1 Abstract

In July 2018 Google Inc. changed their licensing policy for the Google Maps platform. In this document we explain what this means for CadnaA users and how to obtain a Google Maps API key from Google to allow them to download more bitmap tiles than what can be offered by DataKustik.

2 Introduction

In July of 2018 Google Inc. changed their licensing policy for many of their products. This means that Google Earth Version 6.2 – the last version supported by CadnaA – will stop working on October 31st, 2018 and users must obtain their bitmap data from other sources, because the latest version 7.x does not have any means of exporting data to CadnaA or any other software product. Luckily CadnaA 2019 offers two convenient ways to obtain said data:

- **Google Maps**: Google's famous mapping service should be known to everyone. It offers high resolution satellite and road map images, but the number of tiles that can be downloaded is limited (explained in this document).

- **WMS**: <u>W</u>eb <u>M</u>apping <u>S</u>ervices are online services offered by governments and non-profit organizations alike that offer different kinds of satellite, road or landcover data and much more. The available types of data vary from server to server and high-quality data is usually only available for relatively small bounds like a state or an administrative region. This feature has been added in CadnaA 2019.

Please refer to the CadnaA 2019 reference manual on how to use either of those services as we will only explain how to create a Google Maps API key to be used in CadnaA for the remainder of this document.

3 Disclaimer

This document is intended as a guideline on how to set up your own API key. DataKustik can not be held responsible for any misuse of said key or charged for any additional costs that occurred using the services provided by Google. It is your company's responsibility to monitor the use of the key via the API console at

https://console.cloud.google.com/google/maps-apis/overview

4   What is the Google Maps API?

When you go to maps.google.com using your favorite web browser you will see what is referred to as the "**dynamic map**". Here you can search for locations, query routing information, watch the world using Street View and much more. The use of this service is free of charge if used it on your PC or phone.
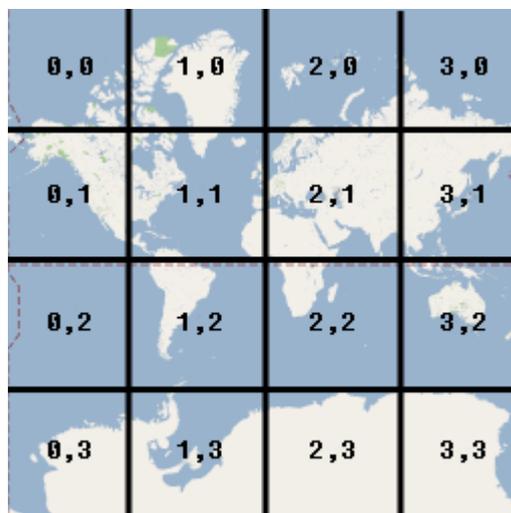
However, if you want to access this service programmatically using the API ("Application Programming Interface") like CadnaA does, you will need a license key to connect to the service. DataKustik provides this key for you in the background, which allows users of CadnaA 2018 or later to select the bounds of what you want to import using the built in CadnaA browser.

Users of CadnaA 2017 or earlier will have to upgrade their CadnaA license to use the Google Maps import or download the latest version in case they have an active software maintenance contract from the DataKustik website.

Before we explain where we are going with this, let us review how the image data in Google Maps is structured. The concept is called a level of detail pyramid which means that different resolutions of any area are provided by the server since loading the whole world at the finest detail would mean downloading gigabytes of data:

- There are 21 zoom levels, each of which contains a set number of bitmaps called tiles. The coarsest level (0) covers the whole world.

- A tile is referred to as a bitmap that is part of a large checkerboard like structure.

- The higher the zoom level gets, the more details you will see, but the visible area shrinks with each step. The number of tiles needed when increasing the zoom level by one increase by the factor of four (doubled in x and y direction respectively), thus the pyramid analogy.

- Therefore, importing a whole city at a very fine level of detail in CadnaA means downloading hundreds or even thousands of tiles!

Here is an example of how the world looks like at the coarsest zoom level when broken down to its tiles (*image courtesy of Google Inc.*):

When you hit the "Export" button in CadnaA's Google Maps browser window a couple of things happen in the background:

1. CadnaA will calculate how many tiles should be downloaded based on the selected bounds (half transparent red square) and the currently selected zoom level.

2. CadnaA downloads each tile, rotates the bitmap based on the currently selected coordinate system and combines all bitmaps into one big bitmap object.

3. The final bitmap is stored on disk or within the .cna file.

To download those tiles CadnaA must make a connection to a different server called the "**static map**", which offers the same data but makes it possible to reference and download single tiles, which is not possible using the dynamic map.

Sadly, Google chose to put a relatively high price tag on downloading image data from the static map service. As of the day of writing DataKustik supplies a quota of 3500 tiles per day for all users over the world combined. After this limit has been reached users will see an error message after the download has been completed:

Please note that if you see above sign within one of your downloaded bitmaps the whole bitmap must be downloaded again to "fix" the missing parts of the image. CadnaA can not simply download the missing pieces.

To successfully download more bitmap data, you can either wait for the next day (which starts at midnight pacific time) or obtain your own Google Maps API key, which is outlined in the next section.

5 Obtaining a Google Maps API key

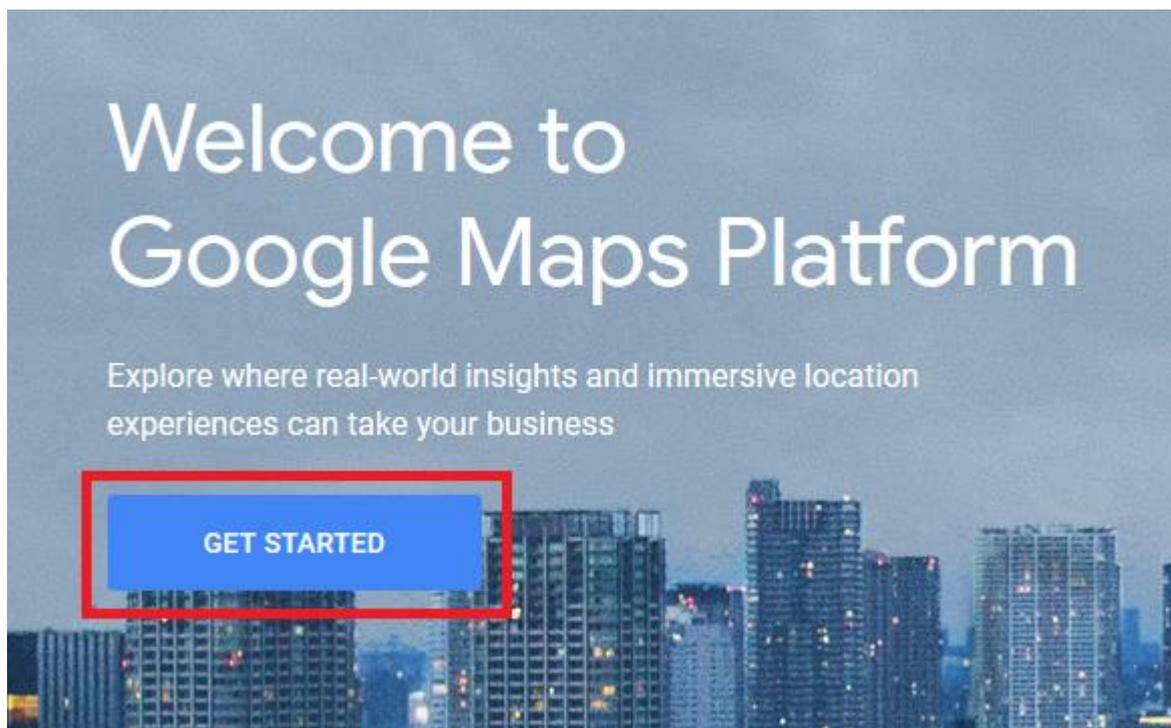To obtain an API key, you will need the following:

1. An active internet connection

2. A **Google account** (gmail.com Address)

3. A valid **credit card** (nothing will be charged, see below)

We strongly recommending reading this document until the end before moving on and creating your key!

After you have successfully created a Google account – you can choose to create an account using your own mail company's mail address or create a Gmail account - go to the following website:

https://cloud.google.com/maps-platform

In case the URL does not work just type "get google maps API key" into your favorite search engine.

Click on the "Get started" button and select "**Maps**" as product in the window that pops up. When moving the cursor above the maps checkbox you will see that "**Maps static API**" is among the APIs included, which is the one we are looking for. We do not need any of the "Places" or "Routing" products. If you are not logged into your Google account yet, you are prompted to do so.
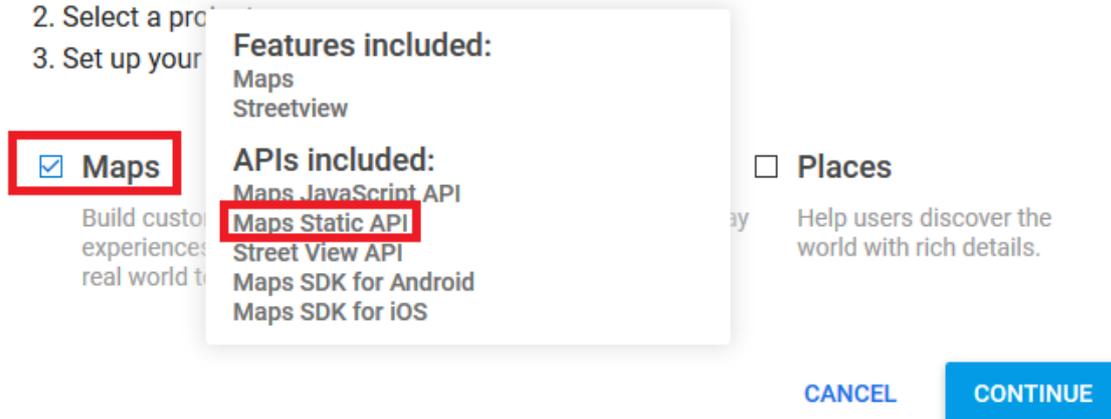
Afterwards you may enter a name for your project. The name is up to you but in this case, we call it "*CadnaA static map*". Make sure you have read the terms of service provided before you proceed!

You should now be forwarded to another page that prompts you to enter your billing information. If that is not the case, try again using another browser like Google Chrome.
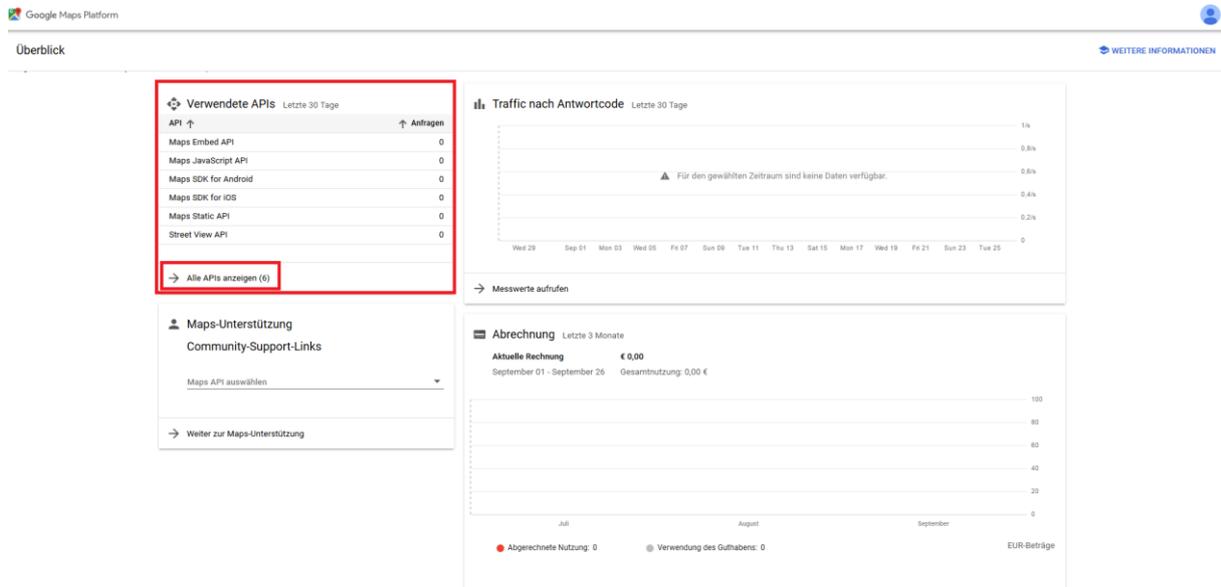
Accept the terms of service and enter your companies address and credit card information. You will not be charged with anything yet, since this information is only used to verify that you are an actual person and we will cover the prices for this service in the next section.

You are now forwarded to the dashboard which you can use to monitor your monthly quotas - listed under the "unsigned requests" section - and manage your API keys. This website should be bookmarked and is always available at
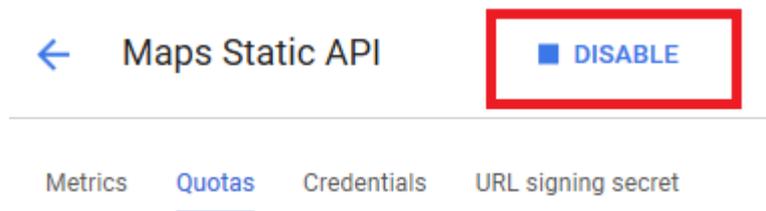
https://console.cloud.google.com/google/maps-apis/overview

Optional step: Deactivate unused APIs

After your credit card has been verified you are prompted to (de-)active the APIs you need or do not need. You should now see the dashboard of the Google Maps platform, click on "display all APIs" as highlighted in the screenshot below.
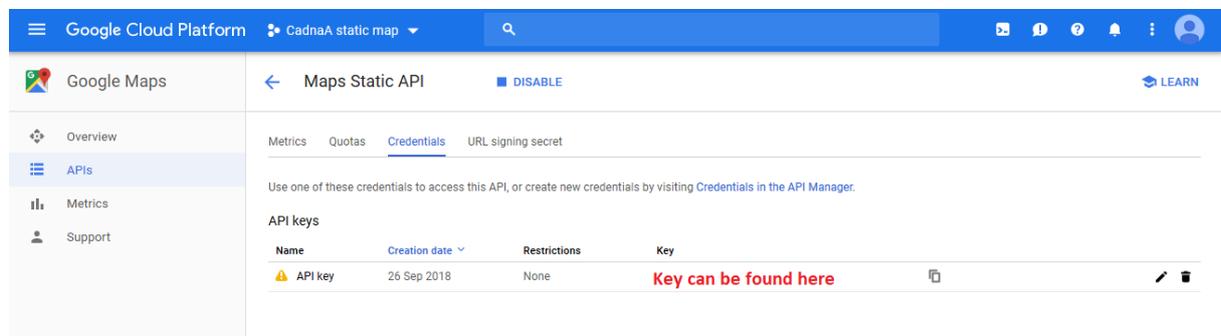
You will see a list of all the APIs that are in use, which are 7 APIs by default. The only one we need is the "**Maps static API**", so we strongly recommend disabling all the others for security reasons. If you need any other API for another app we recommend creating another project with its own API key for security reasons.

To disable an API, click on the "Details" link within the same row and hit the "Disable" button at the top. Afterwards go back and repeat this process for the other APIs. Once an API is deactivated it will not show in the list anymore.

You are now done setting up your API key. Click on the "details" link next to the "Maps Static API" and go to the "**Credentials**" tab, where your API key will be visible.
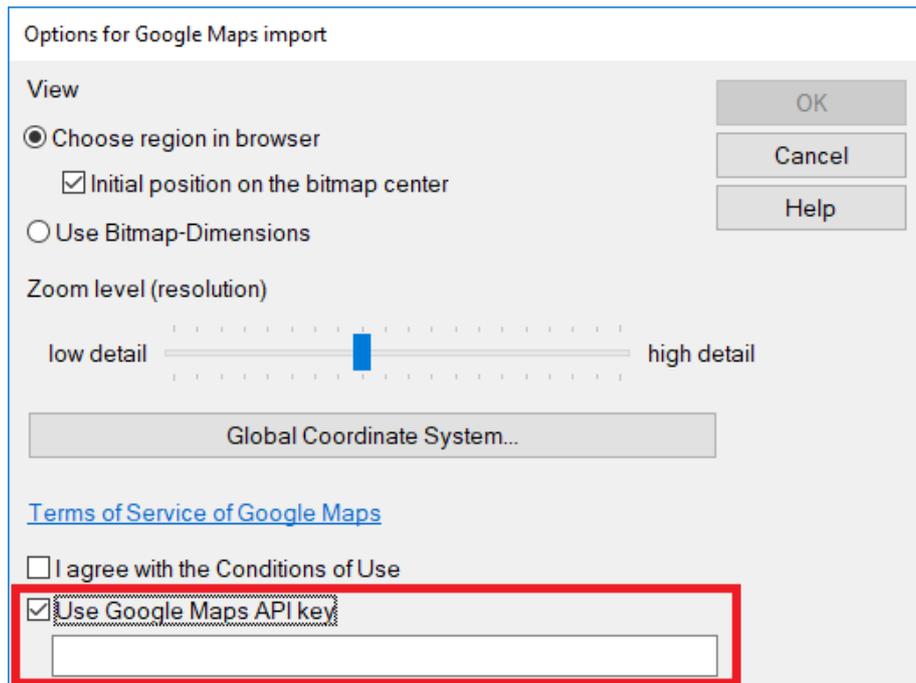

Important: Do not share your API key with anyone outside your company or department or otherwise you might be charged with a hefty bill if someone abuses your credentials. Refer to the next section on how to restrict access.

Adding your API key using CadnaA 2019 or later:

Since CadnaA 2019 the API key can be added within the Google Maps import options dialog that opens once you hit the Google Maps button within the Bitmap object's dialog. The key is stored in CadnaA' INI file (see next paragraph) and not saved in the .cna file so it is safe to pass the file along. Activate the checkbox and copy your API key into the text box below.

Please keep in mind that your API key is visible to everyone that is using CadnaA on your computer and your personal login.

Adding your API key using CadnaA 2018:

In CadnaA 2018 (MR1) the only way to use your code is by going to the INI file. The file should be located here (where *XXX* is your account name):

C:\Users*XXX*\AppData\Local\Datakustik\CadnaA\cadnaa.ini

Open it using a text editor or via the CadnaA main menu using "Options → Open INI-file". Search for a section called [ImpExp] (note the brackets!) and if it does not exist, append it at the bottom of the file.

In the line below add an entry called "MapsKey=*YOURKEY*" and substitute your API key here.
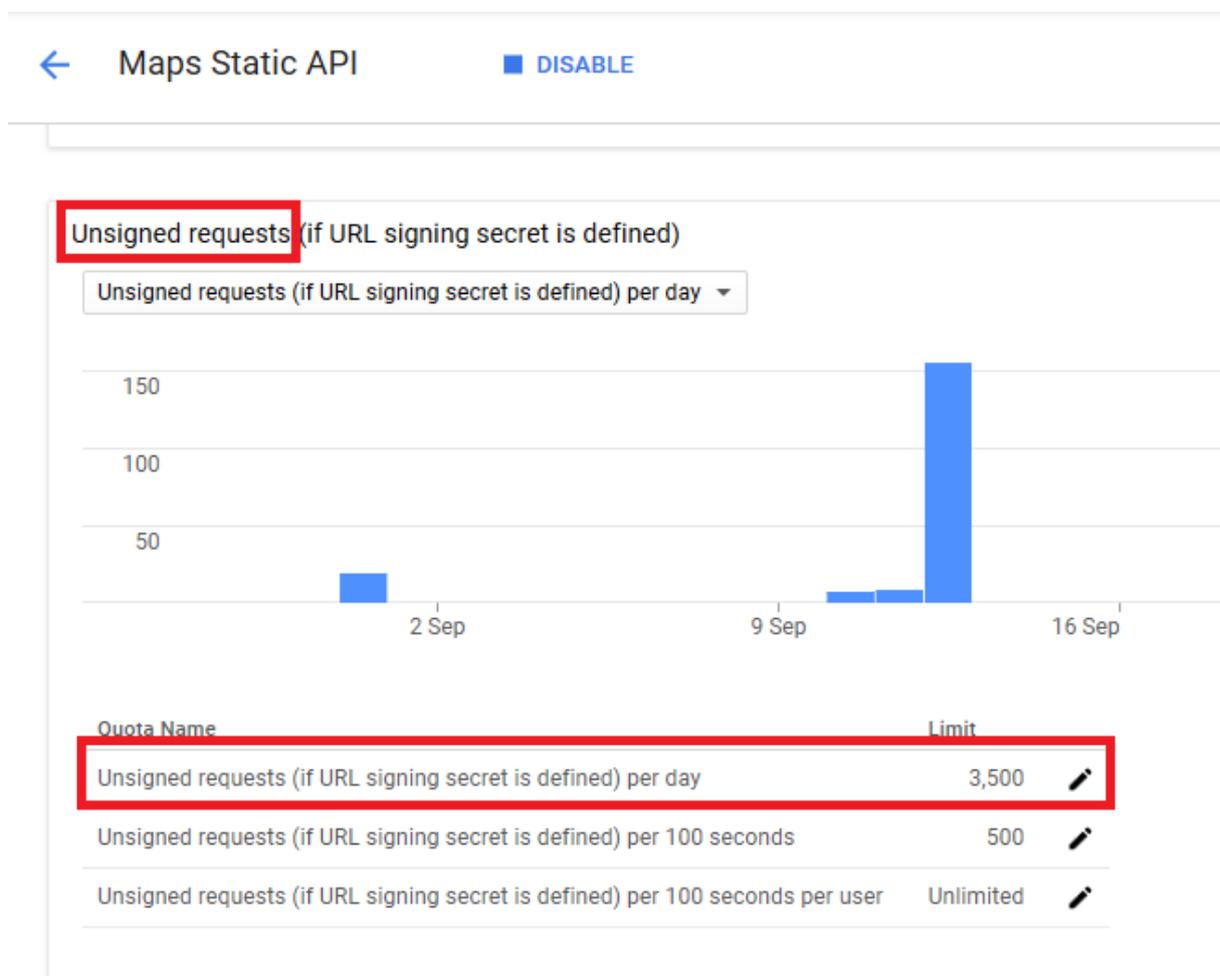
Save and close the INI file and restart CadnaA.

6   Running costs for using the Google Maps API

Using any of the Google APIs is subject to the licensing policy from Google which is subject to change but as of the day of writing it works like this:
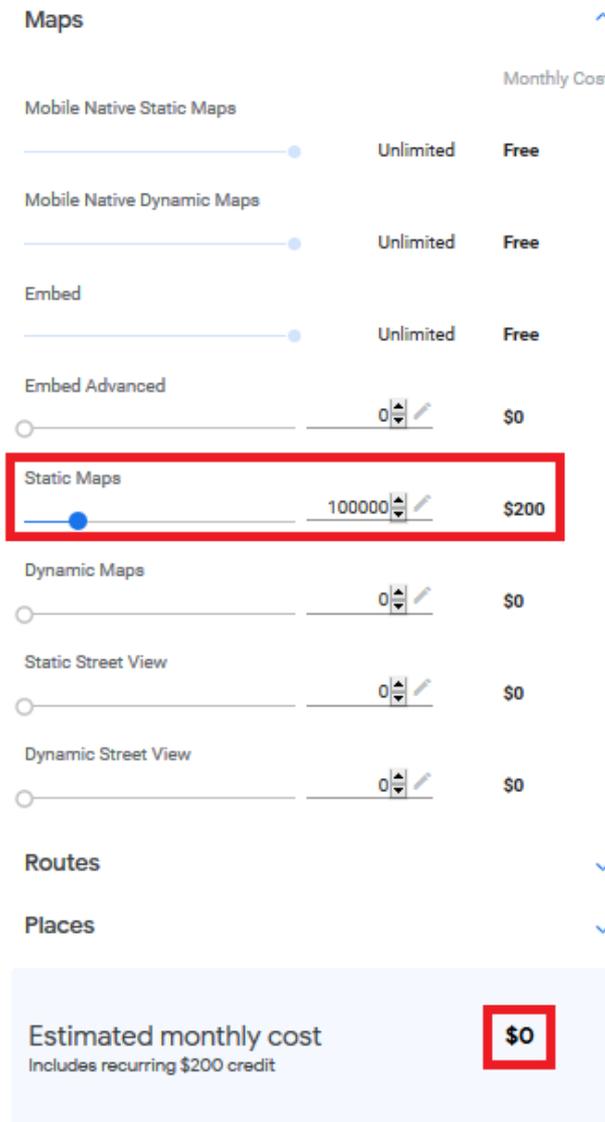
Every month you are have a free quota of 200 US$ (171€) which you can spend on anything within the Google Cloud platform including downloading bitmaps from the Maps server without any additional costs.

This quota is good for 100.000 tiles to be downloaded per month, which should prove sufficiently even for large companies. After you have exceeded your free quota your credit card will be charged with 2 US$ per 1000 tiles.

To restrict the number of downloads per day you can define those limits by going to the "*Details*" page of the Maps Static API and selecting the Quotas tab. The limit you are looking for is listed under "*unsigned requests (if URL signing secret is defined) per day*". In the screenshot below the usage is limited to 3500 tiles per day for all users sharing the API key.

For more information please refer to Google's pricing calculator here:
https://mapsplatformtransition.withgoogle.com/calculator

Your current monthly progress can always be monitored using the API console found at:
https://console.cloud.google.com/google/maps-apis/

7   Closing remarks

In this document we have shown why you might need to have your own Google Maps API key that can be used to download bitmap data in CadnaA.

Since the process described is fairly involved we strongly recommend letting your IT department set this up for you but DataKustik will also gladly help you out any questions arise. Please feel free to contact us at

hotline@datakustik.com