# MSB Imagery Program FAQ v2

## (F)requently (A)sked (Q)uestions

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This document is intended to answer commonly asked questions related to the MSB Recurring Aerial Imagery Program.

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**What is the MSB Recurring Aerial Imagery Program?**

The project objectives include the development of a program with which the MSB can acquire imagery on a recurring basis in a planned and coordinated manner. The program will include a documented process ("checklist") that will allow for obtaining aerial imagery in a more cost effective and streamlined manner, as well as ensuring the imagery meets the needs of the MSB and other funding partners.

**What is the goal of the program?**

The main goal of the program is to establish a process and method for determining what areas of the MSB to acquire imagery for, what frequency to acquire the imagery, and what type and specification of imagery to acquire. The process and methodology established in this project can be used on a recurring basis to acquire imagery without having to reinvent the process from scratch each time.

**What is the program area?**

The program area includes the entire MSB. We will carefully assess which areas of the MSB require aerial imagery and how frequently.

**Why do we need new aerial imagery for the MSB—why not just use Google Earth?**

Google Earth is great for exploring places and often includes good quality satellite imagery. However, the following issues should be considered when using Google Earth:

- Google earth imagery can't be used in other software programs and online mapping applications without paying an annual subscription fee for the use of the imagery.
- The imagery in Google Earth can be inconsistent in terms of date flown, clarity, and ground conditions (snow free, leaf off, etc.).
- Google doesn't update its imagery on a regularly occurring basis and even if you pay for a subscription you don't have a lot of control on what or when locations are flown.
- Google's imagery is not ortho controlled (see below for explanation), so it's accuracy is not as reliable.

**What aerial imagery does the MSB currently have available?**

The MSB currently has two (4) main, large-coverage imagery datasets that are listed below. There are also a variety of imagery datasets available that vary in age, resolution, and quality.

| Year acquired | Resolution | Coverage |
|---|---|---|
| 2020 | 1 foot pixel and 6" pixel in Talkeetna and Willow areas. | Parks Hwy Corridor (from Houston to north of Talkeetna) |
| 2019 | 1 foot pixel and 6" pixel in core area. | Core Area (from Point MacKenzie through the core area and along the Glenn Hwy to Eureka, also includes the Chijuk Creek Natural Resource Management Unit) |
| 2011/2012 | 1 foot pixel and 6" pixel in core area. | Most of the road accessible MSB (doesn't include remote areas) |
| 2004/2005 | 1 meter pixel | Most of the road accessible MSB (doesn't include remote areas) |
| 1939-2015 | Various | Small areas scattered throughout the MSB. |

*6" Orthophoto*

**What is aerial imagery?**

Aerial imagery is usually an aerial photo or digital aerial image. Aerial imagery can be acquired by different means. Three of the most common options are imagery collected by aircraft, satellite, and drone. Technology advances are improving the ability to acquire imagery at a lower cost with better quality.

**Why is aerial imagery important?**

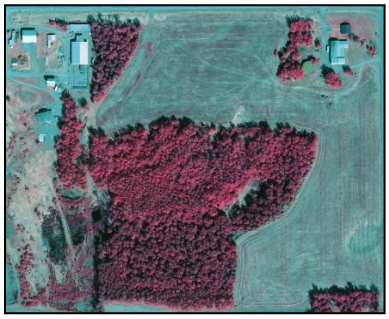
Aerial imagery is a critical component of the GIS "basemap"— the base layers upon which other layers are referenced. An image that is of high enough quality can be used to map the locations of other critical mapping layers, such as roads, buildings, recreational sites, waterbodies, etc.

**What is orthoimagery?**

Typically, aerial imagery used for mapping consists of a rectified aerial image or orthophoto (aka orthoimage). Orthoimagery is aerial imagery or photographs that have been adjusted using survey ground control points and vertical topography, for example a digital elevation model, to ensure that the imagery is positionally accurate. Unlike an uncorrected aerial photograph, an orthophoto can be used to measure true distances, because it is an accurate representation of the earth's surface, having been adjusted for topographic relief, lens distortion, camera tilt, and other factors.

**What is multispectral imagery?**

Multispectral imagery consists of a number of different spectrums of light beyond the typical visible "true color" or red, green, and blue (RGB). Visible (red, green and blue), infrared and ultraviolet are regions in the electromagnetic spectrum. The spectrum is the entire range of light radiation, from gamma rays to radio waves, including x-rays, microwaves, and visible light. These days, typical aerial cameras collect four band imagery which includes RGB and near infrared bands. Only three bands can be viewed at one time in most software applications. A user typically chooses to display an image as either natural color (red, green, and blue bands)—as shown in the example to the right--or color infrared (infrared, red, and green bands)—as shown in the example to the left.



**What is color infrared imagery?**

Color infrared (CIR) imagery includes a band of near infrared (NIR) information. NIR wavelengths are slightly longer than red, and they are outside of the range visible to the human eye. They are frequently collected as part of an aerial imagery collection and delivered as a fourth band of spectral information (in addition to red, green, and blue). Color infrared images (aka false color) are especially useful because the internal cell structure of healthy plants reflects near infrared wavelengths. As a result, it is frequently used to monitor plant health for agricultural, natural resources, and environmental purposes. Conventionally, a digital CIR image is set up to display the infrared band data with a red tone. Red wavelengths are set to appear green, and green wavelengths are set to appear blue. Blue wavelengths are not displayed.

**Can I see my features of interest in the aerial imagery?**

Features being mapped in local government vary widely and include building footprints, roads, utilities, parcels, environmental features, and more. Each person using imagery typically has a particular feature or features they want mapped or identified. Feature mapping is done at different scales depending on the accuracy required by the user. Here are a few examples of features that are mapped using aerial imagery:

- Building footprints and other structures to provide dimensions and area calculations for users such as property appraisers, and property management.
- Roads mapping at various scales for planners, public works managers, engineers, and others.
- Above ground utility features such as power poles, water hydrants, gas-lines, are often mapped at very exacting scales.
- Wetlands and other environmental features: many projects require detailed wetlands and drainage feature mapping, and wetlands management is a key component in many local governments.

A key part of this project is to survey and document what types of features MSB imagery users need to identify or map; and to develop a specification that meets user requirements. Standards for feature mapping have been developed by various mapping agencies and help us in defining the specifications for aerial imagery. For example, the U.S. Army Corps of Engineers has developed a manual for mapping various types of features which includes specific scales and aerial imagery resolutions for those features. The USACE Manual is used by the US Army as a best practice guide for mapping at all levels. In this program we will focus on existing standards and best practices. For each main type of use in the MSB we will develop a set of standard features and specifications which will be documented as “Use Cases.”

**Cost to acquire new imagery? Pros and cons of imagery options?**

Aerial imagery acquisition and production differs greatly in cost depending on a number of factors. Each imagery type has its advantages and disadvantages. Below is a summary of these options listed top-down in order of resolution.

| Imagery type | Cost (approximate) | Pros | Cons |
|---|---|---|---|
| Satellite: medium resolution 2.5 meter pixel.<br>Example: Astrium SPOT™ imagery used by SDMI. | Based on SDMI examples, approximately $50—100 sq.mile. | Large coverage. Can be very good for regional mapping and environmental applications. Comparable to 1:63,360 mapping. | Quality can vary due to cloud cover and acquisition conditions. Even with clear, sharp imagery, there is not enough detail to map local features accurately, e.g. buildings, roads, etc. |
| Satellite: high resolution. 30—50 centimeter.<br>Example: Digital Globe Worldview™ imagery. | In the same range as above. | Large coverage. Can be pan sharpened and enhanced to map local features. Much lower cost than aerial photography. | Quality varies in Alaska due to cloud cover and acquisition conditions. Not enough detail to map at engineering level scales. Horizontal accuracies generally not as good but can be improved with control and nadir. |
| Aerial imagery: 6" to 1 ft. pixel (via aircraft such as plane, helicopter)<br>Example: 2015 Municipality of Anchorage imagery. | Anchorage 2015 cost was $250/sq.mile. | Can achieve high levels of accuracy with survey control, and quality can be better. Can acquire fairly large coverages. | Weather dependency can make it difficult to acquire in narrow timeframes. Requires good control network for high accuracy (ortho) imagery. May require more processing. |
| Aerial imagery 1" very high resolution (via aircraft such as plane, helicopter)<br>Example: 2015 Port of Anchorage imagery. | Can be 10 times or more the cost of 6" pixel resolution imagery. | Provides very clear, very high resolution definition for detailed mapping features. | Requires high amount of overlapping aerial imagery; a high level of processing; large amount of control both vertical and horizontal to orthorectify properly. |
| Drone/UAV.<br>Example: e-Terra™ Anchorage park imagery. | Costs difficult to compare with aerial or satellite imagery. Start up and mobilization costs are less, but costs for large areas could be higher for drones than the other options. | Can acquire very high resolution imagery. Great for project sites, e.g. facilities. Does not require sophisticated sensors and cameras that other options do. Portable: can set up quickly and easily; and acquire sites quickly. Technology is advancing rapidly. | Difficult to get large coverages, e.g. citywide or similar type coverages. Requires a lot of processing to mosaic and adjust imagery thus not good for large areas, e.g. 10 square miles plus. |

**What are some frequent uses for imagery?**

- 3-D Visualization
- Floodplain mapping
- Urban planning
- Transportation planning and design
- Route Mapping
- Building site suitability
- Property appraisal, parcel mapping, and real estate.
- Facility planning and design
- Wetlands mapping
- Building footprint mapping
- Forestry mapping
- Timber volume analysis
- Change detection
- Above ground utility mapping

**Will the MSB work with other partners in this program?**

The MSB will reach out to other partners for contributions to funding and/or resources for aerial imagery acquisition. Partnerships are often a win-win for all, because acquiring imagery in a coordinated fashion reduces the cost for all of the partners. Additionally, it reduces the level of effort required to process and distribute the imagery. We will be reaching out to federal, state, local governments, utilities, and others who utilize aerial imagery as part of their business in the MSB.

**How frequently will the MSB's imagery data be updated (refreshed)?**

The MSB does not currently have an established re-flight cycle for LiDAR or imagery acquisition.

**Is there a project website?**

The MSB GIS division maintains a project website that includes general information, project information and updates, and project documents. The website is located here:
https://data1-msb.opendata.arcgis.com/pages/msb-aerial-imagery

Recurring Aerial Imagery Program story map:
https://msb.maps.arcgis.com/apps/MapSeries/index.html?appid=dc6160bacfa446ce8eacb40101798334

**Who should be contacted with questions?**

About the project:
GISNotifications@matsugov.us

About funding partnerships:
Eric.wyatt@matsugov.us

**What sources were used to develop this document?**

The MSB GIS Division borrowed some of the definitions and descriptions in this document from other publications found online. We thank all sources used.

**Sources:** Municipality of Anchorage (2015 Orthoimagery), US Army Corps of Engineers (Manual No. 1110-1-1000), Environmental Systems Research Institute, Inc (ESRI);; USDA - Four Band Digital Imagery Information Sheet April 2012; American Society of Photogrammetry and Remote Sensing; US Geological Survey/EROS: http://eros.usgs.gov/aerial-photography; Statewide Digital Mapping Initiative (SDMI).