Technical Document

Niagara Weather Service Guide

February 17, 2023

niagara⁴

Niagara Weather Service Guide

Tridium, Inc.
3951 Westerre Parkway, Suite 350
Richmond, Virginia 23233
U.S.A.

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Contents

About this guide

This topic contains important information about the purpose, content, context, and intended audience for this document.

Product Documentation

This document is part of the Niagara technical documentation library. Released versions of Niagara software include a complete collection of technical information that is provided in both online help and PDF format. The information in this document is written primarily for Systems Integrators. To make the most of the information in this book, readers should have some training or previous experience with Niagara software, as well as experience working with JACE network controllers.

Document Content

This document describes how to setup and configure the Weather Service in a station so that you can provide current weather conditions and for casts for one or more locations. Sections in this guide include chapters about using weather components in Px views, how to setup weather reports, advisories and forecasts. Also included is information about reporting sun and moon position and many other features.

Document change log

Updates (changes and additions) to this document are listed below.

February 17, 2023

Removed two property rows from two properties tables for LDAP properties that had been added by mistake to this guide.

August 3, 2020

Replaced AX images. Also, "theWeatherCompany-TheWeatherCompanyWeatherProvider" and "Migrating from Weather Underground to The Weather Company" topics are deleted because those are no longer valid.

January 15, 2019

Revised for Niagara 4.8 including details on changes in the service provided by Weather Underground.

Chapter 1　Weather overview

Topics covered in this chapter

♦ What's new
♦ Using weather components in Px views
♦ Advisories

The weather module provides a WeatherService that you can copy into your station's **ServiceContainer**. Providing that the station has Internet connectivity, or is on a NiagaraNetwork with a Supervisor using the WeatherService, this can provide current weather conditions, as well as forecast conditions, for one or more locales. Other components to calculate current solar and lunar data are also included.

The air quality properties and views are also provided, and additional weather advisory enhancements were made. See "What's new in the weather module" for an overview.

NOTE: Typical usage is for U.S. locales, where weather information comes from the U.S. NWS (National Weather Service), a division of NOAA (National Oceanic and Atmospheric Administration). However, international weather support is available. See "What's new in the weather module".

The following image shows the **Weather Manager** view of the WeatherService which contains several different U.S. locales, or WeatherReports.

Figure 1　WeatherService example with several WeatherReports

In this example, the **Nav** side bar shows one of the WeatherReports expanded, showing child weather components listed. These components are typical to most WeatherReport locales.

NOTE: When a NWS WeatherReport (locale) has an active advisory, it appears in the **Weather Manager** view in alarm, with a red colored row.

What's new

The following summary describes recent developments related to the WeatherService in Niagara.

NOTE: Weather Underground has discontinued free service. This causes the weather-WUndergroundProvider to stop functioning resulting in weather reports with orange highlighting and stale data. In Niagara 4.10 and later, for those who currently use an API key you can continue to use the WUnderground Provider however Weather Underground may require you to generate a new key.

Using weather components in Px views

The weather module supports "drag and drop" usage of some weather components directly onto Px pages, providing iconic views.

Figure 2   Drag and drop component on Px view example (WeatherReport for Current Weather View)
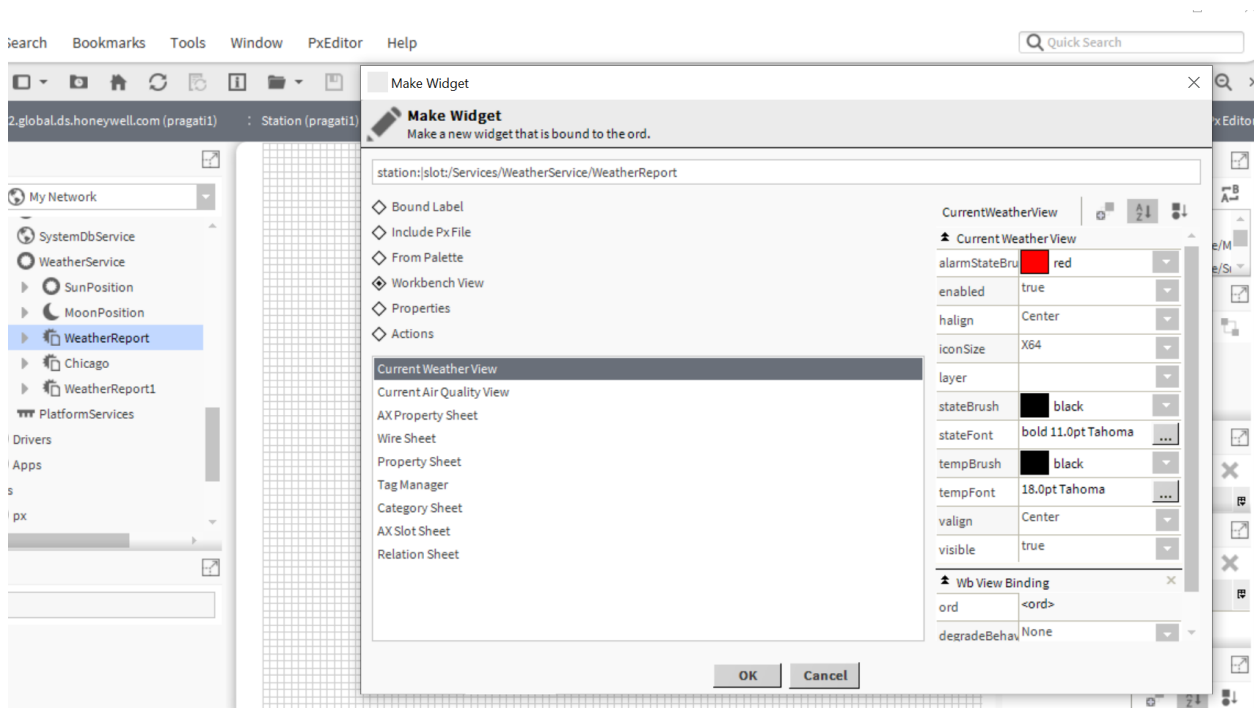
The image above shows a WeatherReport dragged onto a Px page, with the resulting **Make Widget** dialog and default selection (**Current Weather View**). After adding and at runtime this appears as shown below.

Figure 3   Current Weather View in Px editor, and runtime
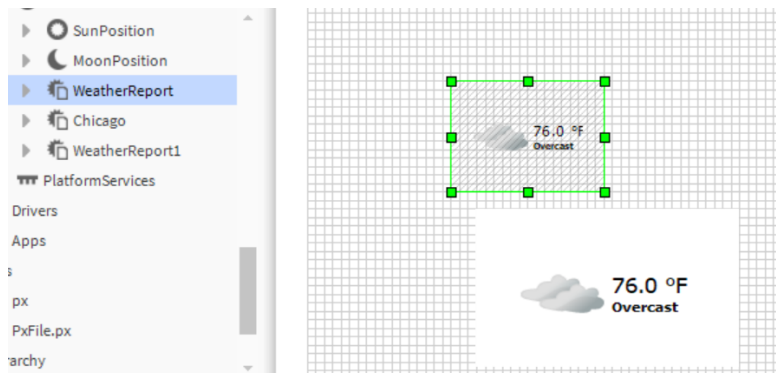
Icons change with weather conditions (along with text) as needed to track characteristics like fair, overcast, cloudy, rain, wind, night time, and so on. The following weather components provide this "drag and drop" Px support:

- WeatherReport — for the **Current Weather View** (as shown in example above).

  NOTE: A WeatherReport also provides a "**Current Air Quality View**", including drag-and-drop support onto a Px page.

- Current, Today, Tomorrow, <daysOfWeek> — for a **Forecast View**.

- MoonPosition — for a **Moon View**. This component is unrelated to any specific WeatherReport.

example of Px support

The example shown here has a **Px** view that provides a dashboard of Weather Conditions, demonstrating various Px techniques and bindings to slots under the configured NwsWeatherProvider (adjustable). The following image shows this view in Workbench.

Figure 4   Example of Px view for WeatherService data
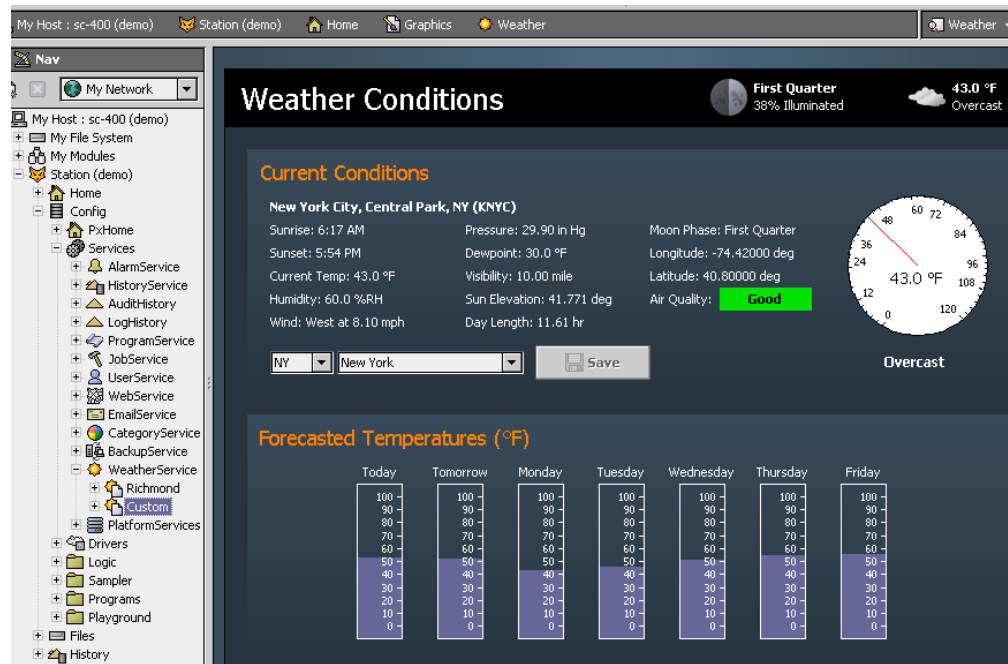
Advisories

A WeatherReport using a provider that issues advisories (such as a NwsWeatherProvider) are enabled to receive these advisories, for example a warning, watch, or advisory. Such advisories are reflected in a report's **Current Weather View**, `CurrentConditions` component, and can also result in Niagara alarms.

Advisories are modeled as dynamic Advisory components, in an Advisories container under a WeatherReport's Current component. An **Advisory Manager** view on this container provides all the provider-issued details for any selected advisory.

By default, advisories also result in alarms. However, this is configurable, in case advisory alarms are not desired.

# Chapter 2   Adding WeatherReports

Topics covered in this chapter

♦ Configuring advisory alarming

To add a report, in the **Weather Manager** click the **New** button, which produces the **New** dialog. Select the number to add, then for each one, select a provider.

NOTE: This example describes adding an NWS provider (type NwsWeatherProvider), typical for a Supervisor and any JACE station that has direct Internet connectivity. The JACE station that is subordinate to a Supervisor in a NiagaraNetwork can alternatively use the "FoxWeatherProvider" type of Weather Report.

You may have a third provider option: Wunderground Weather Provider, for "international weather" support.

Figure 5   Adding New WeatherReport
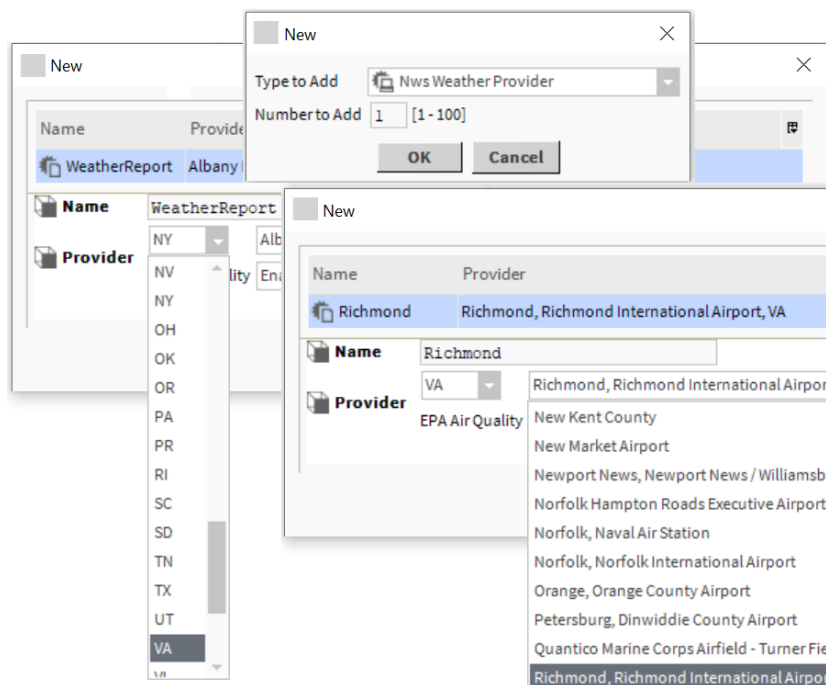
As shown above, for the **NwsWeatherProvider** the **New** dialog shows two fields:

- 2-character region code — typically the U.S. postal code for a state.

    NOTE: Locale codes in the latest **weather** module also include several ISO country codes, in addition to states.

    Name of the locale in that region, possibly an area, city, town, or a combination using a slash "/" delimiter, sometimes using one or more abbreviations.

Enter a unique name for each report (typically, you type in the area or city name as the report name).

NOTE: After adding a WeatherReport, you can get immediate weather data by right-clicking it and issuing the action **Update Weather Report**, or by issuing the same action at the WeatherService level.

You may also wish to review the default setup for NWS advisories.

Configuring advisory alarming

After adding a WeatherReport, you may wish to review the default settings for handling advisories. If using the NWS provider (typical), advisories are included by default.

Prerequisites: The station is opened in Workbench.

Step 1   In the **Nav** tree, expand the WeatherReport's **Provider** to reveal its **Advisories Alarm Ext**.

NOTE: This extension is specific to a NWS (National Weather Service) provider, that is a NwsWeatherProvider.
If configuring advisories for some other weather provider type, skip ahead to Step 4.

Step 2   Double-click the **Advisories Alarm Ext** for its property sheet.

Step 3   By default, NWS advisories are enabled. If you wish no NWS advisories set the `Enabled` property to `false`, and click **Save**. Skip the remaining steps.

Step 4   In the **Nav** tree, expand the WeatherReport's **Current** component to reveal its **Advisories** container, then right-click it and select its property sheet view.

By default, `Alarm Enable` for advisories is set to `true`. This means the Niagara alarm is generated for each new advisory, routed (and formatted) as specified in the **Alarm Properties** settings.

If you wish no alarming (but still want advisories modeled as Advisory components), set the `Alarm Enable` property to `false`, and click **Save**. Skip the remaining steps.

Step 5   Expand the **Alarm Properties** (Advisory Alarm Source Info) container and specify the alarm class to use in the station for alarms from this WeatherReport.

NOTE: The Default Alarm Class is used by default. However, typically you create one or more alarm classes to use for WeatherReport advisory alarms, and specify one of these here.

Step 6   The remaining properties are optional and often left at defaults. Click **Save** when finished.

Chapter 3   Weather components

Topics covered in this chapter

♦ weather-WeatherService
♦ weather-NwsWeatherProvider
♦ weather-WeatherReport
♦ weather-CurrentConditions
♦ weather-Forecast
♦ weather-Advisory
♦ weather-AdvisoryContainer
♦ weather-AdvisoryAlarmSourceInfo
♦ weather-NwsAdvisoryAlarmExt
♦ weather-FoxWeatherProvider
♦ weather-SunPosition
♦ weather-MoonPosition
♦ weatherUnderground-WundergroundWeatherProvider
♦ weather-WeatherManager
♦ weather-CurrentWeatherView
♦ weather-CurrentAirQualityView
♦ weather-AdvisoryManager
♦ weather-ForecastAirQualityView
♦ weather-ForecastView
♦ weather-MoonView

Components include services, folders and other model building blocks associated with a module. You drag them to a property or wire sheet from a palette. Views are plugins that can be accessed by double-clicking a component in the Nav tree or right-clicking a component and selecting its view from the **Views** menu.

The component and view topics that follow appear as context-sensitive help topics when accessed by:

• Right-clicking on the object and selecting **Views→Guide Help**

• Clicking **Help→Guide On Target**

NOTE: The WeatherService is one of three components in the **weather** palette. The other two components on the palette are **SunPosition** and **MoonPosition**, which function independently of weather provider (online) data and other **Weather** components.

Weather components not shown on the palette are typically created as a result of using the **Weather Manager** view of the WeatherService.

The `WundergroundWeatherProvider` component is available, sourced from the weatherUnderground module.

weather-WeatherService

The WeatherService is the service container for all other weather components—it holds child WeatherReport components, which vary by locale. To use, copy the WeatherService from the **weather** palette into your station's ServiceContainer. The default view of the WeatherService is the Weather Manager.
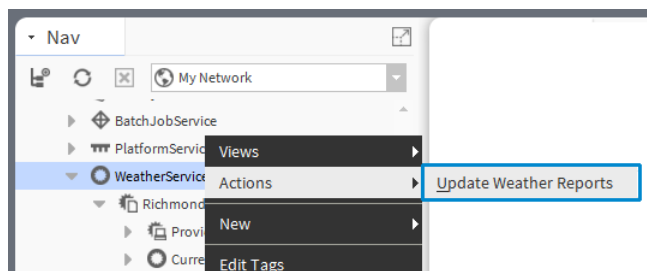
Configuration of the WeatherService includes the ongoing Update Period, which you can adjust from the property sheet (Figure 6). The default update interval is every hour.

Figure 6   WeatherService property sheet
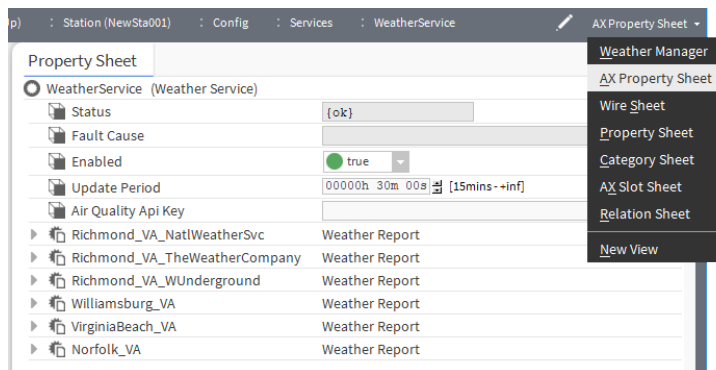
The WeatherService also has an action to manually **Update Weather Reports** (Figure 7).

Figure 7   WeatherService action

This action globally updates all child WeatherReports.

weather-NwsWeatherProvider

Each WeatherReport component has a "Provider" child that interfaces with the weather data source. When adding a new WeatherReport (locale), the default type is the **Nws Weather Provider**, for the NWS (National Weather Service). You select a specific NWS station using two drop-down selection lists, typically specifying a state, then city.

NOTE: Apart from the default Nws Weather Provider, one or more other providers may be available.

- The "Fox Weather Provider" type is available—useful if a JACE station without Internet access, but on a NiagaraNetwork with a Supervisor station using the WeatherService.

- The "Wunderground Weather Provider" is available (in AX-3.7U1and later), providing both the weather module and weatherUnderground module is installed.

For related details, see "weather-FoxWeatherProvider", "weatherUnderground-WundergroundWeatherProvider".

NwsWeatherProvider properties include the "station ID" for the selected weather station, the number of outlook days for the weather report, as well as read-only properties reflecting the locale's longitude and latitude. Also included is an "Advisories Alarm Ext" that allows for alarms when hazardous conditions exist or are expected.

For more details, see the following sections:

- NwsWeatherProvider properties

- "weather-NwsAdvisoryAlarmExt"

Figure 8   NwsWeatherProvider (property sheet)

| Name	Value	Description
Station Id	text string	Station ID is automatically determined when you pick a report (location), using the Weather Manager view.
Outlook	numeric, 7 (default)	Number of days outlook—by default, 7 days. The maximum recommended Outlook value is 7 (days). Any greater number generates additional Forecast components upon a report update, however, they do not contain usable data.
Location	read-only	Displays the location as received from the weather API, resolved for the latitude and longitude values entered.
Longitude	degrees	Configures the geographical longitude of the target location in decimal degrees (both minutes and seconds in decimal format). **NOTE:** Values for latitude and longitude are useful if you are using a SunPosition component for this location. You must enter them in the corresponding properties of that component.
Latitude	degrees	Configures the geographical latitude of the target location in decimal degrees (both minutes and seconds in decimal format). **NOTE:** An online converter for going from degrees, minutes, and seconds, to decimal degrees can be found at: http://www.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html (at this document time).
Air Quality Enabled	`true` (default), `false` Enabled by default.	Configures the display of an air quality value. `true` configures the views (available for both Current and Forecast components) to include support for use on Px pages, provide color indication of air quality, based on an AQI (air quality index) calculation.

weather-WeatherReport

A WeatherReport is a child of the WeatherService and represents a particular locale. It acts as a container for components WeatherProvider (e.g. NwsWeatherProvider), CurrentConditions, and up to 7 Forecast components. The default view of the WeatherReport is the **Current Weather** View.

• Add a WeatherReport using the **New** button in the WeatherService's **Weather Manager** view.

• Drag any WeatherReport component onto a Px page for an iconic-based **Current Weather** View.

• A WeatherReport also has an available **Current Air Quality** View, as does its child CurrentConditions component.

An **Update Weather Report** action refreshes data in its child components.

Figure 9   WeatherReport action
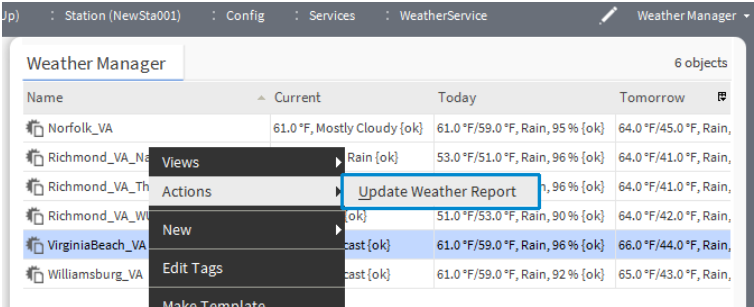
If a newly-added WeatherReport, this action creates the needed child Forecast components. Note also that a global action (to update all WeatherReports) is available at the WeatherService level.

weather-CurrentConditions

Each WeatherReport component has a Current Conditions child component that contains a number of read-only status properties for up-to-date weather statistics, as well as sunrise and sunset time.

NOTE: A WeatherReport's "CurrentConditions" component includes an "Observed" property (in AX-3.7 and later), as a timestamp of when reported conditions were last observed (U.S. NWS providers only). If this time is more than two hours in the past, other Current data values are given status "stale".

Figure 10   Current Conditions (property sheet)
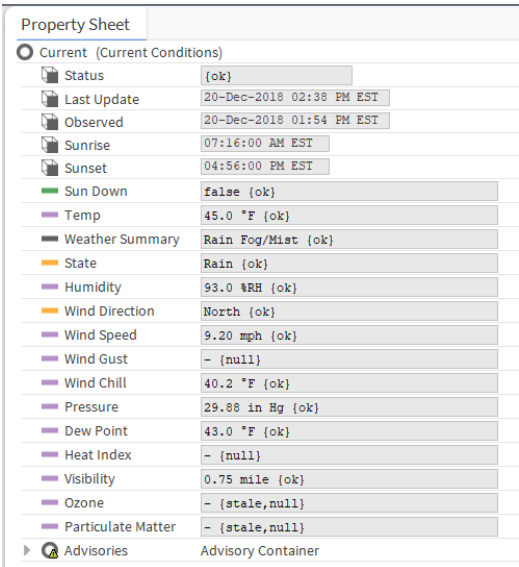
An iconic summary is also available, on the parent WeatherReport's default **Current Weather** View.

A child Advisories container provides management of received weather advisories, for use in the station's alarming subsystem, and an air quality view is also available.

Name	Value	Description
Status (Weather)	read-only	Indicates the current weather condition. Typically {ok} if a connection was made. Other possible statuses include: alarm — if a hazardous condition is imminent/detected in an NWS provider-issued advisory. If alarm, related information is also in properties **Weather Summary** and **State**. fault — if the weather provider references an invalid weather station. stale — if a weather update connection fails, or for a NwsWeatherProvider, if the reported observation time (Observation property) is more than 2 hours in the past. All other properties with status (Sundown, Temp, State, Humidity, and so on) also assume this stale status. The timeout for this "failed connection at update attempt" to a NWS provider is fixed at 15 seconds.
Last Update	read-only	Displays the date and timestamp of the station's last weather report update, in Baja AbsTime format.
Last Failed Write	read-only date and time	Reports the last failed write.
Observed	read-only	Displays the date and timestamp of when the NWS reported the observed values in the last update, in Baja AbsTime format.
Sunrise	read-only	Displays the timestamp for sunrise, in Baja Time format.
Sunset	read-only	Displays the timestamp for sunset, in Baja Time format.
Sundown	read-only	Indicates if the sun is down (true) or up (false). This dynamically updates whenever current time matches the **Sunrise** and **Sunset** times.
Temp	read-only	Displays the current temperature as a StatusNumeric value.
Weather Summary	read-only	Summarizes the current weather conditions, as a StatusString value. This text string is evaluated and converted to a State enumerated value (next property). If CurrentConditions has an alarm status, this describes the alarm condition.
State	read-only	Displays a StatusEnum value derived from the received weather summary text. Enumerations indicate hazardous conditions based on information received in provider-issued advisories.
Humidity	read-only	Displays the current humidity reading as a StatusNumeric value.
Wind Direction	read-only	Displays a StatusEnum value derived from received text.
Wind Speed	read-only	Displays the current wind speed value, as a StatusNumeric.
Wind Gust	read-only	Displays the reported wind gust speed (if available), as a StatusNumeric. Possibly "null" if not available.
Wind Chill	read-only	Displays the wind chill as calculated by the framework using a NOAA formula, providing that the: • temperature is between -50 and 50 degrees F, and

Name	Value	Description
		• wind speed is between 3 and 110 mph (and is specific to the NWS provider). Otherwise, this value is "null". Note that humidity is also utilized. This formula is at: `http://www.nws.noaa.gov/om/windchill/index.shtml`
Pressure	read-only	Displays the current barometric pressure as a StatusNumeric value.
Dew Point	read-only	Current dew point reading, as a StatusNumeric value.
Heat Index	read-only	Displays the heat index as calculated by using a NOAA formula based on: • temperature > 80 degrees F, and • dew point > 60 degrees F, and • humidity > 40% (and is specific to the NWS provider). Otherwise, this value is null. This formula is at: `http://www.nws.noaa.gov/jkl/?n=heat_index_calculator`
Visibility	read-only	Displays a StatusNumeric value for the current visibility.
Ozone	read-only	Displays the level of ozone in the air in parts per million (ppm) as a StatusNumeric value.
Particulate Matter	read-only	Displays the level of particulate matter in the air in micrograms per cubic meter (ug/m^3), as a StatusNumeric value. **NOTE:** • Related to these last two properties, the **CurrentConditions** component also has a **Current Air Quality** View. • The **WeatherService** retrieves air quality metrics by connecting to a U.S. EPA (Environmental Protection Agency) server.

About weather State

The State value of **CurrentConditions** and any Forecast component is a status enumeration derived from received weather summary text, using a best effort approach.

NOTE: This summary text appears in the **CurrentConditions** property sheet as the "Weather Summary" value.

You can link from the State slot of **CurrentConditions** or a **Forecast** component to a StatusEnum type slot of a control point, if needed. Facets of a linked point should be set to the frozen range (EnumRange) of `WeatherState` in the weather module to capture all 28 possible states.

Figure 11   WeatherState enumerations seen in Facets, range Enum dialog

NOTE: Some enumerations were added for hazardous weather conditions, as received in provider-issued watches, warnings, and advisories—for example: tsunami, tornado, flood, and so on. These are reflected in the State property of **CurrentConditions** only if its Status is alarm.

About weather Wind Direction

The Wind Direction value of **CurrentConditions** is a status enumeration derived from received text. You can link from the Wind Direction slot to a StatusEnum type slot of a control point, if needed. Facets of a linked point should be set to the frozen range (EnumRange) of WindDirection in the weather module to capture all 8 possible states.

Figure 12   WindDirection enumerations seen in Facets, range Enum dialog

weather–Forecast

Each WeatherReport component contains some number of **Forecast** components. At any time, children To-day and Tomorrow are available. Depending on the current day of week, the remaining children are named appropriately for that day of the week.

Figure 13   Forecast components

For the NWS provider, 7 **Forecast** components are created by default, based upon the Outlook value specified in the **NwsWeatherProvider** component. Each **Forecast** component contains a number of read-only status properties for predicted weather items, as well as sunrise and sunset times

You can drag any **Forecast** component onto a Px page for an iconic-based **Forecast** View.
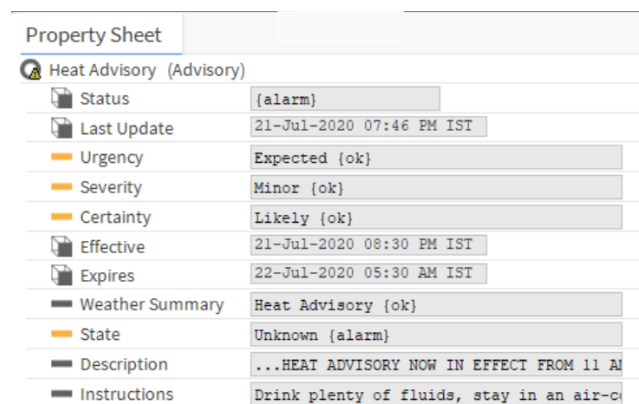
Name	Value	Description
Status (Weather)	read-only	Indicates the current weather condition. Typically `{ok}` if a connection was made. Other possible statuses include:
		`alarm` — if a hazardous condition is imminent/detected in an NWS provider-issued advisory. If alarm, related information is also in properties **Weather Summary** and **State**.
		`fault` — if the weather provider references an invalid weather station.
		`stale` — if a weather update connection fails, or for a NwsWeatherProvider, if the reported observation time (Observation property) is more than 2 hours in the past. All other properties with status (Sundown, Temp, State, Humidity, and so on) also assume this stale status. The timeout for this "failed connection at update attempt" to a NWS provider is fixed at 15 seconds.
Last Update	read-only	Displays the date and timestamp of the station's last weather report update, in Baja AbsTime format.
Sunrise	read-only	Displays the timestamp for sunrise, in Baja Time format.
Sunset	read-only	Displays the timestamp for sunset, in Baja Time format.
High		Predicted high temperature as a StatusNumeric value.
Low		Predicted low temperature as a StatusNumeric value.
Weather Summary	read-only	Summarizes the current weather conditions, as a StatusString value. This text string is evaluated and converted to a State enumerated value (next property). If CurrentConditions has an alarm status, this describes the alarm condition.

Name	Value	Description
State	read-only	Displays a StatusEnum value derived from the received weather summary text. Enumerations indicate hazardous conditions based on information received in provider-issued advisories.
Ozone	read-only	Displays the level of ozone in the air in parts per million (ppm) as a StatusNumeric value.
Particulate Matter	read-only	Displays the level of particulate matter in the air in micrograms per cubic meter (ug/m^3), as a StatusNumeric value. **NOTE:** • Related to these last two properties, the **CurrentConditions** component also has a **Current Air Quality** View. • The **WeatherService** retrieves air quality metrics by connecting to a U.S. EPA (Environmental Protection Agency) server.

weather-Advisory

The weather advisories are dynamically modeled as Advisory components under the Advisories (Advisory-Container) child of the WeatherReport's Current (CurrentConditions) component.

Figure 14   Example Advisory component in Nav tree (and default property sheet view)

Advisory components exist only for the duration of the provider-issued watch, warning, or advisory of a hazardous weather condition. When a weather advisory expires, the corresponding Advisory component is automatically removed from the station.

Typical access of Advisory components is via the Advisory Manager view of the parent Advisories container.

weather-AdvisoryContainer

Each **Current** (CurrentConditions) component of any NwsWeatherProvider (locale) has a child **Advisories** container. Providing that the "Enabled" property of the Provider's `AdvisoriesAlarmExt` is `true` (the default), NWS weather advisories are dynamically modeled as **Advisory** components under this container.

Such advisories are initiated by provider-issued watches, warnings, and advisories of hazardous weather conditions, for that provider's locale. When a weather advisory expires, the corresponding **Advisory** component is automatically removed from this container. Note that sometimes, there may be more than one weather advisory at a time.

NOTE: While any advisory is effective, under the WeatherReport for this locale, the CurrentConditions component reflects an alarm in its "Status" property. During this period, that WeatherReport also appears in alarm (and is colored red) in the **Weather Manager** view of the WeatherService,

Figure 15   Weather Manager view shows weather reports in alarm due to advisory

The AdvisoryContainer's default view is the **Advisory Manager**, a tabular listing of current advisories. Double-click an advisory for a popup showing all advisory properties, including the complete text "Description" and "Instructions" issued by the provider.

Figure 16   AdvisoryContainer (Advisories) under CurrentConditions of NWS WeatherProvider

In addition to holding child **Advisory** components, the AdvisoryContainer has an "Alarm Enable" property and a related child **Alarm Properties** container.

BoundLabel to AdvisoryContainer notes

You can also bind a Px BoundLabel widget to the AdvisoryContainer, to display the most urgent, severe, certain, or recent weather advisory, using special BFormat syntax. This syntax is.

```
%mostUrgent.weatherSummary% or
%mostSevere.weatherSummary% or
%mostCertain.weatherSummary% or
%mostRecent.weatherSummary%
```

The BoundLabel will display the advisory name, such as "Flood Warning" or "Wind Advisory".

NOTE: To avoid BFormat errors when advisories do not exist, append an "alternate" variable onto the BFormat syntax examples listed above. For example, you can use the following:

`%mostUrgent.weatherSummary.value?parent.weatherSummary.value%`

This will display either the most certain advisory—or if no advisories exist, the current weather summary.

About the Common Alerting Protocol (CAP)

The NWS uses the "Common Alerting Protocol" (CAP) in advisory messages, noting "urgency", "severity", and "certainty". Urgency relates to "time available to prepare", severity to "intensity of impact", and certainty to "confidence in the observation or prediction".
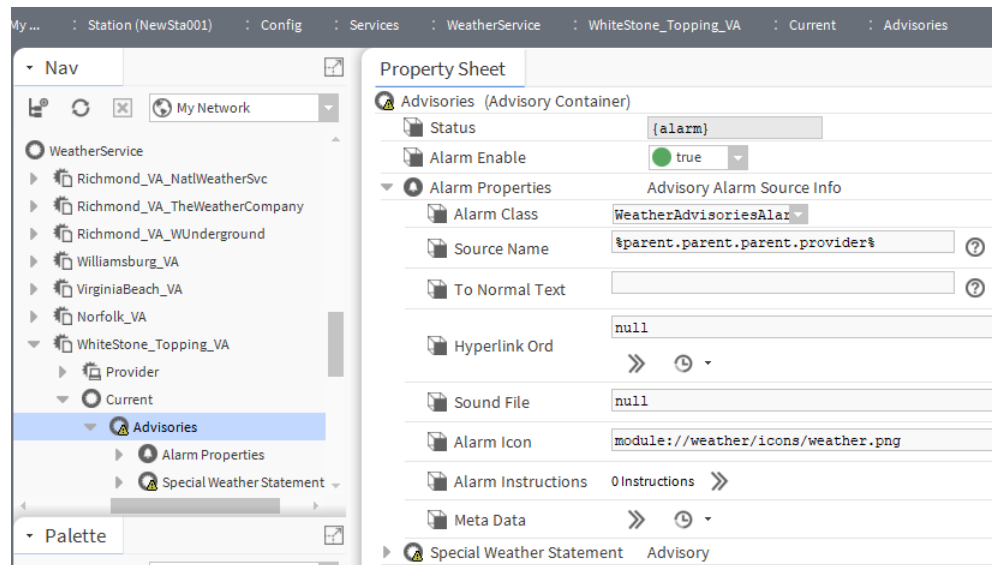
At the time of this document, more details about CAP in general can be found at:

- http://en.wikipedia.org/wiki/Common_Alerting_Protocol
- http://docs.oasis-open.org/emergency/cap/v1.2/CAP-v1.2-os.pdf

AdvisoryContainer properties

Property sheet access of an AdvisoryContainer shows its single Alarm Enable configuration property and a child AdvisoryAlarmSourceInfo (**Alarm Properties**) container.

Figure 17   AdvisoryContainer (property sheet) showing expanded Alarm Properties

Name	Value	Description
Alarm Enable	true (default), false	Enabled (by default), when `true`, each weather advisory results in an alarm, routed using the Alarm Properties below. Note this differs from alarm setup in the "AdvisoriesAlarmExt", where an "Urgency" property existed, configurable to a "lower" urgency level ("Future", "Past", or "Unknown"). If set to `false`, alarming does not occur from weather advisories. However, dynamic modeling of weather advisories using **Advisory** components does continue (in the case of a NwsWeatherProvider, the **Enabled** property of its AdvisoriesAlarmExt must be `true`).

Alarm Properties

Contains typical Alarm Source Info child properties, two of which are described below. Remaining alarm properties operate as in similar alarm extensions for devices or points.

Name	Value	Description
Alarm Class	Default Alarm Class (default)	Often, you create one or more alarm classes expressly for weather-related alarms, and specify one here.
Source Name	`%parent.pa-rent.parent.provider%`	Specifies the sourceName seen in an alarm record, where the default value results in the name of the parent WeatherReport (locale).

About advisories and alarms

The presence of an **Advisory** component under the **Advisories** container (AdvisoryContainer) results in a changed iconic **Current Weather** view (Px), along with an alarm status for both the CurrentConditions component and its parent NwsWeatherProvider.

If the **Alarm Enable** property of the AdvisoryContainer is true (default setting), each advisory results in an alarm routed to the specified AlarmClass, containing weather provider data. See the following sections.

Current Weather view (Px) effects

During an alarm condition for a WeatherReport (locale), the iconic Px widget for its CurrentConditions (**Current Weather** view) reflects the weather advisory, including changed text color.

Figure 18   Example Current Weather view during weather advisory

The default alarm text color is red, configurable in the Px editor (property **AlarmStateBrush**).

When the alarm condition clears (all provider-issued watches, warnings, and advisories have been canceled or expired), the **Current Weather** view returns to its normal state.

Figure 19   Example Current Weather view returned to normal
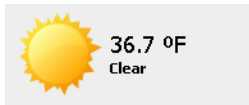
In this case, there are no **Advisory** components under the AdvisoryContainer of the CurrentConditions component.

Weather provider data in Advisory and alarm

A weather advisory results in an **Advisory** component created under the AdvisoryContainer. Typical access is from the **Advisory Manger** view of the AdvisoryContainer, where a double-click provides a popup dialog as given below.

Figure 20   Example Advisory details (popup) from double-click in Advisory Manager view

Blizzard Warning	✕
Status	{alarm}
Last Update	27-Dec-18 2:46:58 PM EST
Urgency	Expected
Severity	Severe
Certainty	Likely
Effective	27-Dec-18 1:14:00 PM EST
Expires	28-Dec-18 7:00:00 AM EST
Weather Summary	Blizzard Warning
State	Unknown
Description	...BLIZZARD WARNING REMAINS IN EFFECT UNTIL 6 AM CST FRIDAY... ...WINTER STORM WARNING HAS EXPIRED... * WHAT...Blizzard conditions. Additional snow accumulations of 5 to 9 inches. Winds gusting as high as 50 mph. * WHERE...Portions of northwest and west central Minnesota and southeast North Dakota. * WHEN...Widespread blizzard conditions through tonight. * ADDITIONAL DETAILS...Travel will be nearly impossible. Widespread blowing snow will significantly reduce visibility, especially in open country. Wind chills as low as 30 below zero will cause frostbite on exposed skin in as little as 30 minutes tonight.
Instructions	A Blizzard Warning means severe winter weather conditions are expected or occurring. Falling and blowing snow with strong winds and poor visibilities are likely. This will lead to whiteout conditions, making travel extremely dangerous. Do not travel. If you must travel, have a winter survival kit with you. If you get stranded, stay with your vehicle. The latest road conditions for the state you are calling from can be obtained by calling 5 1 1.

If the AdvisoryContainer's **Alarm Enable** property is `true`, a corresponding Niagara alarm is routed to the specified AlarmClass in the station.

Figure 21 Example alarm details popup (alarm record) of Niagara alarm from weather advisory

Among the entries in the Alarm Data portion of the alarm record are the following:

- certainty — the enumerated value of the "Certainty" property received from the provider, for example "Possible", "Likely", and so on.
- description — text string from the provider that provides a complete description of the advisory.
- expires — date/timestamp of when the weather advisory expires.
- instructions — text instructions from the provider on what to do because of this advisory.
- msgText — the enumerated value of the CurrentConditions "state" property.
- severity — the enumerated value of the "Severity" property received from the provider, for example "Moderate", "Minor", and so on.
- sourceName — typically the name of the parent WeatherReport (locale), such as "Richmond", etc. (unless "Source Name" under the "Alarm Properties" container has been edited from defaults).
- state — the alarm state and status of the CurrentConditions component.
- urgency — the enumerated value of the "Urgency" property received from the provider, for example "Immediate", "Expected", "Future", and so on.

Once all weather watches, warnings, and advisories have been canceled or expired, the AdvisoryContainer alarm source returns the offnormal alarm to a normal condition.

weather-AdvisoryAlarmSourceInfo

The AdvisoryAlarmSourceInfo (**Alarm Properties**) is a container slot under the **AdvisoryContainer** child of **CurrentConditions**. It specifies the AlarmClass and other parameters used for Niagara alarming from weather advisories, providing that **Alarm Enable** in the **AdvisoryContainer** is `true`.

weather-NwsAdvisoryAlarmExt

Each NwsWeatherProvider has a child Advisories Alarm Ext extension. This provides for alarms initiated by NWS-issued watches, warnings, and advisories of hazardous weather conditions, for the locale of this provider. By default, this extension is enabled.
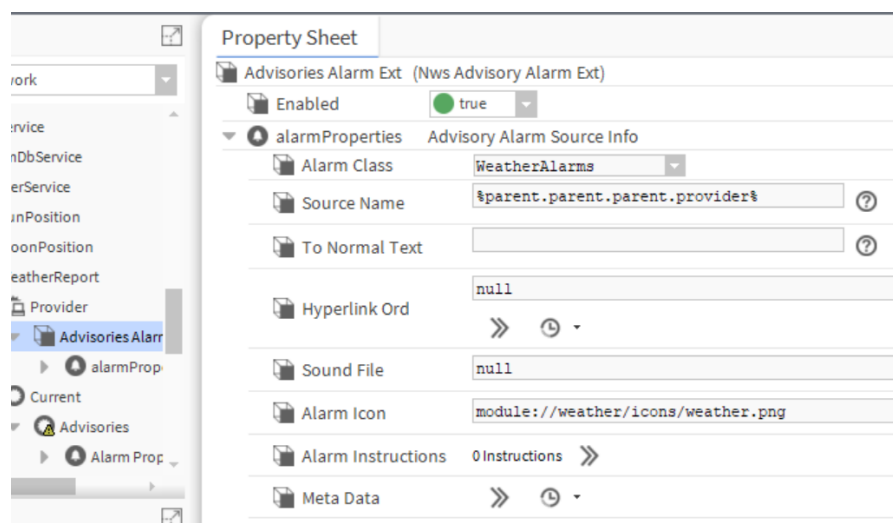
NOTE: The WeatherService architecture for NWS advisories changed—this extension has minimal impact (single property, Enabled, and no other slots).

A child Alarm Properties container holds typical Alarm Source Info properties used to specify which alarm class is used, plus other standard alarm parameters. See the following for more details:

NOTE: Under the WeatherReport for this locale, the CurrentConditions component reflects a related alarm in its Status property, with its State property reflecting an enumerated value for the hazardous condition. The Weather Summary property reflects a subject description received from the NWS.

Property sheet access of NwsAdvisoryAlarmExt shows its configuration properties and the child **Alarm Source Info** container.

Figure 22 NwsAdvisoryAlarmExt (property sheet) showing expanded Alarm Properties

Name	Value	Description
Enabled	true (default), false	Activates the advisories alarm extension
Alarm Properties	additional properties	Alarm Source Info container for alarm-related properties.
		Alarm Class — (default is Default Alarm Class) Often, you create one or more alarm classes expressly for NWS related alarms, and specify one here.
		Source Name — Specifies the sourceName seen in an alarm record, where the default value (as shown in Figure 20) results in the name of the parent WeatherReport (locale).
		These alarm properties operate as in similar alarm extensions for devices or points.

About NWS alarms

An alarm from **Advisories Alarm Ext** (NwsAdvisoryAlarmExt) results in a changed iconic **Current Weather** view (Px) as well as an alarm record with NWS data.

NWS data in alarm record

An NWS-initiated advisory in a system results in an Offnormal alarm with several NWS-specific facets in its Alarm Data.

Figure 23   Example Niagara alarm record from NwsAdvisoryAlarmExt of NwsWeatherProvider

Included in the Alarm Data of the alarm record are the following:

- msgText — the enumerated value of the CurrentConditions "state" property

- nwsCertainty — the enumerated value of the "Certainty" property received from the NWS, for example "Possible", "Likely", and so on.

- nwsDescription — text string from the NWS that provides a complete description of the advisory.

- nwsExpires — date/timestamp of when the NWS advisory expires.

- nwsInstructions — text instructions from the NWS on what to do because of this advisory.

- nwsSeverity — the enumerated value of the "Severity" property received from the NWS, for example "Moderate", "Minor", and so on.

- nwsUrgency — the enumerated value of the "Urgency" property received from the NWS, for example "Expected", "Future", and so on. Corresponds to the "Urgency" property among the NwsAdvisoryAlarmExt properties.

- sourceName — typically the name of the parent WeatherReport (locale), such as "Richmond", etc. (unless "Source Name" under the "Alarm Properties" container has been edited from defaults).

Once all NWS watches, warnings, and advisories have been canceled or expired, the NwsAdvisoryAlarmExt alarm source returns the alarm to a normal condition.

weather-FoxWeatherProvider

The Fox Weather Provider is an available type when adding a WeatherReport in the **Weather Manager**, as an alternative to the default NwsWeatherProvider. See it in the drop-down Type to Add field in the **New** dialog when adding a new WeatherReport.

Figure 24   Fox Weather Provider in initial New dialog, type selection
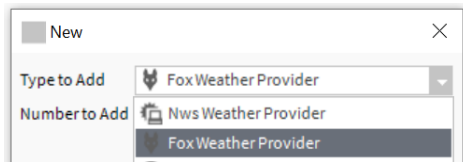
NOTE: Usage is intended for a remote JACE station without Internet access, but which is a subordinate of a Supervisor station already using the WeatherService. Otherwise, you can use the default type: NwsWeather Provider. To use, the following must already be configured:

- An enabled NiagaraStation in its NiagaraNetwork, representing the remote Supervisor station.

- The remote Supervisor station must have an enabled NiagaraStation representing the remote station.

- The remote Supervisor's WeatherService must have one or more working WeatherReports.

When adding, in a secondary **New** dialog, you select the NiagaraStation that represents the Supervisor, and then a specific WeatherReport in that remote station's WeatherService.

Figure 25   Secondary New dialog, selecting Supervisor station, then WeatherReport
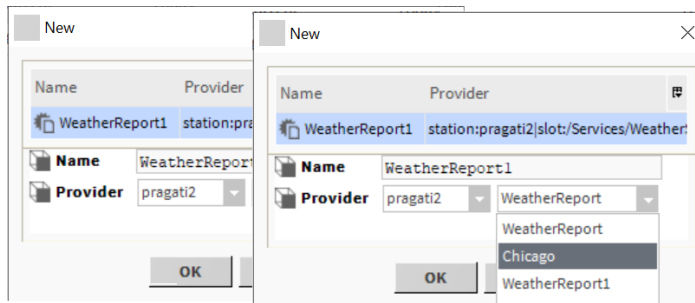
Once added, the remote station gets updated weather data by connecting to the Supervisor and "pulling" the values from the Supervisor's WeatherService.

Figure 26 Edit dialog of added WeatherReport shows FoxWeatherProvider selections
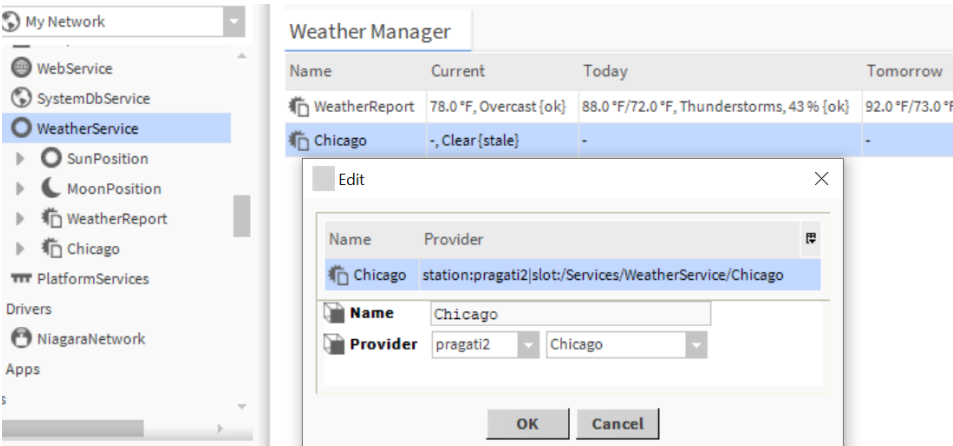
Figure 27 FoxWeatherProvider property sheet
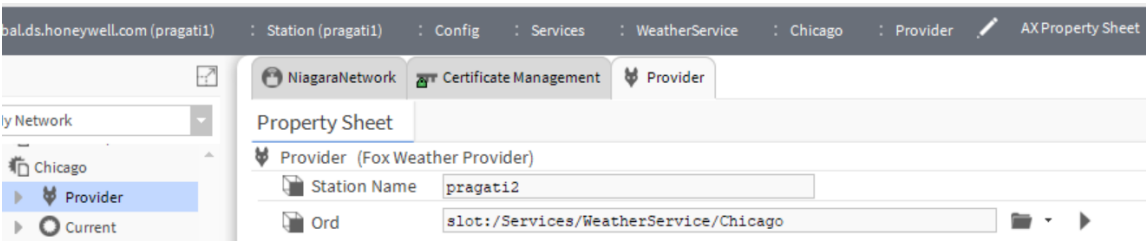
Name	Value	Description
Station Name	text string	Name of the selected NiagaraStation that represents the remote Supervisor station.
Ord	text string	Path in the remote Supervisor station for the source Weather-Report component. **NOTE:** Typically, you do not edit these properties, but instead use the **New** or **Edit** dialog in the **Weather Manager** to make selections from the two drop-down controls in the "Provider" field.

weather-SunPosition

SunPosition provides a variety of solar calculations, and is found on the **weather** palette along with a similar **MoonPosition** component. From the palette, copy (drag and drop) the **SunPosition** component into any station location.

NOTE: Like the **MoonPosition** component, but unlike other weather components, **SunPosition** does not require the station host to have the WeatherService, nor to have Internet connectivity. Output calculations are mathematically derived and executed solely within the station. Usage applies to any geographic location, and not just the U.S. or North America.

Figure 28   Example SunPosition copied into station
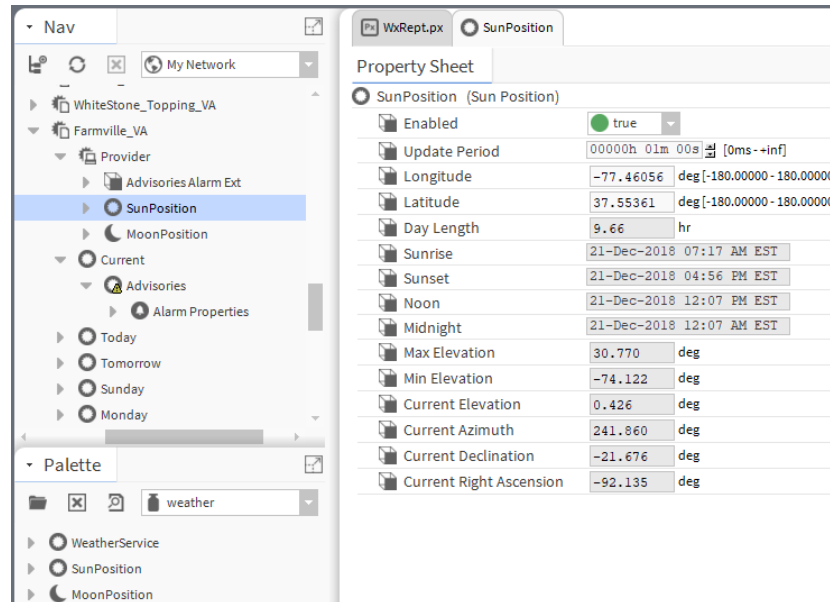
To use, enter **Longitude** and **Latitude** values in decimal degrees (that is, both minutes and seconds in decimal format) into the **SunPosition** component, and **Save**.

NOTE: At the time of this document, an online converter for going from degrees, minutes, seconds, to decimal degrees can be found at: *http://www.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html*

Based on these values, along with the station's date and time, solar calculations are available in SunPosition properties. Unlike the MoonPosition component, there is no special (iconic) view for **SunPosition**.

NOTE: If using the WeatherService and NwsWeatherProvider, to simplify setup, copy it under the **Provider** of a WeatherReport. This lets you easily copy its longitude and latitude values, or you can enter the values manually.

In addition to properties below, **SunPosition** has an available **Recalculate** action, to immediately recalculate all read-only properties.

Figure 29   SunPosition property sheet

A SunPosition component has the following properties:

Name	Value	Description
Enabled	`true` (default) or `false`	Activates (`true`) and deactivates (`false`) use of the object (network, device, point, component, table, schedule, descriptor, etc.).
Update Period	`00000h 01m 00s,` (default)	Configures the interval at which ongoing calculations are made, reflected in the properties below.
Longitude	degrees	Configures the geographical longitude of the target location in decimal degrees (both minutes and seconds in decimal format). **NOTE:** Values for latitude and longitude are useful if you are using a SunPosition component for this location. You must enter them in the corresponding properties of that component.
Latitude	degrees	Configures the geographical latitude of the target location in decimal degrees (both minutes and seconds in decimal format). **NOTE:** An online converter for going from degrees, minutes, and seconds, to decimal degrees can be found at: http://www.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html (at this document time).
Day Length	read-only	Displays the number of hours between sunrise and sunset as a decimal value.
Sunrise	read-only	Displays the timestamp for sunrise, in Baja Time format.
Sunset	read-only	Displays the timestamp for sunset, in Baja Time format.
Noon	read-only	Displays a timestamp for the calculated astronomical noon (when the sun is at its highest point for the day), in Baja Time format.
Midnight	read-only	Displays a timestamp for the calculated astronomical midnight for the current day at the specified location, at this time the sun's elevation is at it's minimum, in Baja Time format.

Name	Value	Description
Max Elevation	read-only	Displays the maximum sun elevation for the specified day, the maximum occurs at astronomical noon.
Min Elevation	read-only	Displays the minimum sun elevation for the specified day, the minimum occurs at astronomical midnight.
Current Elevation	read-only	Displays the angle in degrees between the current position of the sun and the true horizon.
Current Azimuth	read-only	Displays the direction of the sun in degrees relative to true north.
Current Declination	read-only	Displays the angle between the sun and the earth's equator. The sun has zero declination during the equinoxes while crossing the equator. At the winter solstice, the declination is at it's minimum of -23.5 and at the summer solstice it is at it's maximum of +23.5.
Current Right Ascension	read-only	Displays the position of the sun along the celestial equator, with zero being at the 'first point of Aries'.

weather-MoonPosition

MoonPosition is found on the **weather** palette along with a similar **SunPosition** component. From the palette, simply drag and drop the MoonPosition component in any station location. Based upon the station's date and time, this component calculates the current moon phase, age, and percent illumination.

NOTE: Like the **SunPosition** component, but unlike other weather components, **MoonPosition** does not require the station host (JACE) to have the WeatherService, nor to have Internet connectivity. Output calculations are mathematically derived and executed solely within the station. Usage applies to any geographic location, and not just the U.S. or North America.

Figure 30   **Moon** View
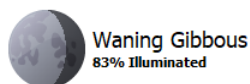
You can drag any **MoonPosition** component onto a Px page for an iconic-based **Moon** View.

Figure 31   MoonPosition property sheet
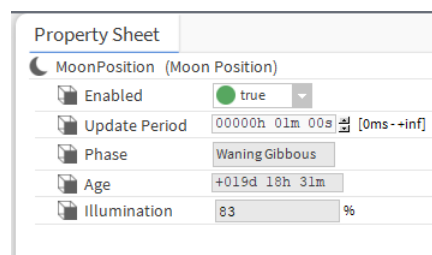
The following properties are accessible in the property sheet for a **MoonPosition** component.

Name	Value	Description
Enabled	`true` (default) or `false`	Activates (`true`) and deactivates (`false`) use of the object (network, device, point, component, table, schedule, descriptor, etc.).
Update Period	`00000h 01m 00s`, (default)	Configures the interval at which ongoing calculations are made, reflected in the properties below.
Phase	text string	Current calculated phase in the moon cycle, as one of the following: • New Moon — Moon's unilluminated side is facing the Earth, and appears completely dark. • Waxing Crescent — Moon less than one half illuminated; illuminated portion is increasing. • First Quarter — Moon is one half illuminated; illuminated portion is increasing. • Waxing Gibbous — Moon more than one half illuminated; illuminated portion is increasing. • Full Moon — Moon's illuminated side is facing the Earth, and is completely illuminated. • Waning Gibbous — Moon more than one half illuminated; illuminated portion is decreasing. • Last Quarter — Moon is one half illuminated; illuminated portion is decreasing. • Waning Crescent — Moon less than one half illuminated; illuminated portion is decreasing.
Age	`000d 00h 00m`	Calculated duration since first entering New Moon phase, in days, hours, and minutes.
Illumination	percent	Calculated illumination percentage, where Full Moon tops at 100%, and New Moon bottoms at 0%.

weatherUnderground-WundergroundWeatherProvider

The **Wunderground Weather Provider** type is available, providing that the station's host platform has both the `weather` and `weatherUnderground` modules installed. The Wunderground Weather Provider interfaces to XML feeds from the Weather Underground® (wunderground.com), appropriate for locations outside of the United States (and its NWS). A developer account (and key ID) is needed from the Weather API of wunderground.com.

IMPORTANT: The Weather Underground has discontinued free service as of December 31, 2018. This will impact those users who utilize a free Weather Underground key in conjunction with our WUnderground Provider. Once the service is discontinued, users can expect to see their weather reports highlighted as orange with stale data.

Alternative options to receive weather from other service providers are available. Note, the National Weather Service provider will continue to work for North America users.

NOTE: In Niagara 4.10 and later, for those who currently use an API key, you can continue to use the WUnderground Provider however Weather Underground may require you to generate a new key.

The Wunderground Weather Provider is an available type when adding a WeatherReport in the **Weather Manager**, providing that the weatherUnderground module is installed (along with the weather module). See it in the drop-down Type to Add field in the **New** dialog when adding a new WeatherReport.

Figure 32   Wunderground Weather Provider in initial New dialog, type selection
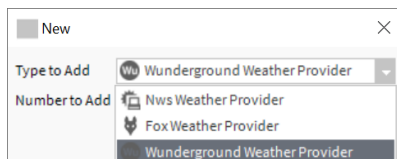
Usage is intended for "international weather", meaning locales outside of the U.S. (and/or areas served by U.S. NWS reports). Otherwise, it is recommend to use the default type: NwsWeatherProvider.

The following requirements and limitations apply when using the Wunderground Weather Provider:

- You require a Weather API "key ID" from wunderground.com, received after opening a developer account. Costs range from free to some tiered monthly fee, based on usage (calls/day and calls/minute). At the time of this document, find more details at: www.wunderground.com/weather/api

- When adding a new Wunderground Weather Provider, you enter your key ID string.

- Although forecasting components and current conditions are available, currently there is no Niagara support for advisories issued through a Wunderground Weather Provider. Thus, the AdvisoryContainer component under the CurrentConditions of such a WeatherReport will remain empty.

- Air quality properties (Ozone, Particulate Matter) and Heat Index of CurrentConditions also remain at null values. Thus, the **Current Air Quality** view remains at "unknown".

When adding, in a secondary **New** dialog, you enter a weather report name, the known latitude and longitude for the location (in decimal degrees), your unique key ID string.

Figure 33   Secondary New dialog, with latitude, longitude, and API "key ID" issued by wunderground.com
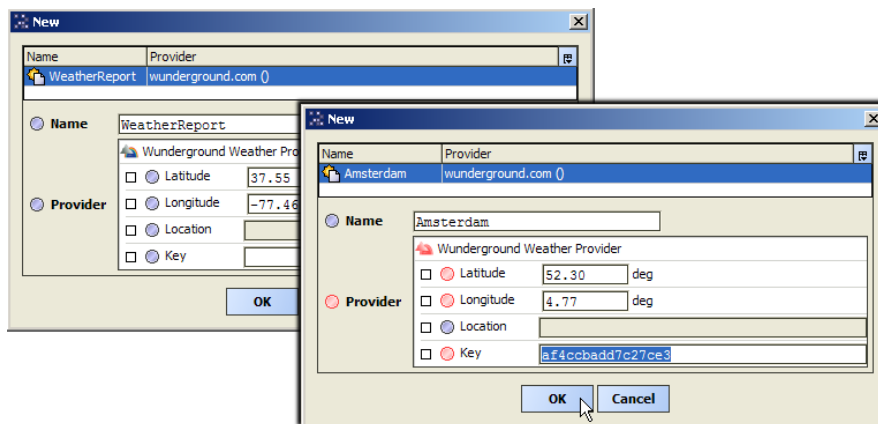
Once added, a connection is made to the weather API at wunderground.com, the location is resolved, and the report is updated, including current conditions and some number of forecast days.

Figure 34   Example property sheet of WeatherReport based on WundergroundWeatherProvider
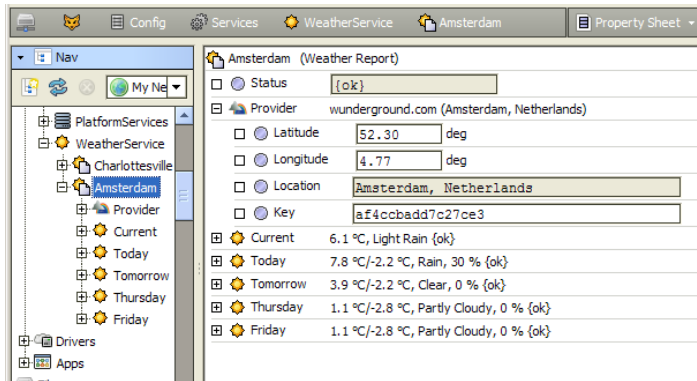
Note values display in Workbench converted to metric units (as shown above) only if the Workbench user's options are set for metric, otherwise values appear in English units (degrees F, mph). Web browser access displays values in units according to the user's Facets, Unit Conversion setting.

Figure 35   Example CurrentConditions property sheet for report based on WundergroundWeatherProvider
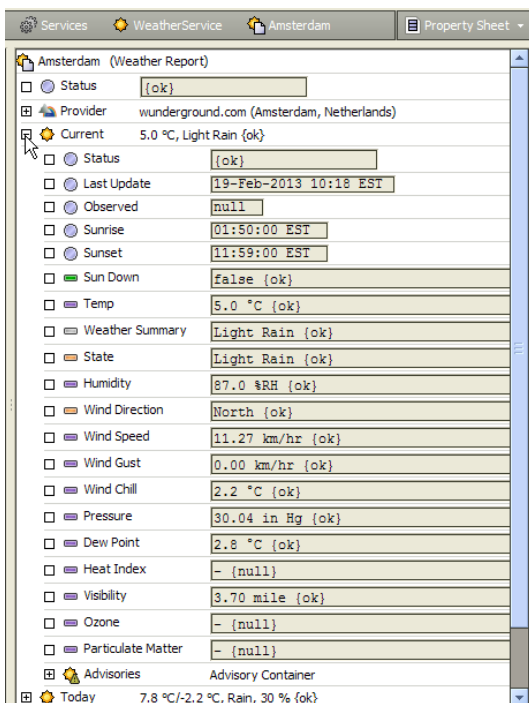
A few CurrentConditions properties may be fixed in English values or units—for example "Pressure" (in Hg) vs. millibars (mb) or "Visibility" (mile) vs. kilometers (km).

WundergroundWeatherProvider properties

Property sheet access of a WundergroundWeatherProvider shows values that represent the three selections made when adding (or editing) the WeatherReport, as well as the resolved location.

Figure 36   WundergroundWeatherProvider property sheet
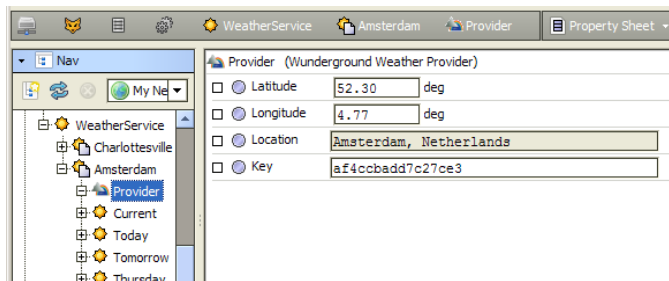
These properties are:

- Latitude

  Latitude of target location in decimal degrees (both minutes and seconds in decimal format).

  NOTE: An online converter for going from degrees, minutes, seconds, to decimal degrees can be found at: http://www.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html (at this document time).

- Longitude

  Longitude of target location in decimal degrees (both minutes and seconds in decimal format).

- Location

  (Read-only) Location text string received from the wunderround.com weather API, resolved for the latitude and longitude values entered.

- Key

  Your unique Key ID string value received from wunderground.com, for your project account (can be used for multiple different WeatherReports).

  NOTE: If you regenerate this API key using wunderground.com's Weather API site, you also need to update this property string to match in your WundergroundWeatherProviders.

weather-WeatherManager

The **Weather Manager** is the default view of the WeatherService—double-click the WeatherService to see it. You use this view to add or edit one or more child WeatherReports (one for each locale of interest).

Figure 37   Weather Manager view

Like other managers, the **Weather Manager** is a table view listing defined child components. The **Weather Manager** table has the following available data columns:

- Name

  Name for the WeatherReport (by convention, edited to be the locale for the report).

- Current

  Current temperature, and summary text descriptor ("Overcast," "Sunny," "A Few Clouds," etc.).

- Today

  Today's forecast data, including temperature high/low, text summary, and precipitation chance (%).

- Tomorrow

  Tomorrow's forecast data, including same values as in Today.

- Sunrise/Sunset

  Predicted time of day for sunrise/sunset.

- Status

  Current status of weather report.

- Provider

  Text descriptor of the locale providing the weather report, for example, "Richmond, VA". Typically this is the same provider descriptor used when selecting a provider in the **New** dialog.

weather-CurrentWeatherView

The **Current Weather** View provides an iconic summary of current weather conditions. This is the default view of each WeatherReport (locale) under the station's **WeatherService**.

Figure 38   Current Weather View example

On a Px page, add this iconic summary by dragging a WeatherReport (locale) onto the Px canvas. In the resulting **Make Widget** dialog, select: **Workbench** View, then: **Current Weather** View.

NOTE: The **Current Weather** View can reflect an active NWS (National Weather Service) advisory as an alarm condition.

weather-CurrentAirQualityView

The **Current Air Quality View** provides color indication of the current air quality, along with a (text) description of the air quality state. It is an available view of each WeatherReport (locale) in the station's WeatherService, as well as a WeatherReport's CurrentConditions child. Usage is intended for WeatherReports using a NwsWeatherProvider.

Figure 39   Current Air Quality View example

On a Px page, to add this view, drag a WeatherReport (locale) or its **Current** child onto the Px canvas. In the resulting **Make Widget** dialog, select: **Workbench View**, then: **Current Air Quality** View.

You can resize the rectangle provided for the view, and optionally change the widget's showAqi property from the default `false` to `true`.

Figure 40   Setting "showAqi" property to true to display numerical AQI
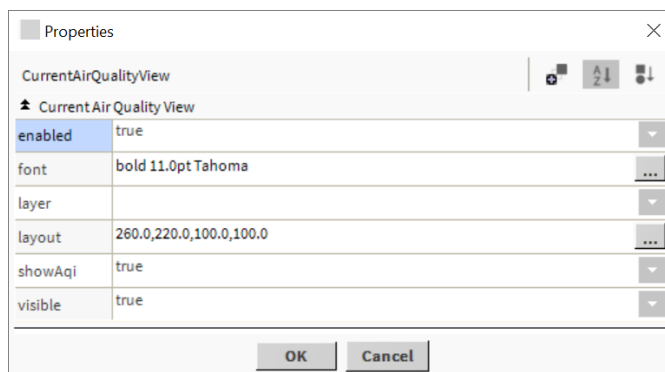
If `showAqi` is `true`, the numerical AQI value (air quality index) displays after the air quality state text descriptor, in parentheses. The example "moderate" air quality state above relates to an AQI of 63.

Possible air quality states are shown below, by default descriptor, color, and AQI range.

Air Quality View (Current and Forecast) states, colors, AQI range

State Descriptor	Color (EPA)		AQI range
Good	Green		0 - 50
Moderate	Yellow		51 - 100
USG*	Orange		101 - 150
Unhealthy	Red		151 - 200
Very Unhealthy	Purple		201 - 300
Hazardous	Maroon		301 - 500
Unknown	White		unknown

*USG is "Unhealthy for Sensitive Groups". State descriptors are editable in the weather.lexicon file.

More information about the Air Quality Index (AQI) can be found on the U.S. Environmental Protection Agency's website at http://www.airnow.gov/index.cfm?aqbasics.aqi

CAUTION: Air quality data is preliminary and unvalidated; it should not be used to formulate or support regulation, ascertain trends, act as guidance, or support any other government or public decision-making.

A WeatherReport's CurrentConditions component and each of its Forecast components have two related properties: "Ozone" and "Particulate Matter".

weather-AdvisoryManager

This the default view of the **Advisories** (AdvisoryContainer) child of a WeatherReport's **Current** (Current-Conditions) component—double-click the AdvisoryContainer to see it. Use this view to review current weather advisories (if any) for this weather provider.

Double-click any advisory row to see a popup dialog showing details for that advisory. Advisory details include a text description and instructions, plus the "Last Update" time for the advisory.

Figure 41 Advisory Manager view with advisory details popup
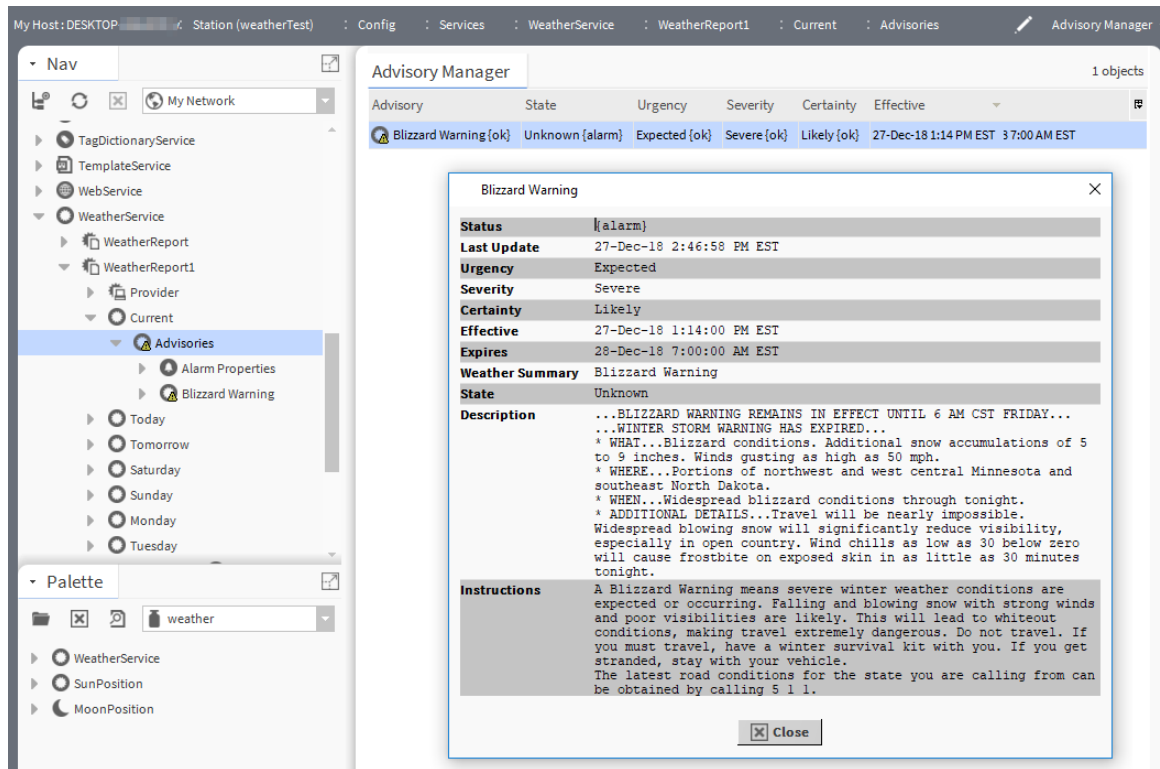
Like other managers, the **Advisory Manager** is a table view listing active child Advisory components. The manager's table has the following available data columns.

Column	Value	Description
Advisory	text string	Name for the Advisory, typically the advisory type (Flood Watch, Blizzard Warning, and so on).
State	text string	Enumerated value derived from the "weather summary" text, which include descriptors for hazardous conditions.
Urgency	"Immediate", "Expected", "Future", "Past" or "Unknown".	The provider-assigned urgency for each advisory.
Severity	"Extreme", "Severe", "Moderate", "Minor" or "Unknown"	The provider-assigned severity for each advisory.
Certainty	"Observed", "Likely", "Possible", "Unlikely" or "Unknown"	The provider-assigned certainty for each advisory.
Effective	date/time	Date/timestamp of when the weather provider issued this advisory.
Expires	date/time	Date/timestamp of when the this advisory is expected to expire, at which time this Advisory component is dynamically removed from the station.

weather-ForecastAirQualityView

The **Forecast Air Quality View** provides color indication of forecasted air quality, along with a (text) description of a forecasted air quality state. It is an available view of each child Forecast component (Today, Tomorrow, <daysOfWeek>) under a WeatherReport (locale).

Figure 42   *Forecast Air Quality View example*

On a Px page, to add this view, drag a Forecast component onto the Px canvas. In the resulting **Make Widget** dialog, select: **Workbench View**, then: **Forecast Air Quality View**.

You can resize the rectangle provided for the view, and optionally change the widget's `showAqi` property from the default `false` to `true`. If `showAqi` is `true`, the numerical AQI value (air quality index) displays after the air quality state text descriptor, in parentheses.

NOTE: Depending on the specific WeatherReport (locale), some number of Forecast components may have an "unknown" air quality state. Otherwise, this view operates the same as the **Current Air Quality** View on the WeatherReport or its CurrentConditions child component.

weather-ForecastView

A **Forecast** view is available on each Forecast child component under any WeatherReport component (Today, Tomorrow, <daysOfWeek>). Each provides an iconic summary of forecasted weather conditions.

Figure 43   *Forecast view example*

On a Px page, add this iconic summary by dragging a Forecast (Today, Tomorrow, <dayOfWeek>) onto the Px canvas. In the resulting **Make Widget** dialog, select: `Workbench View`, then: **Forecast** view.

weather-MoonView

A **Moon** view is available on any MoonPosition component in the station. It provides an iconic summary of the current Moon phase and percent illumination.

Figure 44   *Moon view example*
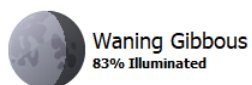
On a Px page, add this iconic summary by dragging a MoonPosition component onto the Px canvas. In the resulting **Make Widget** dialog, select: **Workbench View**, then: **Moon** view.

NOTE: If a locale in the Southern Hemisphere, in the Px editor for **Moon** view properties, change the default value of the `northernHemisphere` property from `true` to `false`. This corrects the crescent side position.

Chapter 4   National Weather Service notes

Topics covered in this chapter

♦ Updated NWS stations list
♦ About NWS connections
♦ About EPA connections
♦ U.S. Environmental Protection Agency (EPA) AIRNow Data Exchange Guidelines

The U.S. National Weather Service (NWS) provides a weather.gov website, allowing access to a variety of meteorological data. Included are current weather conditions, as well as forecasts for selected locales.

NOTE: The NwsWeatherProvider also accesses an EPA-hosted server, to retrieve air quality metrics.

In its internal operation, the WeatherService accesses some of these same NWS HTTP servers to update the weather report for any NWS locale. Two methods are used to retrieve weather data for any locale: a URL-based query to a specific "station ID" for current weather conditions, and a SOAP query for weather forecast conditions, using that locale's longitude/latitude coordinates.

In these two queries to an NWS locale, Niagara uses the "station ID" as well as the longitude/latitude data found in the `nwsStationList.xml` file inside the station's local **weather** module. Each locale entry in that file also includes a 2-character region code (typically a U.S. state), and the text name/descriptor for that locale.

Figure 45   nwsStationList.xml in the weather module contains NWS weather locales
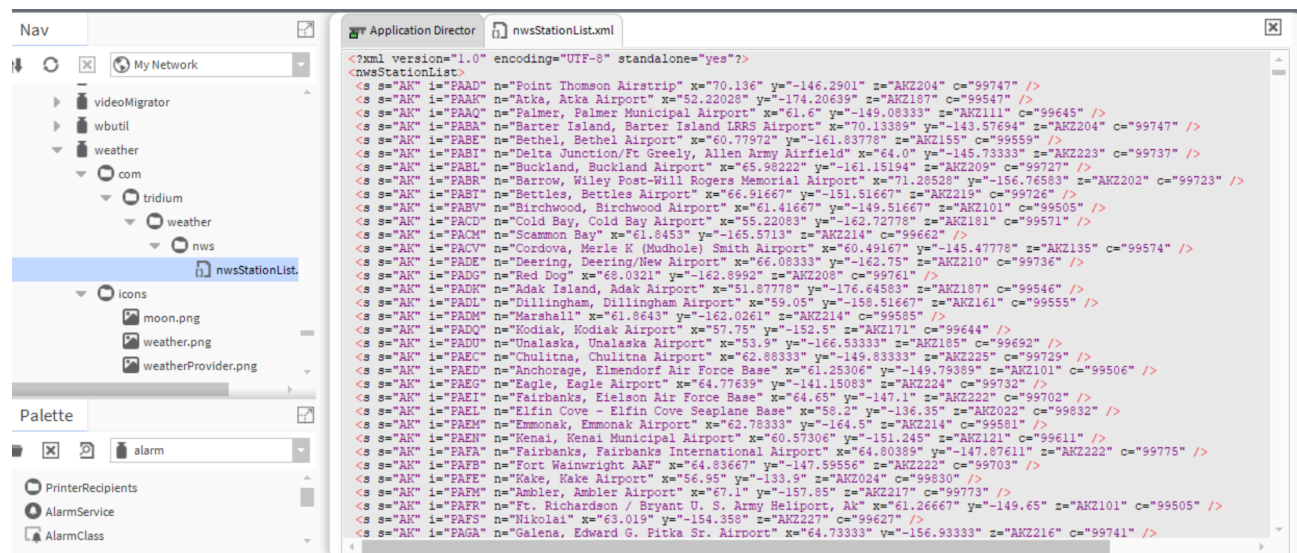
When adding a new NWS report, this list is the source for region code and name/descriptor choices in drop-down selection lists. After adding a report, you also see its four-character "station ID" on the NwsWeatherProvider property sheet.

Updated NWS stations list

In **weather** module builds the development timeframe, the module's internal `nwsStationsList.xml` file was updated at build time, replacing the file used in the initial release. Each updated file reflects new weather stations brought online by the NWS, as well as others that were subsequently dropped. The NWS list

currently contains about 2550 available stations. Additional information has been added to provide for weather advisories.

In the stations list, in addition to U.S. states there are entries for a few U.S. territories and several island countries. In order of locale code, these include Antigua (`AG`), American Samoa (`AS`), Aruba (`AW`), Barbados (`BB`), Bermuda (`BH`), Dominica (`DM`), Fiji (`FJ`), Micronesia (`FM`), Granada (`GD`), Guam (`GU`), Kiribati (`KB`), Niue (`KU`), Saint Lucia (`LU`), Marshall Islands (`MH`), Martinique (`MQ`), Mexico, Cancun (`MX`), New Caledonia (`NL`), French Polynesia (`PF`), Puerto Rico (`PR`), Palau (`PW`), Tonga (`TO`), Trinidad and Tobago (`TT`), Tuvalu (`TV`), Saint Vincent (`VC`), Virgin Islands, British (`VG`), Virgin Islands, U.S. (`VI`), and Samoa (`WS`).

As an updated weather module (with newer stations list) becomes available for any Niagara release, it is recommended to obtain it and install it in any host running a station using the WeatherService.

Verifying NWS station IDs

Independent of Niagara, you can make a quick verification of the "current weather" status for any NWS station, providing you know its four-character station ID. Use a browser and this URL syntax.

```
http://weather.noaa.gov/weather/current/stationID.html
```

For example, to verify the Anchorage, Alaska station `PANC`, point a browser to

http://weather.noaa.gov/weather/current/PANC.html

This may be useful if trying to isolate a problem—say to verify that a station listed in the weather module's nwsStationList.dita is still currently available.

About NWS connections

The NwsWeatherProvider gets initial data (requested on outbound port 80) from www.weather.gov and www.nws.noaa.gov (NWS) by domain name URLs, and requires such addresses to be resolved to IP addresses. On a Supervisor or a Workbench engineering workstation, the host Windows PC is typically configured to obtain DNS servers automatically. In this case, these DNS addresses are resolved and the WeatherService starts normally. Subsequent weather updates typically use cached (previously resolved) IP addresses, however, at times the domain name URLs may be used again.

For any embedded (QNX-based) JACE using a static IP address (typical), where its station needs to use the WeatherService, there are now a couple of connection options:

- If the JACE is part of a NiagaraNetwork with a Supervisor station also running the WeatherService, each WeatherReport in the JACE station can use the "FoxWeatherProvider" to obtain weather updates from an existing WeatherReport in the Supervisor station, rather than directly over the Internet from the NWS. This can simplify IP setup in the JACE, and typically avoids firewall issues.

- If the JACE is "standalone", or, for some reason needs to use the WeatherService with direct NWS connections, its platform TCP/IP Configuration must specify a default gateway and one or more DNS servers. This applies to the weather module in all releases of Niagara.

  If these settings are unknown, you can ask the local IT manager for them. Or, if you have a Windows PC operating on the same subnet as the JACE, you can obtain these settings by opening a DOS command prompt window and entering the command:

```
ipconfig/all
```

  This returns a list of information, including the active Default Gateway and DNS Servers.

  NOTE: The **net** module's **HttpProxyServer** also provides support for a "non-transparent" proxy server, allowing configuration of proxy server settings and open proxy connections.

About EPA connections

For WeatherReports using the default NwsWeatherProvider, air quality metrics are retrieved for current and forecast conditions, including values for ozone and particulate matter levels. From this data, an AQI (Air Quality Index) is calculated, which is used in the WeatherReports' air quality views.

The NwsWeatherProvider gets this data from a U.S. EPA (Environmental Protection Agency) server, at: www.airnowgateway.org

Installations behind a firewall may need to add a rule (exception) to allow access to this information, in addition to rules to allow access to NWS servers.

U.S. Environmental Protection Agency (EPA) AIRNow Data Exchange Guidelines

The EPA AIRNow Data Exchange Guidelines apply to data available from the AIRNow program, which includes these data portals: AIRNow.gov, AIRNow-Tech, and AIRNow Gateway. The purpose of the guidelines is to make all interested parties aware of the nature and objective of real-time air quality information.

- AIRNow observational data are not fully verified or validated; these data are subject to change and should be considered preliminary. Data and information reported to AIRNow from federal, state, local, and tribal agencies are provided for the express purpose of reporting and forecasting the Air Quality Index (AQI). As such, they should not be used to formulate or support regulation, ascertain trends, act as guidance, or support any other government or public decision-making. Official regulatory air quality data must be obtained from EPA's Air Quality System (AQS).

- Only validated data should be used for reports and data analysis whenever possible. AIRNow data are raw data and should never be substituted for validated data stored in the AQS archive.

- Credit should first be given to the appropriate source—federal, state, local, and tribal air quality agencies and the EPA AIRNow program—in products, publications, presentations, or any other related distribution. These federal, state, local, and tribal air quality agencies are the owners of the data and the authorities for the data. A list of state/local/tribal agencies can be found at: http://www.airnow.gov/index.cfm?action=airnow.partnerslist

- Air quality data, forecast values, and advisory statements should not be altered in any way and should be disseminated as received.

- Federal, state, local, and tribal air quality agencies are the authority for issuing air quality forecasts and advisories. Forecasts, advisories, advisory names, and notifications should not be altered in any way.

- Air quality observed and forecast values should be disseminated in accordance with the AQI and corresponding RGB colors as directed in the Guideline for Reporting of Daily Air Quality-Air Quality Index (AQI) http://www.epa.gov/ttn/oarpg/t1/memoranda/rg701.pdf

- All end-users who receive these data should be provided with the most current data available, in particular, advisories issued by federal, state, local, and tribal air quality agencies. The AIRNow program updates all data feeds several times per hour.

- If observational data are used for analyses, displayed on web pages, or used for other programs or products, the analysis results, displays, or products must indicate that these data are preliminary.

- That publications, analyses, products, and/or derived information rely on these data must be made known to the relevant federal, state, local, and tribal air quality agencies and the EPA AIRNow program.

- Data users' contact information must be kept current for the purposes of informing users of these data about any program or product updates and/or problems

- Questions about AIRNow data, forecasts, and advisories should be directed to `AIRNowDMC@sonoma-tech.com` and `white.johne@epa.gov`.