



BLUEHEALTH BEHAVIOUR ASSESSMENT TOOL

A protocol for acquiring data from
participant site observations

Peeter Vassiljev

www.bluehealth2020.eu

 @BlueHealthEU

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 666773.



Contents

Introduction.....	3
General Approach.....	4
1. Background data collection.....	4
2. Preparation of site maps.....	4
3. Planning the observation points or routes.....	5
4. Identifying the range of likely activities to be recorded and designing the specific coding system for each	5
5. Selecting the time periods for sampling	5
6. On-site data collection	7
7. Formatting data after acquisition.....	8
8. Analysis of results both statistically and visually	9
References.....	Error! Bookmark not defined.
Appendix 1. Ideal schedule for observation mapping episodes.....	10
Appendix 2. Operation instructions for QGIS data entry procedure.....	13
1. Prepare files and start QGIS	13
2. Enter background data for the site.....	14
3. Behaviour observation mapping phase.....	15
4. Deleting a data point.....	18
5. Displaying the attribute table and editing attributes	19

Introduction

This document introduces and describes the method for the mapping of behaviour by users of blue spaces. The aim is to be able to link what people do, who does it, where they do it and when they do it both before and after the introduction of the spatial intervention. This approach goes beyond merely recording levels of physical activity to making relationships between all kinds of passive and active behaviour and the physical settings as well as relationships with time of day, weather and the state of the water. It should be read in conjunction with the associated guidebook which focuses more on the overall approach and rationale for the method as well as offering ideas for data analysis and presentation.

General Approach

The methodology includes several steps:

1. background data collection
2. preparation of site maps divided into specific areas or behaviour settings
3. planning the observation points or routes
4. identifying the range of likely activities to be recorded and designing the specific coding system for each
5. selecting the time periods for sampling
6. on-site data collection
7. preparation of a spatially explicit database
8. analysis of results both statistically and visually
9. repetition of steps 6-8 for the post intervention surveys (two phases).

1. Background data collection

Notes and photographs covering the characteristics of the study site should be collected for the initial site survey. This will reveal the character of the area and, if carried out when people are using the site, the likely activities and some of the likely locations within the site where activities are concentrated, to make planning easier. It will also reveal the condition of the site and help in the preparation of a base plan to be used for the recording. In addition, it will suggest suitable places from where all or significant parts of the site may be observed. If the water element of the site is variable, such as being tidal, or the seasons are significant, such as freezing in winter, these should also be noted as it may be necessary to include sampling across these variations. Therefore, the site should be visited several times in order to build up a good overview prior to the data collection phases.

2. Preparation of site maps

Site maps should be prepared by simplifying extracts from digital map bases or aerial/satellite photographs, in order to accentuate relevant elements and erase unnecessary features that would complicate observation recording. The site map should contain the main features such as boundaries, entrances, paths, water edges, main vegetation zones, specific buildings and so on. If the site is clearly subdivided by eg vegetation into different zones, or else the initial survey showed activities related to different locations, then these can be defined as separate behaviour settings. The digital site map will be used in a GIS data acquisition solution on a tablet computer (using QGIS which is free and will be set up ready on tablets to be supplied to surveyors), but a paper version of the site map will equally be required as a fallback solution. Space on the paper map should be provided for noting the date, time of day, weather conditions (sunny/cloudy, dry/rainy/snowy, calm/breezy/windy etc) and the water conditions (calm or with waves, high or low tide, open or frozen, slow or swift flowing, cold or warm etc). If the fallback paper version is to be used then the map should be able to be printed in black and white at A4 format, scaled to fit the paper so that it can be fitted to a clipboard and

unobtrusively carried around. Separate copies should be used for each observation episode so many need to be printed.

3. Planning the observation points or routes

As the whole idea of the method is to observe activities of users of sites then it is necessary to try to be as unobtrusive as possible in the selection of places from which to observe and record without drawing undue attention to the surveyor. If there are single spots such as a high point with an unrestricted view of the entire site, then this is ideal. However, when a site is broken up due to its size, or by tall vegetation or buildings it is necessary to find several observation spots and to plan a route between them to enable a systematic repetition of the observation process each time. If it is possible to use more than one surveyor, then the site can be broken down into zones and each surveyor may be able to stay in one place and thus for the whole site to be covered at once. In some circumstances the safety and security of the surveyor may need to be considered in the choice of how the observations are carried out. If the site or part of it is used for children's play then it may be necessary to take precautions and to carry identification in case of being stopped or suspected of inappropriate behaviour when standing near such places making observations.

4. Identifying the range of likely activities to be recorded and designing the specific coding system for each

Behaviour types to be recorded have been predefined, based on past examples and also new thinking, especially designed in a way that can be easily and efficiently defined via the Tablet interface using QGIS. This consists of a set of drop-down boxes with a number of aspects to be recorded: gender, age group (both derived by observing the person(s) and making an educated guess), a selection from a list of potential activities, who the person was doing the activity with and what they are doing as well (eg listening to music, reading, with a dog etc). The QGIS interface makes this extremely quick to fill in for each point (see screen shots) as well as very easy for subsequent analysis

5. Selecting the time periods for sampling

In general, for the BlueHealth intervention case studies it has been established that the May to September/October period is the most likely for data collection. However, in cases of strong seasonality and winter use, eg in Estonia, some extra sampling may be carried out. As the intervention construction is likely to take place in late winter/early spring it will be necessary to avoid this time.

During the "on-season" observation period the behaviour mapping data is collected every other week, on two random weekdays (Monday to Friday) and one weekend day (consult Table 1 for sample schedule). For example if the first data is collected on three days in first week of May, then the next observation session will be on three days in the third week of May.

The days of the observation period are divided into 4 blocks of morning 7.00 – 11.00; lunchtime 11.00 – 15.00; afternoon 15.00 – 19.00 and evening 19.00 – 23. Four-hour time slots allow for some variation according to the latitude and local patterns of use determined in step 1. Times for field work observation are selected rotationally, so that consecutive observations cycle through the sequence of morning, lunchtime, afternoon and evening (see last column in Table

1). Adhering to this rotation will ensure that samples are more equally spread among times of the day. If due to large size of the observation area the observation can't be expected to be completed within one-time block (determined in phase 1), the observable area should be split into separate pieces as if these were separate areas that are always observed according to their own separate schedule.

Table 1: Sample observation schedule

Observation week	weekday/weekend	date	time in the day
Observation week 1	weekday	Thursday, May 4	morning
	weekday	Friday, May 5	lunchtime
	weekend	Sunday, May 7	afternoon
week in between			
Observation week 2	weekday	Wednesday, May 17	evening
	weekday	Friday, May 19	morning
	weekend	Saturday, May 20	lunchtime
week in between			
Observation week 3	weekday	Monday, May 29	afternoon
	weekday	Thursday, June 1	evening
	weekend	Sunday, June 4	morning

During "off-season" extra sampling two additional observation weeks are utilised. These observation weeks don't have to be separated by one week in between and instead should try to capture the most characteristic winter conditions. With limited daylight these observation weeks should only use lunchtime and afternoon times but double the observations (either one time slot in 4 weekdays and 2 weekend days; two time slots in 2 weekdays and 1 weekend day or a combination of these strategies). If the waterbody is expected to freeze over to be walkable, then such conditions should be targeted, but if due to climate variability the freeze doesn't happen by end of January, a week with snow cover on the ground should be selected; and if snow cover doesn't appear by end of February two weeks in March should be picked. In milder conditions where only occasional snow cover is expected that condition should be targeted, but if due to climate variability snow doesn't occur by the end of January, weeks with temperatures below 0° Celsius should be selected and if cold weather doesn't appear by the end of February, two weeks in March should be picked. If winter temperature is expected to drop below 0°C only occasionally such conditions should be targeted, but if that doesn't occur by the end of January, then two weeks should be picked from February.

Appendix 1 contains the ideal schedule to be followed, which can be modified according to any local factors or problems.

6. On-site data collection

Do not put yourself in unnecessary danger. Always let someone know where you are, what you're doing and when you expect to be back. In some circumstances your safety and security may need to be considered in the choice of how the observations are carried out. For example, you may work in pairs, resort to recording data on paper to avoid unhealthy attention or leave the site altogether when feeling threatened or in danger.

Respect the privacy of people present on-site. Do not take photos or record videos of the subjects present during the behaviour mapping observation with any device (including smartphone). All records must be anonymised - you should not record extra information beyond the given data entry forms that would allow identification of a particular individual in the data.

Regardless of whether the data is collected digitally or on paper the observers should always bring:

- a badge stating who they are and what they're doing and a photo ID
- clipboard (with transparent plastic covering for rain protection)
- at least 2 copies of paper map (fall back in case technology fails)
- set of fine tipped waterproof markers
- larger plastic bag to seal the tablet computer and/or paper maps in case of heavy rain penetrating the backpack or handbag.

Before starting the observations a set of parameters are noted on the paper or digital form which include: date and time of the day; weather conditions (temperature in closest available weather station, sunny/cloudy, dry/rainy/snowy, calm/breezy/windy); and the water conditions (calm/with waves, high tide / low tide, open/frozen, still/slow/swift flowing, cold/ warm).

The observation protocol involves either sitting/standing in the point or points selected for the complete site overview or else in case of limited visibility or narrow linear shape of the area a systematic walk through each park, visiting all sub-areas and taking a visual scan of each sub-area. All visual scans, unless stated otherwise in the specific site instructions, are performed from predetermined observation spots in the direction from left to right. In the case of data collection during the systematic walk through (done only if stated in site instructions) all users are recorded on the map when closest to the observer (who is only moving on the predetermined track). All users observed in that scan are recorded as point data on the site map using the coding selected or, if the codings do not cover an activity, a note of this is recorded separately. The points are accompanied by additional data including: gender (female or male, if gender can't be identified record as male); estimated age class (Child 0...12, Teen 13...19, Adult 20...59, Senior 60+); social context of the activity (alone, in a group, if unknown then mark as alone); secondary activity (doing something while... talking, being on the phone, drinking, eating etc) as already noted above.

In case of large number of users and especially when paper map forms are used for data collection, it is possible to subdivide the visual scan and data entry by gender (recording female users first and male users later) and/or subdivide the observable (sub-)area into yet smaller sub-units. Each person is recorded in the order of the visual scan from left to right. If a person leaves the sub-area after being counted, the record is still kept, if a person leaves the sub-area before being recorded, the record is not made. Same person may reappear in the next sub-area and if that happens during the visual scan, that person should be recorded again. There is an equal chance of another person moving in opposite order and thus never being present in the visual scan and thus never being recorded. Appendix 2 contains instructions on how to use the QGIS tablet-based data input method.

7. Formatting data after acquisition

The data from every observation, if collected using the tablet, is automatically saved into a database ready for further analysis statistically or visually. If the observations were originally mapped by hand, they should be re-recorded in the office into digital form onto a GIS map system using the QGIS program with the data acquisition form files provided. This results in a rich, spatially explicit database of observations for exploration in a number of different ways.

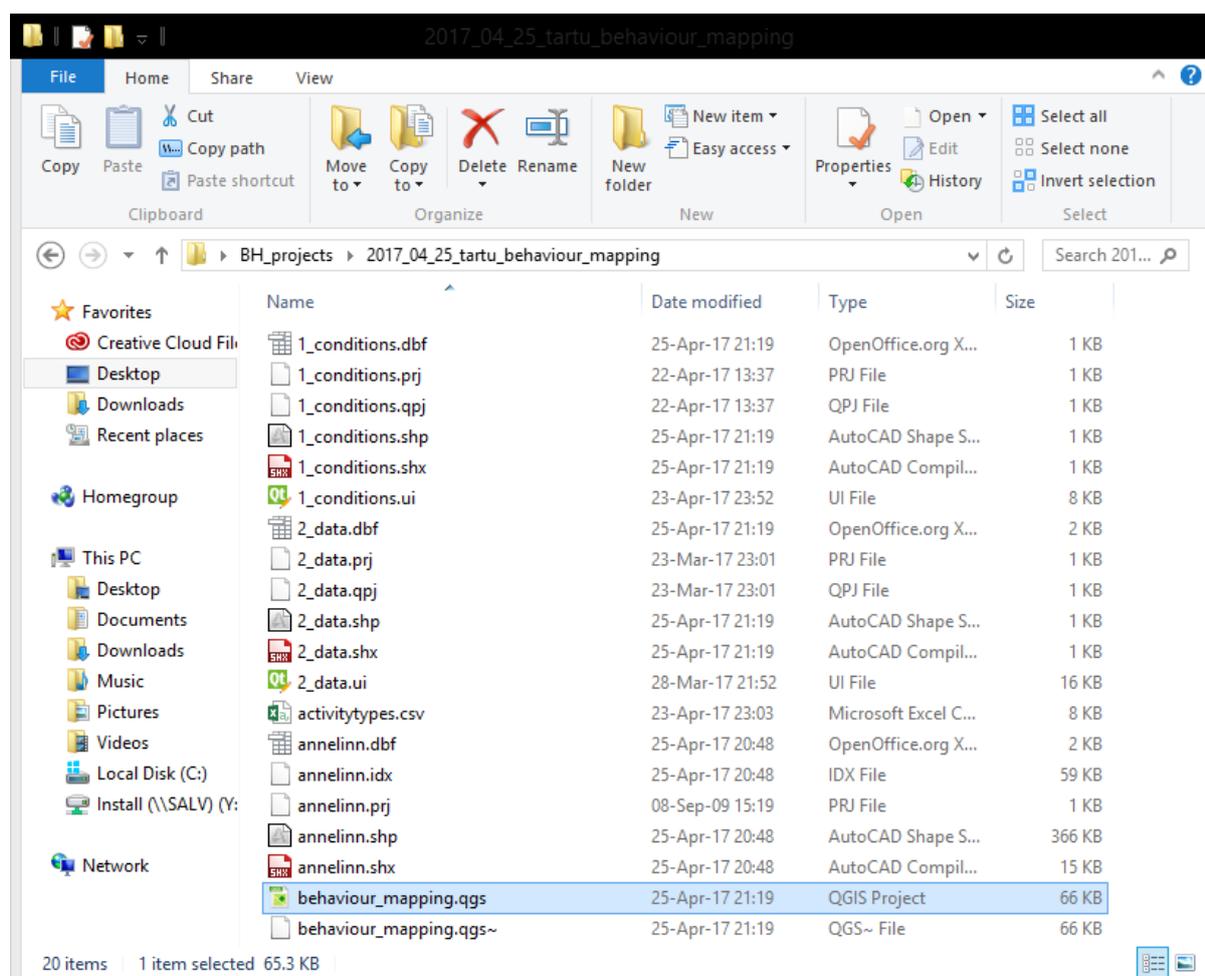


Figure 1. Example of folder content and naming. Double-click the *.qgs file to start.

Each session should be recorded as a separate folder (name example: 2017_05_17_morning_Tallinn) with a set of files and accompanying database. Each inputted point should be identified by gender, age of person, primary and secondary activity and social context of the activity. The data should be checked for consistency and integrity and approved, at which point any paper forms associated with particular observations should be kept securely in case they need to be referred to in the future.

8. Analysis of results both statistically and visually

Once the database is complete the layers can be examined and interpreted e.g. according to type of activities, estimated age of people observed, weather and water conditions, etc. Descriptive statistical analysis, e.g. the production of histograms, drawing on the database to illustrate activities and behaviour for different segments of the population at different times of day or days of the week can be used to reveal temporal variations. Comparison of the mapped data allows analysis of the different spatial attributes of site use according to different layers of data. Once steps 6-8 have been repeated the temporal comparison of pre- and post-intervention surveys can be undertaken. See the accompanying Guidebook for details of analysis techniques.

Appendix 1. Ideal schedule for observation mapping episodes

Sample schedule is provided to illustrate the succession of observation weeks with the gap weeks in between and the rotation of the time in the day when observations should occur (morning 7.00 – 11.00; lunchtime 11.00 – 15.00; afternoon 15.00 – 19.00; evening 19.00 – 23.00). The time should be just as long as it takes to do one round of observations – so probably around 1 hour per session (depends also if two observers are working on a large site or else one observer has to change location). Dates and days are only indicative to illustrate the weekday / weekend balance. If it is likely that observations will not be able to start until after Week 1 below, then use the following week and then follow the schedule as closely as possible. However, this is not strict and in the case of bad weather or other factors then select other convenient dates but try to keep broadly to the overall distribution and certainly the range of times within the days

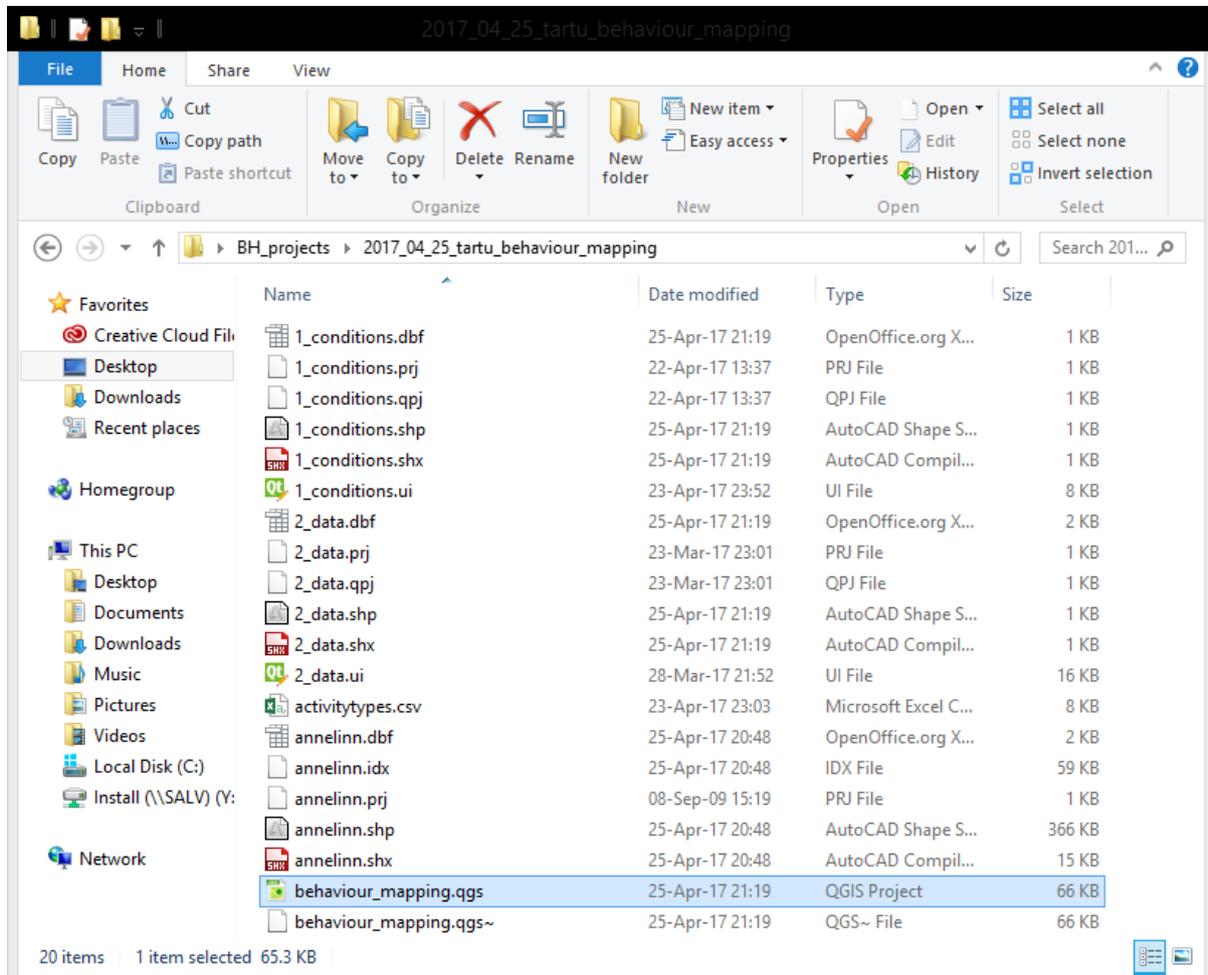
Observation week	weekday/weekend	date	time in the day
Observation week 1	weekday	Thursday, May 4	morning
	weekday	Friday, May 5	lunchtime
	weekend	Sunday, May 7	afternoon
week in between			
Observation week 2	weekday	Wednesday, May 17	evening
	weekday	Friday, May 19	morning
	weekend	Saturday, May 20	lunchtime
week in between			
Observation week 3	weekday	Monday, May 29	afternoon
	weekday	Thursday, June 1	evening
	weekend	Sunday, June 4	morning
week in between			
Observation week 4	weekday	Tuesday, June 13	lunchtime
	weekday	Thursday, June 15	afternoon
	weekend	Saturday, June 17	evening
week in between			
Observation week 5	weekday	Monday, June 26	morning
	weekday	Friday, June 30	lunchtime
	weekend	Saturday, July 1	afternoon
week in between			
Observation week 6	weekday	Thursday, July 13	evening
	weekday	Friday, July 14	morning

	weekend	Saturday, July 15	lunchtime
week in between			
Observation week 7	weekday	Monday, July 24	afternoon
	weekday	Tuesday, July 25	evening
	weekend	Sunday, July 30	morning
week in between			
Observation week 8	weekday	Wednesday, Aug. 9	lunchtime
	weekday	Friday, August 11	afternoon
	weekend	Sunday, August 13	evening
week in between			
Observation week 9	weekday	Tuesday, August 22	morning
	weekday	Wednesday, Aug. 23	lunchtime
	weekend	Saturday, August 26	afternoon
week in between			
Observation week 10	weekday	Thursday, Sept. 7	evening
	weekday	Friday, September 8	morning
	weekend	Sunday, Sept. 10	lunchtime
week in between			
Observation week 11	weekday	Monday, Sept. 18	afternoon
	weekday	Friday, Sept. 22	evening
	weekend	Saturday, Sept. 23	morning
week in between			
Observation week 12	weekday	Thursday, October 5	lunchtime
	weekday	Friday, October 6	afternoon
	weekend	Saturday, October 7	evening
Winter observations: walkable ice cover, snow cover or below 0 Celsius conditions			
Observation week 13	weekday	Monday, Dec. 18	lunchtime
	weekday	Tuesday, Dec. 19	afternoon
	weekday	Wednesday, Dec. 20	lunchtime
	weekday	Thursday, Dec. 21	afternoon
	weekend	Saturday, Dec. 23	lunchtime
	weekend	Sunday, Dec. 24	afternoon

Observation week 14	weekday	Tuesday, January 23	lunchtime + afternoon
	weekday	Friday, January 26	lunchtime + afternoon
	weekend	Sunday, January 28	lunchtime + afternoon

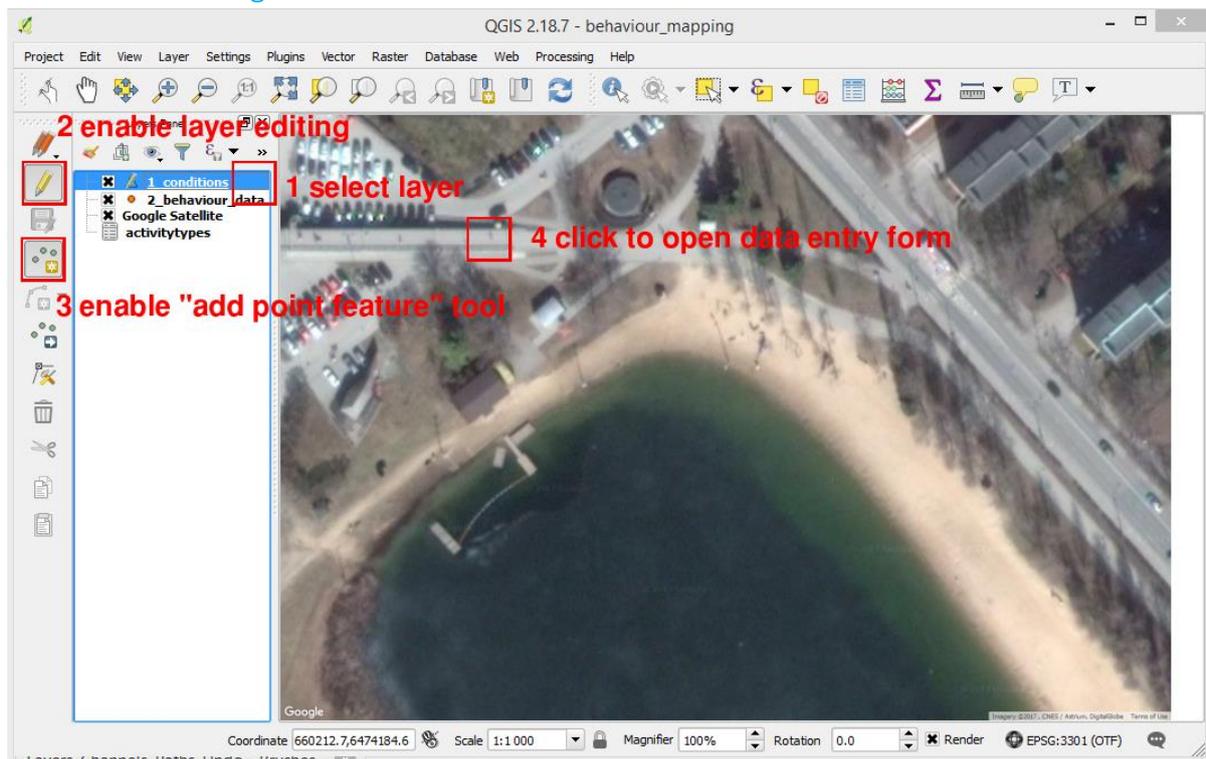
Appendix 2. Operation instructions for QGIS data entry procedure

1. Prepare files and start QGIS

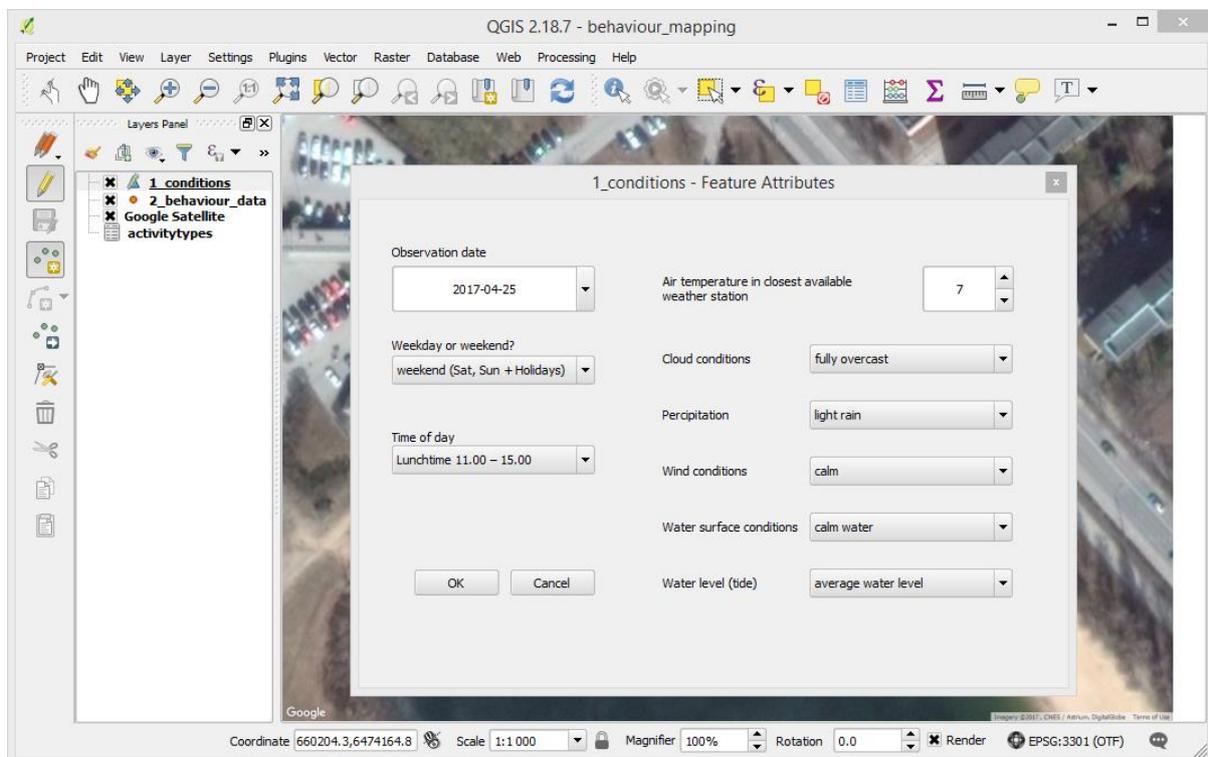


Make a duplicate copy of the "seed" folder and rename it to following naming convention: year_month_date_time-of-day_site-name. Enter the folder and double-click on file "behaviour_mapping.qgs" to launch QGIS with correct data entry layers.

2. Enter background data for the site

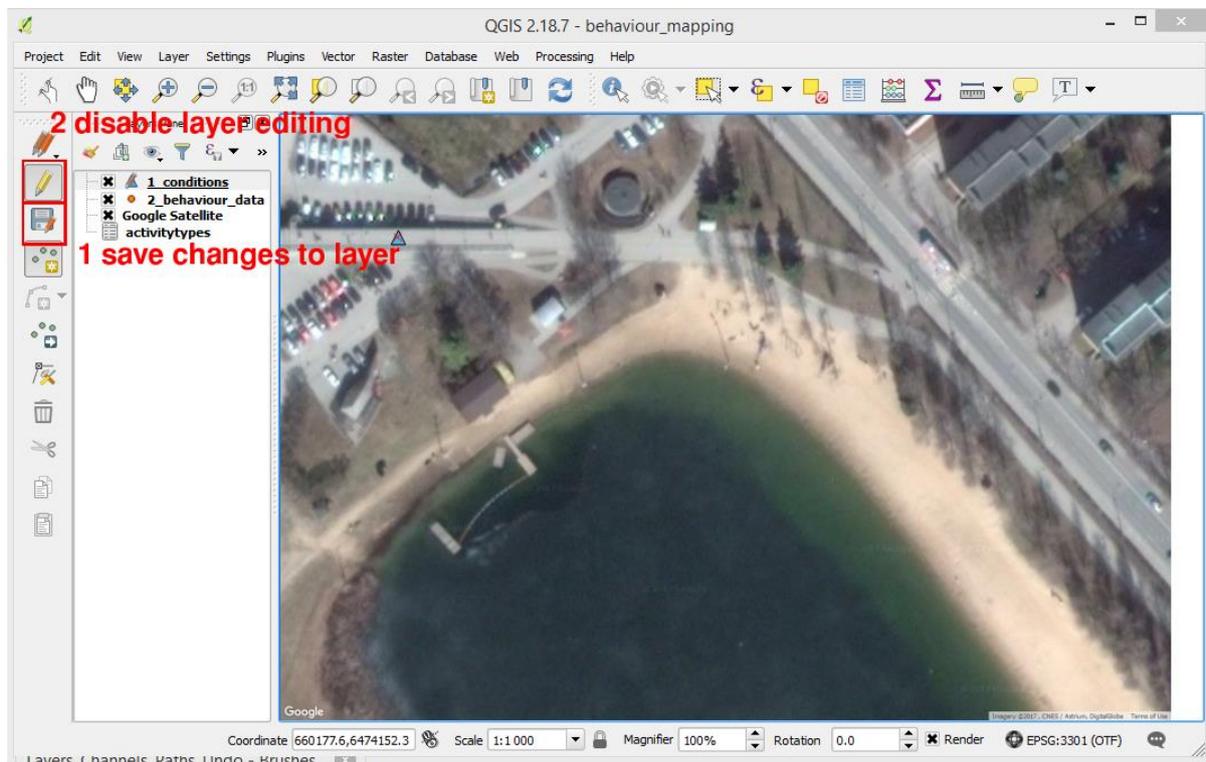


Select "1_conditions" layer, enable layer editing, enable "add feature" tool and click somewhere on the map/photograph to launch the data entry form.



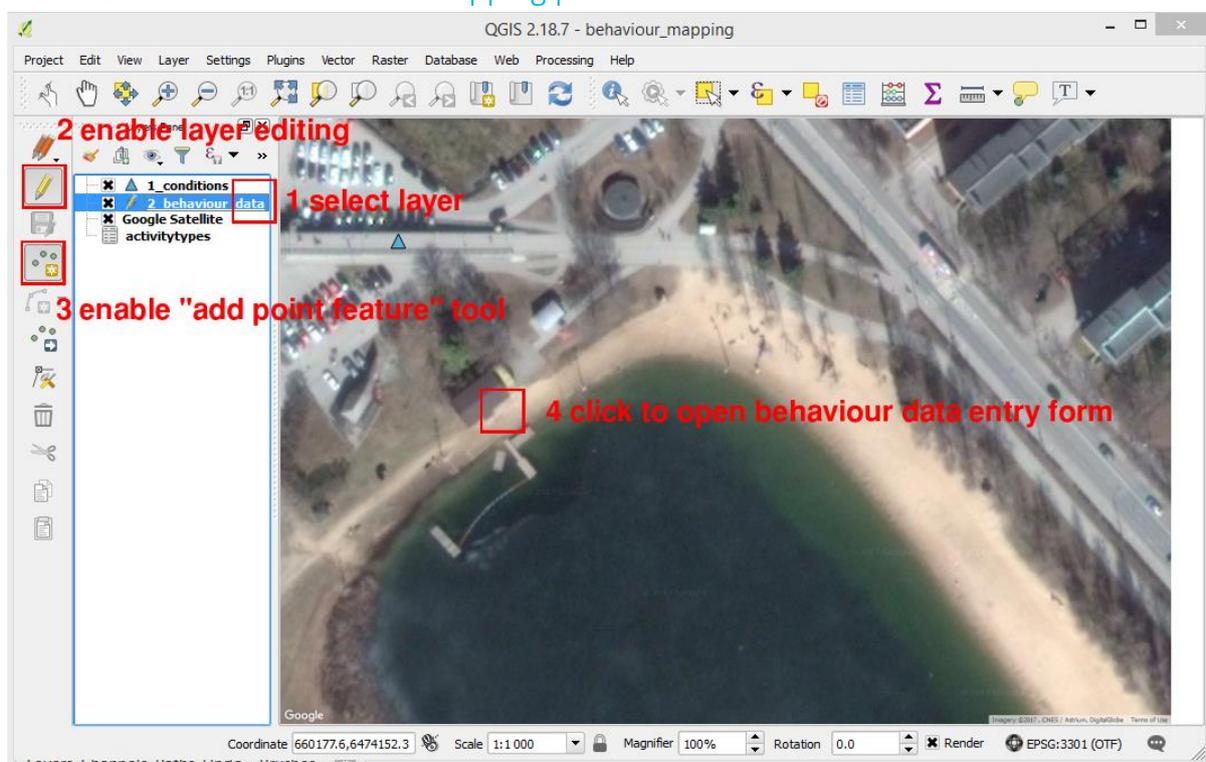
Fill out all the fields and click OK. Data entered here will be automatically carried over to every behaviour observation mapping point, that you will be adding in the next phase. Should

general conditions change (ie the rain stops), this data can be updated as well and new behaviour mapping points will have updated parameters.



Always remember to save changes to the layer and disable layer editing!

3. Behaviour observation mapping phase



Select "2_behaviour_data" layer, enable layer editing, enable "add feature" tool, click on the precise location of the first behaviour mapping data point to bring up the data entry form.

QGIS 2.18.7 - behaviour_mapping

Project Edit View Layer Settings Plugins Vector Raster Database Web Processing Help

Layers Panel

- 1_conditions
- 2_behaviour_data
- Google Satellite
- activitytypes

2_behaviour_data - Feature Attributes

Social background	Primary activity	Secondary activity
Gender: <input type="text"/>	Activity on foot: <input type="text"/>	<input type="checkbox"/> resting / doing nothing
Age group: <input type="text"/>	Wheeled movement: <input type="text"/>	<input type="checkbox"/> sunbathing
Social interaction: alone	Sports and games: <input type="text"/>	<input type="checkbox"/> observing
Comment (optional): <input type="text"/>	Activities in the water: <input type="text"/>	<input type="checkbox"/> listening (earphones)
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	Activities on the water: <input type="text"/>	<input type="checkbox"/> reading
		<input type="checkbox"/> using smartphone
		<input type="checkbox"/> talking on phone
		<input type="checkbox"/> chatting
		<input type="checkbox"/> drinking
		<input type="checkbox"/> eating
		<input type="checkbox"/> grilling

Coordinate: 660214.6,6474188.9 Scale: 1:1 000 Magnifier: 100% Rotation: 0.0 Render EPSG:3301 (OTF)

Example of form displayed. Fill out all fields in Social background section, fill out ONLY ONE field in "Primary activity" section; checkmark as many options in the "Secondary activity" section that apply. Comment box should be used in case, there's a type of activity not listed in the menus (do not add specific descriptions here that would allow to identify the person).

QGIS 2.18.7 - behaviour_mapping

Project Edit View Layer Settings Plugins Vector Raster Database Web Processing Help

Layers Panel

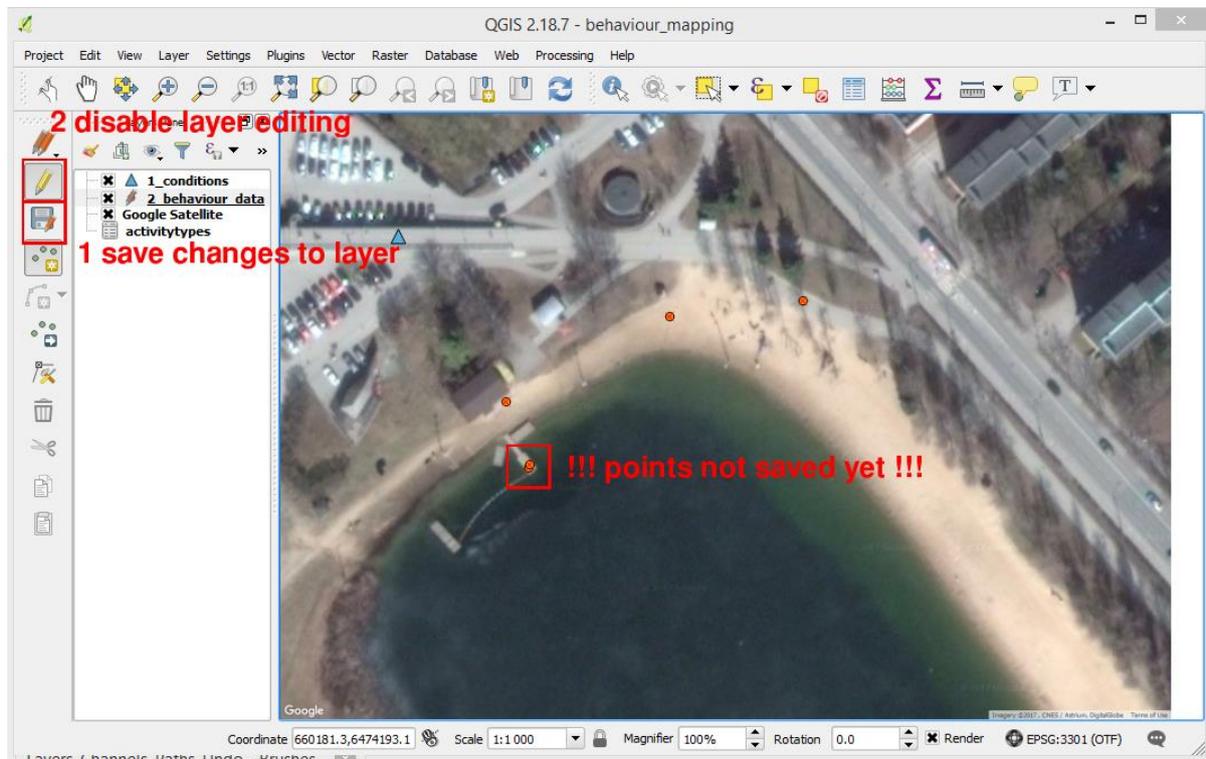
- 1_conditions
- 2_behaviour_data
- Google Satellite
- activitytypes

2_behaviour_data - Feature Attributes

Social background	Primary activity	Secondary activity
Gender: Male	Activity on foot: standing	<input type="checkbox"/> resting / doing nothing
Age group: Adult 21...59	Wheeled movement: <input type="text"/>	<input type="checkbox"/> sunbathing
Social interaction: alone	Sports and games: <input type="text"/>	<input type="checkbox"/> observing
Comment (optional): <input type="text"/>	Activities in the water: <input type="text"/>	<input checked="" type="checkbox"/> listening (earphones)
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	Activities on the water: <input type="text"/>	<input type="checkbox"/> reading
		<input checked="" type="checkbox"/> using smartphone
		<input type="checkbox"/> talking on phone
		<input type="checkbox"/> chatting
		<input type="checkbox"/> drinking
		<input type="checkbox"/> eating
		<input type="checkbox"/> grilling

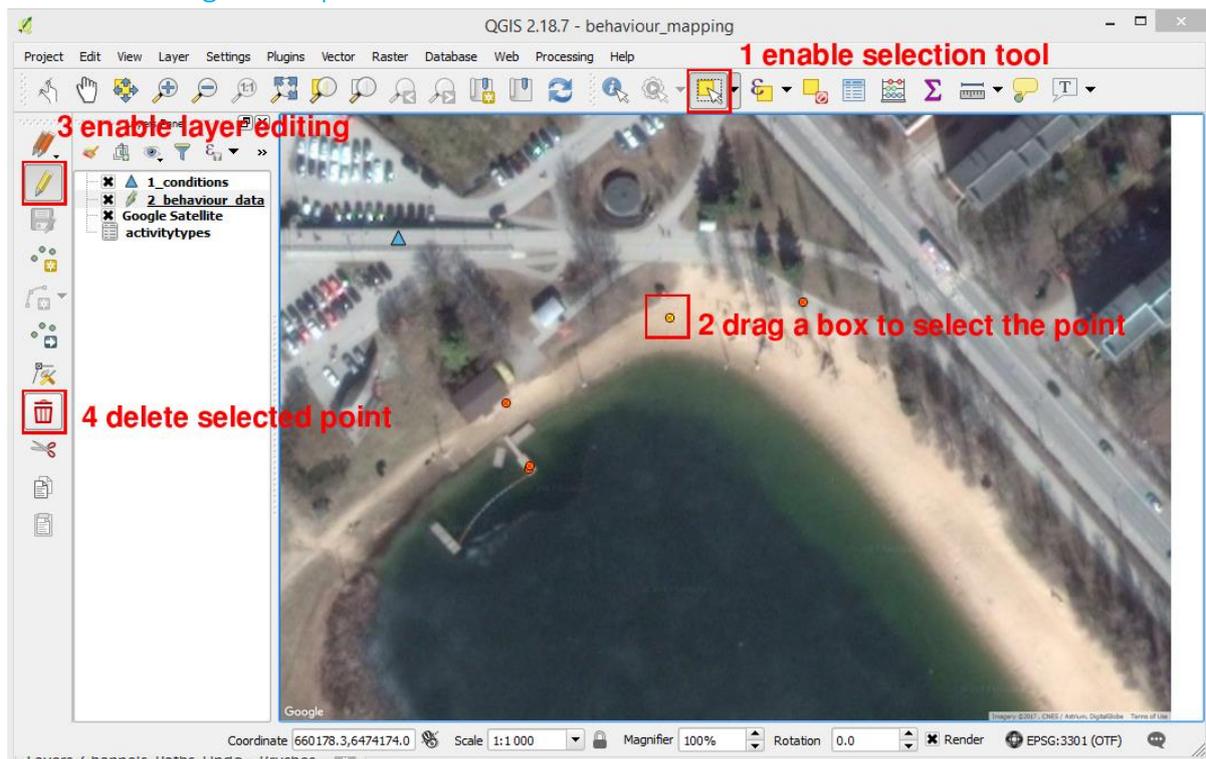
Coordinate: 660288.4,6474193.4 Scale: 1:1 000 Magnifier: 100% Rotation: 0.0 Render EPSG:3301 (OTF)

Fill out the form and press "OK". Proceed to repeat the process to record all people within the designated observation area. Then before moving to the next observation location save the data to layer as described in the following

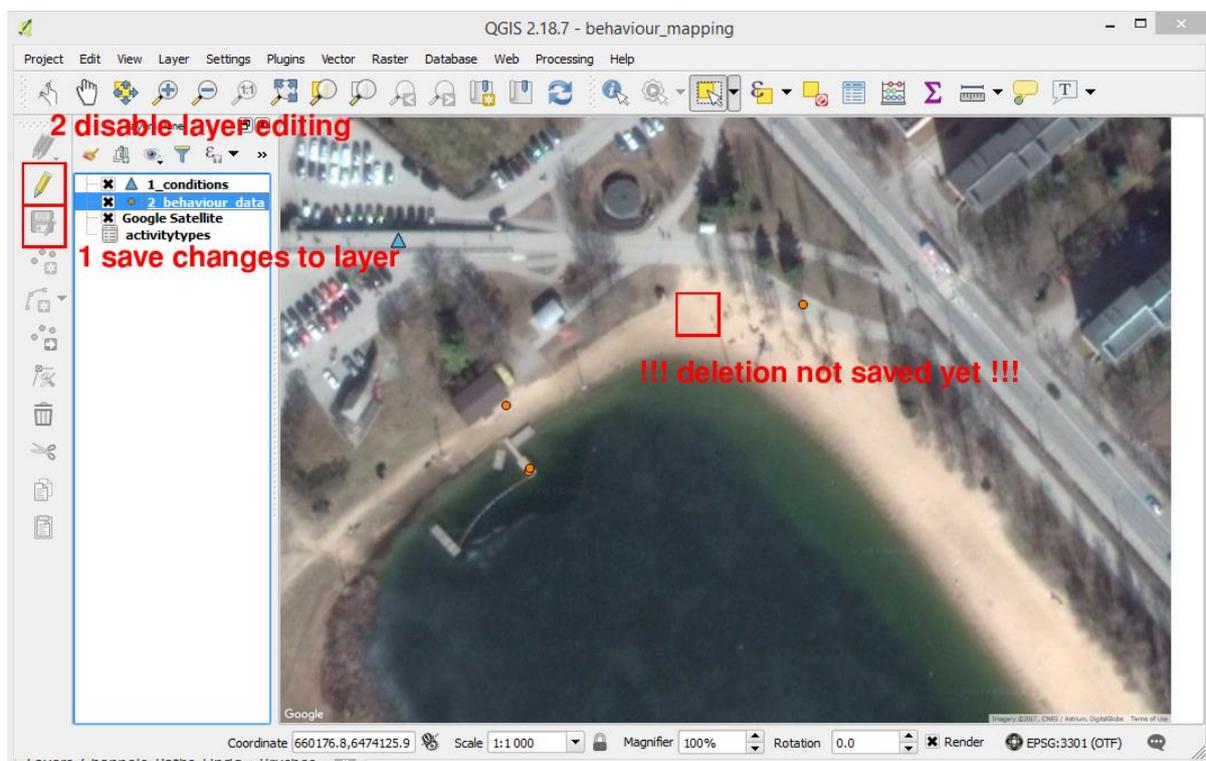


After completing the entry of points, the data should be saved to the layer file. Make a habit of saving changes to the layer frequently. When done, save changes to layer, then disable layer editing to prevent accidental edits.

4. Deleting a data point

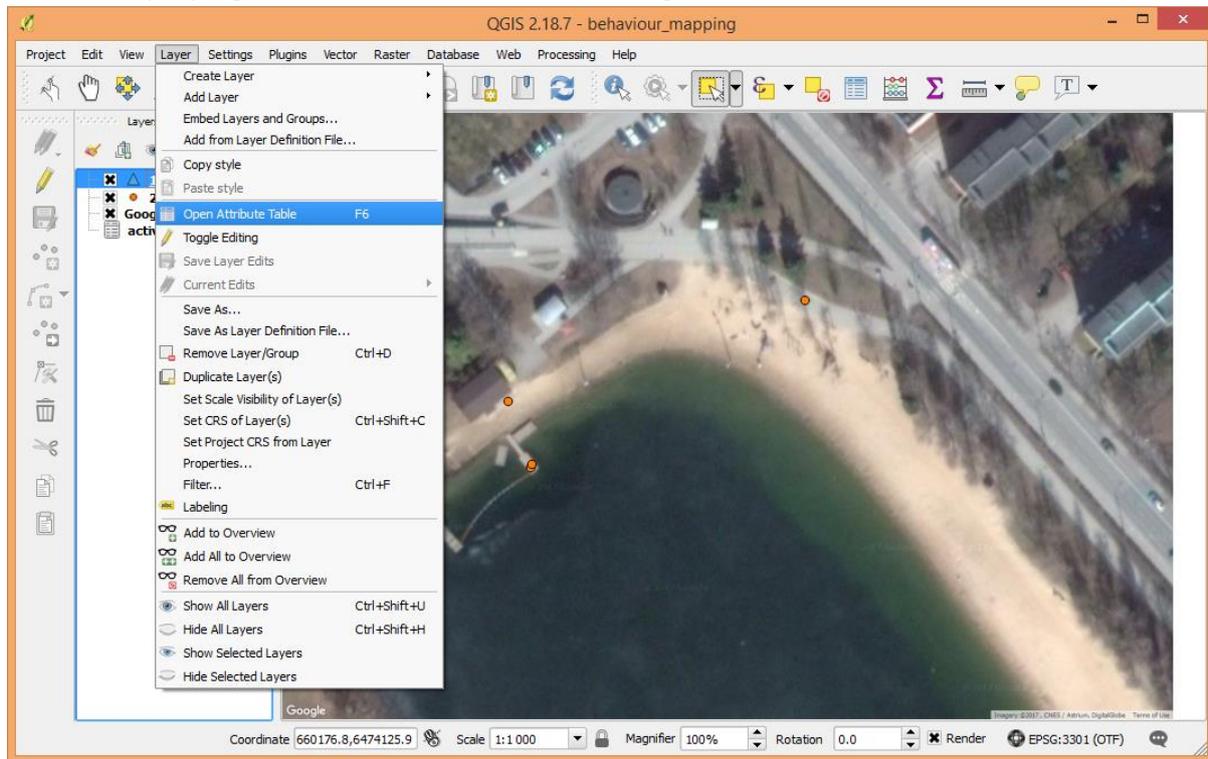


It's possible to delete a point completely if you made a mistake or make changes to the attributes of the point (ie change observed activity of the person). To delete a point enable selection tool, drag a box to select the point to be deleted, enable layer editing mode, press delete button.

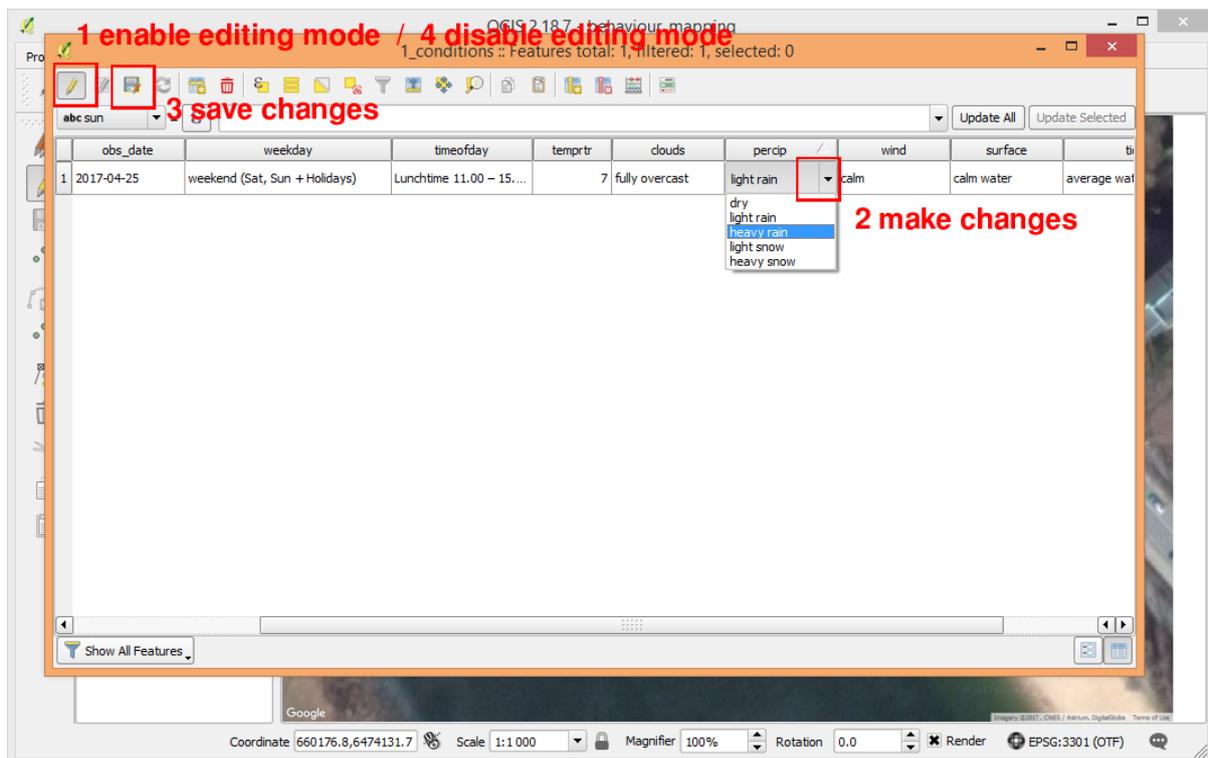


At this point the data is not saved yet! Save changes to the layer, then disable layer editing.

5. Displaying the attribute table and editing attributes



Select the layer you wish to view or edit, click on menu "Layer" and select "Open Attribute Table"



The attribute table of the selected layer is displayed. It is possible to edit the attributes. In case there's a change in general conditions of the site (change in precipitation, wind, cloud conditions etc) this change should be noted by editing the existing record in the layer "1_conditions". Do not add another point instead, but use attribute editing described here (otherwise the changes will not carry over to the new behaviour mapping points entered later).

To edit the attributes displayed in the table enable the editing mode, make changes, save changes and finally disable the editing mode.

2_behaviour_data :: Features total: 5, filtered: 5, selected: 0

activity	mme	wheelc	ports	wate	static	social	astin	bath	st	tenir	adin	rtph	teph	tattir	inkin	atinc	illing	obs_date	iweekday	itimeofday	empri	iclouds	ipercip	iwind
1 standing		NULL	NULL	NULL	NULL	alone	0	0	0	1	0	1	0	0	0	0	0	2017-04-25	2 weekend	2 lunchtime	7	3 fully overcast	2 light rain	1 calm
2 standing		NULL	NULL	NULL	NULL	in a group	0	0	0	0	0	0	0	1	1	0	0	2017-04-25	2 weekend	2 lunchtime	7	3 fully overcast	2 light rain	1 calm
3 sitting		NULL	NULL	NULL	NULL	in a group	0	0	0	0	0	0	0	1	1	0	0	2017-04-25	2 weekend	2 lunchtime	7	3 fully overcast	2 light rain	1 calm
4 NULL		cycling	NULL	NULL	NULL	alone	0	0	0	0	0	0	0	0	0	0	0	2017-04-25	2 weekend	2 lunchtime	7	3 fully overcast	2 light rain	1 calm
5 running...		NULL	NULL	NULL	NULL	alone	0	0	0	0	0	0	0	0	0	0	0	2017-04-25	2 weekend	2 lunchtime	7	3 fully overcast	3 heavy rain	1 calm

Show All Features

Coordinate: 660372.8,6474129.3 Scale: 1:1 000 Magnifier: 100% Rotation: 0.0 Render EPSG:3301 (OTF)

Example to demonstrate that after changing the attributes in layer "1_conditions" the new point entered after the change has different value in "ipercip" column.