

Subcommittee on National Plant Health
Surveillance (SNPHS)

SNPHS Reference Standard No. 1
(SNPHS RS No. 1)

***Development and Approval of Technical
Reference Guides for Plant Pest Surveillance***

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1. INTRODUCTION

This Reference Standard (RS) supports the development of nationally consistent Technical Reference Guides (TRGs) to underpin plant health surveillance activities in Australia. TRGs play a key role in supporting coordinated surveillance approaches across jurisdictions and sectors, and in ensuring surveillance activities align with contemporary science, best practice, and national and international obligations.

1.1 Purpose

The purpose of this RS is to provide clear guidance to authors on the requirements for developing a TRG for plant health surveillance.

This RS establishes a consistent framework to ensure that TRGs:

- Are developed using contemporary science and accepted surveillance practices.
- Include all information necessary to support effective surveillance activities.
- Are structured and presented in a nationally consistent manner.

A TRG provides direction and guidance for conducting surveillance for a specific plant pest or group of plant pests (“pest” includes insects, mites, nematodes, and pathogens). It outlines recommended surveillance methodologies and may also include relevant information on pest biology, taxonomy, identification, and sample processing where these support surveillance outcomes.

TRGs are primarily intended for use by jurisdictional government departments and national plant biosecurity surveillance programs, and may also support surveillance activities undertaken by industry, academia, and research organisations.

TRGs serve as the primary reference for the development of surveillance plans and contribute to a coordinated national plant health surveillance system.

1.2 Scope

Reference Standard (RS)

This RS applies to the development of TRGs for plant health surveillance in Australia. It sets out the broad principles, structure, and content requirements for TRGs to guide nationally consistent surveillance activities. It provides direction to authors about how TRGs should be prepared to ensure they are clear, scientifically robust, and suitable for use.

Technical Reference Guide (TRG)

A TRG provides guidance for conducting surveillance for a specific plant pest, or group of plant pests. TRGs are intended to be clear, well-structured, and written at a level of detail sufficient to support the planning and implementation of surveillance activities.

TRGs developed in accordance with this RS may be submitted through the approval process outlined in Section 2 for consideration as a nationally endorsed TRG. Detailed guidance on the content to be included in TRGs is provided through the TRG template in Appendix 1.

Content included in a Technical Reference Guide

- The agricultural, agroforestry, ornamental, environmental and/or public amenity significance of the pest(s) and justification for surveillance.
- Risk and pathway analysis relevant to surveillance design.
- Pest biology and ecology as they relate to surveillance.
- Surveillance methodologies.
- Data recording and management considerations.
- Diagnostic considerations relevant to surveillance activities.

Content excluded from a Technical Reference Guide

- Detailed aspects of surveillance design, including, statistical rationale and sample size calculations, because these elements are highly context-specific and should be developed on a case-by-case basis during surveillance planning, with advice sought from a biometrician or other relevant expert where appropriate.
- Biological, ecological, and diagnostic information that is not directly relevant to surveillance of the pest(s) specified in the TRG.
- Site- or area-specific information, noting that regional differences may be identified where relevant to surveillance considerations.

- Information that is specific to individual surveillance plans.
- Other mandatory requirements (e.g. market access or statistical).

TRGs provide the scientific and technical foundation for surveillance activities. Surveillance plans are informed by TRGs, but they apply this guidance in a practical way for a specific location. A surveillance plan includes further information specific to location, surveillance purpose, and surveillance implementation, such as:

- Survey/site/region-specific objectives.
- Survey design including epidemiological rationale, sampling approach, and proposed statistical analyses. Local risk factors, pathways, and other considerations relevant to surveillance implementation.
- Logistics.
- Resources.
- Operational groups for delivery.
- Mapping, data collection requirements etc.
- Implementation plan.
- Survey timeframe (could be a once-off project or an annual occurrence).
- Quantity of effort required to meet objectives.
- Training requirements.
- Sites or pathways selected for surveillance as per the TRG.
- Methods to be used to target the pest as per the TRG.

1.3 Structure

This RS includes:

- Section 1: Introduction.
- Section 2: Procedure and approval process for the development of a TRG.
- Section 3: TRG Template and Instructions to Authors.
- Section 4: Appendices.

2. PROCEDURE AND APPROVAL PROCESS FOR THE DEVELOPMENT OF A TECHNICAL REFERENCE GUIDE

2.1 Introduction

This section describes the procedure for developing, reviewing, endorsing, publishing, and maintaining a TRG. The process applies from the initial drafting stage through to endorsement by the Subcommittee on National Plant Health Surveillance (SNPHS), on behalf of the Plant Health Committee (PHC).

Figure 1 provides an indicative overview of the process. The numbered steps below constitute the authoritative procedure.

2.2 Identification of priorities

The SNPHS identifies government priorities for the development of new TRGs or the review of existing TRGs. These priorities are documented in the annual SNPHS work plan reported to PHC.

Industries or other stakeholders may also identify additional priorities and develop draft TRGs using the approved RS. For a TRG to be accepted as an endorsed document, the draft **must** be submitted to the SNPHS through the secretariat and **must** follow the procedure outlined below from Step 1 onward.

2.3 TRG Draft development to endorsement procedure

Phase 1 – Initiation

Step 1: Identification of need for a TRG

- A need for a new or revised TRG for a specified pest or group of pests is received and agreed by the Technical Reference Guide Working Group (TRGWG) or requested by the SNPHS.

Step 2: Author identification

- The National Protocols Coordinator in liaison with the TRGWG, facilitates an Expression of Interest (EOI) process to identify and select a suitable author. Alternatively, authors may be nominated by the SNPHS or may volunteer, subject to endorsement by the SNPHS.

Step 3: Author engagement and briefing

- The National Protocols Coordinator engages and provides the author with:
 - The endorsed RS.
 - Any existing National Diagnostic Protocols (NDPs) relevant to the TRG (where available).
- Upon completion of the TRG draft, the Data Protocol Liaison (TRGWG member) will work with the author to draft a Data Protocol.

Step 4: Draft submission

- The author prepares a draft TRG in accordance with the RS and submits it to the TRGWG.

Phase 2 – Quality check**Step 5: Consistency and quality check**

- The TRGWG nominates evaluator(s) from within the working group to confirm that the draft TRG is consistent with the endorsed RS.
- Where inconsistencies are identified, the draft may be returned to the author for further revision before proceeding.

Phase 3 – Technical review**Step 6: Subject Matter Experts (SMEs) identification**

- The TRGWG identifies or nominates SME(s) to undertake technical review of the draft TRG. Where possible and practical, consideration should be given to appointing an international reviewer with demonstrated experience with the relevant pest(s).
- The TRGWG Coordinator may facilitate an EOI process to identify suitable SME(s), or reviewers may be nominated directly by the TRGWG or the SNPNS.
- SME(s) may include:
 - Experts on the target pest(s) (e.g. biologists, diagnosticians, or surveillance practitioners).
 - Biosecurity or invasive pest experts from universities, CSIRO, or government departments.

Step 7: SME engagement and briefing

- The TRGWG Coordinator engages the identified or nominated SME(s) to undertake the technical review. The TRGWG Coordinator provides the SME(s) with:
 - The draft TRG
 - The endorsed RS
 - The SME Reviewer's Guide
 - The expected timeframe for completion of the technical review

Step 8: Technical review of the draft TRG and submission

- Identified or nominated SME(s) review the draft TRG in accordance with the endorsed RS and the SME Reviewer's guide, and within the agreed timeframe.
- SME(s) provide their comments, recommendations, and any required amendments to the TRGWG Coordinator.

Step 9: Technical review outcomes

- The TRGWG considers the technical review feedback provided by the SME(s).
- Based on the review outcomes, either:
 - Comments are identified requiring further work prior to acceptance; or
 - The draft TRG is confirmed as acceptable and suitable to progress.
- Where further work is required, the TRGWG consolidates SME(s) comments and provides them to the TRG author. The author incorporates the required revisions within an agreed timeframe.
- Where technical review feedback is materially conflicting, the TRGWG facilitates resolution prior to further progression of the draft TRG.
- If SME(s) request to review the revised draft the document returns to Step 8 (Technical review of the draft TRG and submission).
- Where the draft TRG is confirmed as acceptable, the process proceeds to Step 10 (Final TRGWG review).

Step 10: Final TRGWG review

- Nominated TRGWG evaluators conduct a final review of the draft TRG to confirm that technical review feedback has been appropriately addressed and that the document is complete, consistent with the endorsed RS, and suitable to proceed to endorsement.

- Where minor amendments or clarifications are required, the draft TRG is returned to the author to update. The author provides the updated draft within the agreed timeframe.
- Where the draft TRG is confirmed as suitable, the process proceeds to Step 11 (submissions for endorsement).

Phase 4 – SNPNS endorsement

Step 11: Submission for SNPNS endorsement

- The TRGWG Coordinator submits the draft TRG accepted through the final TRGWG review, together with supporting documentation (e.g. SME Reviewer's Guide), to the SNPNS Secretariat for final review by the SNPNS.
- Where the SNPNS identifies issues requiring clarification or amendment, the SNPNS Secretariat returns the TRG to the TRGWG Coordinator. The TRGWG organises updates with the author and resubmits the revised TRG to the SNPNS for further consideration.
- Where the SNPNS confirms the TRG as suitable, the TRG is endorsed by the SNPNS on behalf of the PHC.
- Following endorsement, the TRGWG finalises the TRG, assigns a TRG number for publication on behalf of SNPNS.

Phase 5 – Publication

Step 12: Publication of the TRG

- The endorsed TRG is published on the Plant Surveillance Network Australasia-Pacific [PSNAP website](#).

Phase 6 – Review and maintenance

Step 13: Scheduled review of TRGs

- All endorsed TRGs are reviewed for currency at least every five years, or earlier if required.
- A review may also be initiated in response to specific triggers. Triggers must be specific, related to the scope of the TRG, and may be linked to relevant research and development activities, with references included where appropriate. Examples of review triggers include:

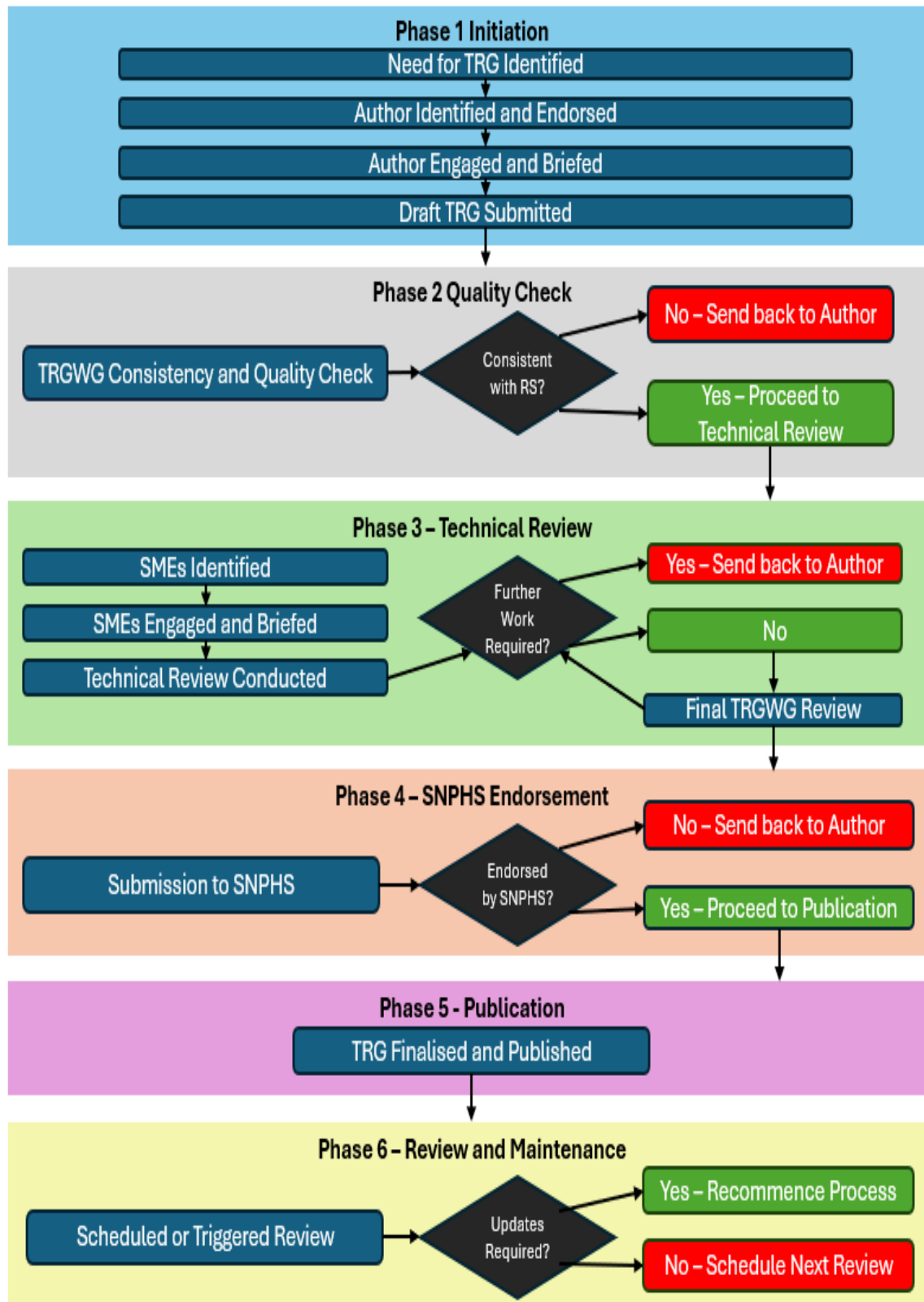
- Changes to market access surveillance requirements relevant to the pest(s).
- Technological advances in surveillance and/or diagnostic techniques relevant to pest surveillance.
- New or significantly changed pest pathways, risk assessments, or pathway analyses.
- A significant amendment to the RS.
- The endorsement, update, or replacement of a relevant NDP.
- Changes to (or development of) the relevant Data Protocol. The Data Protocol Liaison (TRGWG member) will collaborate with the author/ reviewer.
- Reviews consider new or updated information, including but not limited to pest biology, hosts, distribution, climate modelling (including climate change), surveillance or diagnostic methods/technology and management approaches. They also ensure contact information is kept up to date.

Step 14: Appointment of reviewers

- The SNPNS or the TRGWG appoints appropriately qualified expert(s) to conduct the review.

Step 15: Review outcomes

- Where updates are recommended, the TRG review process recommences in accordance with Steps 1-11.
- Where no updates are required, the TRG remains current and is scheduled for review within a further five-year period or earlier if required.

Figure 1: Indicative Overview of the Procedure and Approval Process for the Development of a Technical Reference Guide (TRG).

3. TECHNICAL REFERENCE GUIDE (TRG) TEMPLATE AND INSTRUCTIONS TO AUTHORS

3.1 TRG template structure and author instructions

This section provides details associated with the TRG template (Appendix 1) and instructions to authors for developing a TRG.

The main purpose of a TRG is to provide high level information to develop surveillance plans, which are specific to the surveillance requirements, purpose and locations for a particular pest or group of pests. The TRG should also identify issues or gaps for the reader to consider when developing a plan.

TRGs are arranged as per the template provided with the following sections (with additional sub-headings as appropriate):

- Cover page
- Table of Contents
- Terms, definitions, and abbreviations (optional)
- Contents
 1. Executive summary
 2. Scope
 3. Background and Rationale
 4. Surveillance
 - 4.1 Where and when to conduct surveillance
 - 4.2 Surveillance methods
 - 4.3 Sample handling and diagnostic considerations
 - 4.4 Pest specific requirements
 - 4.5 Record keeping
 5. References
 6. Appendices

Authors **must** follow the exact TRG template (Appendix 1). If the author identifies additional sub-headings or content, approval **must** be sought from the National Protocols Coordinator prior to its inclusion.

In developing the content of the TRG, all information and documents **must** be referenced.

All instructional information [in italics.] and note(s) to authors [in italics.] within the TRG template are to be removed once completed.

Mandatory text to remain is written in Arial 11 (as per Style Guide in Appendix 3).

The TRG template including the cover page template is found in Appendix 1.

A referencing style guide is provided in Appendix 2.

The style guide for formatting required for TRGs is provided in Appendix 3. The TRG template needs to be checked against the formatting style requirements once the author notes and instructions are removed to ensure compliance.

The following outlines the general requirements for writing a TRG:

- Content which should be included in a TRG (please refer to this heading in the Scope on page 5 of this document for further detail).
- A TRG should provide evidence-based recommendations for effective and best practice surveillance of the target pest(s).
- A single TRG may cover a group of pests rather than a single pest, provided the surveillance required across the group is similar. If there are major differences, consider writing separate TRGs.
- It is recommended that dot points or tables (instead of paragraphs of text) are used where practical, for ease of reading.
- Tables **must** be titled as per the Style Guide in Appendix 3.
- References **must** be used to support evidence-based assessments of whether a surveillance method is recommended or not.
- The inclusion of relevant photos (including examples from previous Australian incursions if relevant) should be provided. Photographs **must** be titled and credited using the below format:
 - Images **must** be appropriate, in focus, and of sufficient resolution.
 - Format: for images use JPG or TIFF, for line art/graphics/logos, PNG can also be used.
 - Resolution of images a minimum of 300 dpi at 100%.
 - Resolution of line drawings a minimum of 600 dpi at 100%.
 - Image size minimum of 500 KB and maximum of 5 MB.
 - Images **must** be verified and the source referenced.

- Image files cropped as close to the actual image as possible.
- Images of high quality with good contrast of dark and light.
- Include figures in the serial order in the text.
- Include the meaning of any symbol or abbreviation.
- Ensure that species and genus are clearly stated. Common names and acronyms can be used in the TRG once the species has been clearly defined first and foremost.
- Avoid duplication of information between sections.
- When using 'less common' terms or acronyms, define them in the glossary table (in the Appendices section of the TRG).

3.2 Guidance on section lengths and content

Authors should exercise judgement when determining the length and level of detail for each section of a TRG. The scope and complexity of TRGs will vary depending on factors such as the number of pests covered, pest biology and ecology, and the range of surveillance methodologies available. As such, prescriptive page limits for most sections are not appropriate.

The following principles should guide authors:

- Adequate level of detail
 - Content should be proportionate to the complexity and scope of the pest(s) and surveillance approaches described. TRGs covering multiple pests or more complex surveillance considerations will require greater detail than those addressing a single pest or a limited number of methods.
- Concise and targeted guidance
 - TRGs are reference documents designed to support the planning and implementation of surveillance activities. Content should be clear, concise, and focused on information that directly supports surveillance design, rather than including unnecessary detail or duplication.
- Plain and accessible language
 - Technical and scientific terminology should be used only where necessary. While authors may draw on scientific literature to inform the TRG, information should be synthesised and communicated in a clear and accessible manner, rather than presented as a detailed literature review.
- Distinction from surveillance plans

- o TRGs provide general guidance and should not include site or program specific detail. Information such as logistics, resourcing, site selection, and statistical design should be addressed in surveillance plans, not in the TRG.
- Executive summary length
 - o The Executive Summary should be concise and generally limited to approximately one page, providing a clear, high-level overview of key points.

These principles are intended to promote consistency across TRGs while allowing sufficient flexibility to account for differences in pest scope, risk, and surveillance approaches.

4. APPENDICES

APPENDIX 1 – TECHNICAL REFERENCE GUIDE TEMPLATE

[Before commencing development of the TRG, please read the entire template.]

Cover page [Notes: This cover page is a standardised template cover with the required details completed.]

Subcommittee on National Plant Health Surveillance

Common name of pest/group (scientific name)

Technical Reference Guide

Version number		
Status		
Endorsement date		
Next review date	(5 years from publication date)	
Last reviewed date		
Reviewer(s) and date		
Author(s)		

Table of contents

[Notes: New page. The table of contents should be designed to be simple, with right-adjusted page numbers. Insert here and if the optional terms, definitions and abbreviations section is not included, start body of contents and the numbering of the document on a new page.]

Terms, definitions, and abbreviations

*[Notes: **OPTIONAL section** and new page – delete this page if not required.]*

The main reference for terms and definitions with specific meaning for phytosanitary systems worldwide is the International Plant Protection Convention (IPPC) and the International Standards for Phytosanitary Measures (ISPMs). [ISPM 5](#) – Glossary of Phytosanitary terms, which should be consulted in case of doubt.

Use a simple table format right adjusted.

Insert here and start body of contents and the numbering of the document on a new page.]

1. Executive summary

[Add the following mandatory text to the start of the executive summary section.]

This executive summary provides a quick reference to the key procedures outlined in this TRG. While this summary highlights essential and recommended practices, it is strongly recommended that the full document be reviewed for comprehensive guidance.

[Add your additional text from this point.]

2. Scope

[Notes: This section should provide guidance on the use of the TRG across surveillance types from early detection to response activities. If there are limitations on the use of the TRG it should be clearly stated here. Refer to page 5 scope of the TRG.]

[Start this section using the following mandatory text]

This guide is designed to assist in developing surveillance plans for *(insert pest(s) name(s))* with consideration to the following surveillance types as defined by [ISPM 6](#):

- **Detection** – surveillance conducted to look for new pest incursions into Australia and/or state and territories. Early detection of an exotic pest may increase the chances of a successful eradication response.
- **Delimiting** – to determine spread and/or define the boundaries of an infested area after a new pest or disease has been detected, as the initial detection site might not be the true source or extent of the infestation.
- **Monitoring** – for monitoring pest status, populations, and distribution to inform management decisions, targeted interventions, adjustments to control strategies, low pest prevalence, and area freedom claims.

The above can be used to determine pest status – Pest status is a record recognised by the International Plant Protection Convention (IPPC) (refer to ISPM 8) that indicates the presence or absence of specific pests at a particular location and certain time, within an area, usually a country, under described circumstances.

[Add and amend the following mandatory text.]

The content of this TRG is primarily focused on the surveillance methodology for the pest(s) in question, with information on the relevant biology and ecology of the pest(s), the entry and establishment pathways and target locations limited to how they inform the development of a surveillance plan. Detailed information of the pests can be found in other plans and documents (see Appendix XX). In addition, content includes details about sample handling, in line with diagnostic considerations (e.g. morphological and molecular), record-keeping requirements and any pest-specific obligations. The content in this document should guide targeted biosecurity surveillance programs, however the methods outlined can be applied, in part, to general surveillance initiatives such as industry adopt-a-trap or biosecurity blitz style programs, or to academia and research organisations.

The surveillance technologies and methods outlined are those that are currently available, in use nationally or internationally and have sufficient information (peer-reviewed publications or articles) upon which to make an evidence-based recommendation on their utility and inclusion in Australian surveillance programs.

[Notes: If there are limitations on the use of the guide or if the guide can be applicable to other pests (e.g. those within the same genus) it should be clearly stated here. For instance, limitations could include but not exclusive to:

- *Basic biology*
- *Climate modelling (including climate change)*
- *Trapping or visual surveillance methods*
- *Diagnostic methods and their limitations*
- *The use of citizen science]*

3. Background and rationale

[Notes: This section provides a brief overview of the pest(s), including their status in Australia and outlines the biosecurity rationale for surveillance. This should include the decisions surveillance may inform (e.g. demonstrating pest absence or supporting market access) and justify the need for a dedicated TRG. Justification may include factors such as the pest(s) national priority status (e.g. NPPP), global distribution, environmental and/or industry impacts, defining risk open pathways, and eradication challenges.

Information in this section to include:

- *The current valid scientific name(s) of the pest(s) and previous scientific name(s). Synonyms and common names especially if extensive should be provided in Appendices.*
- *Brief details of key hosts and the type and extent of damage it causes. The pest(s) native range(s) and a description of the expanding range highlighting incursions in*

near neighbour countries. If relevant, briefly describe transmission, vector, or vectoring capacity the pest(s) known to have.

- *A brief overview of entry and establishment pathways, with full detail provided in Sections 4.1.1. and 4.1.2 below.*
- *A summary of eradication likelihood and methodologies if the pest(s) were to enter Australia. Mention of the cost-benefit of conducting surveillance, and costs for control or management if eradication is unsuccessful.*
- *A summary of biology and host types of significance as they relate to the surveillance activities, such as where and when to find specific life stages of the pest, which will be covered in the surveillance section.]*

4. Surveillance

*[Notes: The development of a surveillance plan **must** cover:*

- *Where to look for the pest. i.e. hosts in targeted locations within high-risk entry and establishment pathways.*
- *When to look for the pest. i.e. what time of year, over what period, and what time of day.*
- *How to look for the pest. i.e. the recommended method(s) for surveillance.*

As outlined in the scope of this document, information on entry and establishment pathways and pest biology and ecology is covered as it relates directly to surveillance of the target pest(s). Information on surveillance methodology should provide a higher level of detail to support confidence in the methods being recommended in this document.

The author must follow the instructions outlined in each section below.]

4.1. Where and when to conduct surveillance

[Notes: The purpose of this section is to summarise known pathway information (from e.g., CABI) that is relevant to planning surveillance activities. This section might include information such as human assisted spread (e.g. machinery and cargo) or spread through natural means (e.g. climate and weather). This section should also refer to any risk analyses the Commonwealth Department of Agriculture, has produced and provide links for publicly available documents.]

4.1.1. Entry pathways

[Notes: This section should summarise the regulated and unregulated entry pathways thorough which the pest may enter Australia, such as types of cargo, vessels from specific regions, etc.]

4.1.2. Establishment pathways

[Notes: This section should include a summary of areas, particular land use, environments, and/or soil types where establishment is likely to occur at the end of an entry pathway, and how the pest(s) may spread further along active establishment pathways within Australia. Establishment pathways may include both passive (natural

dispersal, wind, rain, etc.) and active (agricultural practices, transport of goods, vector dispersal, etc.) means of dispersal.]

4.1.3. Site selection

[Notes: This section is to provide details about specific sites along entry and establishment pathways (as described above) that the pest(s) could pass through or end up as influenced by their biology, trade movements, and other retail implications. Examples include residential areas, forests, and cultivated regions. This can include a table detailing these target sites and areas on these sites to target relevant to the pest(s) (as per Table 1).]

Table 1 – Example showing target site and specific areas on site.

Target site	Target areas
Fresh food and flower distribution centres and markets	Bulk storage of vegetables and cut flowers Areas where incoming trucks park and goods unloaded
Areas located in proximity to transport corridors and border crossings	Inspection areas Common rest stops Truck waiting yards

4.1.4. Host range

[Notes: For developing a TRG, “host” refers to any organism or substrate that can support the survival, reproduction, or persistence of the pest. While hosts are often plant species, they may also include other organisms (e.g. insects or fungi), as well as non-living substrates (e.g. soil), dependent on the biology of the pest.

An exhaustive list of hosts is not required for a TRG. Instead, this section should focus on the main hosts of the pest that are reliably documented. These hosts are those that may be affected by the pest under a broad range of conditions and are likely to support its survival.

Where relevant, details should be provided on whether hosts are native, wild, or cultivated, and which hosts are of primary focus based on the risk associated with the surveillance pathway. For example, detection of the pest may be more likely on unmanaged weed hosts than on cultivated crops of the same species.

Consideration should also be given to host relevance to the identified risk pathways, as well as host availability and abundance. Additional host lists indicating such factors can be provided as appendices (as per Table 2).]

Table 2 – Example of host details provided.

Host	Common names	Type
<i>Brassica</i> spp.	Cabbages, mustard plants	Cultivated crop and wild
<i>Apis mellifera</i>	European honeybee	Pollinating insect

*[Notes: Conditional hosts **must** only be included where they are relevant to surveillance. These are hosts that support the pest under a limited and defined set of conditions (e.g.*

experimental settings, specific life stages, or environmental conditions), which should be clearly described. Conditional hosts that are not relevant to surveillance should not be listed.]

4.1.5. Surveillance timing

[Notes: This section is to detail information that can be used to direct surveillance planning over the seasons (per annum). Note that resourcing is at the discretion of the surveillance programs. In determining timing, consideration should be given to:

- Biology of the pest(s) and the host(s) as it relates to their potential lifecycle in Australia and the impacts that has on detectability.*
- Biology of the pest as it relates to increasing or decreasing activity on entry pathways and/or establishment pathways across the year.*
- Seasonality and impacts of abiotic conditions (weather, wind, photoperiod, etc.).]*

4.2. Surveillance methods

*[Notes: The purpose of this section is to define all surveillance methods specific to the pest(s) and describe how they can be used to meet surveillance objectives. Descriptions **must** include signs of the pest (e.g. physical presence of the organism life stages) and any associated damage or symptoms caused to host(s). Descriptions **must** also include how easily these signs and symptoms can be detected in the field, and how this varies depending on host, environmental conditions, and other relevant factors. These surveillance methods can be drawn from existing demonstrably sound techniques (preferably within the Australian context).*

*Recommended surveillance methods **must** be contemporary, evidence based and fully referenced.*

For each method, include:

- A brief description of the technique, including the equipment used, how it operates, and how it enables pest detection.*
- Key advantages and limitations, particularly in comparison with other surveillance methods.*
- Equipment maintenance requirements, and accessibility.*
- Biological and detection factors influencing performance, including symptom expression, confounding stresses (e.g. drought, nutrient deficiency, soil conditions, chemical injury), host interactions, species differences, growth stages, and environmental conditions.*
- Specificity and level of confidence in detection.*
- Limitations related to timing, including dormant periods and abiotic conditions under which the method is less effective.*
- Likelihood of detection (e.g. sample size requirements, sampling intensity).*
- Any specific biosecurity and hygiene considerations (e.g. avoiding cross contamination between sites).*

Non-recommended methods must be detailed within a separate appendix, highlighting that the methods have been reviewed and the reasoning behind their non-selection.

Refer to Appendix 4 for surveillance categories that should be considered when developing a TRG.

Detail relevant surveillance methods under the appropriate category heading in Sections 4.2.1 to 4.2.4 below. If there are no relevant surveillance methods for a particular category, under the heading write “- Reviewed, no methods applicable.”]

[Include and update the following mandatory text and tables.]

The following tables provide a summary of surveillance methods, details include;

1. Researched relevant surveillance methods which are or are not (or, if applicable conditionally) recommended (as per Table 3).
2. A summary of the recommended surveillance methods (as per Table 4), including the advantages and disadvantages of each recommended surveillance method and considerations for the surveillance type (as described in Section 2 Scope). Refer to successful examples in the literature, overseas or past detections in Australia.

Table 3 – Example of a summary of surveillance methods that are or are not recommended.

Surveillance methods (per category)	Recommended/not recommended
Visual surveillance	
<i>Crop inspections</i>	<i>Recommended</i>
<i>Visual field surveillance</i>	<i>Not recommended</i>
Trapping	
<i>Sticky traps</i>	<i>Recommended*</i>
<i>Pheromone traps</i>	<i>Not recommended</i>
Sampling	
<i>Hand sampling</i>	<i>Recommended</i>
<i>Vacuum sampling</i>	<i>Not recommended</i>

* Denotes a recommended surveillance method with notable additional implementation considerations, such as use with other surveillance method(s), environmental constraints, or other key operational requirements. Refer to the relevant sections below for further details.

Table 4 – Example of a summary of recommended surveillance methods for the (add target pest).

Target (<i>Genus species</i>)	Recommended method(s)	Advantages	Disadvantages	Considerations for surveillance types*
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<i>Liriomyza</i> spp.	Hand collection	Can collect immature stages including eggs. Immediate sample collection, (compared to trap monitoring). Mines remain intact and relatively unchanged over a period of weeks. Samples collected on the day.	Low chances of detection. Labour intensive as it often requires a greater number of hosts to be sampled. Requires collectors to be aware of signs and symptoms. Mines are not specific to target leafminer flies. Relies on damage being observable which is difficult especially when population size is low or at early life-stages.	Not ideal for early detection and onerous for delimiting. Might be more suitable for monitoring depending on the situation and surveillance objective. For early detection both hand collection and sticky traps could be used concurrently.
<i>Liriomyza</i> spp.	Sticky traps	Can detect adults prior to damage being observable in field. Can be enhanced by using species specific lures. Easy to use and non-toxic. Easy to replace once sticky sheet is full of specimens or covered in dust.	Can damage or cause incomplete specimens leading to issues in identifying specimens, (but can be minimised by using molecular methods or more frequent trap checks). May become quickly covered with insects in large crops and require more frequent inspection. Cages required in some jurisdictions. Only detects adults.	Suitable for delimiting and monitoring depending on the situation and surveillance objective. For early detection both hand collection and sticky traps could be used concurrently.

* Refer to Section 2 (Scope).

4.2.1. Visual surveillance

*[Notes: This section **must** describe the recommended visual surveillance methods (see Appendix 4 for examples) associated with the pest(s) outlined in the tables above and the points outlined in Section 4.2 above. This section **must** describe the signs and host symptoms of the pest(s), with a focus on how these can be detected through visual surveillance in the field. Relevant pest behaviours that may aid or hinder detection should also be described where applicable (e.g. movement when disturbed, aggregation behaviour, or cryptic life stages).]*

4.2.1.1. Signs and symptoms

[Notes: Provide details on where signs and symptoms are most likely to occur, including:

- *Locations on or within hosts or substrates where the pest or its signs are typically found (e.g. leaves, stems, roots, fruit, soil, nests, or other materials).*

- *Host life stage or context (e.g. developmental stage, maturity, or timing).*
- *Spatial distribution or positioning (e.g. exposed vs concealed, elevated, ground level or internal locations).*

If more than one pest is included in the TRG, a table can help here to provide this information in an easy-to-read format.

Highlight any dormant periods or the timing and abiotic factors when symptoms / damage is less likely to be seen, as well as other conditions which symptoms could be confused with (e.g. nutrient deficiencies).

*Photographs **must** be provided in this section to aid detection and if applicable provide confidence for field triage.*

*This section **must** also detail the recommended collection methods for the pest(s), when being individually collected as a result of visual confirmation.]*

4.2.2. Trapping

*[Notes: This section **must** describe all the recommended static methods (traps) for collecting pest(s) associated with the pest(s) outlined in the tables and points outlined in Section 4.2 above. A brief description of the trap, how it operates, with recommended lures to enable pest detection should also be included.*

*Photos of the traps (especially regarding correct trap deployment set-up specific for the pest(s)) **must** be included.]*

4.2.2.1. Lures

*[Notes: If required, details about lures used to attract and arrest pest(s) **must** be added here. This can include but is not limited to various semiochemicals and semiophysicals lure options. Semiochemicals are signalling molecules emitted by organisms (plants or animals) that trigger specific behavioural or physiological responses in receiving individuals. Semiophysicals are physical stimuli, such as vibrations, sounds, and light, which modify the behaviour of organisms, acting as a counterpart to semiochemicals. Lure options therefore can include:*

- *Semiochemicals:*
 - *Pheromones - synthetic versions of insect sex pheromones (usually female-produced) that attract males for mating.*
 - *Kairomones - chemicals emitted by organisms that benefit the receiving organism (e.g. cues used by pests to locate hosts or food sources).*
 - *Allomones - chemicals that benefit the emitter species by deterring predators or competitors.*
 - *Synomones - chemicals that benefit both the emitter and receiver species (e.g., plant volatiles attracting pollinators).*
- *Semiophysicals:*
 - *Acoustic/vibrational – sounds or vibration signals mimicking mating calls.*
 - *Visible and ultraviolet lights and colours.*

If numerous lures are available, a table can be added for comparison.]

4.2.3. Sampling

*[Notes: This section **must** describe all the recommended sampling methods (see Appendix 4 for examples), used to detect or confirm the target pest(s) outlined in the tables*

above and the points outlined in Section 4.2. Sampling refers to the collection of material (e.g. organisms, tissues, or substrates) for examination or diagnostic testing.

*Descriptions **must** outline how samples are collected, including the types of material to be collected (e.g. plant, soil, water, insect, fungus, nest etc). This should include when and why sampling is used, such as confirming suspected detections identified through visual surveillance, supporting early detection where pests may be present but not easily visible, or detecting pests where no clear signs or symptoms are present.*

Where multiple pests are included, tables may be used to present sampling approaches clearly.

Photographs or diagrams of sampling methods and equipment should be included where they support correct implementation.]

4.2.4. Other methods or support tools

*[Notes: **OPTIONAL** section– delete this section if not required.*

This optional sub-section is for other recommended surveillance methods that may be well established and in use for a specific pest or group of pests. Examples could include remote sensing, digital and olfactory methods (e.g. canine detection programs) that are used for detecting the target pest(s) outlined in the tables above.

These methods may be used to help guide, prioritise, and inform surveillance efforts, but results will likely need to be “ground-truthed” with visual surveillance and/or trapping for actual specimen collection. This aids in confirming target pest presence and reduces the risk of false positives.

*This section **must** include methodology associated with the pest(s), as described in Section 4.2 above.*

Please include key information on technical and/or data analysis and modelling considerations, if applicable.]

4.3. Sample handling and diagnostics considerations

*[Notes: This section **must** include reference to the **National Diagnostic Protocol(s) (NDP) and International Plant Protection Convention (IPPC)**, especially Section 9 (Diagnostic Procedures to Support Surveillance) if available. If Section 9 is not available, then provide a summary of commonly used procedures and identification methods including morphological, serological, and molecular methods at each relevant life stage. This should include requirements for plant diagnostics, if applicable. Define the sample handling requirements for the previously mentioned recommended surveillance method(s). For instance, the requirements for glue traps (e.g. sticky traps, delta traps) may differ from non-glue traps, and this distinction should be provided in detail to the reader.]*

4.4. Pest specific requirements

[Notes: Details in this section pertain to pest specific obligations including workplace health and safety concerns regarding the pest(s) surveillance activities.]

4.4.1. Movement and securement

[Notes: Detail movement and securement requirements for the pest(s) after the mandatory text.]

[Add the following mandatory text.]

Consider jurisdictional biosecurity legislation when moving and securing any suspect exotic plant pest samples, including when sending samples for identification.

In developing a surveillance plan, all participants **must** be clear about their obligations regarding what to do if suspect samples need to be moved and secured.

If movement and securement obligations are not understood, contact the Emergency Plant Pest hotline on 1800 084 881, to obtain instructions to collect, move and store samples safely.

General diagnostic laboratory contact, preparation and sample submission information is provided below in Table 5.

Your chosen diagnostics provider **must** be contacted before sample submission to determine if they have suitable diagnostic and storage capability for the pest(s) (including the life stage being sampled) and have appropriate accreditation to receive biosecurity material.

By law everyone must comply with biosecurity legislation when moving any suspect exotic plant pest sample, including when sending samples for identification. Confirm with the relevant jurisdictional requirements before sending the sample. A chain of custody is necessary.

Ensure detailed labelling of samples for diagnostics, details may include identifying information based on an existing program, site address or location, date, time, and collector's name.

Table 55 – State and territory diagnostic contacts for submission of suspect plant pest samples.

Jurisdiction	Contact details
Australian Capital Territory (DAFF)	13 22 81 Email: ACTbiosecurity@act.gov.au Biosecurity Reports
New South Wales	1800 680 244 Email: biosecurity@dpi.nsw.gov.au Submission: Collecting and submitting plant or insect samples
Northern Territory	1800 084 881 Submission: Plant pathology and entomology contacts NT.GOV.AU
Queensland	13 25 23 Submitters will be advised what to do with samples through this service.

	Report a biosecurity pest or disease Department of Primary Industries, Queensland
South Australia	1800 084 881 Submission: Services - PIRSA
Tasmania	(03) 6165 3777 Email: PlantDiagnosticServices@nre.tas.gov.au Submission: Plant Diagnostic Services Department of Natural Resources and Environment Tasmania
Victoria	(03) 9032 7515 Submission: Diagnostic services Services Support and resources Agriculture Victoria
Western Australia	08 9368 3351 Email: DDLS@dpird.wa.gov.au Photos of samples can also be submitted through MyPestGuide app or website; DPIRD Diagnostics and Laboratory Services Department of Primary Industries and Regional Development

4.4.2. Minimum PPE requirements and safety information

[Notes: This section should include details about pest-specific personal protective equipment (PPE) recommended to limit injuries and to prevent people from becoming inadvertent vectors for the pest(s).]

[Add and amend the following mandatory text.]

When conducting surveillance for **[insert pest(s) name(s)]** ensure all minimum PPE requirements are met, and all relevant safety procedures are followed as detailed below. Any additional PPE and safety requirements outlined by the Commonwealth legislation and by the appropriate jurisdiction where surveillance is being performed, are to be complied with.

Ensure the following:

- *[List in dot points here the requirements specific to the pest(s), e.g. veil and gloves for bees]*

4.4.3. Decontamination of person and equipment

[IF decontamination procedures are applicable / required, this section should detail approved chemicals specific to the pest(s) to decontaminate people and equipment as per template wording below.]

All decontamination procedures detailed here **must** be followed to prevent the spread of pests and diseases during surveillance work. Any additional requirements for decontamination outlined by the Commonwealth legislation and by the appropriate jurisdiction where surveillance is being performed, are to be complied with. If the decontamination procedures on a property being surveyed are higher, adhere to the property requirements.

For details about chemicals refer to [Australian Pesticides and Veterinary Medicines Authority](#) (APVMA) website to find permits relating to chemicals approved for decontamination use. For *(insert pest(s) name(s))* please ensure the following:

- *[list in dot points here the requirements specific to the pest(s).]*

[IF NO decontamination requirements are required for the pest(s) use template wording below.]

Though there are no requirements for decontamination procedures specific for the *(insert pest(s) name(s))* additional requirements for decontamination outlined by the Commonwealth legislation and by the appropriate jurisdiction where surveillance is being performed, are to be complied with.

For details about chemicals refer to APVMA website to find permits relating to chemicals approved for use.

4.5. Record keeping

*[Notes: Data Protocols are based on the Pest Record Specification (PRS) and include controlled vocabulary lists specific to the pest or pest group. The PRS is a flexible set of data fields for plant health surveillance that is consistent with the Darwin Core standard for biological occurrence records. Controlled vocabulary lists are standardised lists of responses to data fields that would otherwise have freeform responses. Controlling the vocabulary in the fields at the input level removes the possibility of erroneous interpretation and ensures consistency across all surveillance data. The record keeping section of a TRG **must** link to the Data Protocol that has been published on the [PSNAP website](#). If a Data Protocol is not available, the TRGWG via the data protocol liaison will facilitate its development in consultation with the author upon the completion of the draft TRG.]*

[Start this record keeping section using the below mandatory text.]

Surveillance data captured for use in the plant health surveillance system in Australia should be collected using the Pest Record Specification (PRS). This biosecurity specific data standard is endorsed for use by SNPHS and PHC and is maintained by the Department of Agriculture, Fisheries and Forestry (DAFF). Surveillance planning should include the development of a program data standard, based on the Pest Record Specification, and utilising any relevant pest-specific Data Protocols. Information on using the Pest Record Specification and Data Protocols is available on the PSNAP website.

Where available, pest specific data protocol for (pest name) has been developed and is available on the [PSNAP website](#).

When undertaking surveillance, the data fields to be collected **must** be considered for individual pests and surveillance methods and the Data Protocol describes the mandatory, required, and optional data fields. Several data fields have specific controlled vocabulary from which they **must** be filled. Controlled vocabulary lists are included in the Data Protocol.

5. References

*[New page for References. Reference style requirements are described in Appendix 2. In this section include references cited in the TRG. Any documents used to obtain the information within the TRG **must** be referenced. This includes scientific publications, published surveillance procedures and manuals, web sites, videos, and personal communications (that have been validated). All material throughout the TRG **must** be referenced.]*

6. Appendices

[New page for Appendices and per appendix, labelling Appendix 1, Appendix 2 and so forth.

Appendices are to be used to provide essential detailed information relevant to the TRG. This should include but is not limited to:

- *Glossary table to explain uncommon terms and acronyms used in the TRG.*
- *Common names and previous taxonomic names*
- *Supporting resources e.g. contingency plans, management plans*
- *Brief summary of non-recommended surveillance methods researched.*

Note: *For non-recommended surveillance methods these should follow the same principles in detail as recommended in Section 4.2.]*

APPENDIX 2 – STYLE GUIDE - REFERENCING

The information in the TRG should be obtained from various reliable sources such as:

- Peer-reviewed journals
- National or International Diagnostic Protocols
- Plant Health Australia
- State and Territory agriculture resources
- CABI Invasive Species Compendium
- Invasive Species Council Australia
- United States Department of Agriculture
- European Food Safety Authority
- European and Mediterranean Plant Protection Organization
- Bugwood Center for Invasive Species and Ecosystem Health (good for photos when Australian examples may not be available)
- Local agricultural departments in countries that have experienced outbreaks are an excellent source of up-to-date surveillance information

When including links to documents in-text, direct readers to the main page of the website to preserve link addresses as long as possible. Links are tested for usability during the TRG review process.

When referencing documents that are unpublished or protected, use a footnote to direct the reader to obtain the document, for example:

¹ Available on request through the *Subcommittee on National Plant Health Surveillance*

Use the Harvard reference style, which is used by Australian government

(<https://www.stylemanual.gov.au/>):

- Journal articles
 - **Rule:** Author A (Year) 'Title of article: subtitle of article,' *Name of Journal*, volume(issue): page–page, DOI: number.
 - **Example:** North RC & Shelton AM. 1996. Ecology of *Thysanoptera* within cabbage fields. *Environmental Entomology* **15**, 520–526. Books Eberhard WG. 1985. *Sexual Selection and Animal Genitalia*. Harvard University Press, Harvard.
 - **Note:**
 - If several manuscripts by the same author(s) and from the same year are cited, a, b, c etc. should be put after the year of publication.

- Include the DOI if possible.
- Books
 - **Rule:** Author A (Year) *Title of book: subtitle of book*, Name of Publisher, Place of Publication.
 - **Example:** Eberhard WG. 1985. *Sexual Selection and Animal Genitalia*. Harvard University Press, Harvard.
- Chapters in books
 - **Rule:** Author A (Year) 'Title of chapter: subtitle of chapter,' in Editor E and Editor F (eds) *Title of book: subtitle of book*, Name of Publisher, Place of Publication.
 - **Example:** Bray RA. 1994. The *leucaena* psyllid. In *Forage Tree Legumes in Tropical Agriculture* (eds RC Gutteridge & HM Shelton) pp. 283–291. CAB International, Oxford. *Website* Bureau of Meteorology. 2014. Southern Oscillation Index Archives – 1876 to present. Available from: <http://www.bom.gov.au/climate/current/soihtm1.shtml> [Accessed 5 March 2014]
- Website with abbreviation
 - **Rule:** Author A (Year) 'Title of webpage,' *Name of larger publication or series*, Name of Website, accessed Day Month Year.
 - **Example:** Bureau of Meteorology. 2014. Southern Oscillation Index Archives – 1876 to present. Available from: <http://www.bom.gov.au/climate/current/soihtm1.shtml> [Accessed 5 March 2014]
 - **Note:** Use (IPPC 2015) as the in-text reference and add 'IPPC International Plant Protection Convention' to the glossary table.
- For other types of media
 - See - 'Referencing and Attribution' at <https://www.stylemanual.gov.au/>

APPENDIX 3 – STYLE GUIDE - FORMATTING

Use the 'keep with next' function to keep headings and paragraphs or tables, figures, and captions together.

Name	Style
Heading 1	Arial 15, bold, 6pt before and after for spacing.
Heading 2	Arial 13.5, bold, 6pt before and after for spacing.
Heading 3	Arial 12.5, bold, 6pt before and after for spacing.
Normal	Arial 11, 1.5 spacing.
Table caption	Placed above the table, Arial 9, 6pt after caption for spacing formatting. Tables referred to in text should be in bold.
Figure caption	Placed below the figure, Arial 9, formatting as per example below – all figure captions must cite a source that is included in the reference list. Figures referred to in text should be in bold.
Header	Each page excluding the title page should have a header, left justified Arial 9.
Page number	Right justified, bottom of the page, beginning with '1' on the first page of the content (after the Table of Contents) Arial 9.
Table of contents	Simple, 3 levels, show numbers, right align numbers, no tab leader.
Link within document	For appendices and sections, create a bookmark or link – linking work should be underlined and not bold e.g. Appendix one. For images that are not with the text, create a bookmark and link to the figure reference in bold and underline to highlight the link.

APPENDIX 4 – SURVEILLANCE CATEGORY DEFINITIONS

The following surveillance categories should be considered when developing a TRG. The table below provides guidance on the categorisation of surveillance methods (e.g. crop inspections, sticky traps, sweep netting) under each type. All types should be considered, with inclusion limited to methods relevant to the target pest(s) and context. These definitions support operational clarity within this guideline and do not replace internationally agreed terminology.

Surveillance category	Definition	Surveillance method examples
Visual surveillance	The systematic observation and examination of hosts, commodities, or environments to detect the presence of a pest, or signs and symptoms of a pest, without the use of attractants or capture devices.	Crop inspections Commodity inspections Hive inspections Visual field surveillance
Trapping	The use of devices designed to attract and capture target pests to support detection, identification, or monitoring.	Pheromone trapping Sticky trapping Light trapping Bait trapping
Sampling	The collection of material (e.g. plant tissue, soil, water, or organisms) from a defined location for examination or diagnostic testing to determine pest presence, absence, or prevalence. This includes both partial samples and whole-of-unit collection, where an entire organism, colony, swarm, or nest is removed and treated as a single sample.	Leaf sampling Petiole sampling Plant sampling Soil sampling Individual insect collection Whole swarm or nest collection Sweep netting Beating trays Beat sheeting Bee alcohol washing Vacuum sampling Sample collection (hand aspirators & pooters)

Surveillance activities may involve more than one type. For example, hive inspections are typically considered visual surveillance but may also involve sampling (e.g. collection of bees or hive material) or trapping (e.g. in hive traps). Where material is removed from its environment, whether as a portion or as a whole organism, colony, swarm, or nest, the activity is classified as sampling.