobile app. A separate ReadMe document is attached in the Internal Package for further detailed information. Lastly, a series of marine-related alert type coverage maps have been included in this release.

Then, version 6.5.0 was released is response to the implementation of RI27 in April 2021. The major items in the release include the zone name changes for marine zones, as well as an air quality forecast site name change in Alberta. The tsunami standard zones in the East Coast have also been updated with the newly defined zone boundaries, zone name and CLCs. This release contains three public zone adjustments that improve the geolocation service of the WeatherCAN mobile app, which are listed along with several other minor attribute corrections.

The version of 6.6.0 includes metadata and boundary corrections that were found since the last release. There are nine public zone boundary adjustments that improve the geolocation service of the WeatherCAN mobile app. In addition, the AQStdFcstZone located within the Internal sub-package has been removed from release after discussing with the Air Quality business. The AQStdFcstZone shapefile will be maintained separately and will only be provided upon request. Last but not least, there are dataset name changes for the two AQ shapefile sets.

The version of 6.7.0 mainly included the improvement to the existing forecast zone boundary for various usages. This included the correction to the boundary of the northern communities, and the boundary change for merging the inland waterbodies and river streams that are not operational in the Marine usage to the adjacent land-kind alert zones.

The version 6.8.0 includes a number of changes affecting different business usages. For the Hurricane usage starting in 2023, the ‘Tropical Cyclone Information Statement’ will make reference to water locations off Canada in the Atlantic Ocean which led to the creation of new water Hurricane standard zone shapefiles in this package. For the Air Quality usage, the ‘Petawawa’ site was removed from the AQStdFcstSiteP shapefiles as it was removed operationally back in September 2022. For the CAP-CP usage, partners reported issues and after investigation, it was discovered that the latest 2011 Census subdivisions (CSD) boundaries were not used for the land CAP-CP shapefile around Great Slave Lake in the Northwest Territories. Consequently, this shapefile was updated in this area to fix this issue. For the Marine and Ice usages, ‘Detroit River’, ‘St. Clair River’ and ‘St. Marys River’ were removed from the marine alert polygons they were mistakenly attached to. For the Marine usage, boundaries on the west coast were changed to remove inlets as per the business direction. For the Public usage, we continued to make minor tweaks and improvements to better represent Public zone boundaries. Also, minor boundary issues and attribute values were fixed for different shapefile sets. Finally, coverage maps were updated (HURALERT, MarLocalized, MarSynoptic, HURCOV, MARCOV and TSUCOV) added (TCS and TDW) and removed (STALERT and TRALERT) following operational changes and to improve those maps.

Version 6.9.0 includes a number of changes affecting different Business Usages. First, the Public and Air Quality usages have new boundaries along with new locations in southwestern British Columbia which affects the PubMesoZone, PubStdZone and AQStdZone sets. The Public usage also changed the name of an Alberta location which affects the PubMesoZone set. The Air Quality usage decided to replace the ‘Parkland County’ forecast site in Alberta for a site representing the town of Genesee which will affect the AQStdFcstSiteP set. For the Ice usage, a decision was made to remove sub areas and replace it by larger standard areas in the IceSubZone set as plans are being made for the integration of ice alerts into a different warning production system sometime in 2024. Issues were also fixed in the exaggerated shapefiles for the PubMesoZone, PubStdZone, AQStdZone, IceSubZone and MarSubZone sets. Holes were removed in exaggerated polygons to correct a mistake that was overlooked in a recent change. Finally, minor boundary issues and attribute values were fixed for different sets. As always, please view the “Errata and Planned Changes” document for the detailed description of changes.

# 2.0 Classification

There are 169 shapefiles available in the MSC Geography Package version 6.9.0. 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).

Shapefile 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 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.

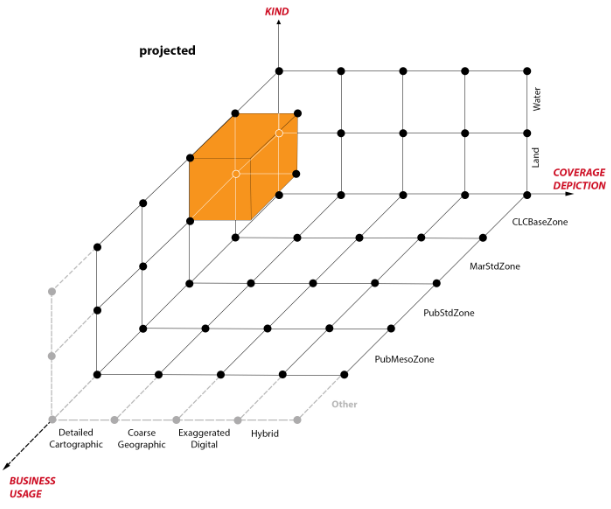


Figure 2.1 – shapefile set – water\_MarStdZone\_detail\_proj

The exceptional layer that refers to the CAP-CP Geo-Coded set is defined 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

The **base** shapefile 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 could be constructed from one or more of these base layer 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 |
| PubStdZone  PubStdSiteL | Public Standard | Public forecast locations at the Public standard[[2]](#footnote-2) level; used in most forecasts, warnings, watches, advisories and special weather statements. |
| PubMesoZone | Public Mesoscale | Public forecast locations at the Public 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 |
| MarStdZone | Marine Standard | Marine forecast locations at the Marine standard2 above level; used in most Marine forecasts, warnings, watches, advisories and special marine weather statements. |
| MarSubZone | Marine SubAreas | Marine forecast locations at the subarea3 level; used in some Marine warnings. |
| TsuStdZone | Tsunami Standard | Tsunami forecast locations at the Tsunami standard2 level; used in Tsunami warnings, watches, and advisories. |
| UGCStdZone | UGC Standard | Tsunami forecast locations at the Tsunami sub region[[4]](#footnote-4) level; used in Alaskan Tsunami Centre warnings, watches and advisories. |
| AQStdZone  AQStdFcstSiteP  AQStdSiteL | Air Quality  Standard | Air Quality forecast locations at the Air Quality standard2 level; used in Air Quality 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 Standard | Hurricane forecast locations at the Hurricane standard2 level; used in all Hurricane warnings and watches. |
| IceStdZone | Ice Standard | Ice forecast locations at the Ice standard2 level; used in all Ice warnings. |
| IceSubZone | Ice Sub Areas | Ice forecast locations at the Ice subarea3 level; used in some Ice warnings. |
| MarMACanSubZone  (previously known as MarMACanZone in version 6.2.0)  MarMACanStdZone | Marine MetArea SubAreas and Standard | Marine forecast locations at the Marine MetArea subarea and standard2 level; used in Marine MetArea warning and forecast products. |
| IceMAStdZone | Ice MetArea Standard | Ice forecast locations at the Ice MetArea standard2 level; used in Ice MetArea forecast products. |
| MarUSZone  (previously known as MarMAUSZone in version 6.2.0) | Marine MetArea US | Marine forecast locations at the Marine MetArea standard2 level; may be used in contingency forecasting with our U.S. partners in the future regarding MetAreas. |
| MarDenZone  (previously known as MarMADenZone in version 6.2.0) | Marine MetArea Danish | Marine forecast locations at the Marine MetArea standard2 level; may be used in contingency forecasting with our Danish partners in the future regarding MetAreas. |
| TsuBPCanSite  (Previously known as TsuBPCSite in version 5.8.0) | Tsunami | Tsunami breakpoint locations used for Canadian Tsunami alerting usage. |
| TsuBPUSite | Tsunami | Tsunami breakpoint locations from the Alaskan Tsunami Centre used for Canadian Tsunami usage. |
| TsuWACanSite  (Previously known as TsuWACSite in version 5.8.0) | Tsunami | Tsunami wave arrival locations used for Canadian Tsunami usage. |
| TsuWAUSite | Tsunami | Tsunami wave arrival locations from the Alaskan Tsunami Centre used for Canadian Tsunami usage. |

Table 2.1 – Business usages for MSC forecast and alert products

## 2.2 Kind

Business usages 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 and Water |
| CLCBaseSiteL | Land |
| CLCBaseSiteP | Land |
| PubStdZone | Land |
| PubStdSiteL | Land |
| PubMesoZone | Land |
| MarStdZone | Water |
| MarSubZone | Water |
| TsuStdZone | Land |
| UGCStdZone | Land |
| AQStdZone | Land |
| AQStdFcstSiteP | Land |
| AQStdSiteL | Land |
| CAP-CP | Land and Water |
| HurStdZone | Land and Water |
| IceStdZone | Water |
| IceSubZone | Water |
| MarMACanSubZone | Water |
| MarMACanStdZone | Water |
| IceMAStdZone | Water |
| MarUSZone | Water |
| MarDenZone | Water |
| TsuBPCanSite | Land |
| TsuBPUSite | Land |
| TsuWACanSite | Land |
| TsuWAUSite | Land |

Table 2.2 – Business usages and the kind for MSC forecast and alert products

## 2.3 Depiction

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.

## 2.4 Projection

In the package, shapefiles are created in two coordinate systems, “Projected” and “Unprojected”. Below is a short description of the projection of each of them.

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 (Projected)
  + 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
* Geographical Coordinated System (Unprojected)
  + 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 169 shapefiles by name that is available in version 6.9.0.

|  |  |
| --- | --- |
| **Business Usage** | **Projected** |
| **Services**  CLCBaseZone | land\_CLCBaseZone\_coarse\_proj  land\_CLCBaseZone\_detail\_proj  land\_CLCBaseZone\_exag.proj  land\_CLCBaseZone\_hybrid.proj  water\_CLCBaseZone\_coarse\_proj  water\_CLCBaseZone\_detail\_proj  water\_CLCBaseZone\_exag\_proj  water\_CLCBaseZone\_hybrid\_proj |
| **Public**  PubStdZone  PubMesoZone  PubStdSiteL | land\_PubStdZone\_coarse\_proj  land\_PubStdZone\_detail\_proj  land\_PubStdZone\_exag\_proj  land\_PubStdZone\_hybrid\_proj  land\_PubMesoZone\_coarse\_proj  land\_PubMesoZone\_detail\_proj  land\_PubMesoZone\_exag\_proj  land\_PubMesoZone\_hybrid\_proj  land\_PubStdSiteL\_coarse\_proj  land\_PubStdSiteL\_detail\_proj  land\_PubStdSiteL\_exag\_proj |
| **Marine**  MarStdZone  MarSubZone | water\_MarStdZone\_coarse\_proj  water\_MarStdZone\_detail\_proj  water\_MarStdZone\_exag\_proj  water\_MarStdZone\_hybrid\_proj  water\_MaSubZone\_coarse\_proj  water\_MarSubZone\_detail\_proj  water\_MarSubZone\_exag\_proj  water\_MarSubZone\_hybrid\_proj |
| **MetArea**  MarMACanSubZone  MarMACanStdZone  IceMAStdZone | water\_MarMACanSubZone\_coarse\_proj  water\_MarMACanSubZone\_detail\_proj  water\_MarMACanSubZone\_exag\_proj  water\_MarMACanSubZone\_hybrid\_proj  water\_MarMACanStdZone\_coarse\_proj  water\_MarMACanStdZone\_detail\_proj  water\_MarMACanStdZone\_exag\_proj  water\_MarMACanStdZone\_hybrid\_proj  water\_IceMAStdZone\_coarse\_proj  water\_IceMAStdZone\_detail\_proj  water\_IceMAStdZone\_exag\_proj  water\_IceMAStdZone\_hybrid\_proj |
| **Tsunami**  TsuStdZone  TsuBPCanSite  TsuWACanSite | land\_TsuStdZone\_coarse\_proj  land\_TsuStdZone\_detail\_proj  land\_TsuStdZone\_exag\_proj  land\_TsuStdZone\_hybrid\_proj  land\_TsuBPCanSite\_coarse\_proj  land\_ TsuBPCanSite \_detail\_proj  land\_ TsuBPCanSite \_exag\_proj  land\_TsuWACanSite\_coarse\_proj  land\_ TsuWACanSite \_detail\_proj  land\_ TsuWACanSite \_exag\_proj |
| **Air Quality**  AQStdZone  AQStdFcstSiteP  AQStdSiteL | land\_AQStdZone\_coarse\_proj  land\_AQStdZone\_detail\_proj  land\_AQStdZone\_exag\_proj  land\_AQStdZone\_hybrid\_proj  land\_AQStdFcstSiteP\_coarse\_proj  land\_AQStdFcstSiteP\_detail\_proj  land\_AQStdFcstSiteP\_exag\_proj  land\_AQStdSiteL\_coarse\_proj  land\_AQStdSiteL\_detail\_proj  land\_AQStdSiteL\_exag\_proj |
| **Hurricane**  HurStdZone | land\_HurStdZone\_coarse\_proj  land\_HurStdZone\_detail\_proj  land\_HurStdZone\_exag\_proj  land\_HurStdZone\_hybrid\_proj  water\_HurStdZone\_coarse\_proj  water\_HurStdZone\_detail\_proj  water\_HurStdZone\_exag\_proj  water\_HurStdZone\_hybrid\_proj |
| **Ice**  IceStdZone  IceSubZone | water\_IceStdZone\_coarse\_proj  water\_IceStdZone\_detail\_proj  water\_IceStdZone\_exag\_proj  water\_IceStdZone\_hybrid\_proj  water\_IceSubZone\_coarse\_proj  water\_IceSubZone\_detail\_proj  water\_IceSubZone\_exag\_proj  water\_IceSubZone\_hybrid\_proj |

Table 2.3 – Projected shapefiles for each business usage

|  |  |
| --- | --- |
| **Business Usage** | **Unprojected** |
| **Services**  CLCBaseZone | land\_CLCBaseZone\_coarse\_unproj  land\_CLCBaseZone\_detail\_unproj  land\_CLCBaseZone\_exag\_unproj  land\_CLCBaseZone\_hybrid\_unproj  water\_CLCBaseZone\_coarse\_unproj  water\_CLCBaseZone\_detail\_unproj  water\_CLCBaseZone\_exag\_unproj  water\_CLCBaseZone\_hybrid\_unproj |
| **Public**  PubStdZone  PubMesoZone  PubStdSiteL | land\_PubStdZone\_coarse\_unproj  land\_PubStdZone\_detail\_unproj  land\_PubStdZone\_exag\_unproj  land\_PubStdZone\_hybrid\_unproj  land\_PubMesoZone\_coarse\_unproj  land\_PubMesoZone\_detail\_unproj  land\_PubMesoZone\_exag\_unproj  land\_PubMesoZone\_hybrid\_unproj  land\_PubStdSiteL\_coarse\_unproj  land\_PubStdSiteL\_detail\_unproj  land\_PubStdSiteL\_exag\_unproj |
| **Marine**  MarStdZone  MarSubZone | water\_MarStdZone\_coarse\_unproj  water\_MarStdZone\_detail\_unproj  water\_MarStdZone\_exag\_unproj  water\_MarStdZone\_hybrid\_unproj  water\_MaSubZone\_coarse\_unproj  water\_MarSubZone\_detail\_unproj  water\_MarSubZone\_exag\_unproj  water\_MarSubZone\_hybrid\_unproj |
| **MetArea**  MarMACanSubZone  MarMACanStdZone  MarDenZone  MarUSZone  IceMAStdZone | water\_MarMACanSubZone\_coarse\_unproj  water\_MarMACanSubZone\_detail\_unproj  water\_MarMACanSubZone\_exag\_unproj  water\_MarMACanSubZone\_hybrid\_unproj  water\_MarMACanStdZone\_coarse\_unproj  water\_MarMACanStdZone\_detail\_unproj  water\_MarMACanStdZone\_exag\_unproj  water\_MarMACanStdZone\_hybrid\_unproj  water\_MarDenZone\_detail\_unproj  water\_MarUSZone\_detail\_unproj  water\_IceMAStdZone\_coarse\_unproj  water\_IceMAStdZone\_detail\_unproj  water\_IceMAStdZone\_exag\_unproj  water\_IceMAStdZone\_hybrid\_unproj |
| **Tsunami**  TsuStdZone  UGCStdZone  TsuBPCanSite  TsuBPUSite  TsuWACSite  TsuWAUSite | land\_TsuStdZone\_coarse\_unproj  land\_TsuStdZone\_detail\_unproj  land\_TsuStdZone\_exag\_unproj  land\_TsuStdZone\_hybrid\_unproj  land\_UGCStdZone\_detail\_unproj  land\_TsuBPCanSite\_coarse\_unproj  land\_ TsuBPCanSite \_detail\_unproj  land\_ TsuBPCanSite \_exag\_unproj  land\_ TsuBPUSite \_detail\_unproj  land\_TsuWACanSite\_coarse\_unproj  land\_ TsuWACanSite \_detail\_unproj  land\_ TsuWACanSite \_exag\_unproj  land\_ TsuWAUSite \_detail\_unproj |
| **Air Quality**  AQStdZone  AQStdFcstSiteP  AQStdSiteL | land\_AQStdZone\_coarse\_unproj  land\_AQStdZone\_detail\_unproj  land\_AQStdZone\_exag\_unproj  land\_AQStdZone\_hybrid\_unproj  land\_AQStdFcstSiteP\_coarse\_unproj  land\_AQStdFcstSiteP\_detail\_unproj  land\_AQStdFcstSiteP\_exag\_unproj  land\_AQStdSiteL\_coarse\_unproj  land\_AQStdSiteL\_detail\_unproj  land\_AQStdSiteL\_exag\_unproj |
| **Hurricane**  HurStdZone | land\_HurStdZone\_coarse\_unproj  land\_HurStdZone\_detail\_unproj  land\_HurStdZone\_exag\_unproj  land\_HurStdZone\_hybrid\_unproj  water\_HurStdZone\_coarse\_unproj  water\_HurStdZone\_detail\_unproj  water\_HurStdZone\_exag\_unproj  water\_HurStdZone\_hybrid\_unproj |
| **Ice**  IceStdZone  IceSubZone | water\_IceStdZone\_coarse\_unproj  water\_IceStdZone\_detail\_unproj  water\_IceStdZone\_exag\_unproj  water\_IceStdZone\_hybrid\_unproj  water\_IceSubZone\_coarse\_unproj  water\_IceSubZone\_detail\_unproj  water\_IceSubZone\_exag\_unproj  water\_IceSubZone\_hybrid\_unproj |
| **CAP**  CAP-CP | CAP-CP\_land\_detail\_unproj  CAP-CP\_water\_detail\_unproj |

Table 2.4 – Unprojected shapefiles for each business usage

# 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 polygons sets that are known as “Internal” are generated based on predefined geographical locations that are identified for each MSC business usage to meet their business needs. The “External” polygon sets are controlled by organizations external to MSC. These external sets are included in our package since MSC 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 for any MSC business usage 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 forecast locations at the Tsunami 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 shapefile sets within the geography package.

|  |  |
| --- | --- |
| Business Usage Category | Business Usage Shapefile Sets |
| Services | CLCBaseZone - land and water  CLCBaseSiteL  CLCBaseSiteP |
| Public | PubStdZone  PubMesoZone  PubstdsiteL |
| Marine | MarStdZone  MarSubZone  MarMACanSubZone  MarMACanStdZone |
| Air Quality | AQStdZone  AQStdFcstSiteP  AQStdSiteL |
| Hurricane | HurStdZone |
| Ice | IceStdZone  IceSubZone  IceMAStdZone |
| Tsunami | TsuStdZone  TsuBPCanSite  TsuWAcanSite |

Table 3.1 – Internal shapefile sets

|  |  |
| --- | --- |
| Business Usage Category | Business Usage Shapefile Sets |
| CAP | CAP-CP (land and water) |
| External | TsuBPUSite  TsuWAUSite  UGCStdZone  MarDenZone  MarUSZone |

Table 3.2 – External shapefile sets

# 4.0 CAP-CP

As previously described, two individual CAP-CP geo-coded sets are derived for both land and water each. 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. More detail of CAP-CP data can be found in MSC\_GIS\_Readme\_CAP-CP\_V6\_9\_0\_E.docx.

# 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 polygon set is listed with its POLY\_ID[[5]](#footnote-5), PRIME\_ID, NAME[[6]](#footnote-6), NOM[[7]](#footnote-7) and the CLC[[8]](#footnote-8) 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 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 Coverage Maps

In addition to a number of shapefile sets, a set of alert type and program coverage maps (PDF format) in both English and French are available in the current geography package. A program coverage map can cover multiple business usages. For example, the Public program coverage map covers the PubMesoZone, PubStdZone and PubStdSiteL business usages. These coverage map images are generated based on the provincial spatial extent for each program or alert type. The tables below lists the program and alert type coverage maps that are available in the package along with a short description.

|  |  |
| --- | --- |
| **Program** | **Description** |
| Public (PUBCOV) | The spatial extent of the areas within Canada referenced in Public alerts. |
| Hurricane (HURCOV) | The spatial extent of the areas within Canada referenced in Hurricane alerts. |
| Marine (MARCOV) | The spatial extent of the areas within Canada referenced in Marine alerts. This coverage map encompasses five individual maps; map for the entire country, the Southeastern area map, near Lake Manitoba area map, near Lake Ontario area map and Southwestern area map. |
| METAREA (MARMACOV) | The spatial extent of the areas within Canada referenced for Marine METAREA business usage. |
| Tsunami (TSUCOV) | The spatial extent of the areas within Canada referenced in Tsunami alerts. |
| Air Quality (AQCOV) | The spatial extent of the areas within Canada referenced in Air Quality alerts. |

|  |  |
| --- | --- |
| **Alert Type** | **Description** |
| Hurricane Alerts (HURALERT) | The spatial extent of the areas within Canada referenced in Tropical Cyclone Alerts. |
| Tsunami Alerts (TSUALERT) | The spatial extent of the areas within Canada referenced in Tsunami Alerts. |
| High Water Level Warning  (WLW) | The spatial extent of the areas within Canada referenced in High Water Level Warning. |
| Strong Wind Warning  (SWW) | The spatial extent of the areas within Canada referenced in Strong Wind Warning. |
| Tropical Cyclone Information Statement (TCS) | The spatial extent of the areas within Canada referenced in Tropical Cyclone Information Statement. |
| Storm Surge Warning (TDW) | The spatial extent of the areas within Canada referenced in Storm Surge Warning. |
| Localized Marine Alerts | The spatial extent of the areas within Canada referenced in Localized Marine Alerts. |
| Synoptic Marine Alerts | The spatial extent of the areas within Canada referenced in Synoptic Marine Alerts. |

# 8.0 MSC Geography Package Extract Locations

The three latest versions of the MSC Geography Package is available on the Datamart site at this address: <https://dd.meteo.gc.ca/meteocode/geodata/>

The Google Drive cloud environment can also be used by clients to extract the MSC Geography Package. The process for publishing the MSC Geography Package to the Datamart passes through this Google Drive cloud environment. Each new version of the package will appear on this cloud environment first before appearing on the Datamart. Interested parties, looking for more lead-time access to the latest MSC Geography package, will be able to retrieve the package from this cloud environment. For future releases, if you want to receive the Google Drive link to download the package before it gets published on the Datamart, please contact us at [MSC.Geography@ec.gc.ca](mailto:MSC.Geography@ec.gc.ca).

All 169 shapefiles make up the version 6.9.0 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.

The following files can be found in “version\_6\_9\_0” 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\_9\_0.doc  Appendix\_Forecast\_Locations\_V6\_9\_0.doc  Forecast\_Locations\_Emplacements\_de\_Previsions\_V\_6\_9\_0.xlsx  MSC\_Geography\_Package\_Errata\_and\_Planned\_Changes\_V6\_9\_0.doc  MSC\_GIS\_Readme\_V\_6\_9\_0\_E.doc  MSC\_GIS\_Readme\_V6\_9\_0\_F.doc |
| MSC\_Geography\_Pkg\_V6\_9\_0\_Land\_Geometry | Land geometry – CLCBASEZONE\_LAND, CLCBASESITEL, CLABASESITEP, PubStdZone, PubStdSiteL, PubMesoZone, TsuStdZone, UGCStdZone, AQStdZone, AQStdFcstSiteP, AQStdSiteL, HurStdZone, TsuBPCanSite, TsuWACanSite |
| MSC\_Geography\_Pkg\_V6\_9\_0\_Water\_Geometry | Water geometry – CLCBASEZONE\_WATER, MarStdZone, MarSubZone, IceStdZone, IceSubZone, MarMACanSubZone, MarMACanStdZone, IceMAStdZone, HurStdZone |
| MSC\_Geography\_Pkg\_V6\_9\_0\_Land\_Proj  MSC\_Geography\_Pkg\_V6\_9\_0\_Land\_Unproj | CLCBaseZone (land), PubStdZone, PubStdSiteL, PubMesoZone, TsuStdZone, AQStdZone, AQStdFcstSiteP, AQStdSiteL, HurStdZone, TsuBPCanSite, TsuWACanSite |
| MSC\_Geography\_Pkg\_V6\_9\_0\_Water\_Proj  MSC\_Geography\_Pkg\_V6\_9\_0\_Water\_Unproj | CLCBaseZone (water), MarStdZone, MarSubZone, IceStdZone, IceSubZone, MarMACanSubZone, MarMACanStdZone, IceMAStdZone, HurStdZone |
| MSC\_Geography\_Pkg\_V6\_9\_0\_Land\_KMZ | land\_PubStdZone\_coarse.kmz,  land\_PubStdZone\_detail.kmz,  land\_PubStdZone\_exag.kmz,  land\_PubStdZone\_hybrid.kmz, land\_PubMesoZone\_coarse.kmz, land\_PubMesoZone\_detail.kmz, land\_PubMesoZone\_exag.kmz,  land\_PubMesoZone\_hybrid.kmz |
| MSC\_Geography\_Pkg\_V6\_9\_0\_Water\_KMZ | water\_MarStdZone\_coarse.kmz,  water\_MarStdZone \_detail.kmz,  water\_MarStdZone \_exag.kmz,  water\_MarStdZone \_hybrid.kmz, water\_MarSubZone\_coarse.kmz,  water\_MarSubZone \_detail.kmz,  water\_MarSubZone \_exag.kmz,  water\_MarSubZone \_hybrid.kmz |
| MSC\_Geography\_Pkg\_V6\_9\_0\_External\_Unproj | UGCStdZone, TsuBPUSite, TsuWAUSite, MarDenZone, MarUSZone  MSC\_Geography\_Pkg\_Readme\_External\_V\_6\_9\_0\_E.doc  MSC\_Geography\_Pkg\_Readme\_External\_V\_6\_9\_0\_F.doc |
| [MSC\_Geography\_Pkg\_V6\_9\_0\_CAP-CP\_V1\_0\_draft\_Unproj](https://dd.meteo.gc.ca/meteocode/geodata/version_6.0.0A/CAP-CP/MSC_GIS_Polygon_Pkg_V6_0_0A_CAP-CP_V1_0_Unproj.zip) | CAP-CP (land) and CAP-CP (water)  CAP-CP\_Geocodes\_V1\_0\_draft.xlsx  MSC\_Geography\_Pkg\_V6\_9\_0\_Readme\_CAP-CP\_V1\_0\_draft\_E.docx  MSC\_Geography\_Pkg\_V6\_9\_0\_Readme\_CAP-CP\_V1\_0\_draft\_F.docx |
| MSC\_Geography\_Pkg\_V6\_9\_0\_Coverage\_Maps | Program:  AQCOV\_EN.pdf  AQCOV\_FR.pdf  HURCOV\_EN.pdf  HURCOV\_FR.pdf  MARCOV\_EN.pdf  MARCOV\_FR.pdf  PUBCOV\_EN.pdf  PUBCOV\_FR.pdf  TSUCOV\_EN.pdf  TSUCOV\_FR.pdf  MARMACOV\_EN.pdf  MARMACOV\_FR.pdf  Alert\_Type:  HURALERT\_EN.pdf  HURALERT\_FR.pdf  TSUALERT\_EN.pdf  TSUALERT\_FR.pdf  TCS\_EN.pdf  TCS\_FR.pdf  TDW\_EN.pdf  TDW\_FR.pdf  WLW\_EN.pdf  WLW\_FR.pdf  SWW\_EN.pdf  SWW\_FR.pdf  MarLocalized\_EN.pdf  MarLocalized\_FR.pdf  MarSynoptic\_EN.pdf  MarSynoptic\_FR.pdf |

Table 8.1 – File names of the shapefile sets and other documentation

# 9.0 Errata and Planned Changes 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 for tracking purposes. The document contains two main sections, “Outstanding Issues” and “Resolved Issues”. Once the issues in the Outstanding Issues are addressed, they are moved to the Resolved Issues section.

The errata file will be periodically updated as new issues are discovered or reported by clients. 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.

# 10.0 MSC Geography Package Versioning

The MSC Geography Package uses 3 node versioning. The latter 2 nodes are based mainly on the two types of issues mentioned in the Errata and Planned Changes document.

The first node of the versioning is associated with major changes. For example, the previous number 5 was changed from 4 not only due to the significant amount of boundary and metadata issues but also due to the introduction of the new MetAreas 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.

# 11.0 Questions, Comments or Feedback

For any questions, comments or feedback on the package, you are invited to contact the administrators of the MSC Geography Package at [MSC.Geography@ec.gc.ca](mailto:MSC.Geography@ec.gc.ca).

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 business usage 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 usage of MSC. Standard locations represent the common forecast locations used by MSC in all, or the majority of the standard products issued by the business. Standard locations are made up of 1 or more base locations as defined by the business. [↑](#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 usage for smaller scale event based warnings. [↑](#footnote-ref-3)
4. Each individual shape defines a location that is considered either a sub division of the “standard”, or a duplicate of the “standard” used for U.S. Tsunami usage using UGC (Universal Geographic Codes) extended to Canadian areas to provide continuity of service for tsunami watches, warning and advisory products. [↑](#footnote-ref-4)
5. A unique 6-digit ID that is assigned automatically when creating polygons using a predefined range. [↑](#footnote-ref-5)
6. Name of the location/zone, the most common location references used for weather and environmental information within MSC products. [↑](#footnote-ref-6)
7. French translation of the location name described above. [↑](#footnote-ref-7)
8. 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-8)