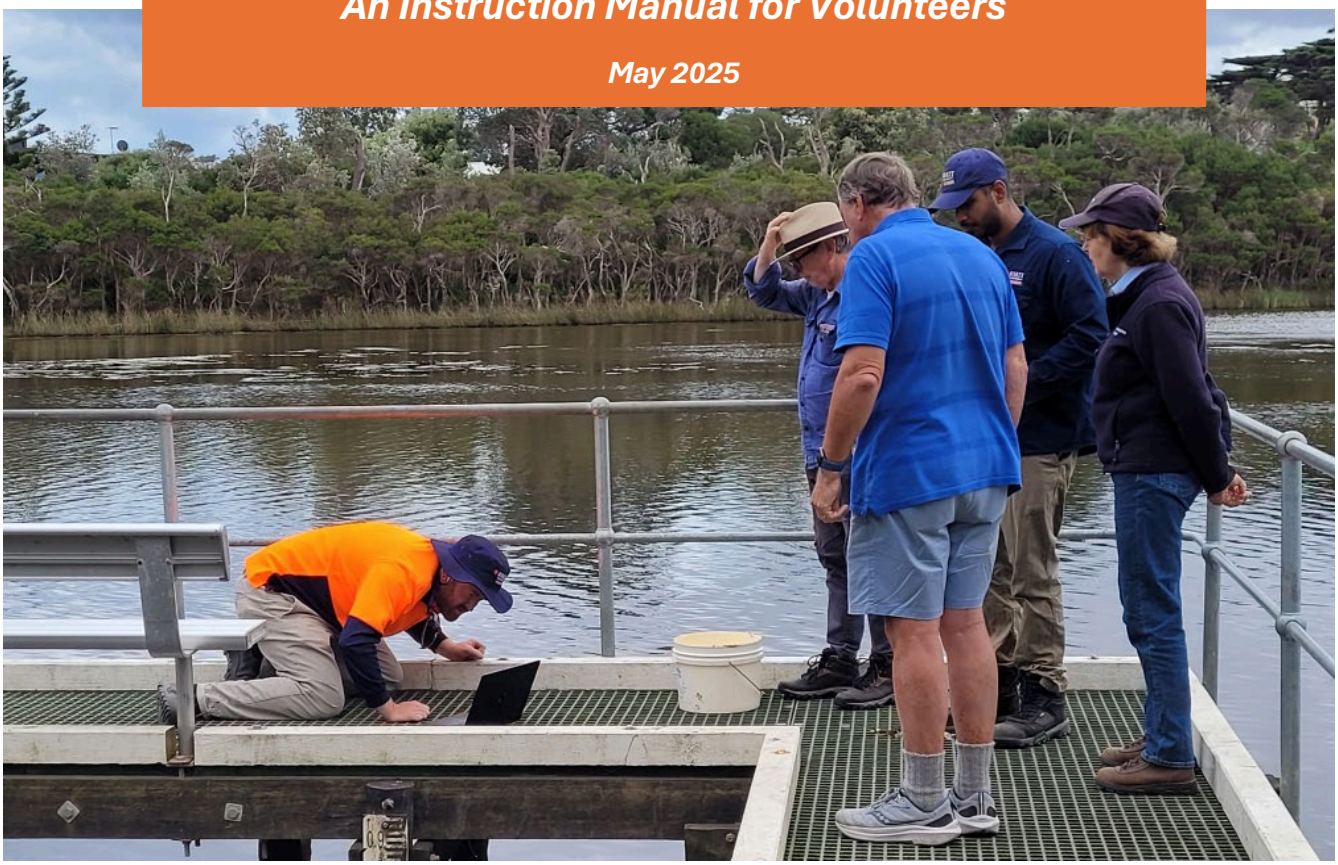
Exploring Unseen Threats: Contaminant Trends and Impacts in Port Phillip Bay

An Instruction Manual for Volunteers

May 2025



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PORT PHILLIP ecocentre

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Acknowledgment of Country

We respectfully acknowledge the Traditional Custodians of these unceded lands and waters on which we conduct this project; the Bunurong, Wadawurrung and Wurundjeri, Woi wurrung and Boon wurrung language groups of the eastern Kulin Nations. We pay our respect to their Ancestors and Elders, past and present and recognise their ongoing connection to lands, waters and culture.

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Project Webpage and Volunteer Resources:

http://rmit.edu.au/aquest/ppb-unseen-threats

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ABOUT THE PROJECT

Thank you for joining the "*Exploring Unseen Threats: Contaminant Trends and Impacts in Port Phillip Bay*" project!

This project aims to understand the risks that everyday contaminants such as those from home use, urban and commercial areas, agricultural activities, industrial manufacturing and transport, pose to the health of our estuaries and bays. Funded by the Department of Energy, Environment and Climate Action (DEECA) through the Port Phillip Bay Fund, the Exploring Unseen Threats Project is a collaborative effort. It combines the scientific expertise of RMIT University's Aquatic Environmental Stress Research Group (AQUEST) incorporating the Aquatic Pollution Prevention Partnership (A3P), the National Measurement Institute (NMI), and Melbourne Water's Research and Modelling Team, along with volunteer organisations including The Port Phillip Ecocentre, Estuary Watch, and The Werribee Riverkeeper Association, and citizen volunteers to monitor contaminants in surface waters in our estuaries and bays.

Over the next three years, our goal is to collect essential data on the types of contaminants present in our estuaries and bays and assess their impacts on bay health. We aim to involve individuals in monitoring efforts, enabling them to learn about the health of their local estuaries and understand the pressures they face. Through these efforts, we seek to provide valuable data on water quality concerning contaminants. This information will be crucial in evaluating the risks pollution poses to environmental. social and economic values of our estuaries and bays, thereby guiding strategies to protect and restore these vital areas.

ABOUT THIS MANUAL

This manual provides background information on the importance of understanding contaminants in our estuaries and bays. It includes detailed instructions for field safety, collecting reliable and representative samples, and submitting samplers and data to AQUEST scientists. The headings are colour-coded: Orange indicates "Need to Know" sections, while Green signifies "Nice to Know" sections, which are not essential.

For additional instructions on sampling protocols, please refer to the volunteer resources on our webpage at http://rmit.edu.au/aquest/ppb-unseen-threats. To obtain copies of the video or manual, please download from the site or contact the AQUEST project team at: aquest@rmit.edu.au.

We hope you find this manual helpful in your efforts to monitor and protect your local waterways and bays.

WHAT ARE CONTAMINANTS OF CONCERN AND WHY MONITOR THEM?

Contaminants of concern in water pollution are chemicals posing significant risks to aquatic environments, ecosystems, and human health due to their toxic, persistent, and bio-accumulative properties. These chemicals originate from various sources, including homes, industry, agriculture, urban runoff, and wastewater discharge.

Thousands of chemical contaminants are in use today, potentially affecting our estuarine and marine environments. Key types of contaminants of concern that may be present in our estuaries and bay include, but are not limited to:

Pesticides: are chemical compounds that are used to control, prevent, eliminate, suppress, or repel pests. "Pesticide" is a broad term that includes insecticides (insect control), herbicides (weed management), fungicides (for fungus control), rodenticides (rodent control), growth regulators, and other materials like miticides, which are used for mite control, or products that eliminate snails and slugs (molluscicides) chemicals used to eliminate or control pests, including insects, weeds, fungi, and other unwanted organisms. They are designed to interfere with the natural body functions of pests, thereby preventing, destroying, repelling, or mitigating them. Even at low concentrations, they may harm aquatic life, especially sensitive species like fish and amphibians, and can accumulate in the food chain.

Pharmaceuticals: Any kind of drug used for medicinal purposes in humans or animals, like antibiotics, antidepressants, pain medicine, hormones. They can be persistent in the environment affecting the behaviour, reproduction, and survival of aquatic organisms at low concentrations.

Per- and Polyfluoroalkyl Substances (PFAS): are industrial chemicals used in products like firefighting foams, non-stick coatings, and waterproof fabrics. PFAS are known as "forever chemicals" due to their persistence in the environment. They can accumulate in organisms, posing long-term ecological and health risks.

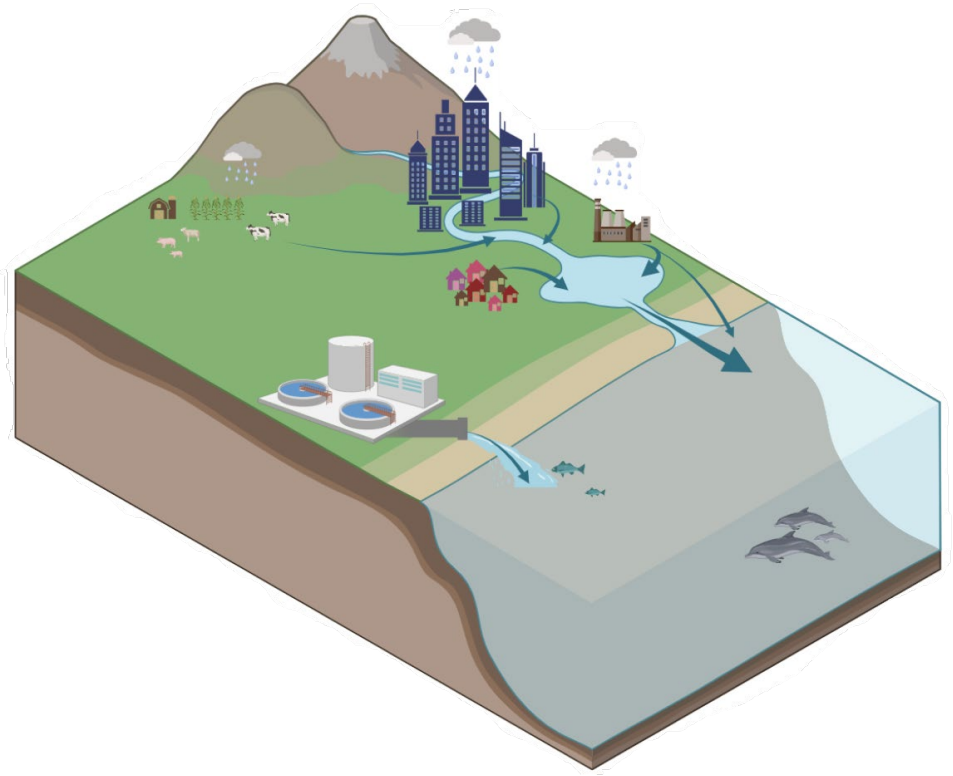
Personal Care Products: Ingredients found in cosmetics, soaps, and sunscreens, such as microbeads, fragrance or certain UV filters, can accumulate in water bodies and harm aquatic ecosystems. Microplastics, for example, can be ingested by marine life and enter the food chain.

Port Phillip Bay and its estuaries possess intrinsic ecological, social, and economic value. However, they are constantly threatened by population growth, urbanisation, pollution, and climate change. The health of these intricate ecosystems is influenced by activities occurring in their surrounding catchments. Estuaries, serving as a vital link between freshwater ecosystems and the bay, also act as primary conduits for the transport of contaminants. As urbanisation and climate change intensify, estuaries and the bay face increased pressure, posing challenges to

maintaining their health. Information on the quality of our estuaries and Bays is of critical interest to local, state and federal agencies as water quality is integrally linked to the economic, social and environmental vales these environments provide.

The growing use of chemicals in everyday life poses risks to our estuaries and bays, disrupting ecological balance and degrading water quality. Currently, comprehensive information on contaminants in Port Phillip Bay's surface waters is lacking, as are studies on their impacts. Identifying contaminant issues and locations is essential for effective management and prioritisation.

The Exploring Unseen Threats project will investigate the occurrence and potential impacts of contaminants used in everyday processes within our estuaries and bays. The project will advance our understanding of the state of marine and estuarine environments by providing data to identify priority contaminants and areas of concern, thereby enabling effective management and prioritisation of issues to protect and maintain bay and estuary health.



Examples of contaminant transport pathways through estuaries to the bays

HOW WILL MONITORING BE UNDERTAKEN?

The monitoring program aims to assess contaminants in the surface waters of our estuaries and bays. To achieve this, we will utilise specialist sampling equipment known as passive samplers, along with a unique chemical analytical method capable of detecting up to 40,000 different contaminants.

Passive samplers are environmental monitoring devices that employ a collection medium, such as filter paper or powder, to accumulate chemical pollutants from water over extended periods. This method contrasts with grab sampling, which involves collecting a water sample at a single point in time. Passive samplers are submerged underwater for several weeks to months, during which they absorb chemical contaminants. After this deployment period, they are retrieved and analysed to identify the contaminants they have accumulated, providing valuable insights into the presence of various pollutants in our estuaries and bays.

For this project, we will use two types of passive samplers: POCIS (Polar Organic Chemical Integrative Sampler) and Chemcatcher (see photos below). The Chemcatcher consists of a thin, paper-like membrane, whereas the POCIS sampler uses powder held between two porous filter papers. Each sampler captures different contaminants based on the chemical properties of its medium. By deploying both types, we aim to collect comprehensive data on the types and concentrations of a broad range of contaminants present in the water.

POCIS passive sampler and its housing (left) and Chemcatcher sampler and its housing (right).

WHAT ARE THE STEPS IN MONITORING?

The monitoring process consists of three key steps:

STEP 1: Deployment and Retrieval of Passive Samplers

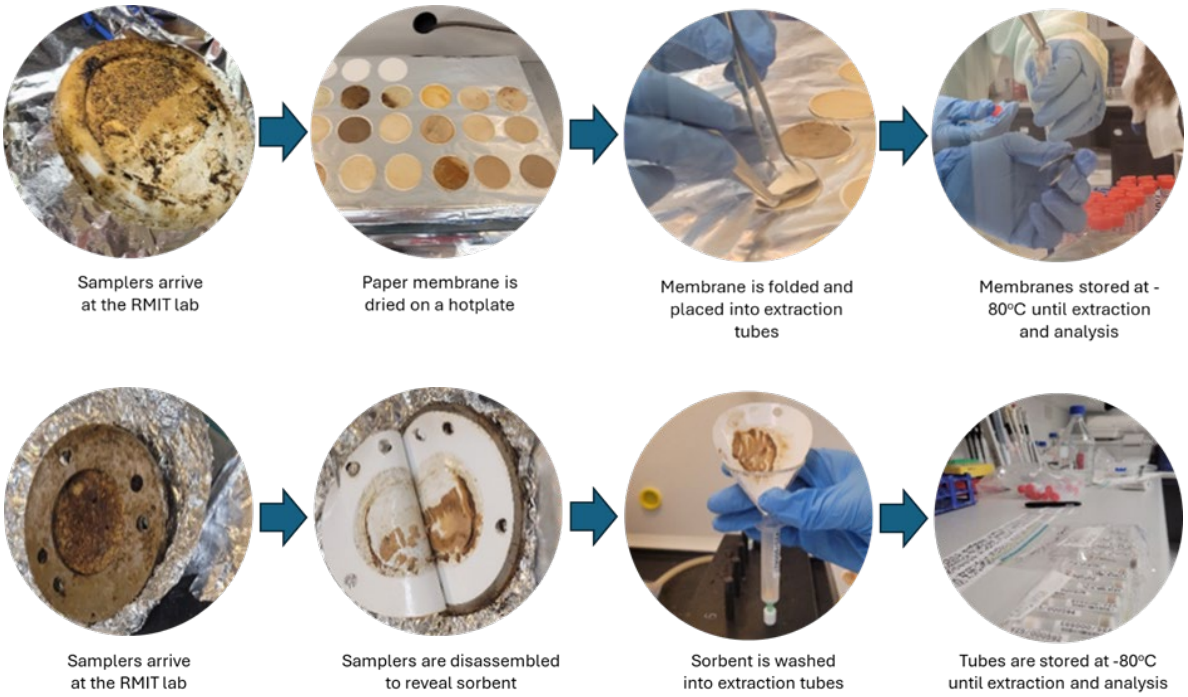
This stage requires the assistance of enthusiastic volunteers. The AQUEST technical team at RMIT prepares the passive samplers and delivers them to designated drop-off points for volunteers who have completed induction training and on-site orientation. These volunteers then deploy the samplers by tethering them in stainless-steel cages in estuaries, where they remain underwater for the duration of the deployment period, typically one month. After this period, volunteers retrieve the samplers, cover and chill them, and return them to the collection point for the AQUEST team to pick up. If you're not part of a volunteer group, you can still participate; we can connect you with a like-minded group at a convenient location.

Deploying passive samplers from a jetty

STEPS 2 and 3: The Sample Analysis Procedure

Step 2: Sampler Processing

Once the passive samplers arrive at the AQUEST laboratories at RMIT in Bundoora, they undergo processing to prepare them for sending to the National Measurement Institute (NMI) laboratories. This involves removing membranes from the Chemcatcher or sorbents from the POCIS, drying, and preserving them for later chemical extraction and analysis. The figure on the next page illustrates the processing steps for Chemcatcher and POCIS samplers.



Chemcatcher (Top) and POCIS (Bottom) sampler processing procedures at RMIT Bundoora laboratory.

Step 3: Sampler Extraction

Processed samples are sent to the NMI laboratory in Port Melbourne, where contaminants absorbed by the samplers are extracted and analysed using Liquid Chromatography Quadrupole Time-of-Flight Mass Spectrometry (LC-QToF-MS). This technology, shown below, allows for both suspect screening of known contaminants and non-target screening to detect unknown contaminants absorbed by the samplers. This comprehensive method helps us to screen for up to 40,000 different contaminants.

By following these steps, our monitoring program can effectively identify and analyse a wide range of contaminants in our estuary and bay waters.

Waters LC-QToF-MS instrument at the National Measurement Institute laboratory, Port Melbourne.

ROLES AND RESPONSIBILITIES

This project involves many partners, groups, and individuals. The intended roles and responsibilities of each, which may evolve over time, are outlined below:

Volunteers: Stay safe while helping deploy and retrieve passive samplers during sampling events. Follow the guidance of your group coordinator as you learn about monitoring pollutants in the bay. You can also join pollution workshops. Your participation enables the project to gather much more valuable information than is otherwise possible!

Group Co-ordinator: This role can be filled by someone from a partner organisation or a volunteer, and it involves overseeing sampling events. The group coordinator manages the deployment and retrieval of passive samplers and shares safety and process information with participants. They will receive the sampling kit, coordinate other volunteers on-site, and potentially upload photos and records. Most importantly, they will enjoy connecting with like-minded individuals and the great outdoors. 😊

RMIT AQUEST/ A3P: As the lead organisation, RMIT AQUEST/ A3P coordinates daily project tasks, including project design, implementation, reporting, and the coordination of volunteers and partners.

Melbourne Water: A key beneficiary of the data, Melbourne Water will facilitate knowledge transfer and integration into strategies and plans. They will play an active role in ensuring the data collected at sites meets their needs to support estuary and bay management.

National Measurement Institute: Leading the analytical component, they ensure the scientific robustness of chemical analysis and assist in interpreting data for accuracy.

Port Phillip EcoCentre: Support the volunteer components; including volunteer engagement, holding the pollution workshops at the new EcoCentre facilities, advisory support, and knowledge transfer (socials plus)

Estuary Watch: Support the volunteer aspect of the program, focusing on volunteer engagement, communications, and knowledge transfer.

Werribee River Association: Support the volunteer components, including volunteer engagement, knowledge transfer, and site identification.

YOUR ROLE AS A VOLUNTEER

As an active volunteer in this project, you play a vital role in the monitoring program by deploying and retrieving passive samplers, which are central to our efforts to effectively monitor and identify contaminants in our local estuaries and the bay.

As a member of a participating group (for safety, we require a minimum of two people in the field), you will:

- Visit selected estuary sites during monitoring rounds and learn to deploy and retrieve pre-prepared passive samplers
- Learn to make site observations about estuary condition and surrounding land-use.
- Upload volunteer attendance records, notes and photographs from your sampling events.
- Be encouraged to participate in pollution workshops to learn about the data collected and promote findings from the monitoring program.

Scientific data collected by volunteers will be summarised to assess spatial and temporal differences in contaminants across our estuaries and the bay. This summarised data will be made available on the project webpage http://www.rmit.edu.au/aquest/ppb-unseen-threats and shared with government organisations, such as Water Authorities, the Environmental Protection Authority, DEECA, Catchment Management Authorities, and local councils, to help identify contaminants and areas of concern.

By assisting with the deployment and retrieval stages, volunteers enable specialised staff to spend more time on the extraction phase. This allows us to process more samples, enhancing the information produced and leading to a more robust data set for management actions.

SAFTEY INFORMATION (Occupational Health &Safety)

Your safety is our top priority. This section provides essential information to assist group coordinators and volunteers understand and manage risks. It is essential that all participants understand and follow the OH&S procedures outlined below.

Training in field procedures

Training ensures that volunteers can collect quality-assured (QA) data safely.

All participants need to familiarize themselves with the protocols for deploying and retrieving passive samplers by attending training sessions, consulting the Field Sampling Protocol section below, and viewing instructional videos on the project webpage http://www.rmit.edu.au/aquest/ppb-unseen-threats. Following this if participants have further questions about sampler handling, contact your group coordinator first, and if unresolved, reach out to the RMIT volunteer coordinator at aquest@rmit.edu.au.

Hands-on field demonstrations and training sessions are compulsory to participate in field monitoring. Look out for announcements or check with your group coordinator or email aquest@rmit.edu.au to participate.

Understand the risks

A general fieldwork risk assessment has been prepared for the activities being undertaken during the monitoring phases of this project. A copy is included in the Appendix and hard copies are provided in the field kit.

The purpose of a risk assessment is to:

- Identify potential hazards participants might encounter.
- Assess the risk level associated with each hazard.
- Implement corrective measures to eliminate or control hazards.
- Reduce risk levels based on the hierarchy of controls.
- Review and evaluate the effectiveness of corrective measures.
- Encourage open discussion about hazards and risk mitigation.

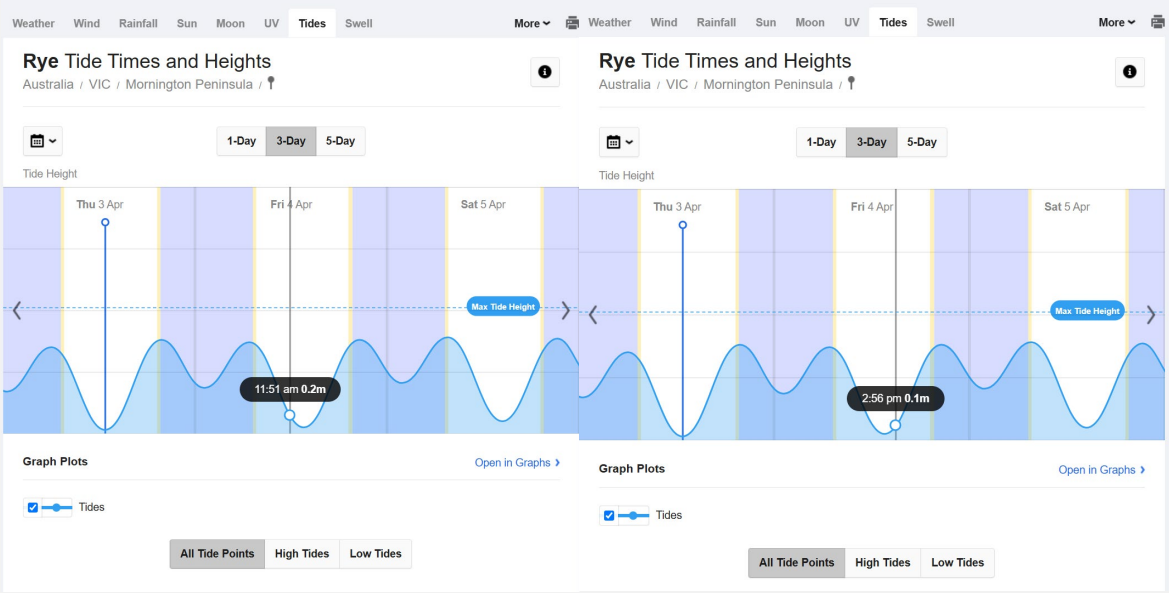
Fieldwork risk assessments must be read, discussed, and signed by each volunteer (on the Volunteer Attendance Sheet) during their first visit and reviewed on subsequent visits, as conditions may change. Once signed, please send the volunteer attendance record to AQUEST@rmit.edu.au .

Any personal details you provide will be managed according to RMIT's privacy policy and used only for this project. You can review the policy at RMIT Privacy Statement

Remember, if any activity puts a participant at risk, do not attempt or continue it

Standard safety procedures for field sampling

- **Use the buddy system:** Always work with a partner when deploying or retrieving samplers and collecting water samples. **Never sample alone!**
- **Inform someone:** The Group Coordinator should notify someone not in the field about your location, duration, and emergency contact information. Upon completing the site visit, call to confirm you're safe 😊.
- **Site Approval:** Always have your sites checked and approved by your group coordinator before commencing monitoring.
- **Choose safe sites:** Select sites with safe, easy access to the water. Avoid areas with steep, slippery, or unstable banks, deep or swiftly flowing water, or long and dense vegetation. Check that sites are not prone to rapid flood or tidewater rise risks.
- **Access during low tide:** Use an app like willyweather.com.au to check tide times. For example, in the figure below, the best time to visit an estuary near Rye on Friday, 4th April, is between 12pm and 3pm. Access sites only during low tide to ensure samplers can be deployed where they will remain underwater at low tide. When walking in tidal areas, test the ground's firmness before stepping. If you need to enter the water briefly, make sure it is less than knee-deep or below your gumboot level to stay dry. Use a stick to check water depth and ground firmness to avoid losing footwear in mud. If water levels are unsafe for sampler retrieval, do not enter the water. Instead, take photos and notify RMIT.



- **Water Quality and Hygiene:** Be mindful of water quality contamination. Always ensure personal hygiene and protection.

Environmental hazards

Wildlife Awareness: Be cautious of snakes, spiders, bees, mosquitoes, prickly plants etc.

Make noise to deter snakes when walking to/from the site. If a snake is seen, abort the visit and inform RMIT.

Use mosquito repellent: especially in areas of high populations. Always apply repellent prior to putting on gloves and setting up samplers. Preferably away from the vehicle and sampling area to avoid contamination.

Wear protective clothing: If the site is heavily vegetated wear long pants, gaiters, strong boots and a long-sleeved shirt to avoid scratches, stings, mosquito or snake bites.

No smoking: Do not smoke during sampling as this can also contaminate the samplers.

Extra Precautions: Be aware of potential site-specific hazards such as dead trees or logs that present tripping or falling limb hazards.

Safety equipment and clothing

Field Attire: Wear long pants, long sleeves, sturdy boots, gumboots or closed-toe shoes, and bring extra items for weather protection (e.g., sun hat, sunglasses, sunscreen, rain jacket).

Sunscreen: Apply sunscreen prior to putting on gloves and setting up samplers to avoid contamination of samplers.

Visibility: Wear bright, Hi-Visibility clothing so you can be easily seen.

Gloves: Always wear gloves when handling and collecting samplers to avoid any contamination.

Extra precautions: Bring extra clothing and a towel in case you get wet.

First Aid and Site Hygiene

First Aid: Keep a First Aid Kit and snake bite bandage handy.

Communication: Ensure a mobile phone is accessible during field trips.

Drinking Water: Carry drinking water with you to maintain hydration, especially during hot weather.

Hand washing: Bring hand washing supplies and wash hands after sampling, especially if you bring food on your trip.

Footwear Cleaning: In areas with soil pathogens, clean footwear with antibacterial wash to prevent spread between sites.

We encourage all volunteers to take personal responsibility for their safety and their group's safety.

PLEASE REMEMBER, IN CASE OF EMERGENCY CALL 000

FIELD SAMPLING

Group Coordinators or designated leads for a site will receive a sampling kit containing all the equipment needed to deploy and retrieve the passive samplers, along with specific instructions to guide you through the deployment and retrieval process. Check your kit contents regularly for defects, dirt, mould, and damage. As these kits may be used over several years, please advise RMIT AQUEST if you notice any equipment has deteriorated. New passive samplers will be prepared for each sampling round. If they look different to what you expect, after consulting the training material, please contact aquest@rmit.edu.au.

A field sampling kit checklist is provided below and a laminated copy is in your kit. Please note that the passive samplers and all related equipment remain the property of RMIT University and must be returned to your group coordinator or the project manager on completion of sampling.

FIELD SAMPLING KIT CONTENTS

1. GLOVES
2. PEN & SHARPIE PEN
3. STEEL CABLES
4. PASSIVE SAMPLERS (2 types)
5. PASSIVE SAMPLER CAGE
6. LABELLED ZIP-LOCK BAGS
7. SPARE ALUMINIUM FOIL
8. PAPER TOWEL
9. ESKY WITH ICE BRICKS
10. EXTRA CABLE TIES
11. SCISSORS
12. RMIT LABELS WITH PROJECT LINK
13. MALLET
14. STEEL PICKETS
15. INSTRUCTION MANUAL
16. STEP BY STEP INSTRUCTIONS
17. FIELD SAMPLING CHECKLIST
18. RISK ASSESSMENT FORM
19. SITE ATTENDANCE SHEETS
20. INCIDENT REPORT FORM
21. PLIERS
22. BUCKET SML

FIELD SAMPLING APPROACH

Field sampling involves several key tasks: pre-planning, attendance and safety checks, sampler deployment and retrieval, followed by shipping and photo documentation. Detailed information on these activities is provided in the subsequent pages.

Pre-planning

Effective sampling requires thorough preparation to ensure ideal conditions and efficient teamwork. Coordinate with your group to select the best day and time for sampling, ensuring at least two volunteers can participate. Verify the low tide times on apps like Willyweather.com and check the weather conditions. Ensure your group has all necessary equipment using the Equipment Checklist.

Complete Sampling Attendance Sheet & Site safety briefing

Upon arrival at the site, complete the attendance sheet, the acknowledgement and consent form, and review the risk assessment. Identify and discuss any site-specific safety risks with your team. Delegate tasks, including designating someone to take photos of the sampling process and surroundings. Apply mosquito repellent and sunscreen prior to any sampling activities, away from the sampling equipment, considering wind direction so that there is no drift to your vehicle or sampling gear.

PASSIVE SAMPLER DEPLOYMENT AND RETRIEVAL

Passive samplers are deployed at sites for a period of four weeks. The process consists of several key steps: selecting a suitable deployment point, preparing samplers for deployment, and conducting the actual deployment and retrieval. A detailed step-by-step guide is available on pages 20-24, along with a laminated guide included in your sampling kit. Below is a summary of each step's purpose and key points to ensure consistency.

SELECTING SAMPLER DEPLOYMENT POINTS

The first step in deploying samplers is choosing a suitable and secure location. This could be a tree trunk, bridge, jetty or another permanent structure at the site. If no structures are available, create one by installing a stake into the bank. The sampler cages must be submerged throughout the deployment period, ideally 30 cm below the water surface. Additionally, select a discreet location to minimise visibility and reduce the risk of curiosity or tampering. It is best to survey the site thoroughly to identify a deployment spot that aligns with these requirements before preparing the samplers.

PREPARING PASSIVER SAMPLERS FOR DEPLOYMENT

Prior to deploying your samplers, they need to be unwrapped and attached in the passive sampler cage. The samplers have pre-attached clips which are used to secure them to the steel cable attached to the cage. You will also be supplied with a steel cable with clips on each end which are used to secure the cage to your tethering point and the cable to the cage. We suggest you work out of your boot or vehicle tray if you have one, otherwise on a table or the ground can work to setup the samplers and cage.

IMPORTANT:

It is important to be careful when handling the passive samplers as to not pierce the sampler membranes, notably for the POCIS sampler, as this will render them unusable. You must ensure you always wear gloves when handling the samplers so as not to contaminate them.

If you need to place the samplers down during this process, please protect them by placing them on the extra supplied aluminium foil, paper towel or the zip-lock bag. Never sit them on bare ground or an unclean surface as this will result in contamination of the sampler.

DEPLOYING PASSIVE SAMPLERS

Sampler deployment involves placing the samplers in the water, where they will remain for a 4-week period. Once you've secured the samplers in the cage and attached the cable to the top, they are ready for deployment at the pre-identified location. You will take the cage, with the samplers, to the designated attachment site and secure it using the steel cable. You will then gently lower the sampler cage into the water to complete the deployment.

After the deployment, you will need to ensure that the volunteer attendance form, photos and any notes are uploaded via Volunteer Resources: at http://www.rmit.edu.au/aquest/ppb-unseen-threats

Duplicates and Field Blanks

You might be provided with a duplicate set of samplers, which helps verify the repeatability and consistency of our findings, thereby boosting confidence in the results. These will be deployed using the same method as the other samplers, but they will be placed in a separate cage.

You may receive a Field Blank, which helps identify airborne or atmospheric contaminants that resemble those being tested at the site. It also checks for any handling-related contamination. This ensures that any detected contaminants originate from the water rather than external sources.

During sampler deployment

You are not required to attend to the samplers in any way between putting them into the water and taking them out again. However, if you are local to the site and would like to check on the samplers, please feel free to do so! You could check that they haven't been tampered with and that it remains below the water for the whole time. If you make any adjustments or notice anything, please let the RMIT team know, (you can add a note in the Volunteer Portal)

RETRIEVING PASSIVE SAMPLERS

The samplers will be collected from the site, packaged, and submitted to the RMIT AQUEST group for processing approximately one month after deployment. You will be notified of a specified week for retrievals. Your team will need to decide which day within that week is best for retrieval, considering the low tide times, weather and volunteer availability. Once the samplers are retrieved, they should be packaged and transported to the designated pickup location.

SAMPLER DROP-OFF AND PICKUP

A group member will collect the sampling kit, which includes the passive samplers, from a designated pickup location before deploying the field samplers. After retrieval, the samplers will be returned to the same drop-off location.

Contaminants can and do degrade during transport. To reduce the loss of contaminants between sampler retrieval and analysis, it is important to transport the samples to the laboratory as soon as possible, to keep the samples as cool as possible, and out of direct sunlight. The AQUEST team will organise these logistics and provide detailed instructions to participating volunteers prior to sampling.

FACTORS THAT MAY AFFECT THE QUALITY OF THE PASSIVE SAMPLERS

The quality of data generated in a laboratory depends, to a large degree, on the integrity of the samples that arrive at the laboratory. Consequently, in the field, precautions to protect samples from contamination and deterioration need to be considered. There are many sources of contamination; the following are some basic precautions to consider:

- Sampler becomes dry during deployment. If the samplers dry out during the deployment period as they have not been deployed in a location where they will remain underwater during both high and low tides, this will affect their ability to uptake chemicals. Make sure you have deployed them at low tide to best ensure they will be located in a spot where they will remain underwater during the deployment period.
- Samples must never be permitted to get warm; they should be stored in a cool place (e.g. in the shade and inside).
- Sample collectors should always wear disposable gloves when handling the samplers and sampling equipment during deployment and retrieval. Change gloves between samples. The disks of the passive samplers must not be touched with anything (e.g. bare hands, gloves, etc.) except by the water being sampled. Use gloves on the housing only.
- Keep hands clean and refrain from smoking or eating while working with samplers.
- Apply sunscreens and insect repellents prior to undertaking sampling or removing sampling equipment from your car. Ensure your hands are gloved to prevent contaminating your sample with sunscreen and insect repellent that you have applied to your own person.

STEP-BY-STEP PASSIVE SAMPLER DEPLOYMENT AND RETRIEVAL PROTOCOL

This protocol outlines a step-by-step guide for the different stages involved in passive sampler deployment and retrieval including selecting sampler deployment locations, sampler preparation, deployment, retrieval, completing paperwork and sampler drop off.

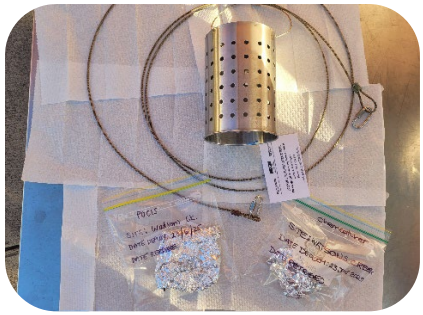
SELECTING A SUITABE DEPLOYMENT POINT

1. Visually inspect the sampling site and identify a location for tethering the sampler cage during deployment. This could be a tree trunk, bridge, jetty or other permanent structure present at the site. If there are no permanent structures you may need to install a steel picket. If required to install a picket, use a mallet to hammer it into solid substrate on the bank, as near to the water's edge as possible, without it being in danger of being washed away.



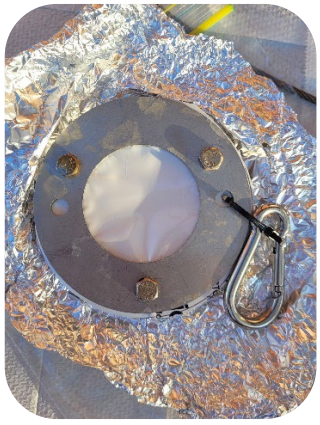

SAMPLER PREPARATION

2. Put clean gloves on.
3. Lay some clean paper towel or aluminium foil out on your site workspace. This could be the boot or tray of your car, a table or the ground.
4. Remove a sampler cage, a steel cable with two clips attached at either end and a zip-lock bag containing a Chemcatcher and POCIS sampler from your sampling kit and place on your site workspace.

5. Starting with the POCIS sampler, remove the POCIS sampler from the zip-lock bag. Unwrap the sampler from the aluminium foil and using the pre-attached clip, clip the sampler to the steel wire inside the passive sampler cage. (See below). Ensure when handling the sampler you only touch the steel ring and not the paper membranes. Be careful not to puncture the paper membranes.

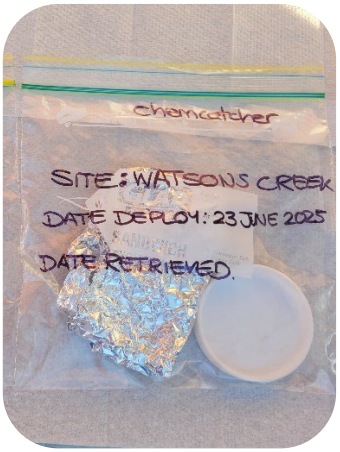
6. Place the aluminium foil back into the zip-lock bag and label the bag with the site details, time and date of deployment and then place back into your sample kit.



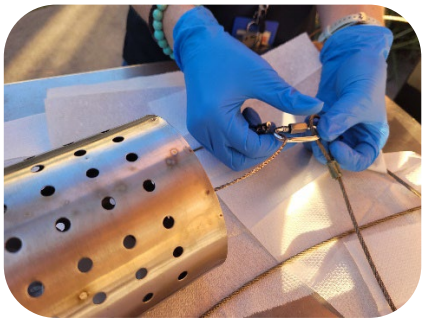
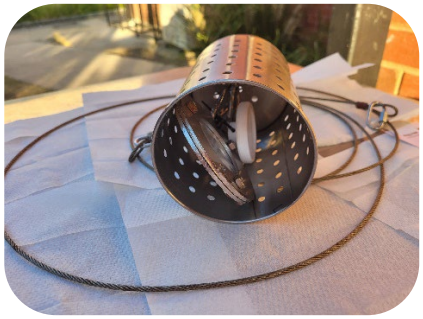

7. Next remove the chemcatcher passive sampler from the zip-lock bag. Unscrew the lid on the bottom of the chemcatcher and place it back into the sip-lock bag. * N.B. there are three parts to the Chemcatcher, make sure the bezel holding the filter stays with the sampler.

8. Using the pre-attached clip, clip the chemcatcher to the steel wire inside the passive sampler cage, next to the POCIS sampler (see photo).

9. Label the chemcatcher bag with the site details and deployment date, time and place back into your sampling kit.

10. Attach the end of the long loose steel cable to the short steel cable looped through the top of the passive sampler cage using a clip (See photo).


11. You are now ready for sampler deployment.

NOTE: If you need to sit the passive samplers or cage down at any point once the samplers are attached, ensure you do this on clean paper towel or aluminium foil.

PASSIVE SAMPLER DEPLOYMENT

12. Take the sampler cage, with steel cable attached and samplers attached down to your pre-determined tethering location.
13. Using the end of the cable not attached to the sampler cage, tether the cable to your identified tethering point, i.e.: tree trunk, bridge, steel pole, star steel picket. Wrap the steel cable around the bridge support, tree trunk or secure structure and secure it back to the cable with the attached clip using a second quick link. Similarly, if attaching to a picket: Clip the quick link through one of the holes at a low point on the picket (see photo).
14. Gently place the sampler into the water, to be submerged by ~30 cm. At low tide the sampler needs to remain fully submerged.
15. Attach an RMIT label to the end of the cable to identify the samplers (at the topmost point of the picket or cable wrapped around a tree or bridge - to potential avoid third party damage).

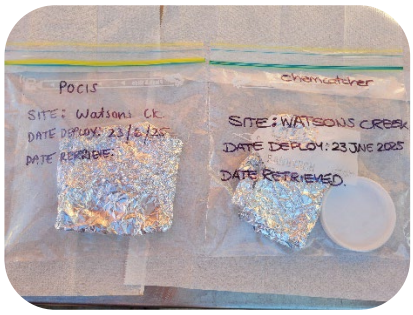


<u>You may have been supplied with a duplicate,</u> in which case please repeat Steps 6- 14, attaching this duplicate to a second anchor point. A duplicate sample shows us if what we found is repeatable and consistent, increasing our confidence in what we detect.

You may have been provided with a Field BLANK: If so, at your vehicle, after you have unbagged the passive sampler at Step 9, please take the field blank out from its zip-lock bag, open the aluminium foil to expose it to the air leaving it in your vehicle for the whole time while you take your actual sampler down to the water to deploy. On returning to your vehicle, please rewrap the blank in the foil and return it to the zip lock bag. This lets us know if there are any airborne or atmospheric contaminants which may be similar to what we are testing for at the site and allows us to distinguish between these two potential sources of pollution.

PASSIVER SAMPLER RETRIEVAL

16. Put clean gloves on.
17. Lay some clean paper towel or aluminium foil out on your site workspace. This could be the boot or tray of your car, a table or the ground.
18. Remove the pre-labelled zip-lock bag for your POCIS and chemcatcher sampler from your sampling kit and place on your site workspace. Ensure you have the lid for the chemcather sampler and a piece of aluminium foil to cover the POCIS sampler.
19. At the location where the sampler is tethered, you need to untether the steel cable and then slowly pull the passive sampler cage out of the water.



20. If you can safely access the water, gently shake the cage in the water to remove any attached sediment or animals that might be in or on the cage.
21. Take the steel cable and cage containing the samplers back to your site workspace where you will process them for transport.
22. Take a photo of the condition of the samplers.
23. Unclip the steel cable from the top of the sampler cage and roll up and place into the supplied zip-lock bag.
24. Unclip the POCIS and chemcatcher samplers from the cage cable and site them gently on clean paper towel or aluminium foil. Take a photo of them to show their condition.

25. For the POCIS sampler, wrap it in a piece of aluminium foil and then place it into the pre-labelled zip-lock bag and seal. The bag should be labelled with the site name; date of deployment and you need to add the date of collection.
26. For the chemcatcher, remove the lid from the zip-lock bag and fill it with a little bit of site water. Then screw the lid onto the bottom of the chemcatcher. Place the chemcatcher into a second pre-labelled zip-lock bag, seal and add the date of retrieval to the label.
27. Place both samplers in their zip-lock bags into the esky.

NOTE: If you need to sit the samplers down anywhere, ensure you place them on some clean paper towel or aluminium foil.

Ensure you take photos while you are deploying and retrieving the samplers and of the samplers after retrieval

COMPLETING DOCUMENTION

Organise for the paperwork and photos to be emailed to: aquest@rmit.edu.au or monica.tewman@rmit.edu.au

SAMPLER DROP OFF

28. Drop the samplers off to the pre-determined drop off location. Samplers need to be kept cool, but NOT ON ICE. They will need to be refrigerated if delivery is not possible for several hours or days.
29. Notify RMIT AQUEST staff via aquest@rmit.edu.au that you have dropped them off for pickup.

DURING SAMPLER DEPLOYMENT

You are not required to attend to the samplers in any way between putting them into the water and taking them out again. However, if you are local to the site and would like to check up on the samplers, please feel free to do so! You could check that it hasn't been tampered with and that it remains below the water for the whole time. If you make any adjustments or notice anything, please let the RMIT team know, either directly or through the volunteer portal.

PHOTOGRAPHS OF YOUR SITE AND THE SAMPLERS

Photographs provide a visual record of your site during deployments and retrievals, identify the location of samplers at the site and provide evidence of change. They also provide visual evidence of the condition of samplers. You need to identify a location at your site where you can take photographs to compare changes over time. You need to be able to find the same position to take photos on subsequent visits. Below are some guidelines on setting up a photo point, taking photos, naming files and uploading to the database.

Setting up a photo point

Consider:

- Safe access to the site, both now and in the future.
- The use of landmark features which future pictures can be matched up with which will not change or be hidden - use a tree, fence post, range of hills or bend in the estuary for a guide.
- Ensure the present and future view from the camera to the point of interest is uncluttered.
- That young tree/shrub vegetation will get taller as it grows and can become a wall of green at the front of your site.

Photos we would like:

- **Site Overview:** A wide photo of the site showing the sampler's location and surroundings.
- **Sampler in Place:** A photo of the sampler in its deployment position after deployment and before retrieval.
- **Environmental Changes:** Any visible changes or events (e.g., floods, trash buildup, or damage to the area).
- **Nearby Landmarks:** A reference photo of landmarks (e.g., trees or buildings) to ensure the site is easy to locate again.
- **Samplers on retrieval:** a photo of the cage and samplers once they are retrieved from the water to show the level of biofouling and condition of the samplers.
- **Volunteers in action:** as many photos as you like, group photos, action photos, all fabulous!

TIPS ON TAKING PHOTOS – INITIAL AND SUBSEQUENT VISITS

- Take photos from the same position each visit. Only take one photo from each photopoint to avoid confusion.
- Ensure the images are in focus and well-lit.
- Set camera to record GPS coordinates (if applicable), date stamp "on", and set to "Auto" setting.
- Do not use a wide angle or a telephoto lens, as this alters the perspective of the photo and makes it difficult to repeat. Use the highest resolution possible. This will allow the use of photos for reports and promotion of the Port Phillip Bay Exploring Unseen Threats project.
- Take a hard copy of the picture(s) with you on future visits to make lining up the shots easier, make sure they are framed in the same manner.
- Have a little "sky" in the shot if possible

NAMING AND UPLOADING PHOTOS

It is good practice to upload your collected photos the day you return from the field. That way you won't forget which photos were for each site and photo point. Please email your photos to aquest@rmit.edu.au or monica.tewman@rmit.edu.au

Naming Files: Name photos clearly to match the site and visit date for easy tracking (e.g., "SiteA_ 20250113_Deployment_ Photo number_Photographers name or initials").

e.g. BalcombeCreek_20250122_Retrieval_1_MT

If more than one photopoint is active at a site, include the letter P after the date and the number. For example, P1, P2, etc.

KEY CONTACTS FOR VOLUNTEERS

Project Management and research team RMIT AQUEST:

Dr Jackie Myers jackie.myers@rmit.edu.au
Dr Pulasthi Serasinghe pulasthi.serasinghe@rmit.edu.au
Monica Tewman monica.tewman@rmit.edu.au
General Volunteer Information aquest@rmit.edu.au

Partner contacts:

Port Phillip EcoCentre: Tyler King tyler@ecocentre.com and Alison Orchard ali@ecocentre.com
Werribee River Association: Sophia Bagatsing sophia.bagatsing@werribeeriver.org.au
Estuary Watch: Jane Petch jane.petch@melbournewater.com

Project Webpage and Volunteer Resources:

For registering as a volunteer, accessing training resources and other resources:
http://www.rmit.edu.au/aquest/ppb-unseen-threats

A big thank you for participating in our Exploring Unseen Threats contaminant monitoring project!

APPENDICES

Exploring Unseen Threats Field Sampling Checklist

ITEMS WITH AN * NEXT TO THEM ARE NOT PROVIDED IN THE SAMPLING KIT. VOLUNTEERS ARE TO PROVIDE THESE ITEMS AS NEEDED.

General	
Exploring Unseen Threats Instruction Manual for Volunteers May 2025	
Field Sampling Checklist (this form)	
Volunteer attendance sheet	
Risk Assessment	
Incident Report Form	
Step-by-step passive sampler deployment and retrieval protocol	
Pen	
Sharpie pen	
Extra cable ties (long and short)	
Fresh aluminium foil	
Paper towel	
RMIT labels with project link	
Bucket Small	
*Mobile phone/ camera	
Health and Safety Items	
Gloves	
*Personal Protective Equipment (long pants, long shirt, sturdy closed-toe footwear/ boots, gumboots, hat, sunglasses, rain jacket, warm clothes etc. condition dependant. Gaters if you have them	
*First Aid Kit/ Snakebite bandage	
*Sunscreen	
*Insect Repellent	
*Drinking water	
*Hand washing water and soap	
*If in a known soil pathogen area- Antibacterial wash for footwear	
*Any medication required- e.g. Ventolin, EpiPen etc.	
*Towel (just in case)	
*Change of clothes (just in case)	
Passive Sampling Equipment	
Steel cables	
Star steel Picket	
Mallet/hammer	
Scissors and Pliers	
Passive samplers (2 types) Chemcatcher and POCIS. (Chemcatcher casing is *removed on deployment and reattach on retrieval- please retain cap while the sampler is deployed)*	
Protective cage with steel cable attached	
Labelled zip-lock bags (for retrieval)	
Esky with NO loose ice (ice bricks OK) *(if +6h transport time)*	
Potential Extras: Blank and Duplicate passive samplers	

Exploring Unseen Threats Volunteer Attendance Sheet

Fieldwork Date: ___/___/_____ Fieldwork Start Time: _____ End Time: _____ Total number of hours spent: _____

1.Volunteer Information *Please request an individual form if you prefer

No.	Full Name	Contact Number	Emergency Contact Name	Emergency Contact Number	Confirmation of training	* Risk Acknowledgement	Signature
1							
2							
3							
4							
5							

*Confirmation of training and Risk Acknowledgements

I acknowledge (please sign or initial above) that I have engaged in on-line and in-person training (see http://www.rmit.edu.au/aquest/ppb-unseen-threats) ,and have read, understood and signed the Risk Assessment for this project, discussing any aspect I am unfamiliar with.

2. Site Information Site Code (if known): _____Site Name: _____

3. Group Co-ordinator Information Volunteer No. from above table _____or

Name: _____Contact Number: _____

Instructions for Volunteers & Group Co-ordinator

1. Please ensure all fields are filled in completely and accurately including the risk acknowledgement.

2. Once the form is completed, can the Group Co-ordinator or delegate please photograph the entire form/s and email it to aquest@rmit.edu.au or monica.tewman@rmit.edu.au **Please name the file in the following format:** Volunteers_Site_date (yyyy/mm/dd) e.g. Volunteers_Chinamans_20250122

All information provided is subject to RMITs Privacy Policy RMIT Privacy Statement and will be used solely for the purpose of this project

In case of an Incident: Don't delay in calling 000 if required

Please fill out the Incident Report Form, notify aquest@rmit.edu.au and share a copy of the completed form as soon as possible.

Exploring Unseen Threats Incident Report Form

This form can be filled out on-line at "Launch General Public SafetyNow" https://www.rmit.edu.au/about/our-values/health-safety-wellbeing/global-safety-model/risk-incident-management/incident-management-investigation (scroll down to this button) or manually below and emailed to aquest@rmit.edu.au asap.

Author details

Name: _____ Email address: _____ Phone Number: _____

Incident details

Is this a confidential incident? Yes/ No

Description:

_____

_____*continue over page if required*

Date and time of occurrence: _____

Incident Type: *Please circle applicable*: Health and Safety: 1. Biological material/agent 2. Chemical/Hazardous substances 3. Climate/ Natural events 4. Falling Objects 5. Flora and Fauna 6. Manual Handling 7. Marine/ Aquatic 8. Plant and equipment 9. Personal medical condition 10. Sharps/ Blades 11. Slips and trips 12. Thermal (Hot/Cold) 13. Vehicle and transport

What were you doing? *Please circle applicable*: Fieldwork/ Travelling/ Participating in event

Where did the incident occur? _____

Who was involved? _____

Is there an injury to report? *Please circle applicable*: Yes/No

If Yes, Injury details: *E.g. Left hand was bruised* _____

Collection Notice

RMIT University ("RMIT") is collecting your personal information for the purpose of assessing, managing and responding to incidents reported to us, including to seek further information about the incident, to offer assistance and support, and for incident reporting and risk management. We may collect your information directly from you, or from someone else if they are reporting an incident on your behalf or you are otherwise involved in an incident.
We may use or share your personal information for the purposes outlined above. We may also need to share your personal information to keep people safe or to meet our legal obligations. This may include reporting to government agencies or sharing information with emergency services such as police or ambulance, and RMIT security. For some types of incidents, we may need to share your information with our insurance provider. If you wish to access or amend your personal information held by us, please healthandsafety@rmit.edu.au. For further information about how we manage and protect your personal information, please refer to the RMIT Privacy Statement.

Exploring Unseen Threats Risk Assessment Form

SECTION 1: GENERAL INFORMATION					
Activity Description:	Volunteer Passive Sampler Deployment and Retrievals				
Will the activity take place in a controlled access area?	☐ Yes	☒ No	*If "Yes" consider suitable control measures in the risk assessment - Section 3*		
Below is a checklist of *some* example hazards. Use the checklist to assist with completion of this form and use the 'Other' space available for any hazards identified which are not included in the checklist. All identified hazards must then be assigned to the relevant activity step in Section 3 of this document.					
☒ Environmental conditions	☒ Hazardous Substances	☐ Electrical	☐ Mechanical	☐ Motion	
☐ Objects	☐ Pressure	☐ Hazardous atmospheres	☒ Ergonomic hazards	☐ Hazardous Building Materials	
☐ Temperature	☐ Sound / Noise	☒ Ground uneven / unstable / slippery	☐ Work in isolation	☒ Vehicles / transport	
☐ People / Behaviour (violence, child safety)	☐ Stored energy	☒ Biological material (*e.g. bacteria, viruses*)	☐ Unauthorised access to plant/equipment/substances/materials/work or learning environment		
☒ Other (describe):	Sharps				
☐ Work at heights*	☐ Manual handling	☐ Confined spaces*	☐ Psychosocial (Mental Wellbeing)	☐ Plant / equipment	
☒ Field work	☐ Hot work*	☐ Radiation (*including UV*)	☐ Lasers		
Persons completing RA:					
Name:	Signature:				
Refer to Volunteer Attendance Sheet for signing					

SECTION 2: INSTRUCTIONS TO PERFORM THE RISK ASSESSMENT
What you should do for each stage of the risk assessment:
For each step in the activity, provide a brief description for each identified hazard in Section 1 and associated risk in Section 3. Note that there may be more than one hazard for each step of the activity / tasks. Determine the current risk rating (i.e. the risk with existing controls in place) in Section 3 by referencing the Risk Matrix in Section 4. Specify the risk control type and control description for each hazard in Section 3. Risks must be controlled to as low as reasonably practicable. A combination of control measures may be used to reduce risk. *Note: Apply the Hierarchy of Controls (Section 5) to reduce the level of risk. Select the most effective controls in preference to least effective ones as much as reasonably practicable.* Once controls have been selected, determine the residual risk rating by again referencing the Risk Matrix in Section 4. If the residual risk is High or greater, the activity is not to proceed until higher level control(s) are determined and implemented to reduce the risk. Sign off on Sections 7 (Consultation / Technical Review) and Section 8 (Approval) *Note: Any Residual Risk scores equal or greater than Medium must be escalated to the Senior Leader for discussion and sign-off before the activity can be undertaken.* *Note: Sign-off requirements may change based on level of risk.*

SECTION 3: RISK ASSESSMENT						
Activity or Task *List the steps required to perform the activity or task in the sequence they are carried out.*	**Hazards & Risks** *List the hazards and risks that could cause injury when the activity or task is performed*	**Current Risk Controls** *Detail the controls currently in place that will reduce the risk. If none exist, please note this*	**Current Risk Rating** *(with existing controls) (Refer to Section 4)*			**Responsibility** *Name the person responsible to implement the control measure identified*
			Consequence	Likelihood	Risk Rating	
Travelling to and from field sites (driving and parking)	<u>Traffic hazards:</u> Multiple fatalities, serious injuries including permanent disability from being in a car accident on route. Risk of fatality or very serious injuries at sites where car must be parked close to road	Vehicles should be inspected for damage prior to departure. Plan your trip in advance and ensure that the vehicle is safe for use. All vehicle occupants must wear a seatbelt at all times when the vehicle is in motion. Do not use your phone while driving. Passengers should assist with navigations where possible.	5	A	H	Fieldworker
Travelling to and from field sites (driving and parking)	<u>Driver fatigue:</u> Multiple fatalities in the event of an incident cause by driver being too tired to concentrate properly	Do not drive a vehicle when you are impaired by tiredness or medication. Avoid long travel days (more than 8 hours). Avoid driving late at night and very early in the morning. Do not drive under the influence of medication. If travelling in remote areas, ensure that at least two team members have valid driver's licences in case one person becomes incapacitated.	5	A	H	Fieldworker
Travelling to and from field sites (driving and parking)	<u>Loose equipment:</u> Injury from being hit by unrestrained or loose item in the cabin or tray.	Avoid storing loose item on the back seat. Securely pack or restrain loose items (use tubs with lids for small items such as jars). Avoid transporting equipment in the cabin, or in the same area as the occupants. All items must be secured to minimise the risk of unrestrained objects striking the vehicle occupants in the event of a collision.	3	C	M	Fieldworker

Travelling to and from field sites (driving and parking) Inspect Site and unpack vehicle. Conduct fieldwork/sampling	Fire: Multiple fatalities in the event of a bushfire, especially on roads with poor access or remote areas	Prior to each day of fieldwork check the Fire Danger Rating for the appropriate Fire District on the CFA website. Field work should be postponed on days of Extreme or Catastrophic fire ratings. During fieldwork regularly monitor the Emergency VIC website or App to check for active bushfires. To find warnings and updates Listen to ABC Local Radio, commercial and designated community radio stations and watch Sky News TV. If smoke or fire is observed, call the CFA (9262 8444) and leave the area. In an emergency dial 000. Consider taking a fire extinguisher for fieldwork when practical. When conditions are dry, windy, and hot, avoid driving through long grass as this poses a fire hazard.	5	A	H	Fieldworker
Travelling to and from field sites (driving and parking) Inspect Site and unpack vehicle. Conduct fieldwork/sampling	COVID-19. Avoiding eating or touching your face while in vehicles. Don't perform fieldwork if unwell or showing any symptoms of being unwell. Field workers to take wipes, hand soap, sanitiser, and water for handwashing. Avoid touching your eyes, nose and mouth.	Infectious diseases (COVID-19): Fatality or illness associated with contracting and/or passing on an infectious disease (COVID-19)	2	C	M	Fieldworker
Travelling to and from field sites (driving and parking) Inspect Site and unpack vehicle. Conduct fieldwork/sampling	Inclement weather: Multiple fatalities or very serious injuries (including death) from driving in inclement weather (including thunderstorms, strong winds and heavy rainfall causing flash flooding).	Check the forecast weather conditions prior to going out (and during field work if conditions are predicted to change) and where possible postpone field work to avoid driving in adverse weather conditions (especially thunderstorms or high winds or heavy rainfall that could cause flash flooding).	5	A	H	Fieldworker

	Moderate to serious injuries (possible fatalities) working in inclement weather such as thunderstorms, gale force winds					
Inspect Site and unpack vehicle. Conduct fieldwork/sampling	<u>Animals/insects:</u> Fatality or injuries from being bitten/stung by venomous insects and animals. Fatality or injuries from contracting a mosquito-borne virus such as Ross River Fever	Be vigilant and avoid long grass/undergrowth wherever possible; avoid disturbing venomous animals where possible. Wear appropriate clothing and footwear (long sleeves, trousers, boots), and use insect repellent where appropriate. When working in long grass wear appropriate snake gaiters, chaps or gumboots (to reduce risk of snake bite). Take snake bite kit when working in areas likely to be suitable for snakes. Where possible avoid working in areas with large numbers of mosquitoes present. Apply insect repellent to avoid mosquito bites and to limit the possibility of catching a mosquito-borne virus such as Ross River Fever.	5	A	H	Fieldworker
Inspect Site and unpack vehicle. Conduct fieldwork/sampling	<u>Trip/slip hazards/uneven ground or work surface:</u> Moderate to serious injury from trips/slips/falls when assessing the site. Hazards include tripping over obstacles (e.g. vegetation, logs, fences, wire, rubbish), slipping on wet or muddy surfaces and stumbling over uneven ground.	Avoid uneven terrain where possible. Avoid accessing sites where there are lots of physical hazards (such as logs and fences) and substitute with better access points (e.g. avoid steep cliffs or undermined banks). Be vigilant when accessing the site to avoid tripping and slipping. Be vigilant at sites and where possible avoid climbing over objects (e.g. logs, fences) or walking through vegetation. Wear appropriate work boots or gum boots with good soles that grip.	4	B	H	Fieldworker
Inspect Site and unpack vehicle. Conduct fieldwork/sampling	<u>Interaction with public (threat to safety):</u> Moderate to serious injury dealing with public at some sites (particularly urban sites)	Be vigilant about being approached by members of the public (including other field workers being approached). Do not work alone. Avoid interacting with members of the public who appear to pose a threat and if in doubt call the police (on 000).	3	B	M	Fieldworker

Inspect Site and unpack vehicle. Conduct fieldwork/sampling	Falling limbs: Fatality or serious injury from falling limbs from trees	Avoid working or parking under large trees during windy conditions Avoid parking under or working near trees with large limbs, especially river red gums. While some trees are more likely to lose limbs in windy conditions, river red gums will lose limbs when it is still (especially during warm and dry weather). For some work (such as working in fire-affected areas), hard hats should be worn.	5	A	H	Fieldworker
Inspect Site and unpack vehicle. Conduct fieldwork/sampling	Manual handling: Minor to serious injuries from unpacking heavy objects from vehicle. Moderate injuries from carrying equipment, especially buckets containing sediment.	All fieldworkers **must complete the Volunteer Training** which addresses Manual Handling prior to engaging in this activity. Lifting should be restricted to small, suitably sized loads. For larger loads, use two people or a lifting aid. To avoid carrying equipment long distances park as close to the site as possible	3	C	H	Fieldworker
Inspect Site and unpack vehicle. Conduct fieldwork/sampling	Repetitive movements, awkward postures: Minor to serious injuries from awkward postures while unpacking objects from vehicle. Minor injuries from awkward postures while collecting samples.	All fieldworkers **must complete the Volunteer Training** which addresses Manual Handling prior to engaging in this activity. Field workers should follow this training when doing awkward and repetitive tasks and should be vigilant about risks. Take frequent breaks when doing repetitive tasks. Avoid sustained awkward postures while working and try to ensure that work (e.g. assembling passive samplers) is conducted at an appropriate height (e.g. use a picnic table or work off the tray of the vehicle). When doing tasks that require repetitive movements, take frequent breaks, and do stretches to reduce the risk of injuries.	3	C	H	Fieldworker
Inspect Site and unpack vehicle.	Extreme temperatures: Minor to serious illness from exposure to extreme temperatures (heat and cold)	Avoid working under extreme temperature conditions and work at times of the day to avoid this (or reschedule to another day). Observe and understand weather forecasts to make these decisions. Wear appropriate	3	C	H	Fieldworker

Conduct fieldwork/sampling		clothing for conditions (e.g. warm, waterproof clothing if cold; SunSmart, loose clothing in hot weather). Drink plenty of water in hot conditions, try to work in the shade where possible and be vigilant about health of other field workers (look for signs of hypothermia, heat exhaustion and heat stroke). Field workers should undergo first aid training.				
Inspect Site and unpack vehicle. Conduct fieldwork/sampling	<u>Radiation (UV):</u> Minor to moderate injuries from exposure to UV radiation (short-term; in the long term can lead to skin cancer)	If possible, avoid working at times when UV radiation is highest. Otherwise, wear protective clothing (long sleeves, hat, sunscreen, sunglasses), and try to work in the shade where possible.	2	D	M	Fieldworker
Conduct fieldwork/sampling	<u>Biological material:</u> Minor to moderate illness from exposure to pathogens at some sites (especially polluted urban and agricultural streams).	Wear personal protective equipment (gloves, appropriate clothes and when necessary, eye protection or a face mask) when working with contaminated (or suspected contaminated) field samples (inc. sediment) and wash hands with soap and clean water after working with environmental samples.	3	C	H	Fieldworker
Conduct fieldwork/sampling	<u>Deep and/or flowing water:</u> Minor injuries to very serious consequences (drowning) from working around water, particularly at sites with deep, flowing water.	Never work alone around water. Fieldworkers who are not competent swimmers must not be within two metres of the water unsupervised and must always wear a personal floatation device in and around the water. Do not enter the water to deploy or retrieve the passive samplers Assess the conditions (slope, flows and depth) prior to deploying samplers. Stay away from the water's edge, using a tie-off point safe on the banks. Do not panic if you fall in. Stand up and make your way back to the bank, if it's too deep, kick on your back or swim back to the bank. If you need assistance, ask your field buddy to assist with a stick or similar.	5	B	H	Fieldworker
Conduct fieldwork/sampling	<u>Unstable/deep substrates:</u>	Never work alone around water and soft substrates. Do not enter soft mud substrates. Check softness and depth with a stick before walking on. Do	5	A	H	Fieldworker

	Minor injuries to very serious consequences (drowning) from getting stuck in or falling on unstable or deep substrates.	not panic if you get stuck. Stop and spread your body weight evenly over the mud and crawl out. You may need to remove your shoes. If you need assistance, ask your field buddy to assist with sticks/branches which you place on the mud to stand on to get out.				
Conduct fieldwork/sampling	Sharp objects Injury or illness from cuts from sharp objects including rubbish and syringes.	Be vigilant when working in areas with a lot of rubbish and sharp objects. Avoid picking up sharp objects or rubbish and wear appropriate PPE (solid work boots, gloves).	1	D	M	Fieldworker
Conduct fieldwork/sampling	Flash flooding Minor injuries to very serious consequences (drowning) from getting stuck in or falling on unstable or deep substrates.	In urban systems water levels can rise very quickly, keep an eye upstream especially if there has been rain in the last 24 hours.	5	A	H	Fieldworker
Conduct fieldwork/sampling	Maintain clear access to walking and bike paths for other waterway users Minor injuries to very serious consequences (from being hit by a passing cyclist)	Ensure you keep bike paths and walkways clear for other users	4	C	H	Fieldworker

Note: ***Add more rows if required.***

SECTION 4. RISK MATRIX	
Risk Consequence Rating Tool	
Purpose of the tool	Use this *'Risk Consequence Rating Tool'* to enable the consistent assessment of potential risk impacts. This tool defines the criteria to rate the consequences and allows consistent assessment of risks across the university.
How to use this tool	Using the explanation under the different consequence criteria (Education & Research, Student Experience etc. identify the most relevant measures related to your risk. You may have one or more consequence criteria (i.e. Financial and Student Experience) that apply to the risk. When identifying the rating always use the highest associated rating as the final rating (e.g. Financial = Major, Student Experience = Severe, you would therefore select the highest out of the two which would be Severe.)

Risk Consequence Criteria

Rating	Description	People, Safety & Environment
5	Extreme Exceptional impacts on operations or objectives	Single or multiple fatalities Serious disabling physical or mental illness to multiple people Extreme environmental damage (>5 years)
4	Severe Significant impacts on operations or objectives	Severe irreversible damage or impairment to one or more people Irreversible health effect or medium to long-term disabling illness Long term environmental damage (2-5 years)
3	Major Large impacts on operations or objectives	Reversible injury or moderate irreversible damage or impairment to one or more people. Typically, an injury resulting in loss of a scheduled shift of work (i.e. Lost Time Injury) Severe reversible mental or physical health effect of concern that would typically result in a lost time illness Medium term environmental damage (1-2 years)
2	Moderate Material impacts on operations or objectives	Reversible injuries requiring treatment but does not lead to restricted duties. Typically, a medical treatment Reversible health effects of concern that would typically result in medical treatment Short term environmental damage (<1 year)
1	Minor Slight impacts on operations or objectives	Low level short term subjective inconvenience or symptom. Typically, first aid or no medical treatment Reversible health effects little concern requiring first aid treatment at most Minor environmental damage

Risk Likelihood Rating Tool

Purpose of the Tool	Use this ***'Risk Likelihood Rating Tool'*** to enable the consistent assessment of the possibility of a risk occurring. This tool defines the criteria to rate the likelihood and allows consistent assessment of risks across the university
How to use this tool	Using the definitions under the different criteria headings (i.e. Qualitative, Percentage, Timeframe & Exposure) identify the most relevant and applicable criteria rating the likelihood of the risk. Where multiple criteria can be applied, use the one that results in the highest likelihood rating (e.g. Percentage = Likely, Timeframe = Possible, you would therefore select the highest rating out of the two which would be **Likely)**

Risk Likelihood Criteria

Rating		Qualitative	Percentage	Timeframe	Exposure
E	**Almost Certain**	• Risk is expected to occur • Would be extremely surprised if the risk didn't occur	• Greater than 90% chance of occurring	• Expected to occur within 6 months	• Individuals are exposed multiple times each day
D	**Likely**	• Strong possibility for the risk to occur • Would be surprised if the risk didn't occur	• Between 60% to 89% chance of occurring	• Expected to occur within 1 to 2 years	• Individuals are exposed approximately once per week
C	**Possible**	• Possible that the risk may occur • There is potential for the risk to occur	• Between 20% to 59% chance of occurring	• Expected to occur within 2 to 3 years	• Individuals are exposed approximately once per month
B	**Unlikely**	• Slight possibility for the risk to occur • Would be surprised if the risk occurred	• Between 5% to 19% chance of occurring	• Expected to occur within 3 to 4 years	• Individuals are exposed approximately once per year
A	**Rare**	• Extremely unlikely for the risk to occur • Would be extremely surprised if the risk occurred	• Less than 5% chance of occurring	• Not expected to occur within the next 5 years	• Individuals have not been known to be exposed

Risk Exposure Rating Tool

Purpose of the tool	Use the ***'Risk Exposure Rating Tool'*** to highlight the severity of the risks (i.e. Low, Medium, High, Critical). This in turn helps determine which risks you should focus your efforts and resources on. The tool also highlights the implications associated with the different ratings for aspects such as: impacts on objectives; management oversight; reporting; and review.
How to use this tool	The 'Risk Exposure Rating Tool' is used to evaluate risks based on severity of their consequence and their likelihood to occur. To evaluate the risk exposure, use the 'Consequence Rating Tool' to define the consequence rating and the 'Likelihood Rating Tool' to define the likelihood rating. Once you have ascertained these two ratings you can then plot what the risk exposure rating is (i.e. Low, Medium, High, Critical) from the matrix below. To understand the implication of each rating, refer to the descriptions in the Risk Exposure Ratings table to the right.

Risk Exposure Matrix		Consequence Rating				
		Minor (1)	**Moderate (2)**	**Major (3)**	**Severe (4)**	**Extreme (5)**
Likelihood Rating	**Almost Certain (E)**	**Medium**	**High**	**Critical**	**Critical**	**Critical**
	Likely (D)	**Medium**	**Medium**	**High**	**Critical**	**Critical**
	Possible (C)	**Low**	**Medium**	**High**	**High**	**Critical**
	Unlikely (B)	**Low**	**Low**	**Medium**	**High**	**High**
	Rare (A)	**Low**	**Low**	**Low**	**Medium**	**High**

Risk Exposure Ratings

Rating	Description
Critical	• Objectives will not be achieved • Requires relevant management's highest priority and urgent attention • Risk must be visible and reported to at least the Vice Chancellor's Executive level (or equivalent) • Risk must be reviewed at least every 6 months
High	• Achievement of objectives under serious threat • Requires relevant management's priority and active involvement • Risk must be visible and reported to at least the Executive Director level (or equivalent) • Risk must be reviewed at least every 6 months
Medium	• Some threat to achievement of objectives • Requires relevant management's active monitoring • Risk must be visible and reported to at least the Director level (or equivalent) • Risk must be reviewed at least annually
Low	• Achievement of objectives not under threat • Can be dealt with normal course of business • Risk must be visible and reported to at least the Senior Manager level (or equivalent) • Risk must be reviewed at least annually

SECTION 5: CONTROLLING THE HAZARDS – THE HIERARCHY OF CONTROLS

Specify the risk control type and control description for each hazard in Section 3.
The ways of controlling risks are ranked from the highest level of protection and reliability to the lowest. This ranking is known as the hierarchy of controls. The hierarchy of controls can be applied in relation to any risk.
You must always aim to eliminate the risk, which is the most effective control. If this is not reasonably practicable, you must minimise the risk by working through the other alternatives in the hierarchy.
The lower levels in the hierarchy are less effective because controls that change the hazard or minimise exposure to the hazard can only minimise the risk. You cannot eliminate the risk without eliminating the hazard.
Administrative controls and **personal protective equipment (PPE**) are the least effective at minimising risk because they do not control the hazard at the source and rely on human behaviour and supervision. These control measures should only be used: to supplement higher level control measures (as a back-up), as a short-term interim measure until a more effective way of controlling the risk can be used, or when there are no other practical control measures available (as a last resort).
Elimination The most effective control measure involves eliminating the hazard and associated risk. The best way to do this is by, firstly, not introducing the hazard into the workplace. For example, you can eliminate the risk of a fall from height by doing the work at ground level. You can eliminate risks by removing an existing hazard, for example, by removing trip hazards on the floor, disposing of unwanted chemicals, or not working in an isolated or remote area.
It may not be reasonably practicable to eliminate a hazard if doing so means that you cannot create the end product or deliver the service. If you cannot eliminate the hazard, then you must minimise as many of the risks associated with the hazard as reasonably practicable.
Substitution, isolation and engineering controls If it is not reasonably practicable to eliminate the hazards and associated risks, you must minimise the risks using one or more of the following approaches.
Substitute the hazard with something safer. For instance, replace solvent-based paints with water-based ones.
Isolate the hazard from people. This involves physically separating the source of harm from people by distance or using barriers. For instance, install guardrails around exposed edges and holes in floors; use remote control systems to operate machinery; store chemicals in a fume cabinet.
Use ***engineering*** controls. An engineering control is a control measure that is physical in nature, including a mechanical device or process. For instance, use mechanical devices such as trolleys or hoists to move heavy loads; place guards around moving parts of machinery; install residual current devices (electrical safety switches); install sound dampening measures to reduce exposure to hazardous noise.
Administrative controls
If risks remain, they must be minimised by implementing administrative controls. Administrative controls include work methods or procedures that are designed to minimise exposure to a hazard as well as the information, training and instruction needed to ensure people can work safely. For instance, develop procedures on how to operate machinery safely, provide training and support to managers and staff to identify and manage health and safety risks, implement anti-bullying policies, limit exposure time to a hazardous task, and/or use signs to warn people of a hazard. Some administrative measures will be necessary to ensure substitution, isolation and engineering controls are implemented effectively, for example, following safe work procedures when using equipment.
Personal protective equipment (PPE)
Any remaining risks must be minimised with suitable PPE. Examples of PPE include earmuffs, respirators, face masks, hard hats, gloves, aprons and protective eyewear. PPE limits exposure to the harmful effects of a hazard but only if workers wear and use the PPE correctly. Some administrative measures will be necessary to ensure substitution, isolation, engineering controls and PPE are implemented effectively, for example, following safe work procedures when using equipment.

Hierarchy of Control