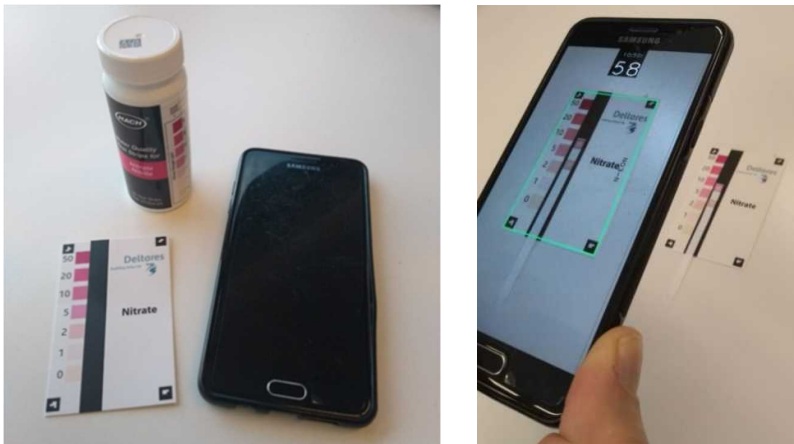




Nitrate App User Guide

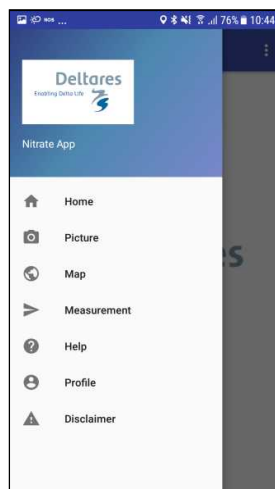
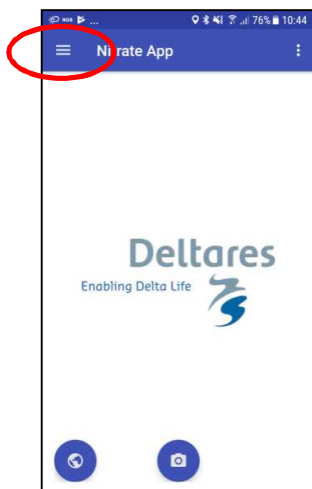
Here we describe how to use the Nitrate App. There are 8 simple steps, which are described below. To use the Nitrate App, the following is needed:

- Jar of Hach test strips¹
- Deltares legend card¹
- Smartphone with Nitrate App (available for both Android and iOS)



Home screen and menu options

After opening the Nitrate App, the home screen appears (Image 1). You can access the menu (Image 2) by clicking on the 3 horizontal lines at the top left.



1. Home screen, menu access 2. Menu

¹ Test strips and legend cards can be ordered from Hach, see: <https://publicwiki.deltares.nl/display/wqapp/Getting+Started>

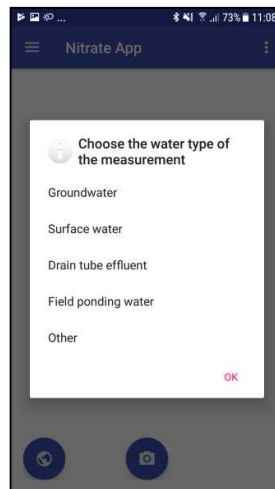
The Nitrate App menu has the following options:

- Home: go back to home screen
- Picture: scan a measurement (also accessible via the camera button on the home page)
- Map: overview of the measurements on a map (also accessible via the map button on the home page)
- Measurement: overview of own measurements in table format
- Help: help function, link to additional information
- Profile: login function for private measurements; refer to:
https://publicwiki.deltares.nl/display/wqapp/Results?preview=/127635640/133269134/manual-inlog_EN.pdf
- Disclaimer

An Internet connection is required to send measurements. If you do not have an Internet connection, the measurement will be saved and sent the next time you open the Nitrate App and do have an Internet connection. You can see if your measurement has been sent under the heading 'measurements' in the main menu.

Steps to take a measurement

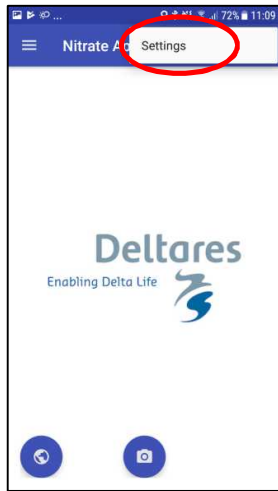
1. Take a water sample with as little mud, plants, and animals as possible. Rinse the beaker well before collecting the sample.
2. Take a test strip, close the test strip container, and have your smartphone and a reference card handy.
3. Turn the Nitrate App on and go to the 'take picture' screen (Images 3). After entering the water source (Image 4), you can take a nitrate measurement.



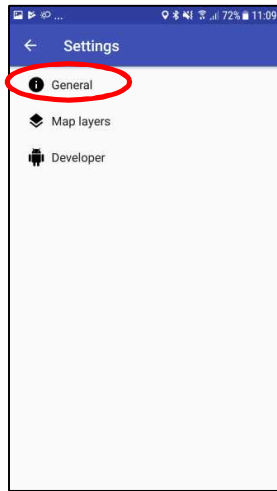
3. Go to the 'take picture' screen
4. Select the source of the water being measured²

² The selection screen to choose the default water source only appears during the first measurement. Water source can be adjusted when sending a measurement, and default water source can be adjusted via the settings.

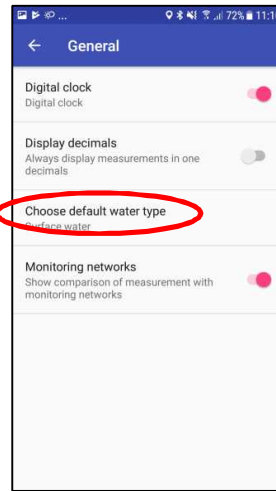
Modify default water source using the settings



1.

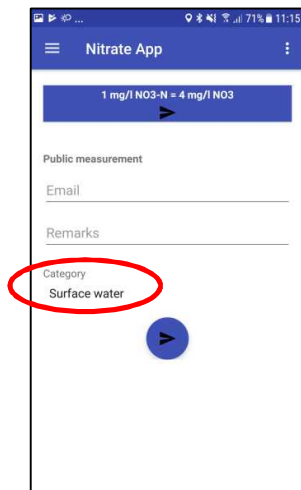


2.

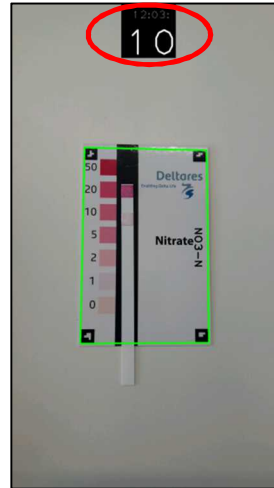
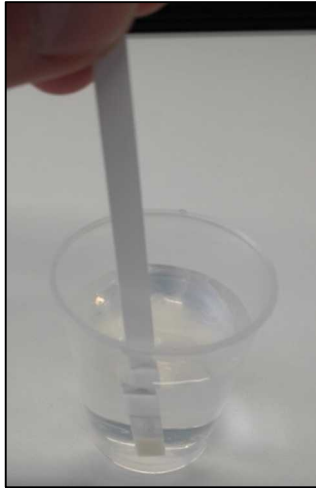


3.

Modify water source when before sending a measurement



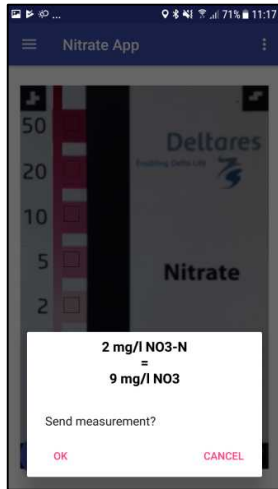
4. Dip the test strips into the sampled water for 1 second (Image 5), place the test strip on the black bar on the legend card and look at the seconds counter. Make sure that the test strip is in the middle of the black bar. The upper square on the test strip shows the nitrate concentration; the lower one is for nitrite. Place the strip upright with the square for nitrate next to the closest corresponding color code on the legend card to get a reproducible and accurate measurement (Image 6; see Annex for examples of erroneous measurements and faulty placements). By placing the colored square close to the legend, the chance of errors due to shadows and/or reflections is small.



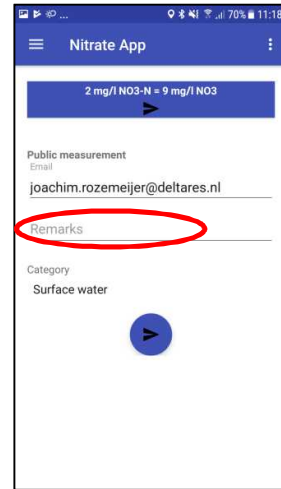
5. Dip the test strip in the sample for 1 second
6. Look at the seconds counter
6. Make sure that the image is in focus and that all of the corners of the legend card are recognized by the app. A green frame should appear. When it appears, the picture can be taken. Take the picture 30 seconds after dipping the test strip into the water by pressing on the screen of your smartphone³.

³ If you click on the screen of your smartphone, a green frame will appear around the legend card. A red dot may also appear next to the seconds counter. After you have clicked on the screen and the green frame is recognized by your smartphone, the scan is made immediately. It is important to click on your screen only after 30 seconds have elapsed from the moment when you dipped the test strip in the water sample and only once the legend card and test strip are in focus. If you have clicked on your screen too early or by error, you will see a flashing red dot visible next to the seconds counter. Click on the screen again to exit this recording mode; the flashing red dot will disappear. You can now readjust and set up adequately to take the picture.

7. Check the nitrate value that was measured and send the measurement (Image 7). The concentration is given in both NO₃-N (low value) and in NO₃ (high value). The first time that you take a measurement, you must enter your email address. After the first measurement, your email address will automatically be filled in. It is possible to add additional information in the 'comments' section before sending the measurement (Image 8).



7. Check the concentration of nitrate measured and send the measurement



8. Add additional information about the sample

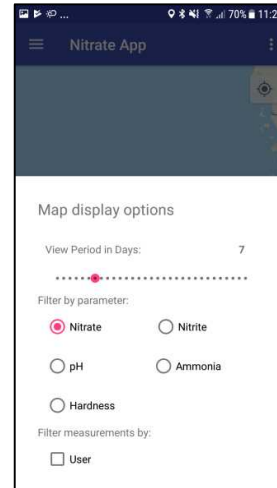
8. Close the Nitrate App or take another measurement.

All public measurements are available in the map function within the app. It is also possible to view all measurements via the Internet platform: <https://tl-ng015.xtr.deltares.nl/waterkwaliteit-app-service/index>.

Various display options are available:

- Period (number of days)
- Filter by parameter (nitrate, nitrite, pH, ammonium)⁴
- Filter for measurements made by the current user or all available measurements

⁴ It is possible to measure pH and ammonium with the App. This requires different test strips and other reference cards. It is also possible to measure nitrite with the same test strips as for nitrate, but with a different reference card.



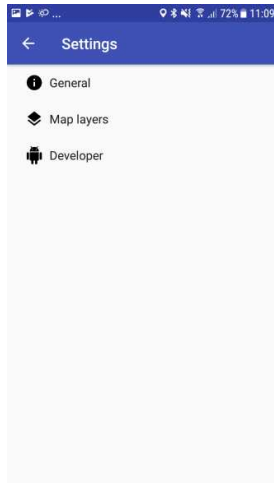
Select different period to display on the map Adjust map display options

Adjust the period to display using the left and right arrows below the map. In the settings, choose between a map or satellite image to display in the background.

Change settings

Under settings, the following functions appear:

- General
- Map layers
- Developer

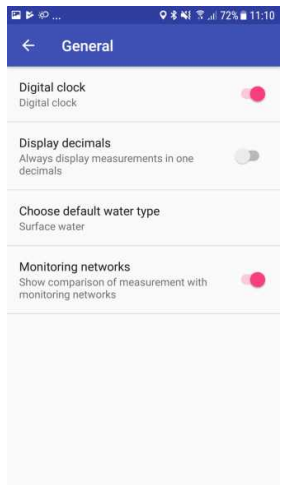


General

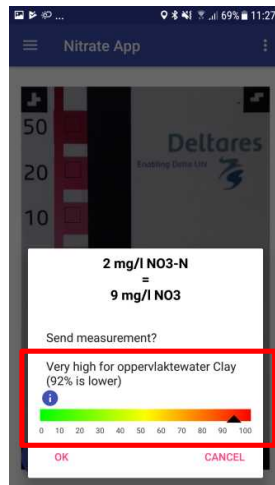
In the general options, it is possible to make the following adjustments:

- Digital clock: turn the digital clock on or off (seconds counter)
- Display decimals: turn the option to display measurements with 1 decimal on or off
- Choose default water type: modify the default water source

- Monitoring networks: turn the comparison of the measurement with monitoring networks on or off (note: this option is only available for measurements in the Netherlands)



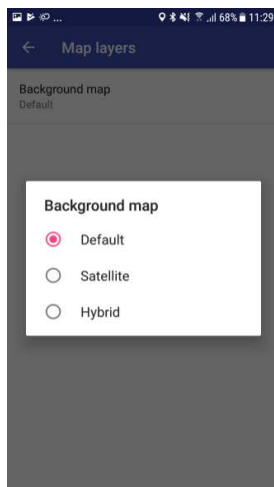
General options



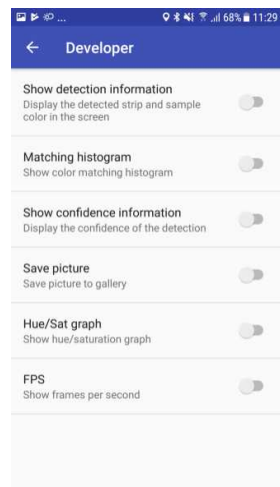
Comparison between the measurement and the measurements from the LMM and MNLSO⁵

Map layers

In the map layers, it is possible to change the background map to a satellite image.



Background map



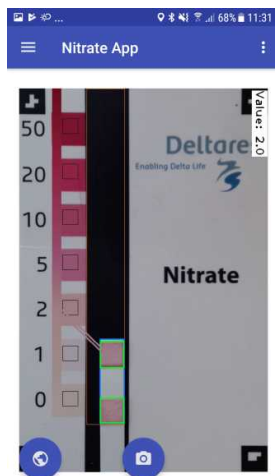
Developer settings

Developer

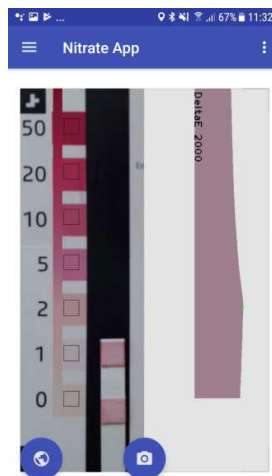
- Show detection information (Image 9): show the strip and identified color on the screen after the measurement has been taken. The color areas on the strip are given a blue and green square for nitrate and nitrite, respectively. The legend colors receive a black square, and the interpolated legend is displayed. There are dashes between the strip and the legend color that it was matched to – one dash for each color. The correspondence between both colors can be expressed as a confidence number (see item 3 below).

⁵ Note: this option is only available for measurements in the Netherlands.

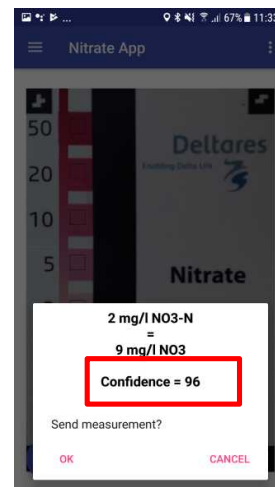
2. Matching histogram (Image 10): show a color matching histogram after taking the measurement. This displays a graph with the degree of similarity between the colors on the legend and on the strip. A small green dot at the maximum indicates the color on the legend that most closely matches the color on the strip.
3. Show confidence information (Image 11): after taking the measurement, the confidence of the measurement is given to indicate the degree of correspondence between the colors on the legend and on the strip. A high value means a high agreement. In poor light or with a dirty measuring strip, the confidence of the measurement is low, e.g. below 75%.
4. Save picture: automatically save the picture on your smartphone. When turned on, both the empty and the interpreted scan (with detection information, matching histogram) will be saved.
5. Hue/Sat graph (Image 12): show the hue/saturation graphs of the measured value from the legend.
6. FPS (Image 13): show the number of frames per second.



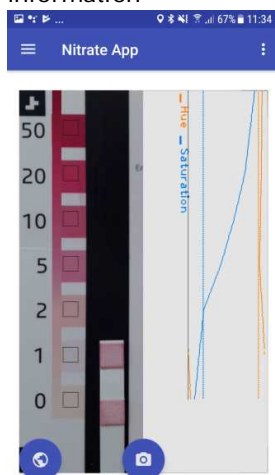
9. Show detection information



10. Matching histogram



11. Show confidence of the color matching

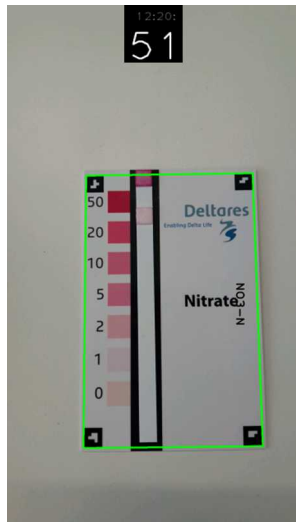


12. Show the hue/saturation graphs



13. Display with the number of frames per second

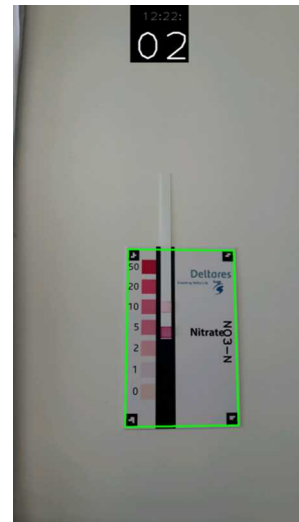
Erroneous measurement attempts with the nitrate test strip



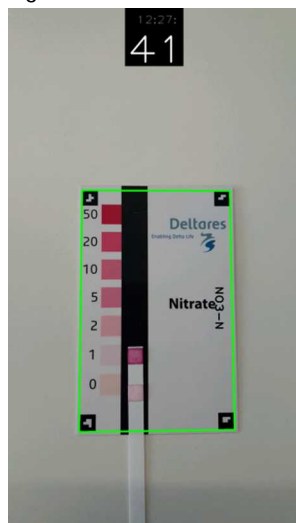
The strip is placed outside of the legend



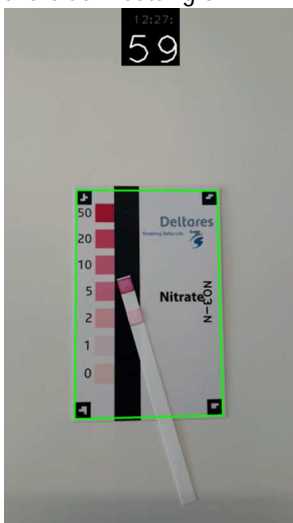
The strip is not placed in the black rectangle



The strip is placed upside down



The color of the nitrate square (top square on the strip) is not placed next to the corresponding legend color



The strip is crooked