

Supplementary material

Stream pictures



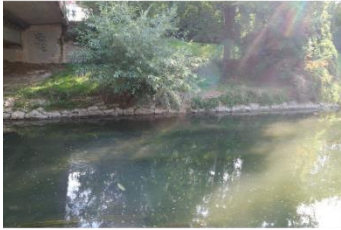
rather unsuitable



rather suitable



suitable



suitable



rather suitable



suitable



suitable



rather suitable



rather unsuitable



rather unsuitable



unsuitable



rather unsuitable



unsuitable



unsuitable



rather suitable



suitable



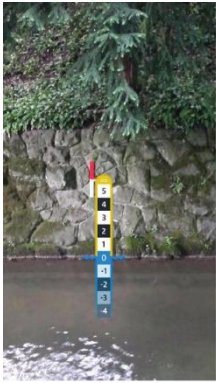
rather suitable



rather unsuitable

5 Figure S 1: Stream picture selection offered to participants for the staff gauge placement (1st and 4th task). The suitability categories are stated below each picture. The participants could change their selection between the 1st and the 4th task.

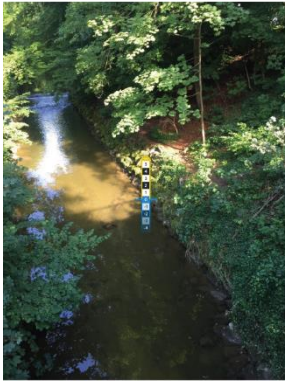
Examples of reference pictures for the rating task



suitable



rather suitable



rather unsuitable



unsuitable

Figure S 2: Examples of pictures to be rated during the rating of reference pictures tasks (2nd and 5th task) with different suitability categories.

10 **Training study**

CrowdWater Training Survey

Hello!

Thank you for participating in this survey! This survey is part of the CrowdWater project, a hydrological citizen science project initiated by the University of Zurich. In this survey we test if playing the CrowdWater game helps CrowdWater app users perform even better. The results of this survey might be published in a scientific journal.

This survey is meant for participants who have not yet used the CrowdWater app or played the CrowdWater game.

There are 6 different tasks. It takes roughly 60-90 minutes to complete all these tasks.

If you have any questions regarding the survey or if you are interested in receiving the results of the study please contact barbara.strobl@geo.uzh.ch.

*Required



Consent form

Thank you for participating in the "CrowdWater Training" study. In this study, we investigate how people playing the CrowdWater game influences CrowdWater app participant's ability to set up stations and contribute stream level measurements. By participating, you contribute to research that will help us understand how we can best engage the public in hydrological citizen science projects. This survey is hosted by researchers at the University of Zurich, Switzerland in agreement with ethical regulations of this institution.

If you agree to participate, you will be asked to answer some questions and to perform some tasks. The entire process should take approximately 60-90 minutes. There is also a short outdoors task, which you can fulfill on your own within 14 days of taking this survey. Your participation to this survey is voluntary. If you decide to participate, you are free to withdraw at any time. You do not need to disclose personal information; all data will be made anonymous and will be treated as confidential. There are no direct benefits to you as a participant and there are no foreseeable risks to you for participating or declining to participate in this study. The collected data may be used for a scientific publication and will be stored in anonymized form in a data repository.

Temporarily, in order to make sure no one participates twice, IDs will be connected to participants. If a user does not fulfill the additional outdoors task within 14 days they might be sent a reminder by the research team. This connection will be deleted permanently once the survey is completed and will not be used in any way for the analysis of the data.

At the end of the study you can choose a small gift, intended to compensate you for the invested time and effort. The gift options are a movie voucher in Zurich, a tea towel of the Swiss water network or a traditional Swiss treat. If you would like us to send you the gift, please provide a mailing address.

For questions related to this study, please contact Barbara Strobl, researcher at the Department of Geography of the University of Zurich (barbara.strobl@geo.uzh.ch).

By clicking on the button below, you indicate you consent to participate in this survey.

1. Please indicate if you give your consent *

Mark only one oval.

- Yes, I give my consent and would like to start the survey.
- No, I do not give my consent and would like to exit the survey. *Skip to "Thank you for participating!"*

Demographics

First there are a few questions about you.

2. User ID (you were given a user ID before this survey, if you are not sure what your user ID is please contact barbara.strobl@geo.uzh.ch) *

3. I have participated in the CrowdWater game in the past. *

Mark only one oval.

- Yes *After the last question in this section, skip to "Thank you for participating!"*
- No

4. I have used the CrowdWater app in the past. *

Mark only one oval.

- Yes *After the last question in this section, skip to "Thank you for participating!"*
- No

5. Age

Mark only one oval.

- <= 20
- 21 - 40
- 41 - 60
- 61 - 80
- > 80

6. Gender

Mark only one oval.

- Male
- Female
- Other

7. Highest level of obtained education

Mark only one oval.

- Primary school
- Secondary school
- Apprenticeship
- A-Levels
- University / Applied University
- Other: _____

Task 1: Place a virtual staff gauge

In the CrowdWater project citizen scientists can help to collect water level data. To collect this data they upload pictures of streams and insert a virtual staff gauge as a reference. Participants can use this initial reference image at a later time to assess the change in water level of the stream and when multiple measurements are made at different times can thereby provide a time series of water levels.

The steps required for placing a virtual staff gauge are explained below and are also shown in the following video: <https://www.dropbox.com/sh/qqzhlkisyo3vs50/AABVsn97LxKDEf6tkCV1CHWoa?dl=0> (no audio).

Here are the steps for this task:

Step 1) Use this Dropbox Link (<https://www.dropbox.com/sh/9h2x368f8hgztke/AAAYQDAJWV1xfRKFXE8SDRUXa?dl=0>), which includes a choice of 18 reference images. Save all of these reference images somewhere on your computer. Which of these images do you think would serve as a suitable reference image? A good reference image makes it easy to see changes in the water level. Choose one of the 18 reference images.

Step 2) The next step of this task is to go to <https://www.spotteron.com/crowdwater>. Log in with your user ID and password (you were given a user ID and password in advance) and agree to the "Terms of Use".

Step 3) Click on the three horizontal bars in the upper left corner and then select "ADD SPOT" (see Figure 1 below).

Step 4) Select the category "WATER LEVEL" (see Figure 2 below).

Step 5) Under "Select picture" you can now upload the reference image of your choice that you saved on your computer during step 1.

Step 6) Once you have uploaded the image, the image editor will automatically open (see Figure 3 below). Instead of the blue graphic your selected reference image should be displayed. Click on the virtual staff gauge that you think is most suitable (green, yellow or red - see Figure 3). The green one if you think that the current water level is relatively low, the yellow one if you think that the current water level is average and the red one if you think that the current water level is relatively high. Place the staff gauge on the image how you think it would be most suitable for later use to see changes in the water level. You can adjust the size and the position of the virtual staff gauge to reflect how much you think the water level will change throughout the seasons or between droughts and floods.

Step 7) Under "Leave a comment..." please write "1st virtual staff gauge".

Step 8) You can ignore the "Date and Time" field for now and click on "Save" at the bottom.

Step 9) If an error message regarding the location of the spot comes up, just move the map to the Atlantic and try again. (Drag the map and not the crosshair.)

Figure 1

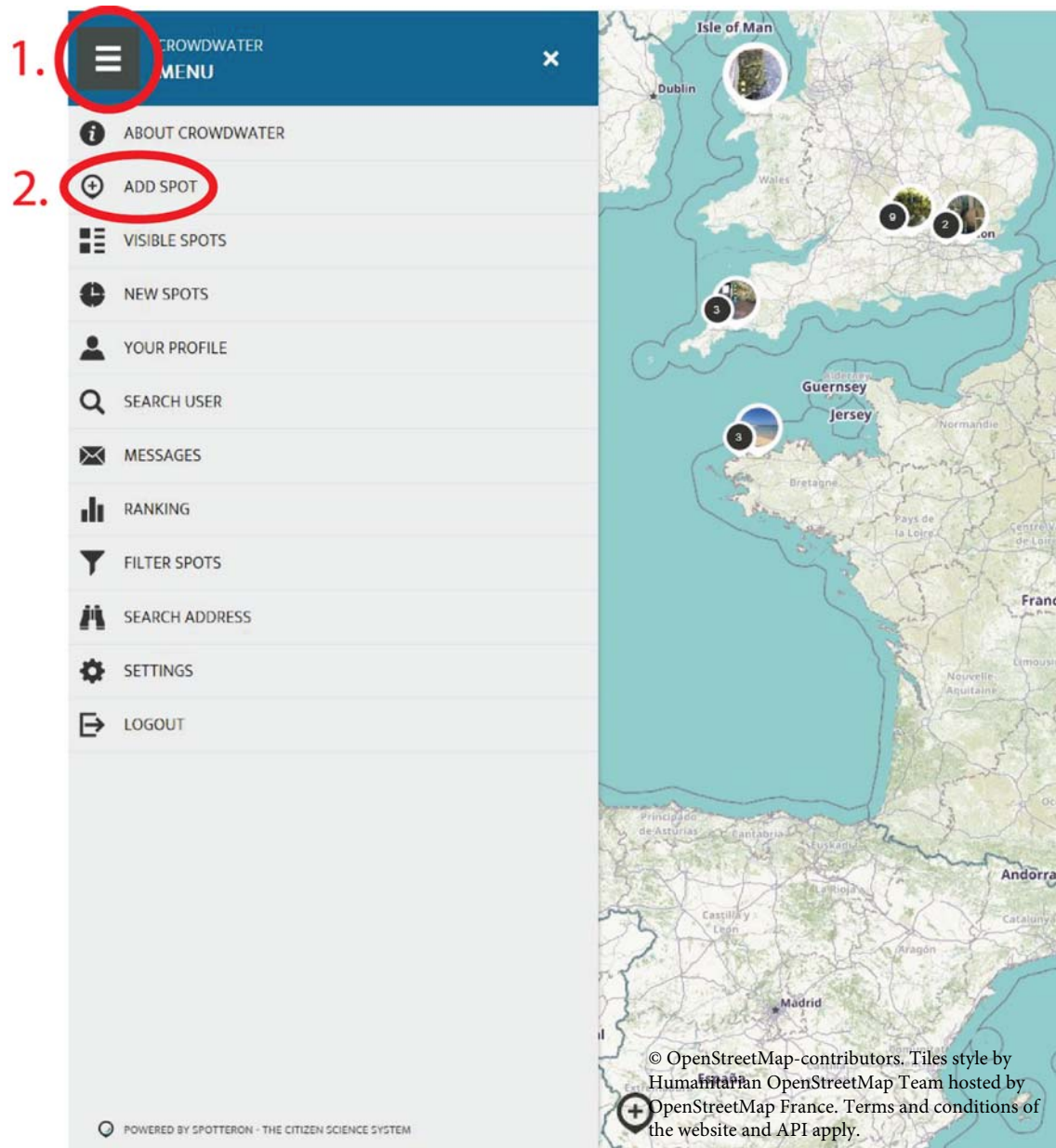
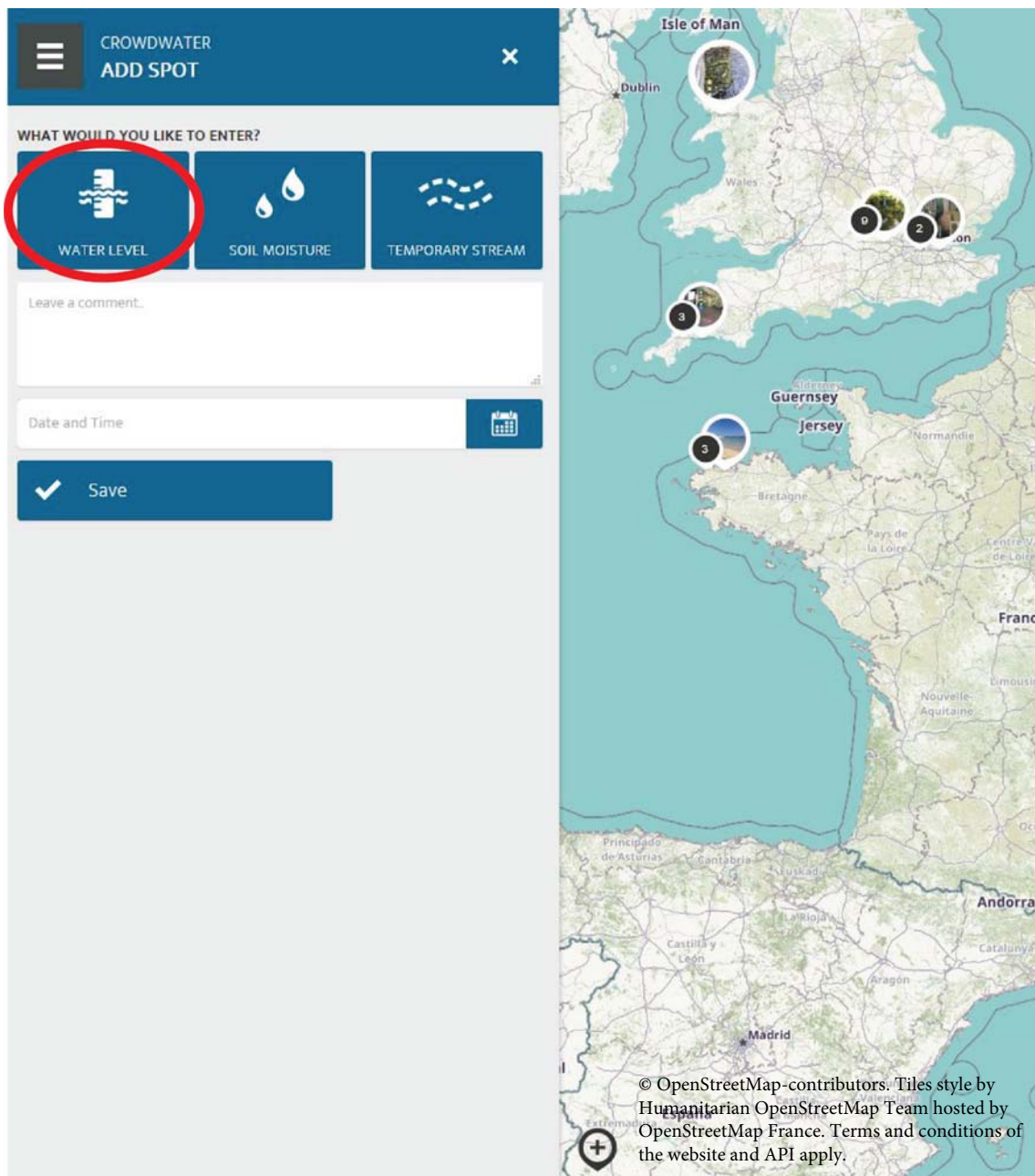
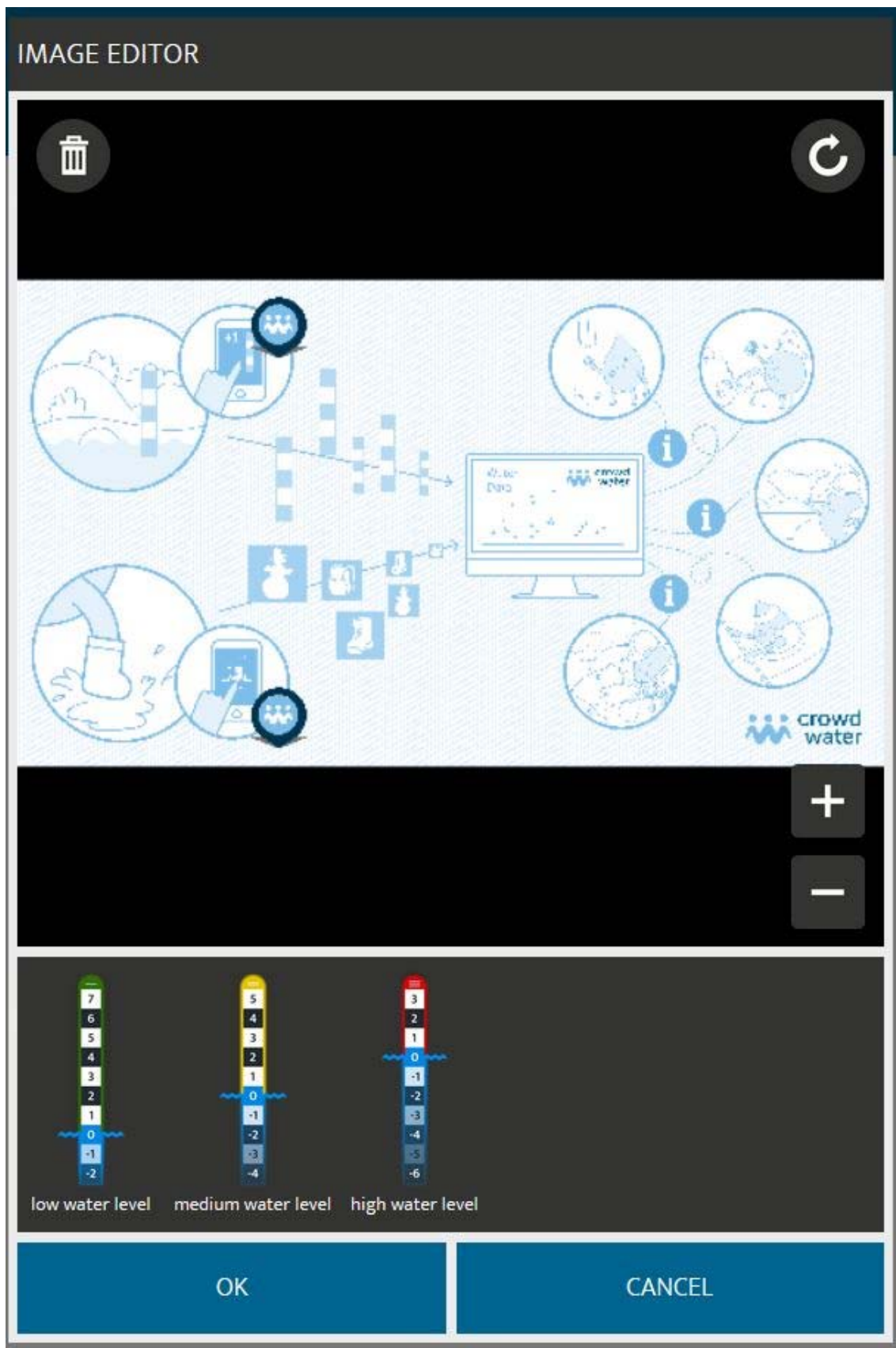


Figure 2

**Figure 3**



8. I have submitted my chosen reference image with a virtual staff gauge on the spotteron.com/crowdwater page and would like to continue with the survey. *

Mark only one oval.

Yes

How confident are you that the virtual staff gauge that you just placed will be a suitable reference picture for further

measurements?

9. *

Mark only one oval.

- I am very confident that this will be a suitable reference image.
- I think it will be a rather suitable reference image.
- I am not sure if this will be a suitable reference image or not.
- I think it will be a rather unsuitable reference image.
- I am very confident that this will be an unsuitable reference image.

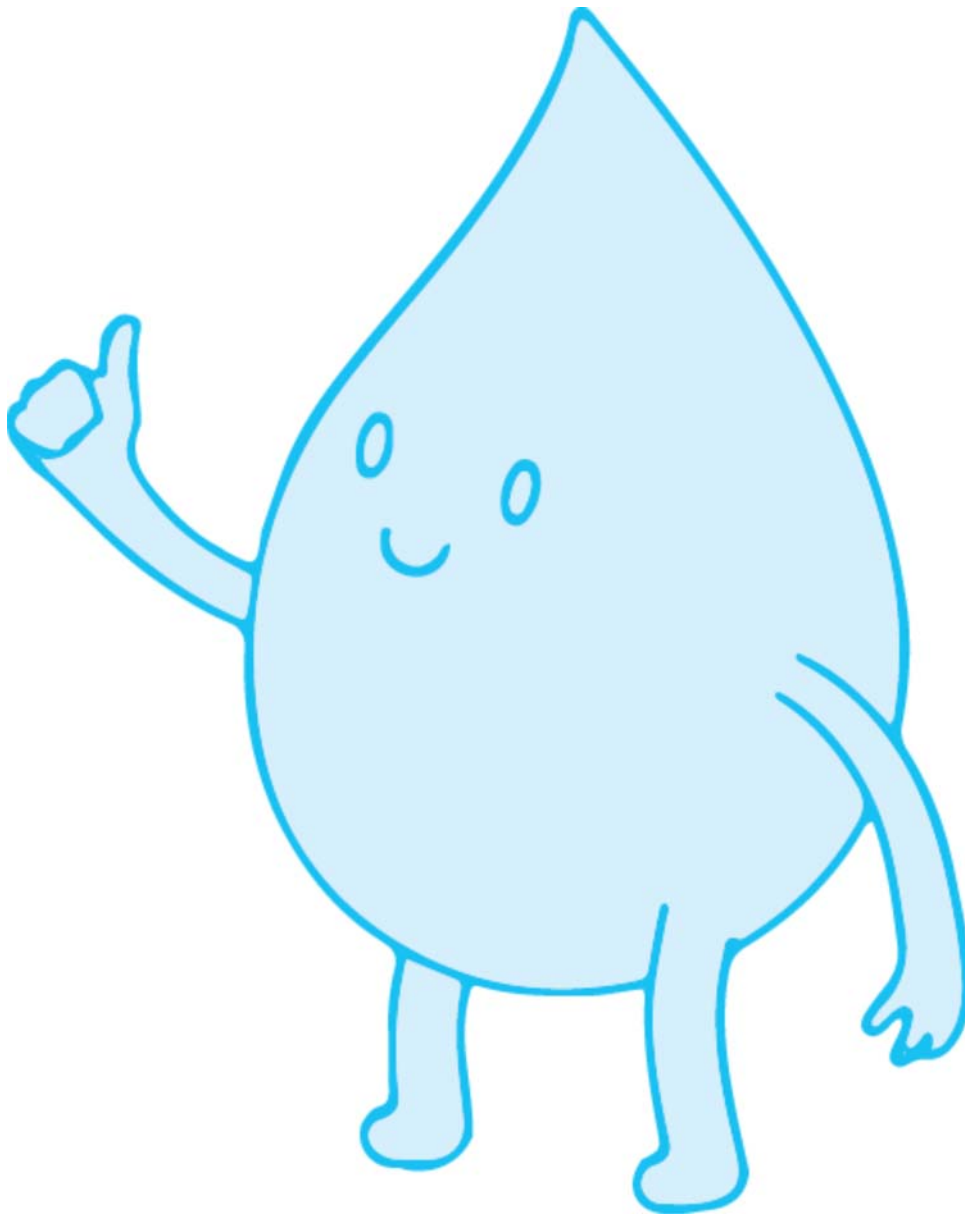
How easy/ difficult was it to place the virtual staff gauge into the reference image?

10. *

Mark only one oval.

- Very easy
- Rather easy
- Neutral
- Rather difficult
- Very difficult

Well done, you have just completed one of the trickiest parts of the survey!



Task 2: Evaluation of app spots

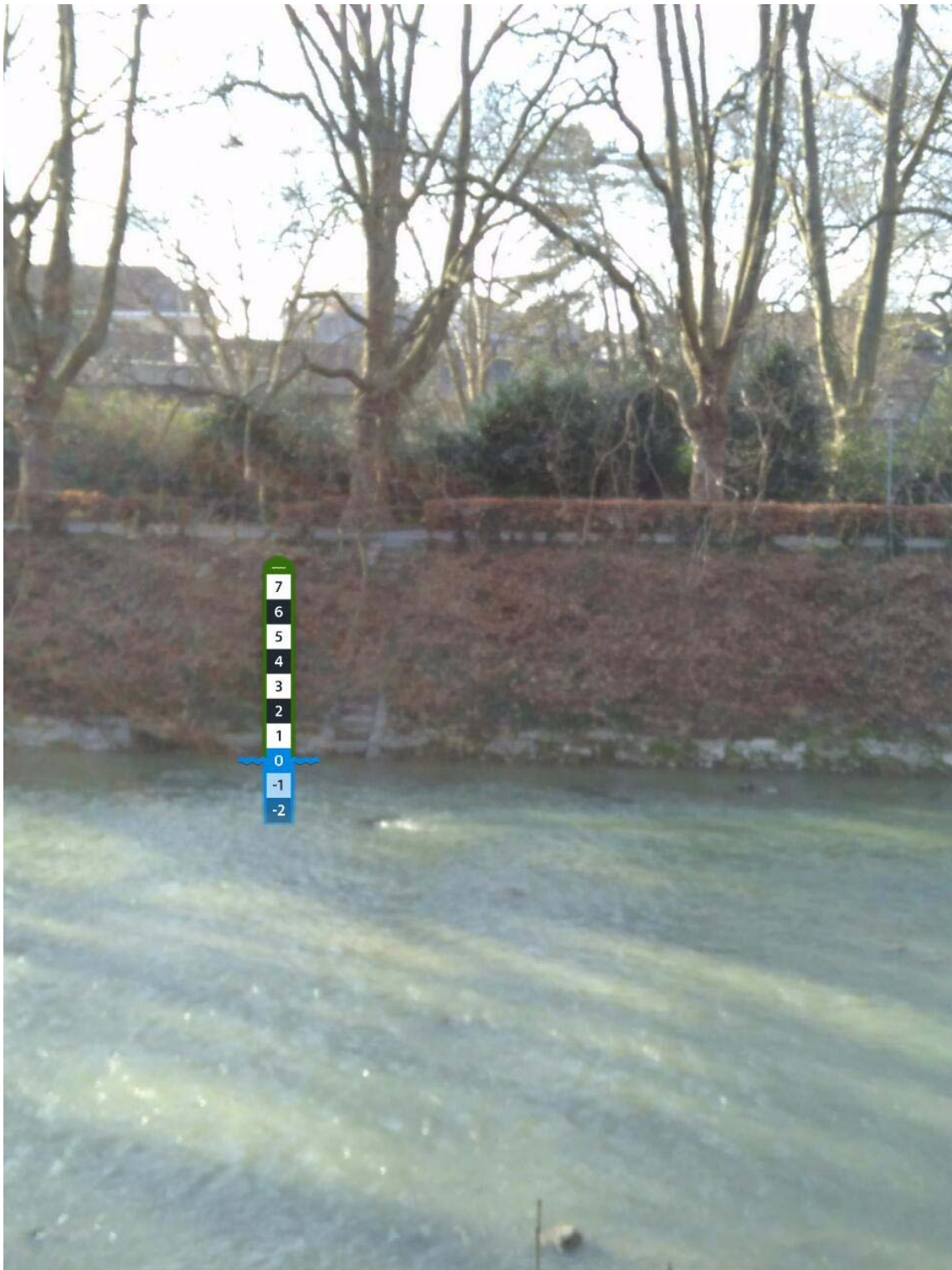
In this section of the survey you will evaluate other reference images. You can select between:

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Try to think about how useful the reference image would be for further water level measurements in order to create a time-series of water level data for this site.

There are 30 reference images to evaluate.

Reference image 1



11. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 2

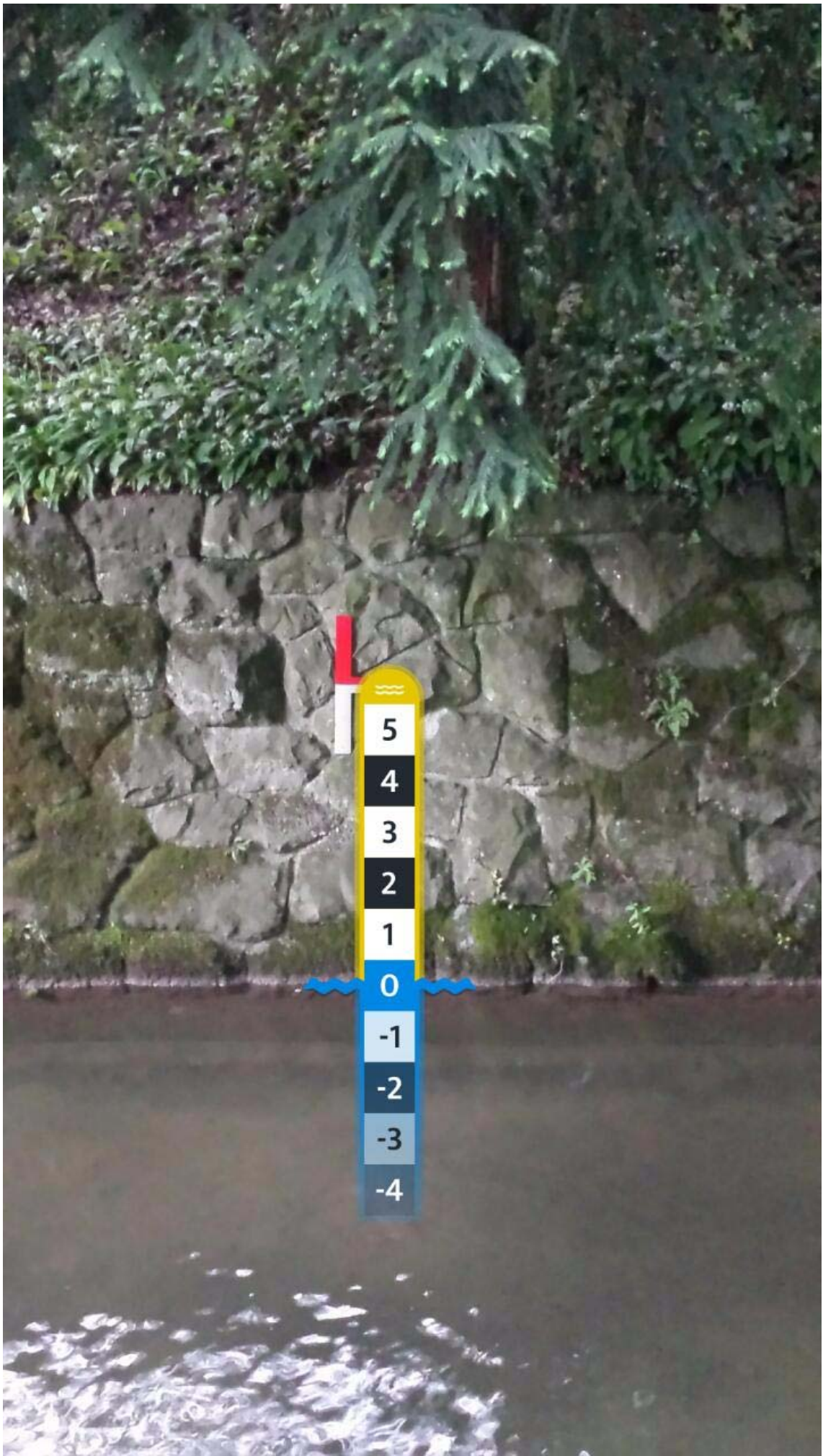


12. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 3



13. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 4

14. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

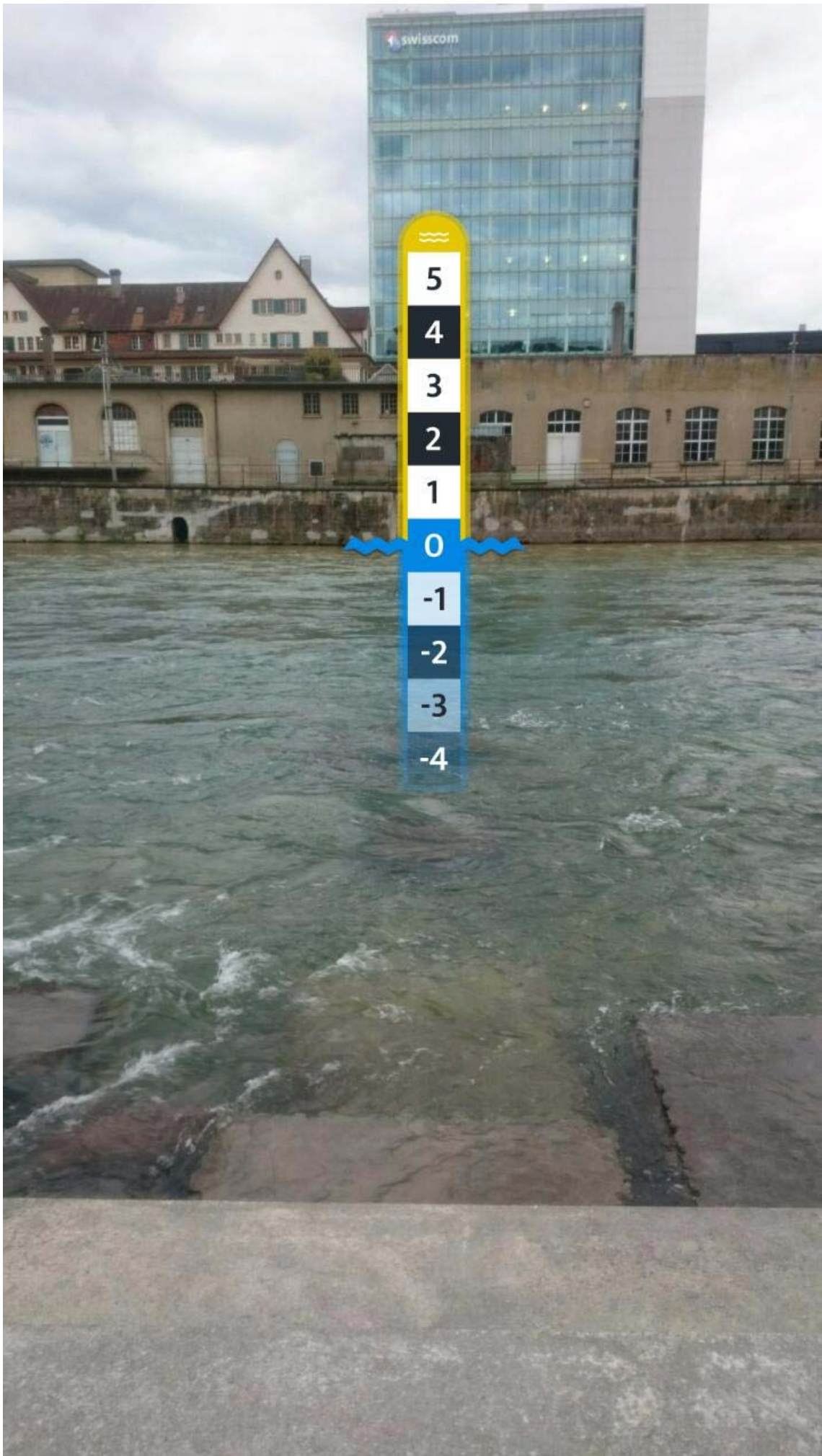
Reference image 5

15. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

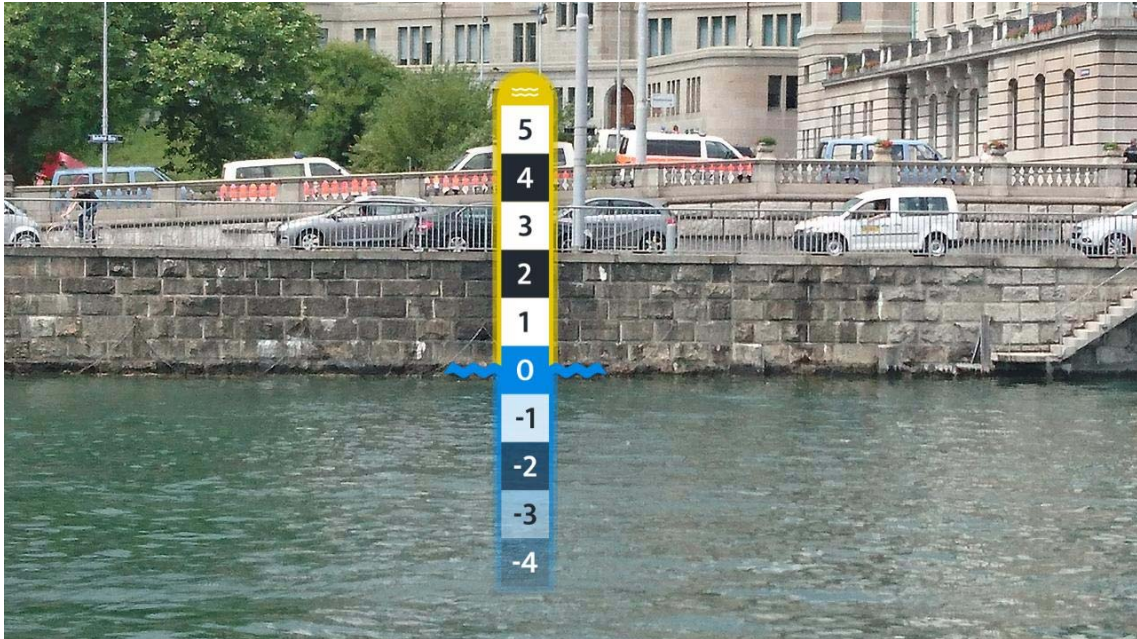
Reference image 6



16. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

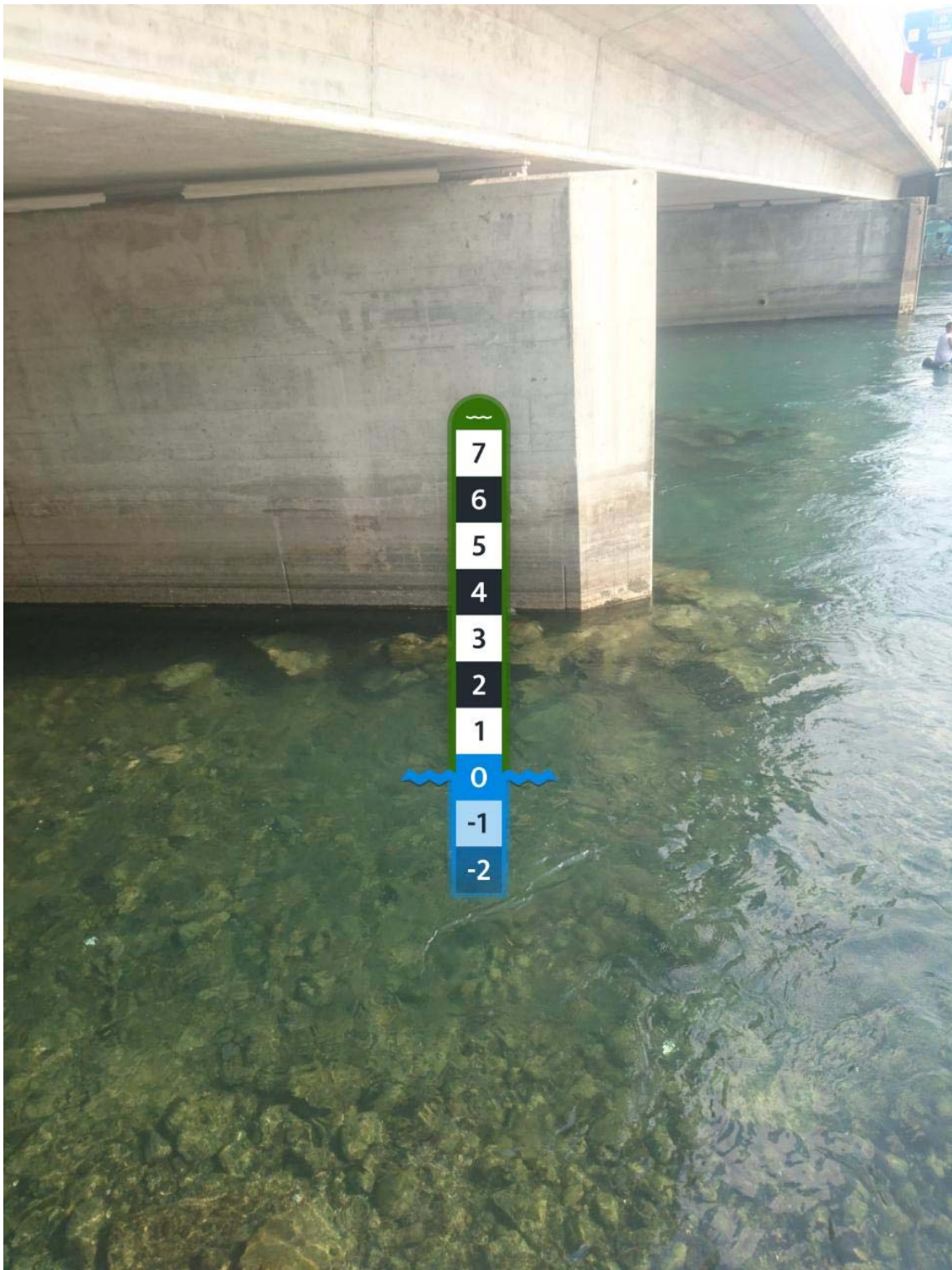
Reference image 7

17. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 8



18. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 9



19. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 10

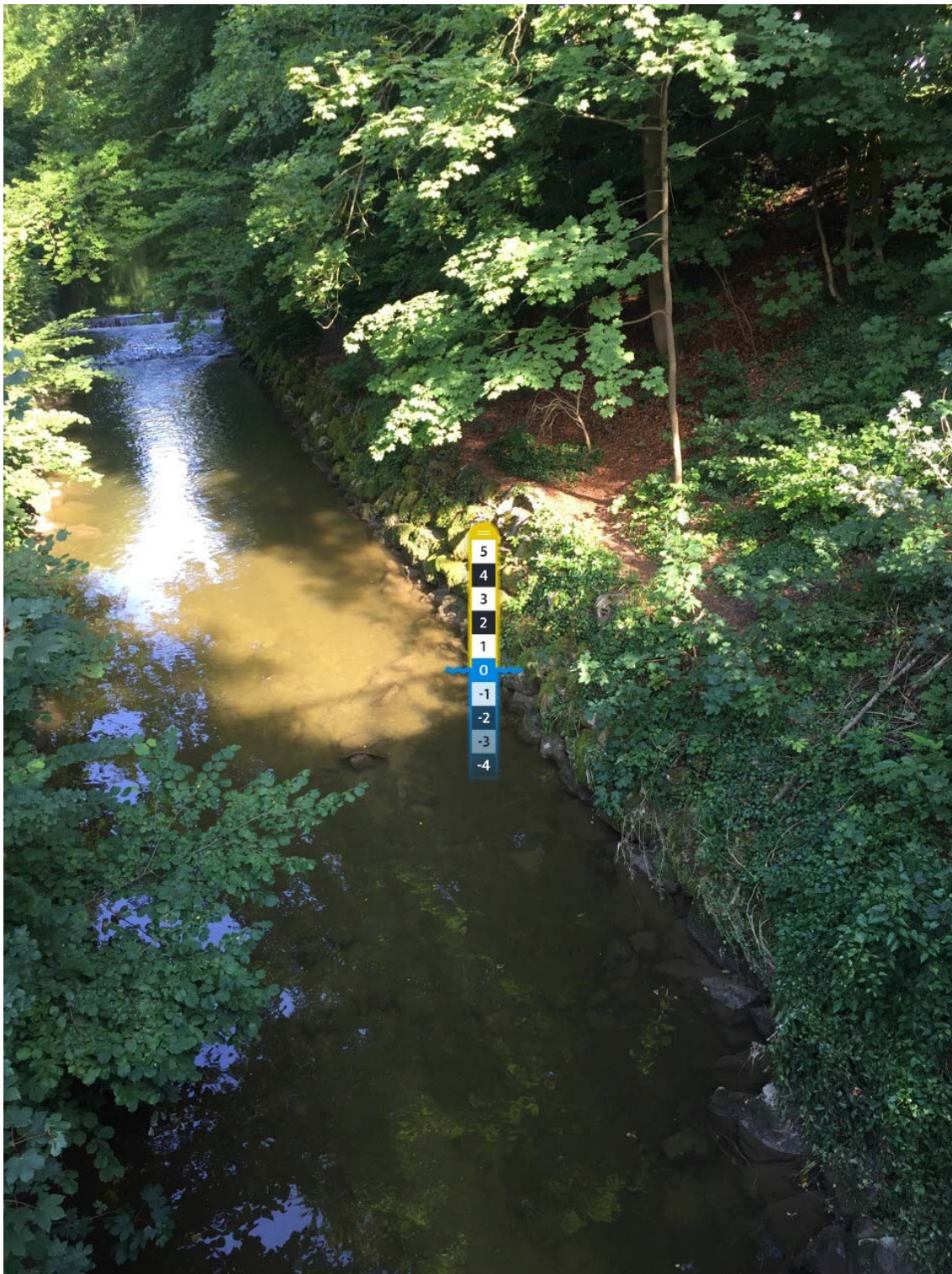


20. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 11



21. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 12



22. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 13

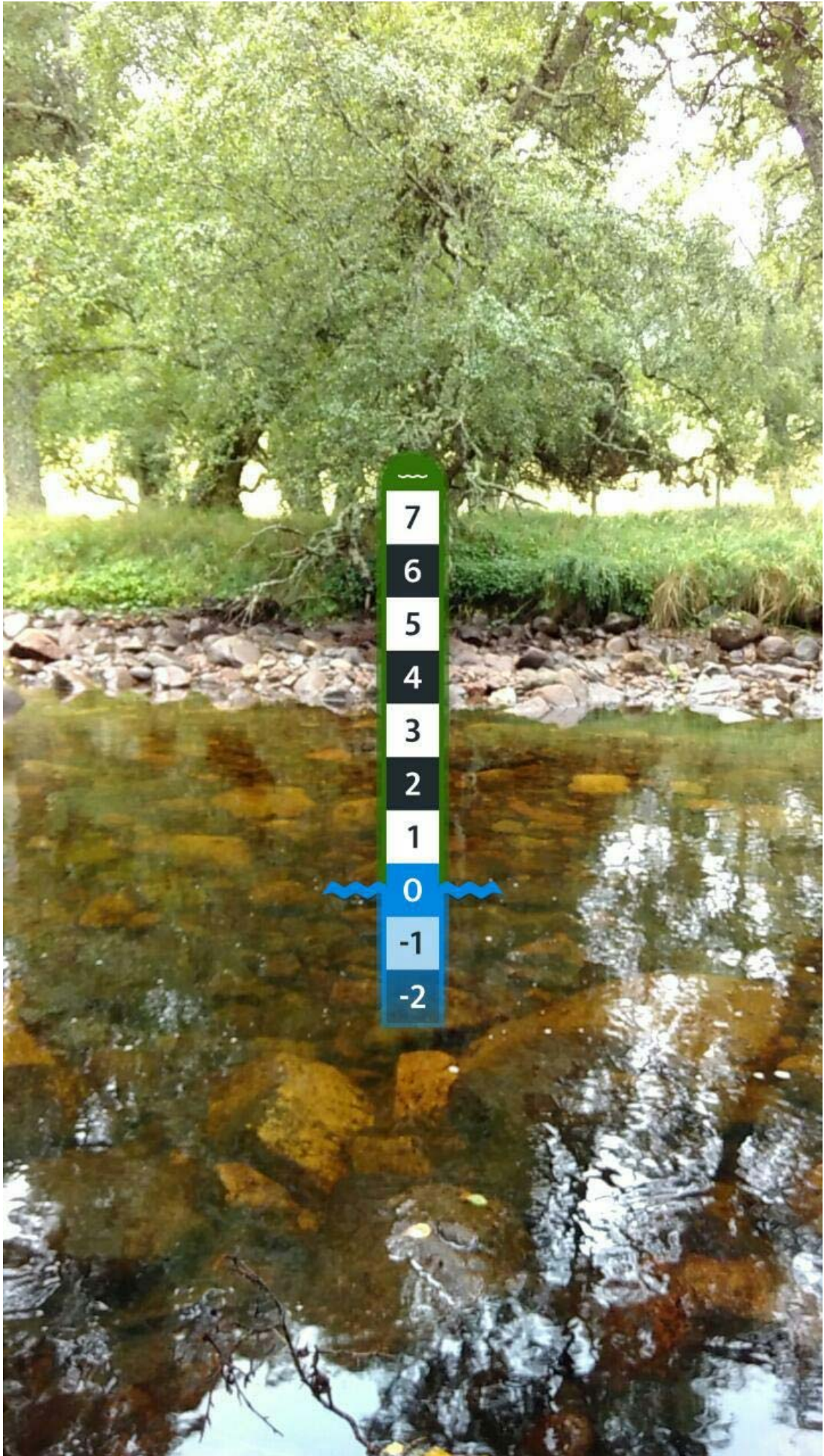


23. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

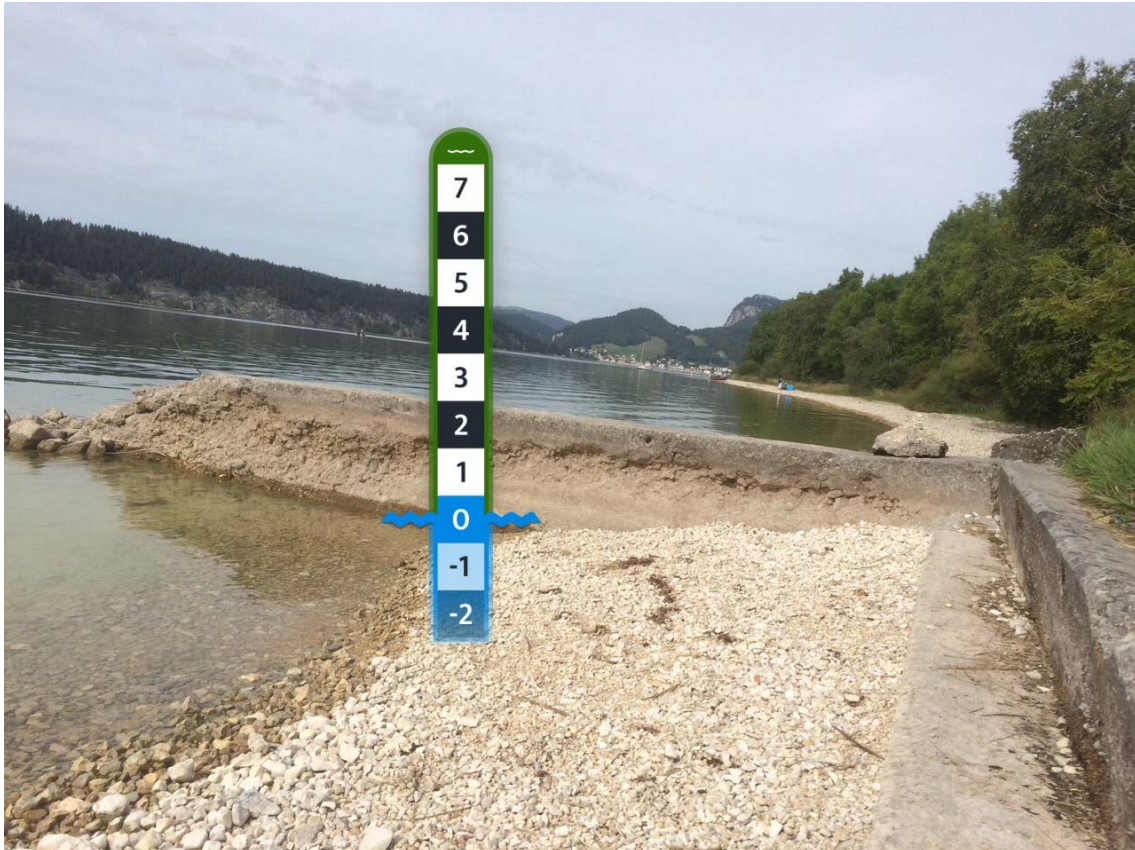
Reference image 14



24. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 15

25. *

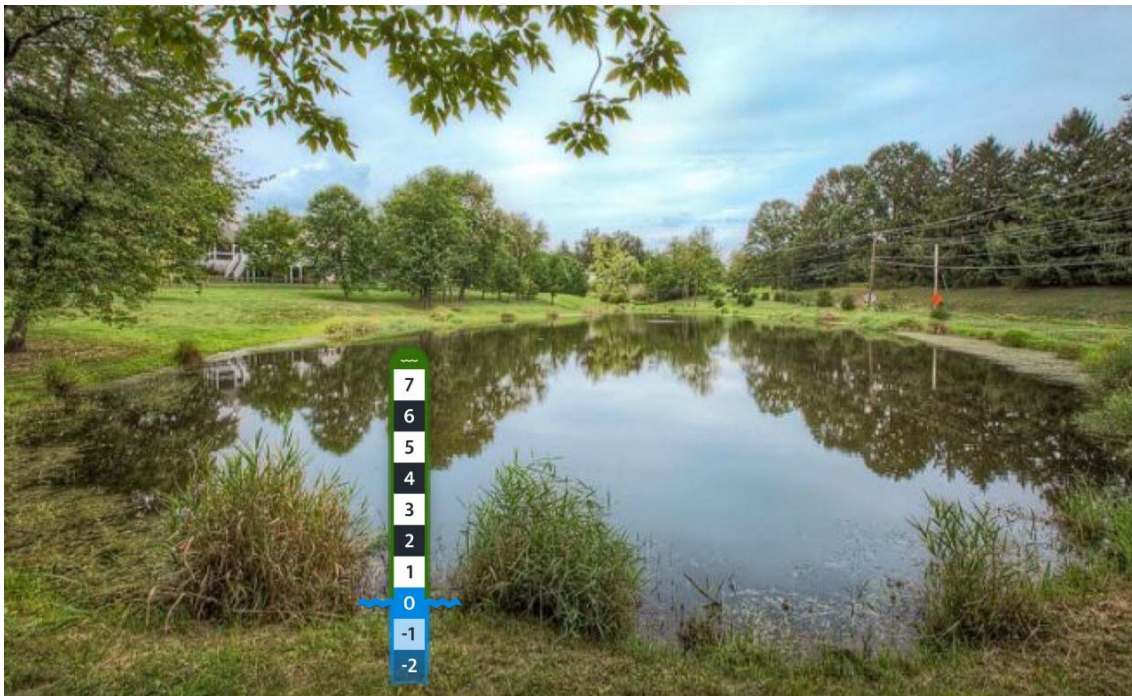
Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Great job - you are half way through the pictures :)



Reference image 16



26. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 17



27. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 18



28. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 19



29. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 20



30. *

Mark only one oval.

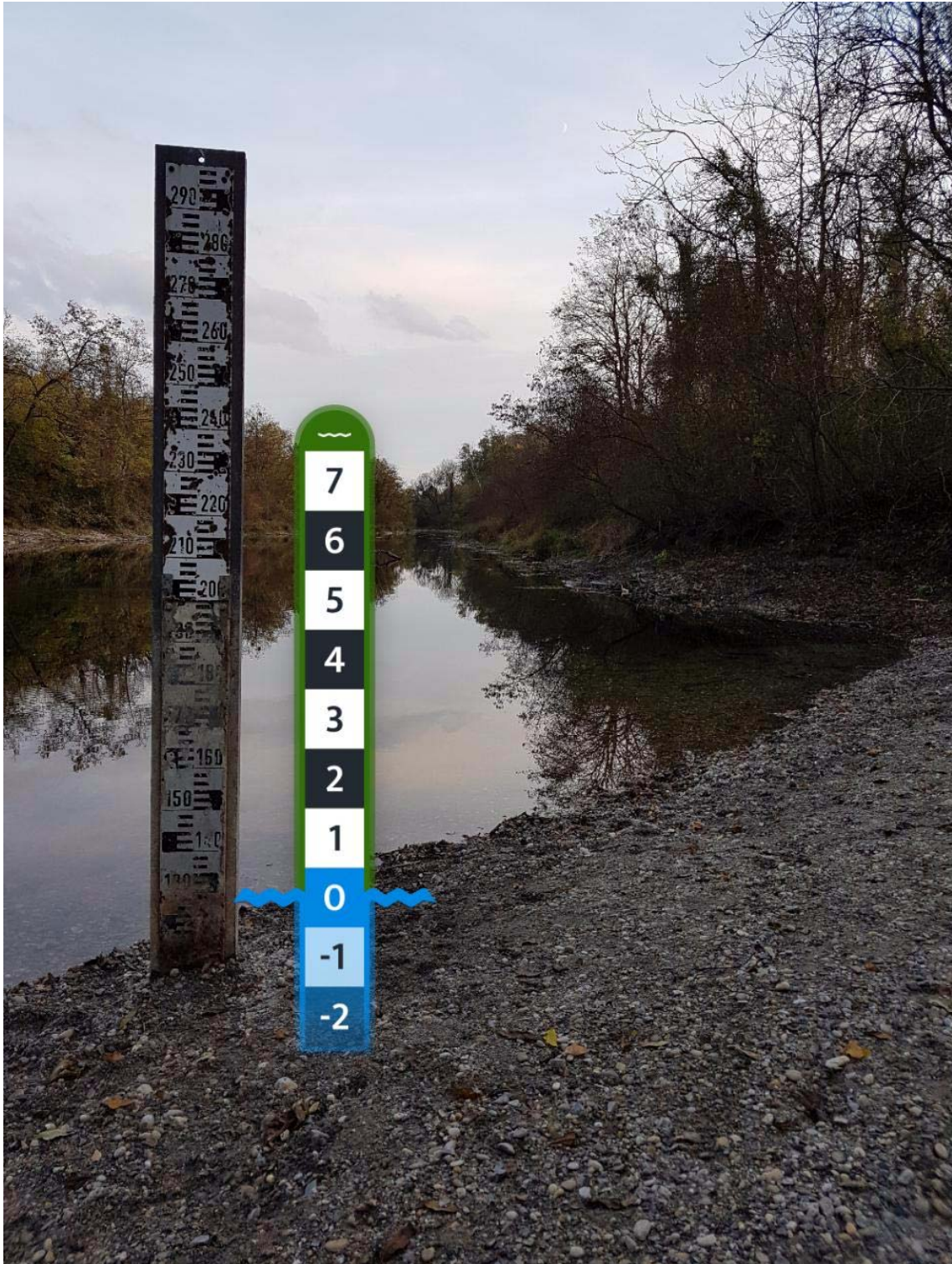
- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 21

31. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 22

32. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 23

33. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 24

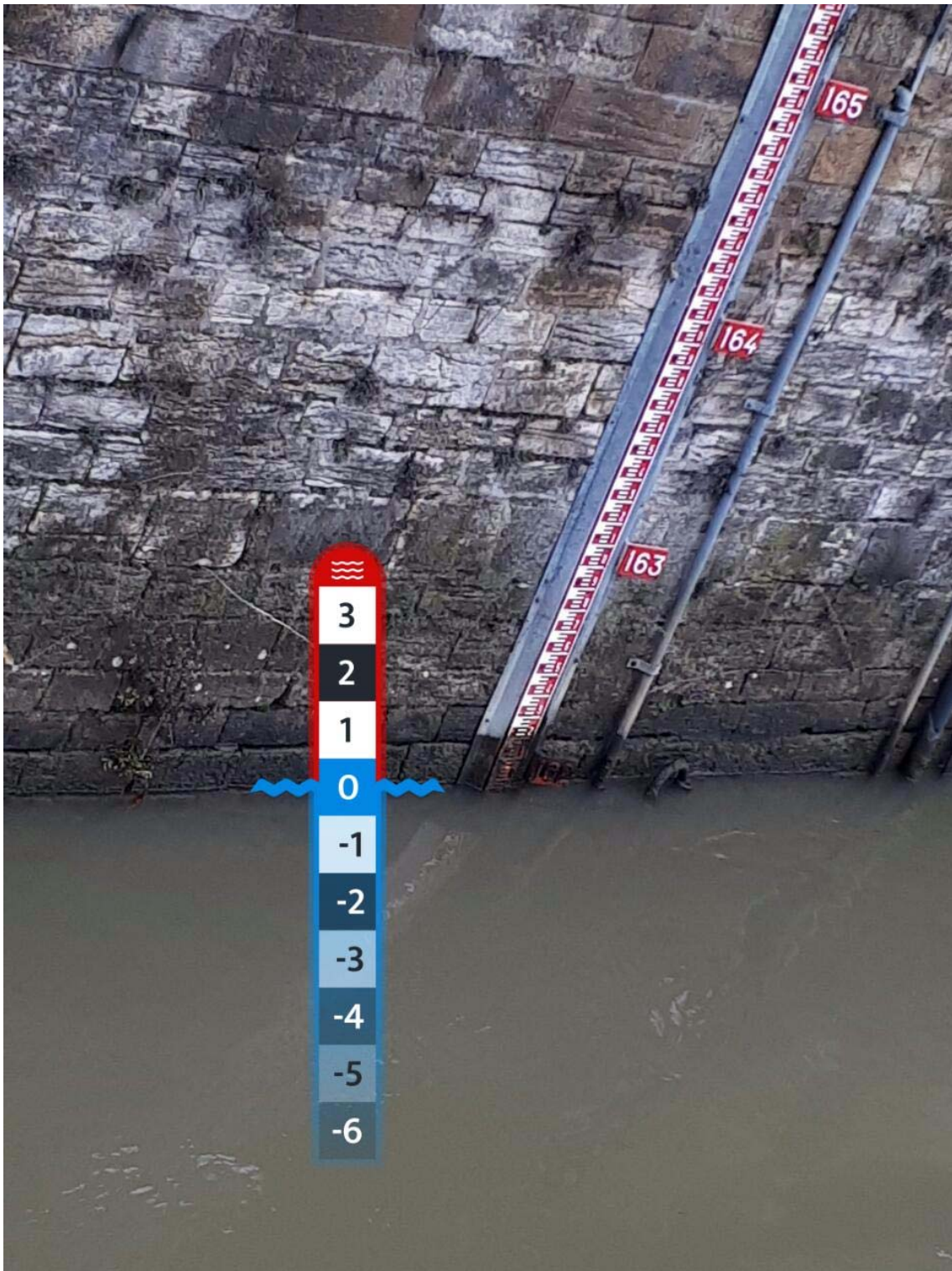


34. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 25

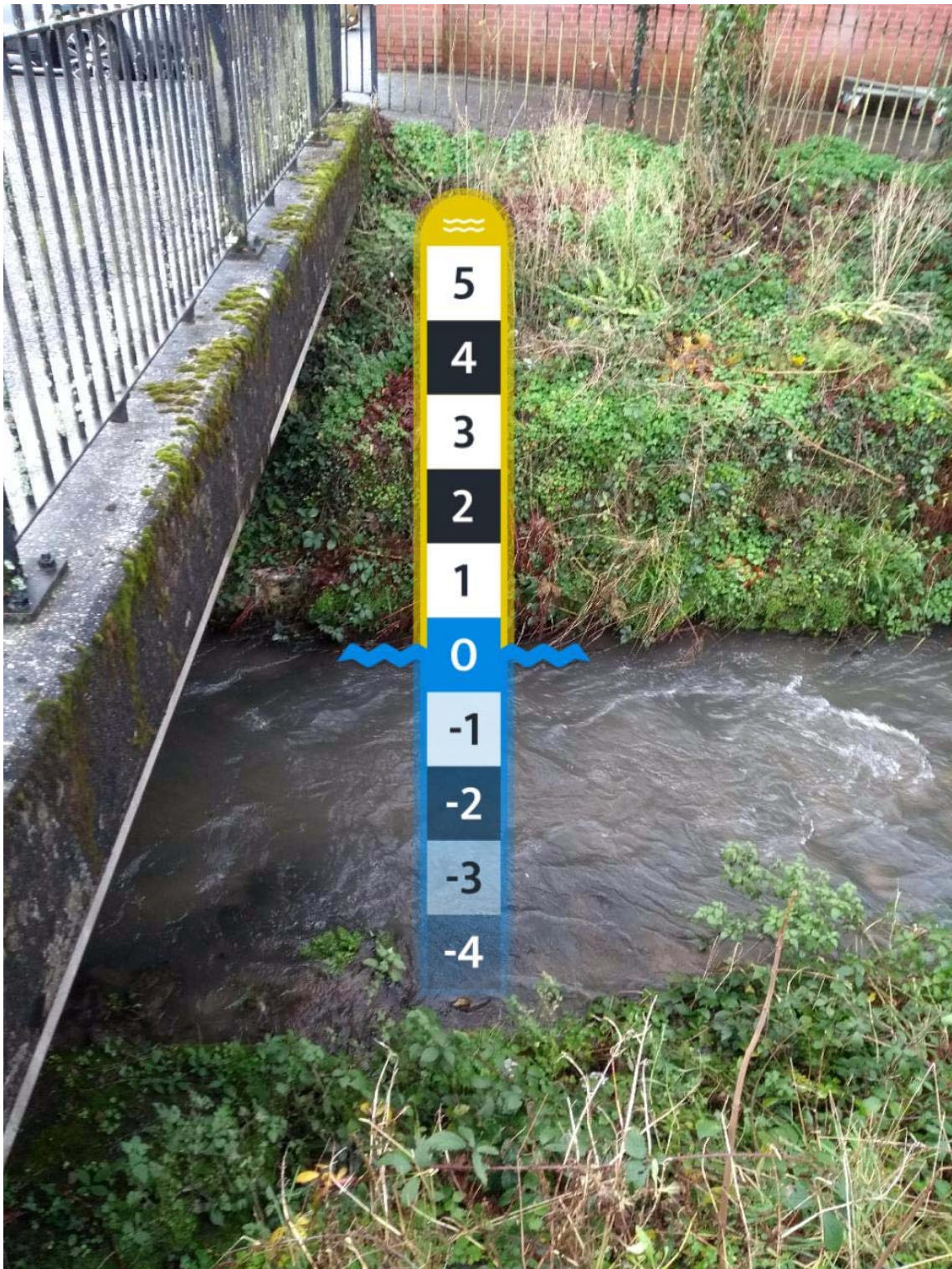


35. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 26

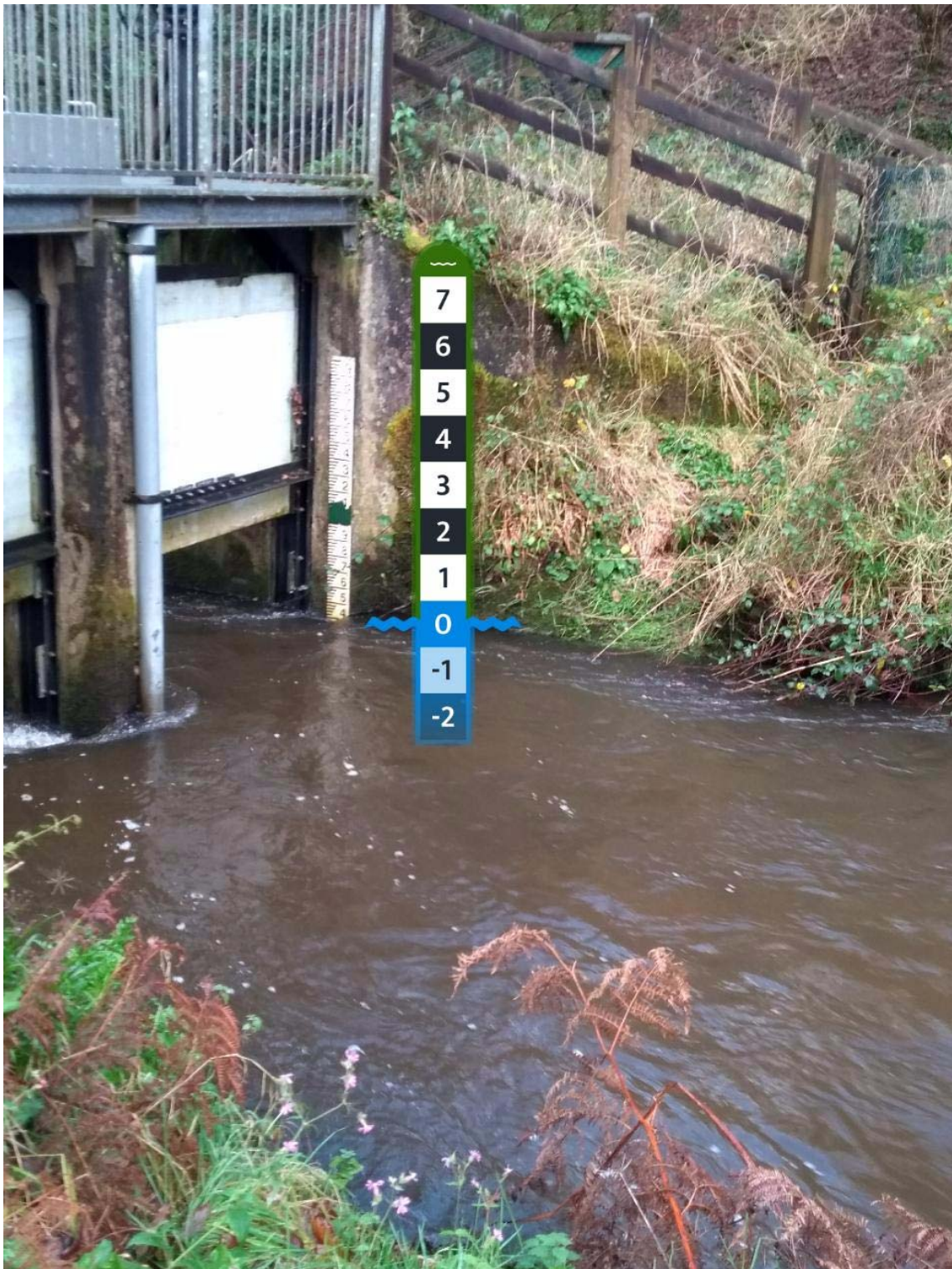


36. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 27



37. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 28



38. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 29



39. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 30



40. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

How confident are you that you evaluated the app spots accurately?

41. *

Mark only one oval.

- I am very confident that I evaluated the app spots accurately.
- I think I evaluated the app spots rather accurately.
- I am not sure if I evaluated the app spots accurately or not.
- I think I evaluated the app spots rather inaccurately.
- I am very confident that I evaluated the app spots inaccurately.

How easy/ difficult was it to evaluate the app spots?

42. *

Mark only one oval.

- Very easy
- Rather easy
- Neutral
- Rather difficult
- Very difficult

Task 3: Play the CrowdWater Game

Now we get to the fun part - the CrowdWater game :).

Log in to the game with the same user ID and password (i.e. the one that you used for the placement of the virtual staff gauge before). Click on "JOIN GAME NOW!" to start.

In the round you will see two pictures - on the left is the reference picture and on the right an update picture. To take a closer look at any of the images, you can click on them. Try to find references, for example noticeable rocks, bridge pillars or something similar. To select a water level class for the update image click on the number of your choice beneath the picture pair.

You can find the CrowdWater game under this link: <https://cwclone.spotteron.net> (sometimes Internet Explorer isn't working - in that case please try an alternative browser)

>>> <https://cwclone.spotteron.net> <<<



43. I have finished the CrowdWater game (<https://cwclone.spotteron.net>) and would like to continue with the survey. *

Mark only one oval.

- Yes

How easy/ difficult was it to play the CrowdWater game?

44. *

Mark only one oval.

- Very easy
- Rather easy
- Neutral
- Rather difficult
- Very difficult

Was it fun to play the CrowdWater game?

45. *

Mark only one oval.

- It was a lot of fun.
- It was a bit of fun.
- Neutral
- It wasn't really fun.
- It wasn't fun at all.

46. Why was it fun/ no fun?

Task 4: Place a virtual staff gauge - again

We hope you enjoyed the CrowdWater game! We would now like you to place the virtual staff gauge one more time. Please think about your previous choice and ask yourself if after seeing the other images, you think a different image is more useful.

Here are the steps again (and this is the link to the demonstration video: <https://www.dropbox.com/sh/qqzhlkisy03vs50/AABVsn97LxKDEf6tkCV1CHWoa?dl=0>) (no audio).

Step 1) Take another look at your 18 reference images. Would you still like to choose the same one? Feel free to pick a different one, if after the game you think another reference image will be more suitable. A good reference image makes it easy to see changes in the water level.

Step 2) Go to <https://www.spotteron.com/crowdwater> and if you logged out log in again with the same user ID and password.

Step 3) Click on the three horizontal bars in the upper left corner and then select "ADD SPOT" (see Figure 1 below).

Step 4) Select the category "WATER LEVEL" (see Figure 2 below).

Step 5) Under "Select picture" you can now upload the reference image of your choice that you saved on your computer during step 1.

Step 6) Once you have uploaded the image, the image editor will automatically open (see Figure 3 below). Instead of the blue graphic your selected reference image should be displayed. Click on the virtual staff gauge that you think is most suitable (green, yellow or red - see Figure 3 below).

The green one if you think that the current water level is relatively low, the yellow one if you think that the current water level is average and the red one if you think that the current water level is relatively high. Place the staff gauge on the image how you think it would be most suitable for later use to see changes in the water level. You can adjust the size and the position of the virtual staff gauge to reflect how much you think the water level will change throughout the seasons or between droughts and floods. The placement of this staff gauge does not have to be done in the same way as last time, if since the game you think this could be done in a better way.

Step 7) Under "Leave a comment..." please write "2nd virtual staff gauge".

Step 8) Ignore the "Date and Time" field and click on "Save" at the bottom.

Step 9) If an error message regarding the location of the spot comes up, just move the map to the Atlantic and try again. (Drag the map and not the crosshair.)

Figure 1

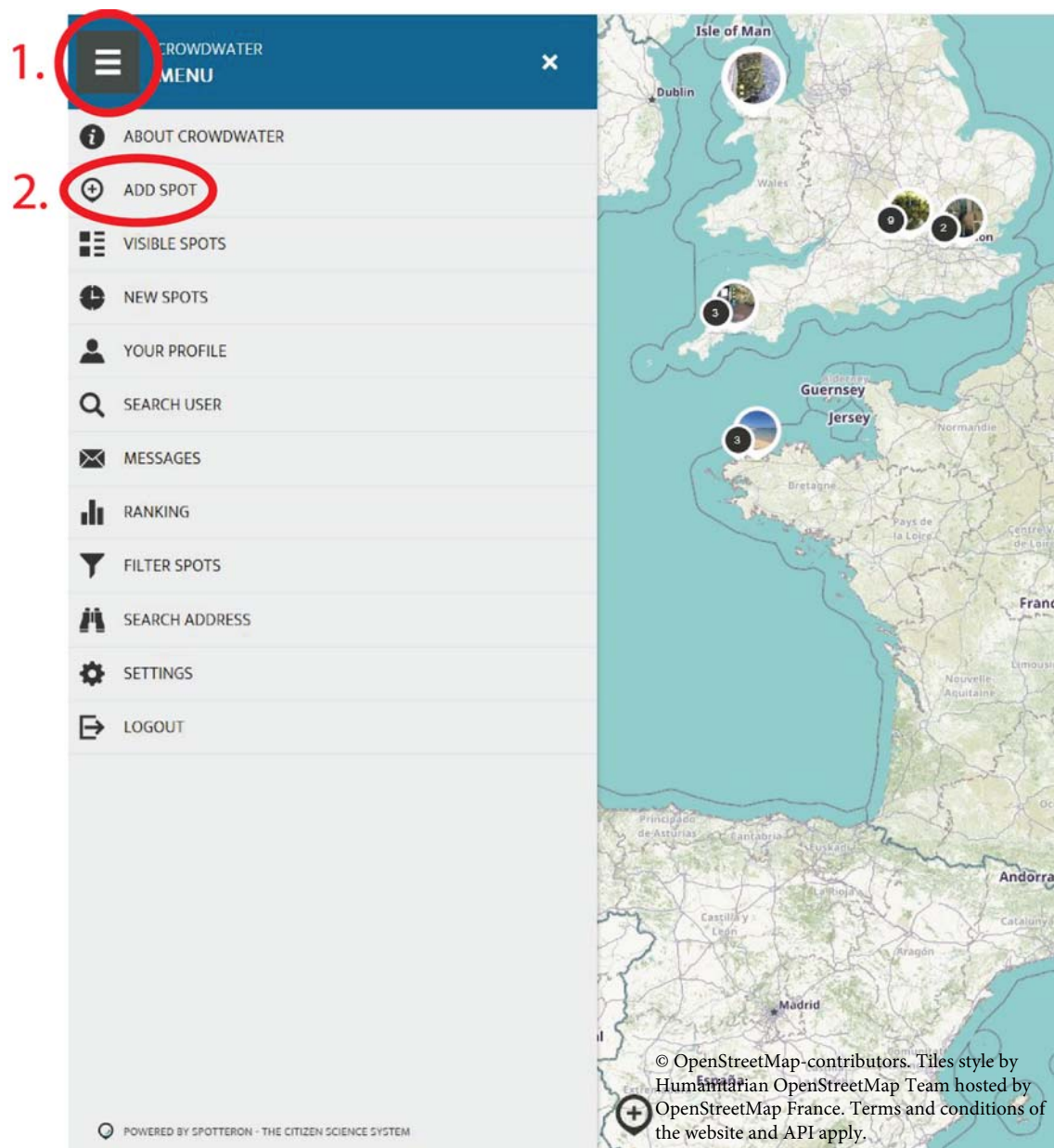
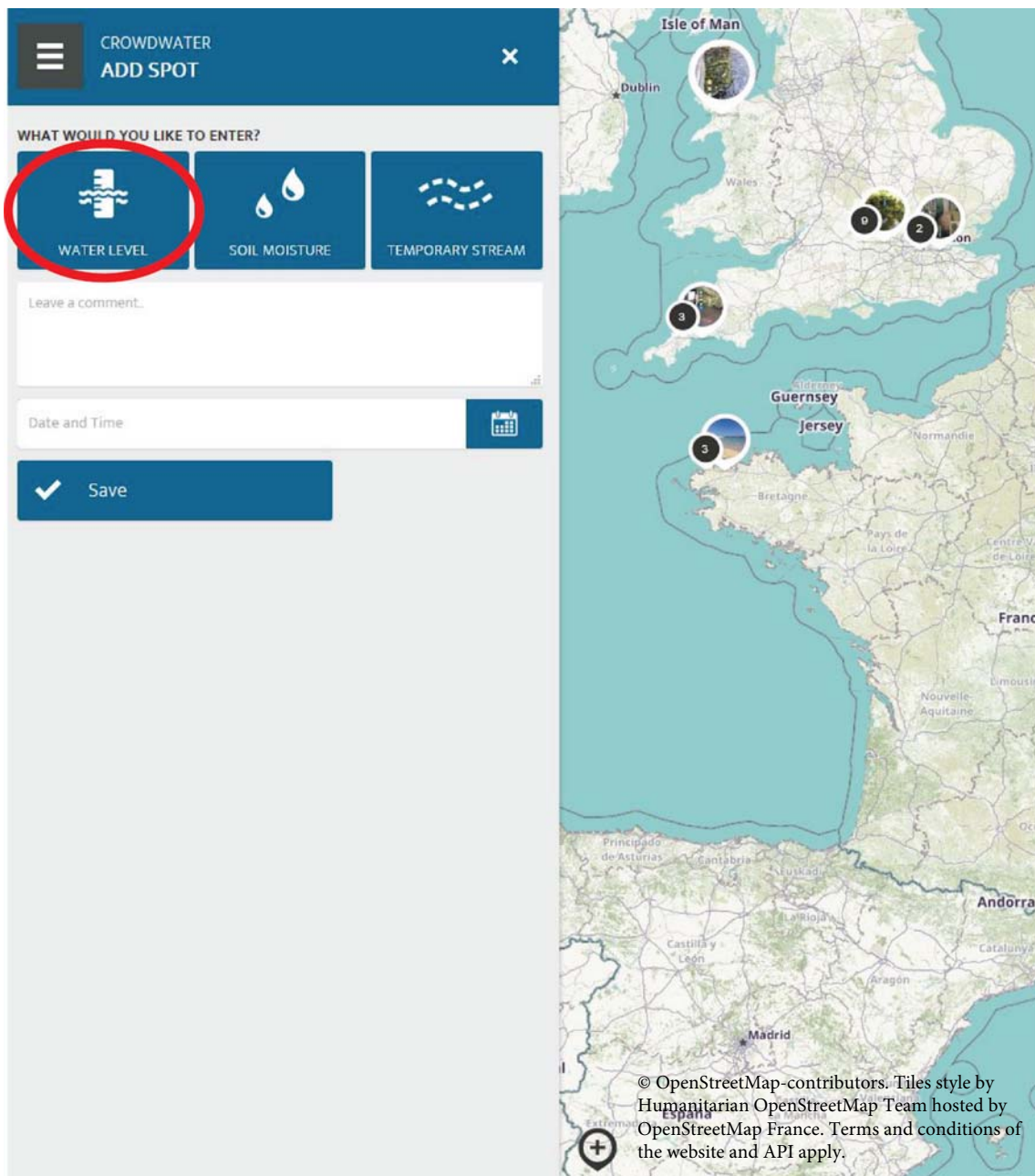
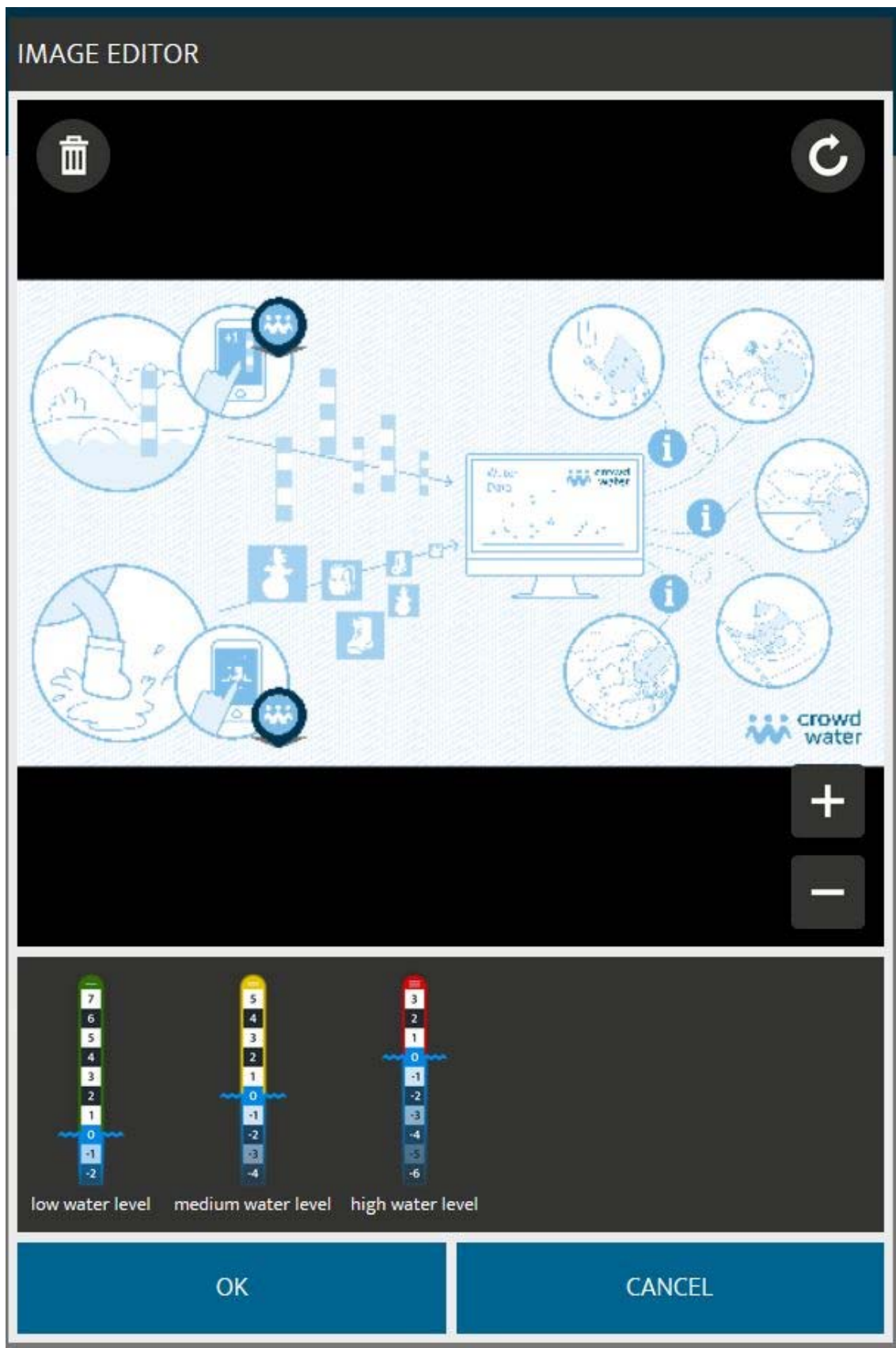


Figure 2

**Figure 3**



47. I have submitted my chosen reference image with a virtual staff gauge on the spotteron.com/crowdwater page and would like to continue with the survey. *

Mark only one oval.

Yes

How confident are you that the virtual staff gauge that you just placed will be a suitable reference picture for further

measurements?

48. *

Mark only one oval.

- I am very confident that this will be a suitable reference image.
- I think it will be a rather suitable reference image.
- I am not sure if this will be a suitable reference image or not.
- I think it will be a rather unsuitable reference image.
- I am very confident that this will be an unsuitable reference image.

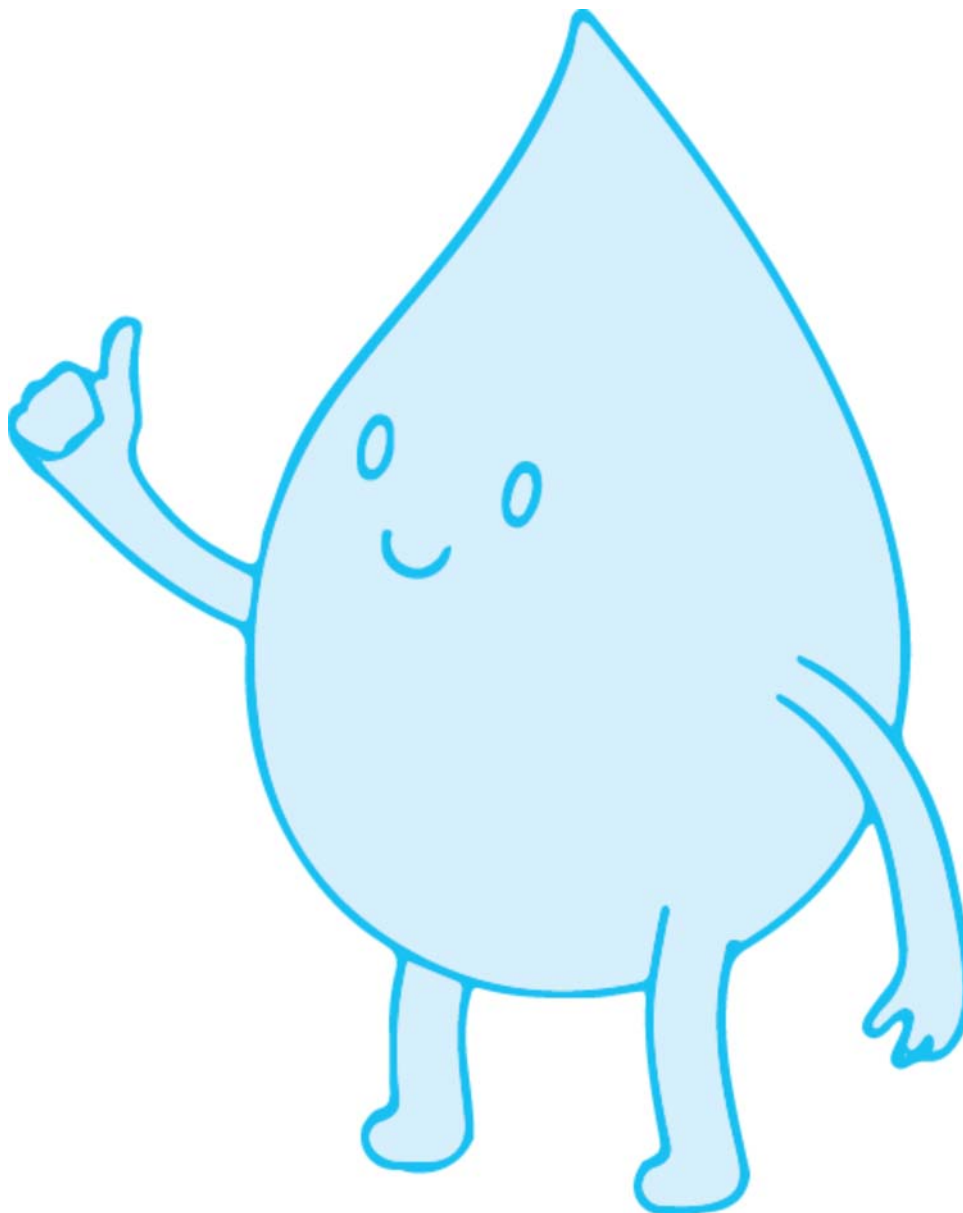
How easy/ difficult was it to place the virtual staff gauge into the reference image?

49. *

Mark only one oval.

- Very easy
- Rather easy
- Neutral
- Rather difficult
- Very difficult

Well done!



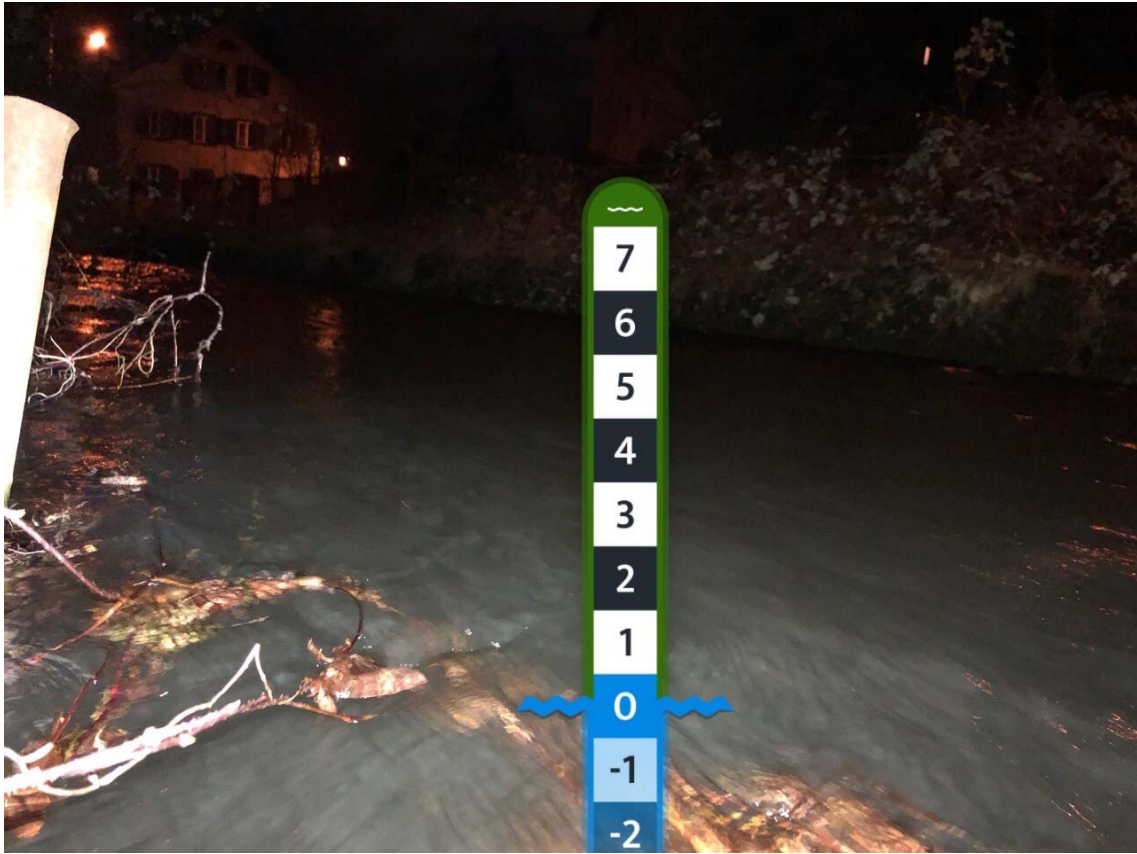
Task 5: Evaluation of app spots

After playing the game you might have changed opinion on what makes a good reference image. So in this section of the survey we ask you to evaluate another 30 reference images. Just like before, you can select between:

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Try to think about how useful the particular reference image would be for further updates in order to create a time-series of water level data.

Reference image 31



50. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 32

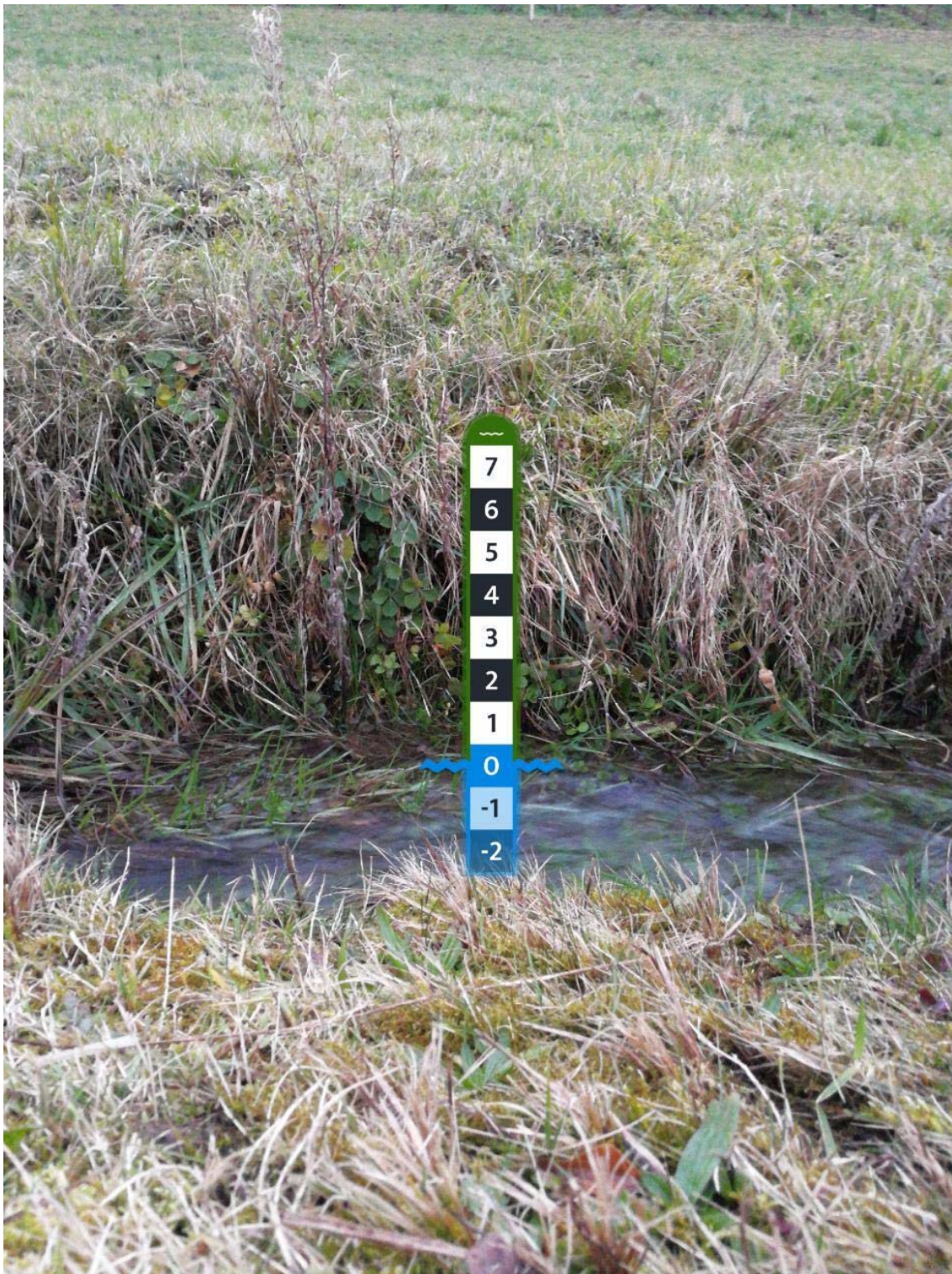


51. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 33



52. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 34



53. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 35

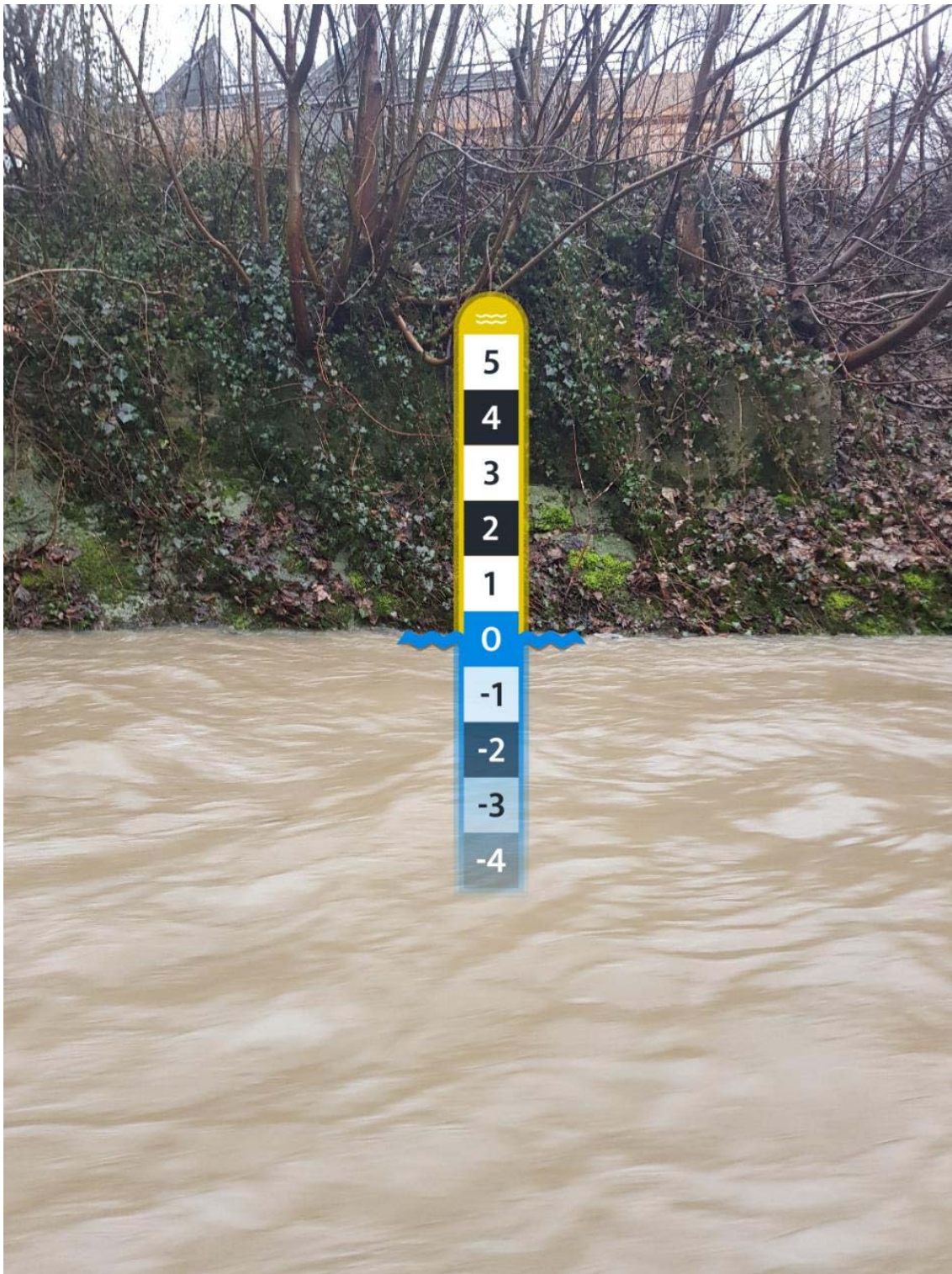


54. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 36

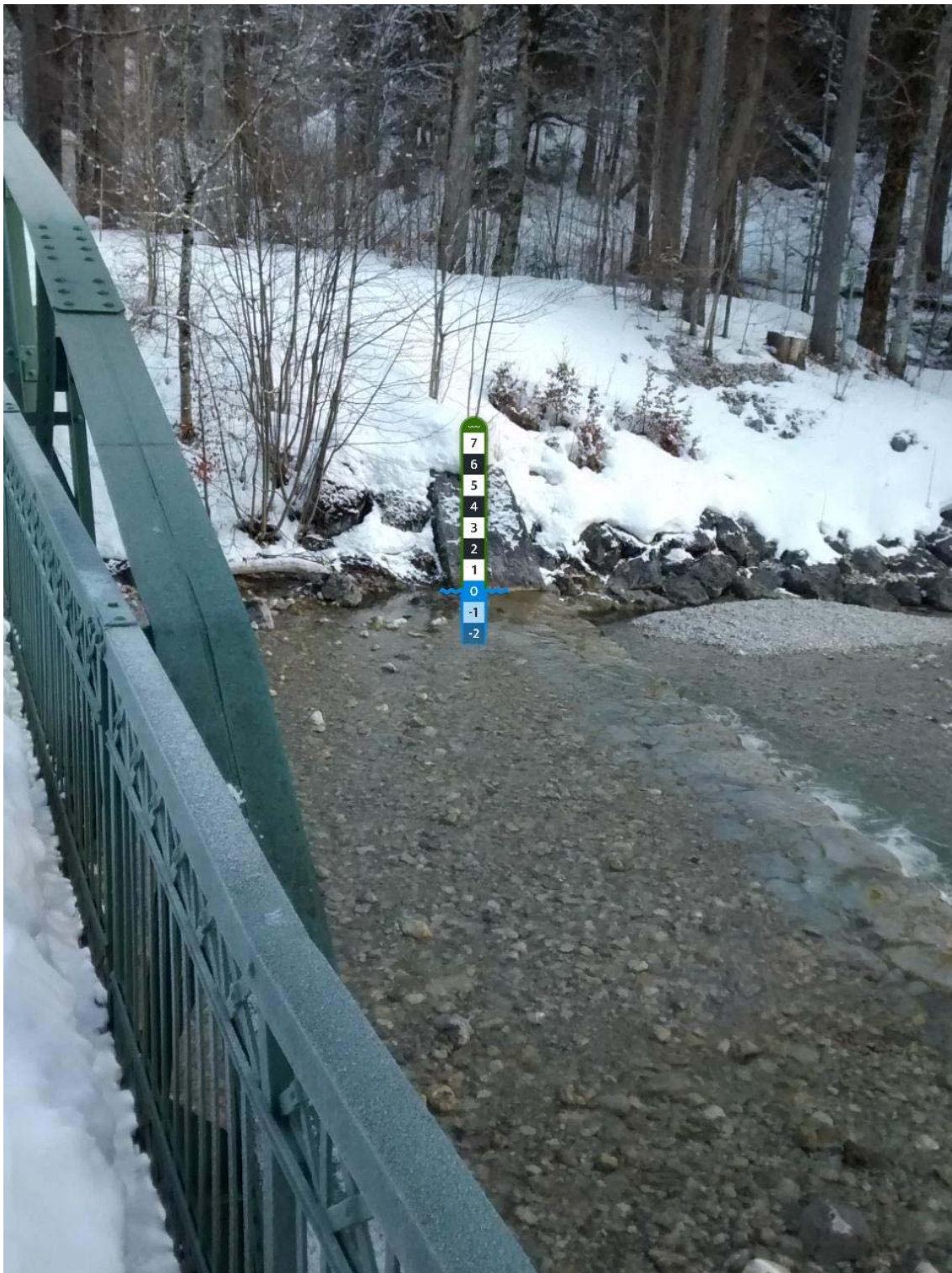


55. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 37



56. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 38



57. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 39

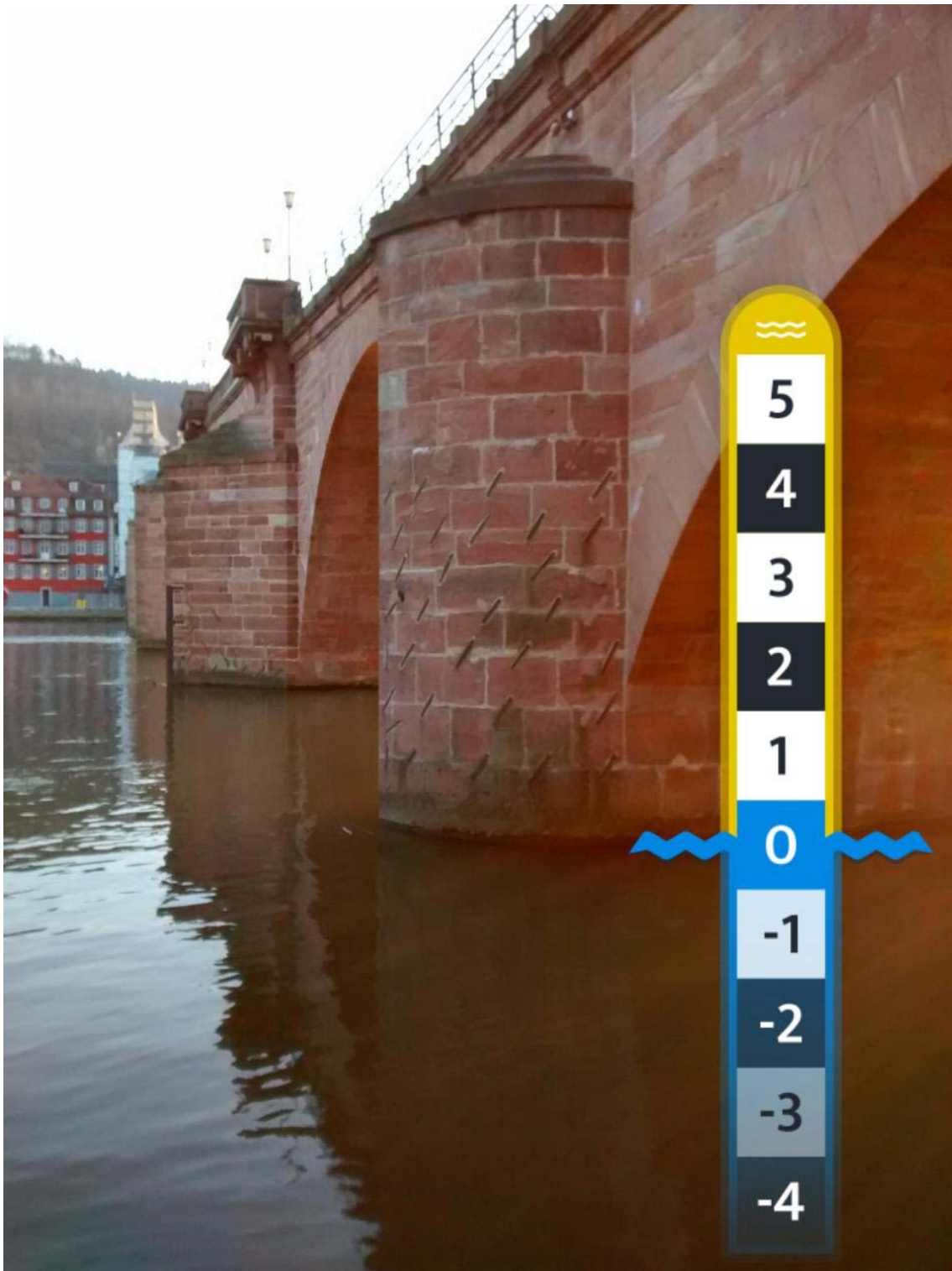


58. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 40



59. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 41



60. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 42

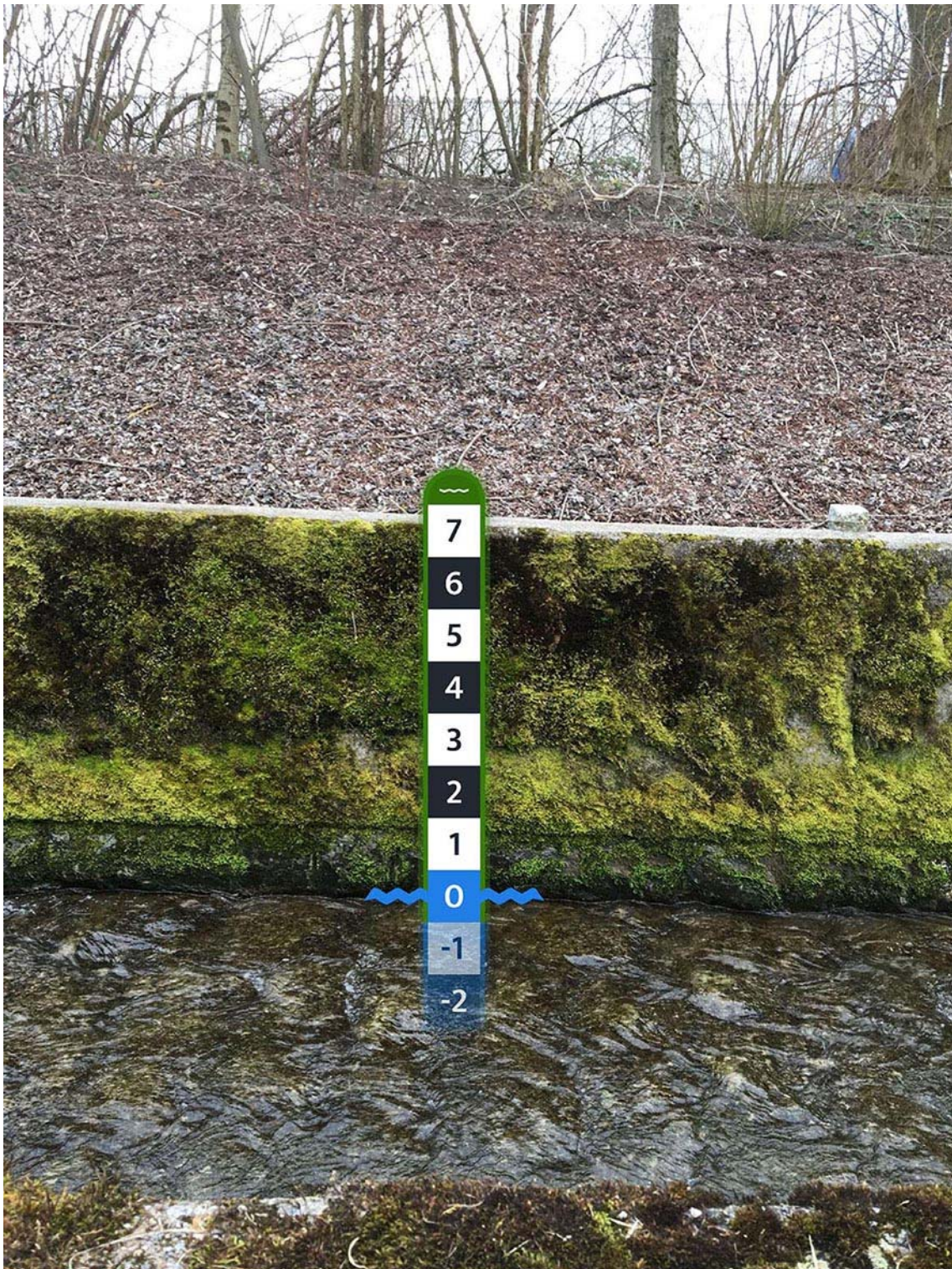


61. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 43

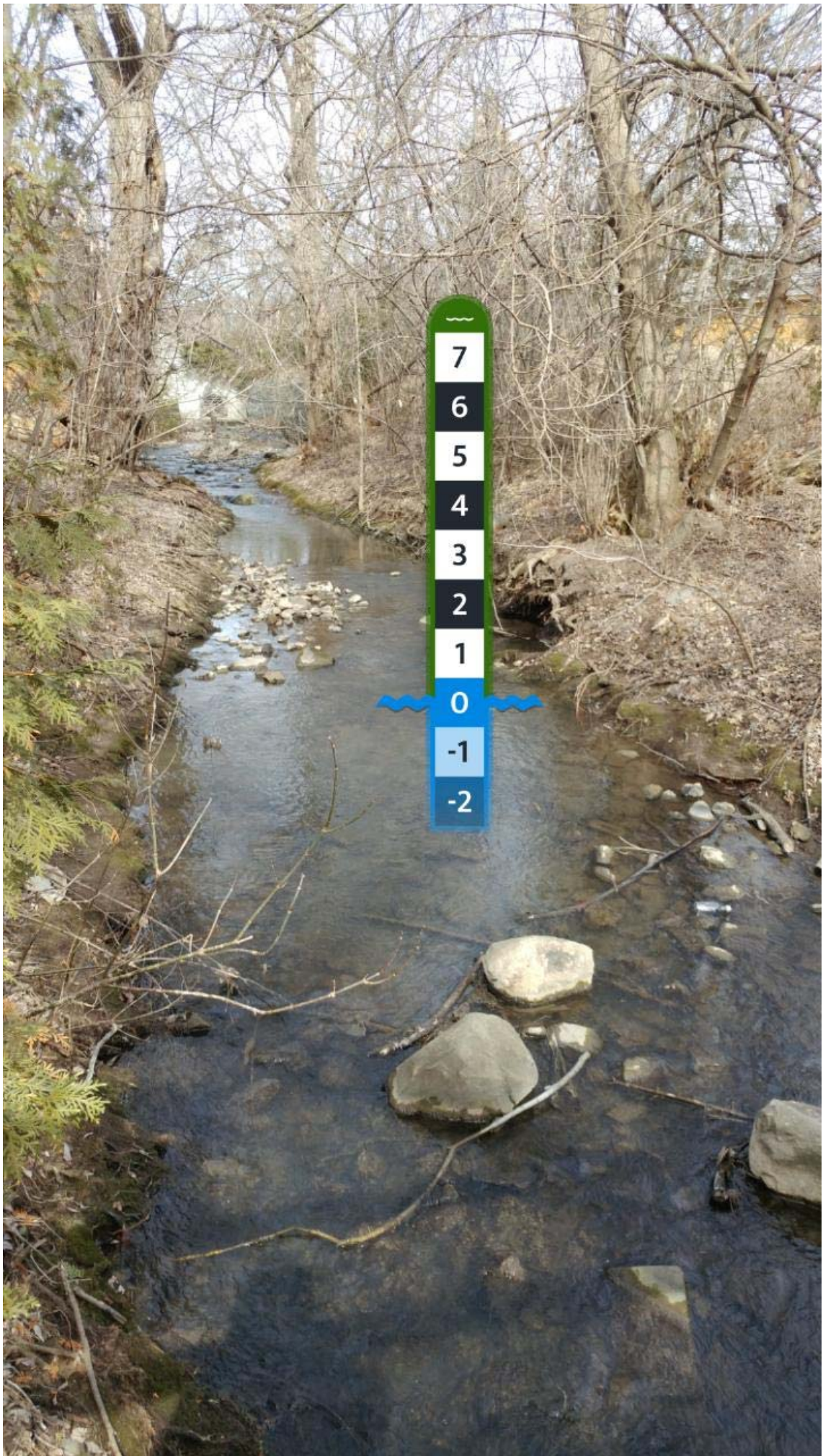


62. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 44



63. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 45

64. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 46

65. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 47

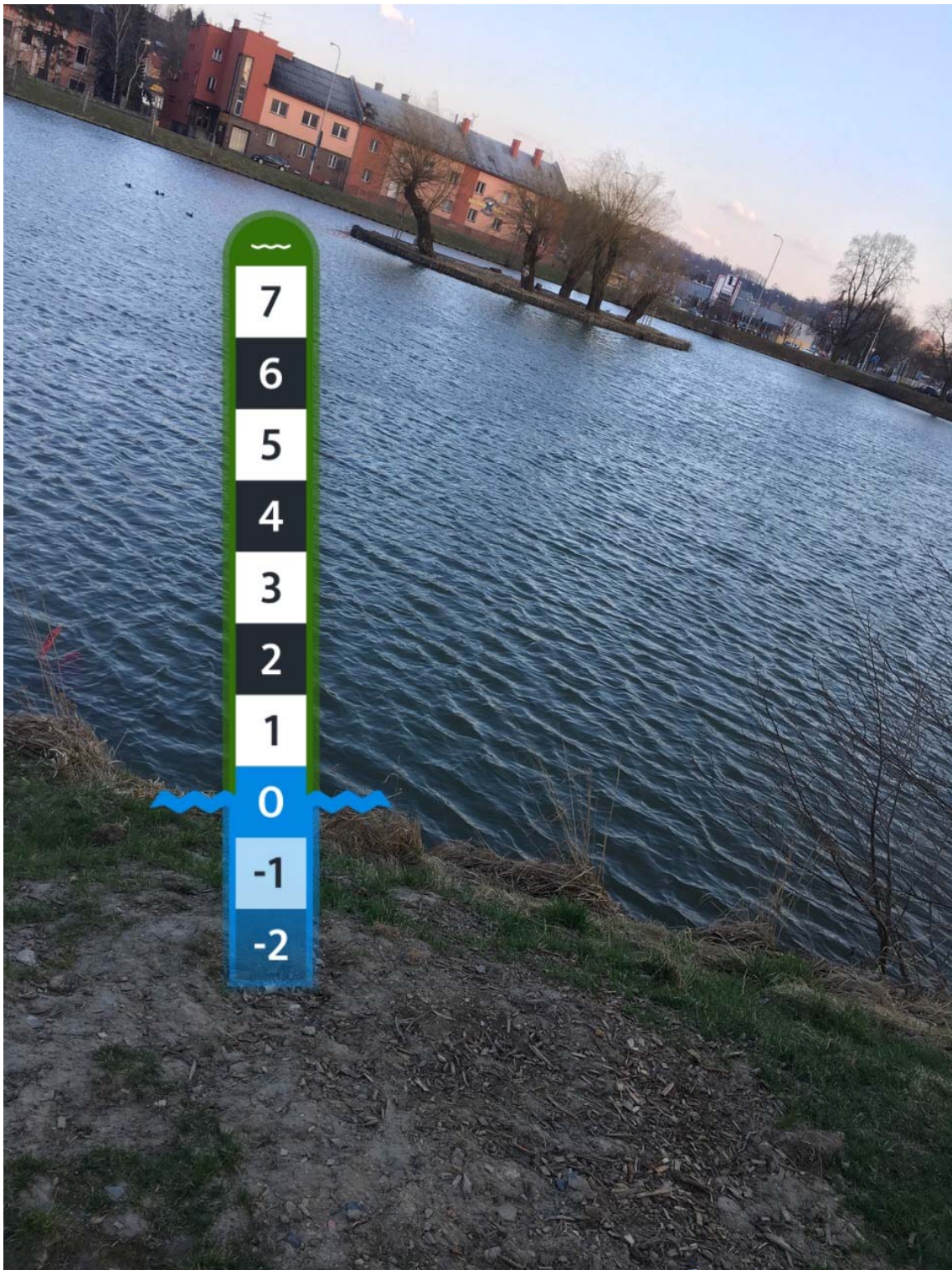


66. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 48

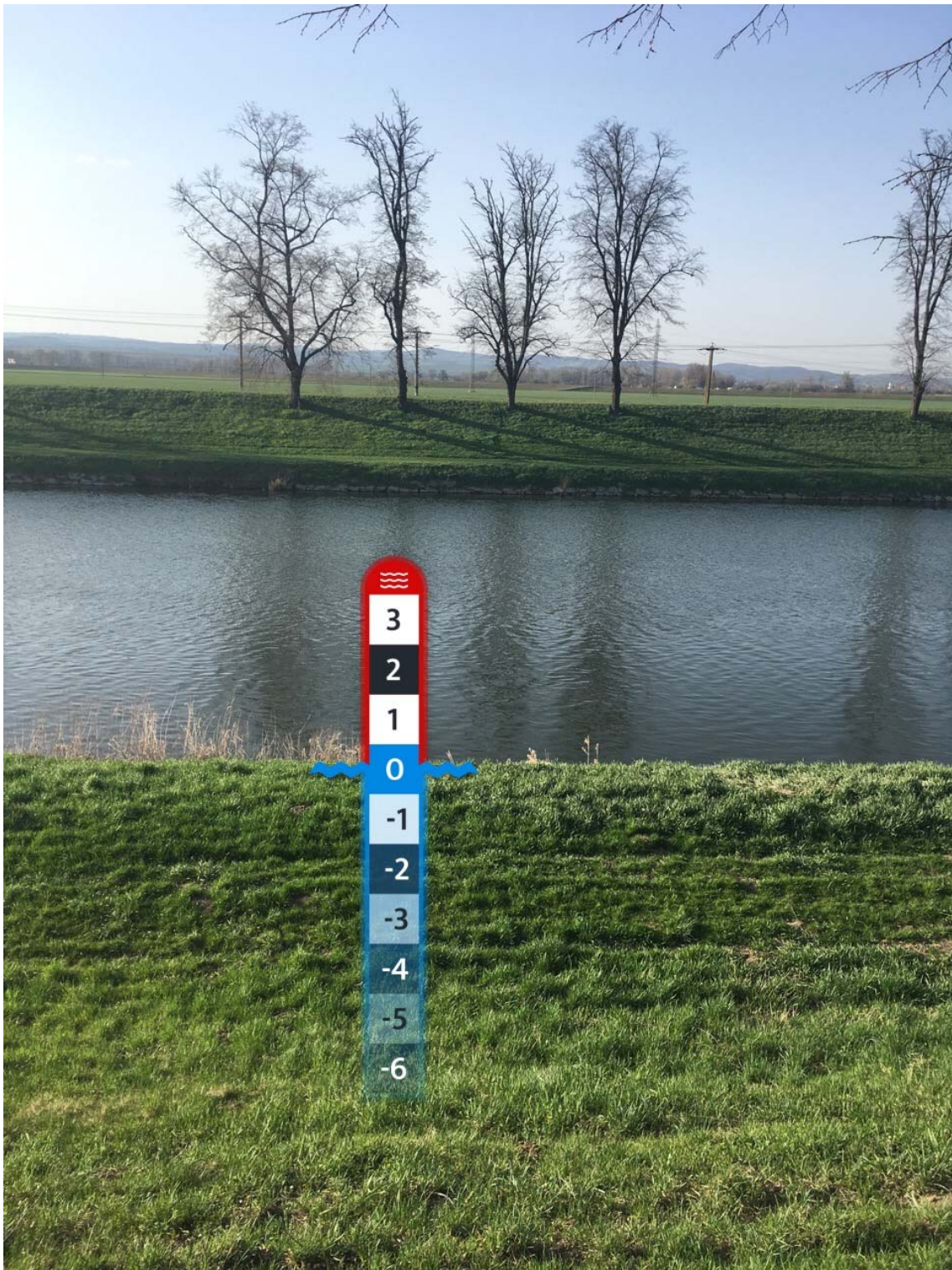


67. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 49



68. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 50



69. *

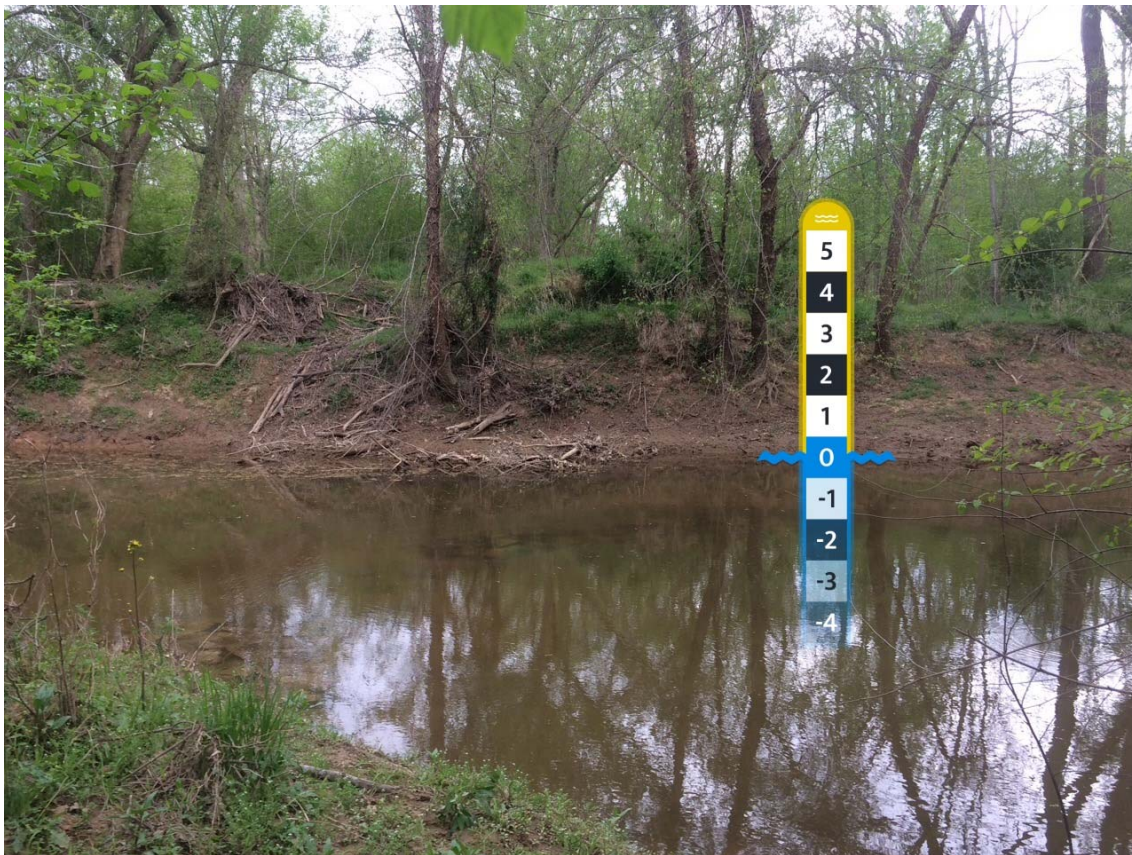
Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Only 10 more reference images to go!



Reference image 51

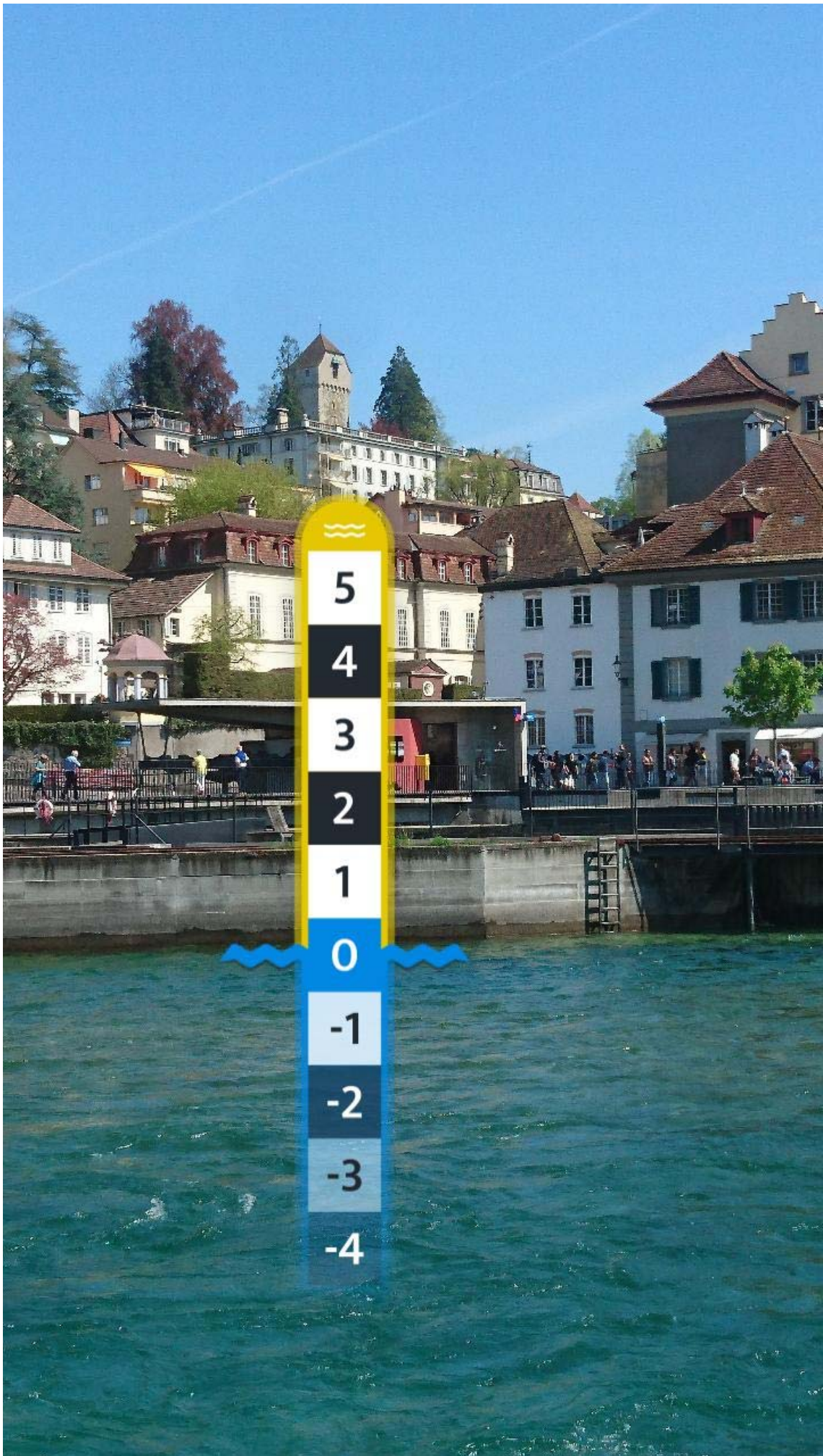


70. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 52



71. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 53

72. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 54

73. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 55

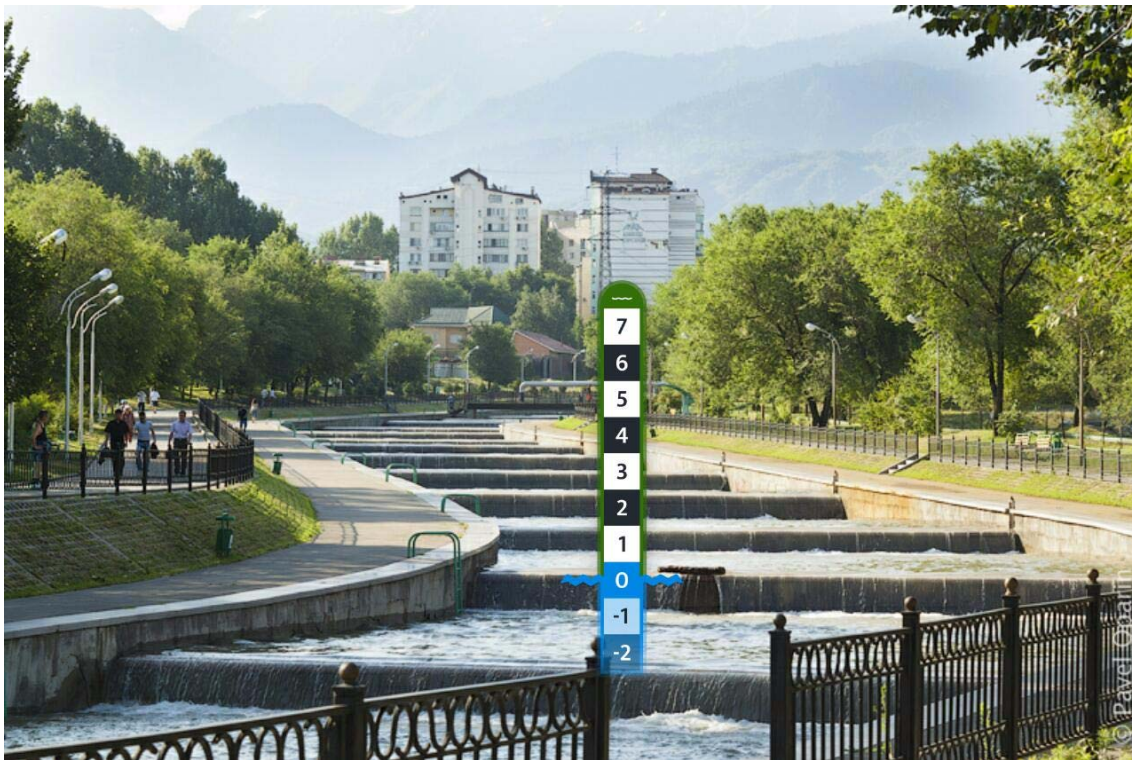


74. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 56

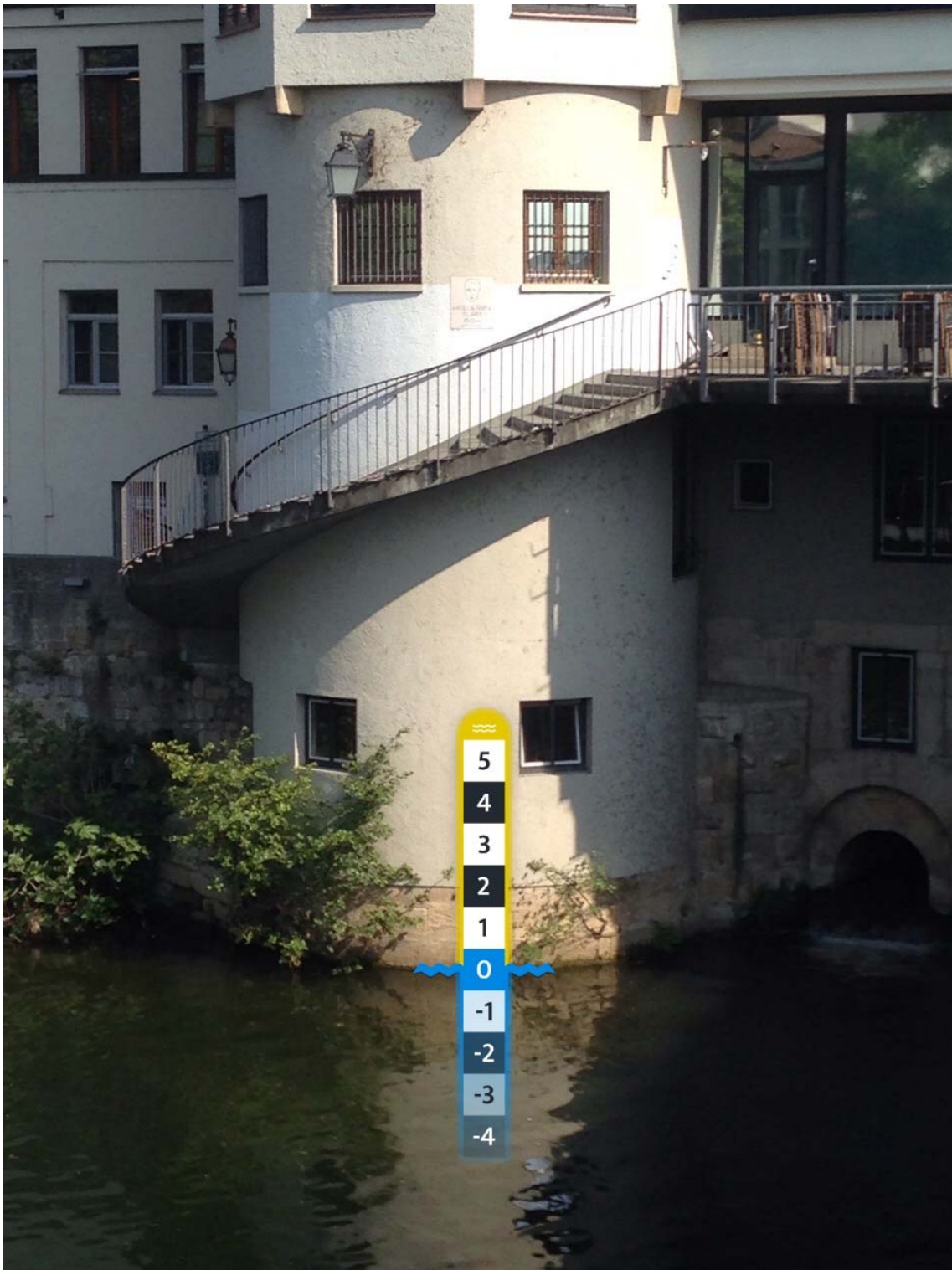


75. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 57



76. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 58



77. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 59

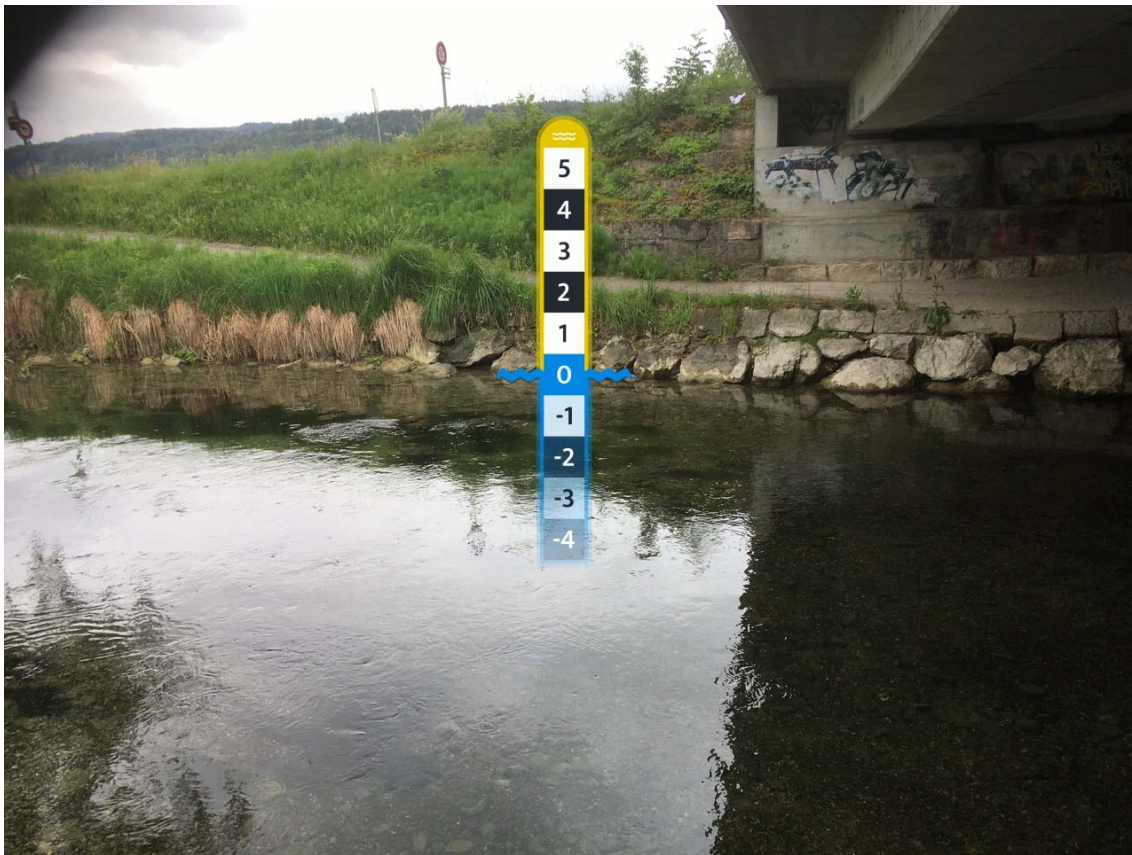


78. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

Reference image 60



79. *

Mark only one oval.

- unsuitable
- rather unsuitable
- rather suitable
- suitable

How confident are you that you evaluated the app spots accurately?

80. *

Mark only one oval.

- I am very confident that I evaluated the app spots accurately
- I think I evaluated the app spots rather accurately.
- I am not sure if I evaluated the app spots accurately or not.
- I think I evaluated the app spots rather inaccurately.
- I am very confident that I evaluated the app spots inaccurately.

How easy/ difficult was it to evaluate the app spots?

81. *

Mark only one oval.

- Very easy
- Rather easy
- Neutral
- Rather difficult
- Very difficult

Task 6: Use the CrowdWater App

Well done! You have now completed the entire computer based part of the survey! By now you are probably an expert in placing staff gauges, so we would like you to create a new CrowdWater spot and place a staff gauge in the CrowdWater app within the next 14 days. Optionally you can also place the staff gauge in spotteron.com/crowdwater - just like you did in the survey - but with your own picture of a river or stream. You can choose the river or stream yourself, it can be located anywhere in the world!

You can download the app here:

- Android: <https://play.google.com/store/apps/details?id=com.spotteron.crowdwater>

- iOS: <https://itunes.apple.com/us/app/crowdwater-spotteron/id1213513623?mt=8>

You can also simply search for CrowdWater | SPOTTERON in your app store.

Log in to the app with the user ID and password that you have been using during this survey.

If you need any help to download, log in or operate the app please contact barbara.strobl@geo.uzh.ch.

Have fun measuring the water level outdoors! :)



82. **How confident are you that you will be able to choose an appropriate spot for your reference image in the app? ***

Mark only one oval.

- I am very confident that I will be able to choose an appropriate spot.
- I think I will be able to choose a rather appropriate spot.
- I am not sure if I will be able to choose an appropriate spot or not.
- I think I will be unable to choose a rather appropriate spot.
- I am very confident that I will be unable to choose an appropriate spot.

83. **How confident are you that you will be able to place the virtual staff gauge nicely in your reference image with the app? ***

Mark only one oval.

- I am very confident that I will be able to place the virtual staff gauge nicely.
- I think I will be able to place the virtual staff gauge rather nicely.
- I am not sure if I will be able to place the virtual staff gauge nicely or not.
- I think I will be unable to place the virtual staff gauge rather nicely.
- I am very confident that I will be unable to place the virtual staff gauge nicely.

84. **I have completed all computer related sections of this survey and am ready to use the app outside! ***

Mark only one oval.

- Yes

Feedback & comments

85. **If you would like to provide some feedback regarding the survey or have some comments feel free to post them here. You can also contact me directly via barbara.strobl@geo.uzh.ch.**

Thank you present

As a thank you for participating in this survey you can choose one of the following presents. If we cannot give you the present personally we will be happy to send it to you (but please take note that the movie voucher is only valid in Zurich, Switzerland). Please send your mailing address to barbara.strobl@geo.uzh.ch or enter it in the field below if you would like us to send you one of the presents.

86. Present options

Mark only one oval.



Zürcher Kinogutschein (Zurich cinema voucher - only valid in Zurich, Switzerland!)



Kitchen towel with the Swiss water network



Basler Leckerli (swiss cookies), 300g

87. If you would like us to mail you your present please enter your mailing address here or send an email to barbara.strobl@geo.uzh.ch

Thank you for participating!

Thank you for filling out the survey! Your contributions are very much appreciated and will help me with my PhD research!

If you would like to learn more about the project, take a look at www.crowdwater.ch. You can also create your own CrowdWater account and start collecting data. If you enjoyed playing the CrowdWater game, you can join one of the monthly championships and win some prizes: <http://www.crowdwater.ch/de/crowdwater-spiel/>.

Finally, if you want to receive regular updates on the CrowdWater project, you can register for the CrowdWater newsletter here: <https://www.crowdwater.ch/de/wie-kann-ich-mitmachen/>.



Powered by

 Google Forms