Development of the New Zealand risk assessment of pushing and pulling (NZRAPP)

RESEARCH REPORT

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Te Kāwanatanga o Aotearoa
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WORKSAFE
Mahi Haumaru Aotearoa

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EXECUTIVE SUMMARY

Background and purpose

There are currently no recommended methods to assess pushing and pulling tasks in New Zealand, and generally there is a need to improve hazardous manual task risk management. Further, the current, *Code of practice for manual handling* (Department of Labour et al., 2001) needs updating.

Previous research reported that resources and tools are needed to help businesses, inspectors, and professionals from across the work health and safety disciplines to easily identify musculoskeletal risks and controls (WorkSafe New Zealand, 2024b, 2025a). This led to WorkSafe adopting the suite of tools from the Health and Safety Executive (HSE), in the United Kingdom (UK). These tools were selected as they provide a comprehensive approach to address the range of risk factors associated with hazardous manual tasks.

A staged approach was used to develop the initial set of hazardous manual tasks tools for use in Aotearoa New Zealand. This report outlines the development process undertaken at Stage 3 which saw the completion of the New Zealand risk assessment of pushing and pulling (NZRAPP).

How we developed NZRAPP

In Stage 3, reported here, we developed an initial draft of NZRAPP. We had already confirmed with the HSE at Stage 1 that we could adapt the suite of tools to make them relevant for New Zealand. NZRAPP was reviewed internally before being designed. Due to time and budget restrictions, a simplified approach was taken compared with Stage 1, with no user trials occurring. But the principles learnt at Stage 1 were applied and similar formatting and layout were used to ensure consistency.

Outcomes

The HSE's RAPP tool (Health and Safety Executive, 2016b) was adapted and became the New Zealand risk assessment of pushing and pulling (NZRAPP) (WorkSafe New Zealand, 2025c). NZRAPP has two different types of pushing or pulling assessments: using non-powered wheeled equipment, and moving loads without wheels. NZRAPP helps assessors to identify high-risk pushing and pulling tasks and to check the effectiveness of control measures. The HSE (UK) are currently reviewing RAPP as they identified that the tool may underestimate the overall level of risk when certain risk factors combine, such as pushing or pulling heavy loads on slopes. A revised version is expected in 2026. To mitigate this underestimation until then, we suggest assessors consider all the contributing risk factors and undertake further investigation of tasks that involve pushing or pulling heavy loads on slopes.

Conclusions

There was a clear need to provide New Zealand businesses, and those working across the health and safety disciplines including inspectors with up-to-date, quick and easy to use, but scientifically robust hazardous manual task risk assessment tools. Research showed that the HSE suite of tools from the UK would be the most suitable. The Stage 3 development of NZRAPP aligns with NZMAC and NZART and is the final tool that was planned as part of the initial toolkit of New Zealand resources to help businesses assess hazardous manual

tasks and to manage musculoskeletal health risks. This should only be seen as the starting point, and there are many other resources needed to support the uptake of these tools. However, due to organisational restructure, the development of further tools or resources is not planned.

Recommendations

We recommend that the NZRAPP is used with other tools such as the *Contributing factors for musculoskeletal risks checklist* to address the wide range of work organisation and psychosocial risk factors. This will contribute towards a more comprehensive health risk management approach and should involve worker engagement and participation.

Businesses still require additional resources and guidance to support better management of the musculoskeletal risks workers are exposed to. The development of online tools, case studies, additional resources, and training are recommended. This work needs to be supported by an updated 'Code of practice for manual handling' or a new hazardous manual tasks good practice guide or similar.

CONTENTS

appendices

figures

1.0
Background and purpose of this report

This report outlines the development process of NZRAPP and acts as a record to provide the logic behind why specific changes to the HSE tool were made.

Musculoskeletal harm makes up around 30% of health harm impacting New Zealand workers (WorkSafe New Zealand, 2019). In terms of musculoskeletal health risk management New Zealand still has much to do to better manage worker exposure and control the risks.

Current guidance needs updating. The *Code of practice for manual handling* (Department of Labour et al., 2001) is over 20 years old and does not reference the Health and Safety at Work Act (2015). Updated resources and tools are needed to help businesses, inspectors, and professionals from across the work health and safety disciplines to easily identify risks and controls.

The New Zealand risk assessment of pushing and pulling (NZRAPP) was adapted from the Health and Safety Executive (HSE) in the United Kingdom for use in Aotearoa New Zealand. It is part of a series of manual task risk assessments and was developed in Stage 3 of the project.

Within this report we use the term 'hazardous manual tasks'. Pushing and pulling activities may be considered hazardous when one or more of the following characteristics are present:

- high, sudden, repetitive, or sustained forces
- repetitive movements
- sustained or awkward postures, or
- exposure to vibration (Safe Work Australia, 2016).

WorkSafe New Zealand (2024b) recommended that tools providing a comprehensive approach to address the range of risk factors associated with hazardous manual tasks are needed. One of the limitations of these tools is that they mainly focus on physical risk factors, with limited consideration of work organisation or psychosocial factors (WorkSafe New Zealand, 2024b, 2025a). To better consider these risk factors we developed the *Contributory factors for musculoskeletal risks checklist* (WorkSafe New Zealand, 2024a). This checklist can be used after completion of the NZMAC, NZART, or NZRAPP and considers the range of contributory risk factors associated with musculoskeletal discomfort, pain, or injury that workers might be exposed to.

The development of NZRAPP marks the completion of the initial set of tools that WorkSafe set out to deliver. The manual handling screening tools and the NZMAC risk assessment were developed in Stage 1, and the upper limb screening tool and NZART risk assessment were developed in Stage 2. The completion of these tools marks the first step in providing New Zealand businesses and work health and safety professionals with updated resources so they can better manage the risks associated with work-related musculoskeletal disorders (WRMSDs). While these tools provide a starting point, there remains the need for more supporting resources, guidance, and training to assist businesses to use these effectively.

2.0
Outline of the staged development approach

IN THIS SECTION:

The development of NZRAPP completes the initial suite of tools that businesses can use to manage their risks associated with hazardous manual tasks.

2.1 Review of the three development stages

A staged approach was needed to adapt the range of HSE manual task tools for use in New Zealand. The priority was given to the types of activities that commonly occur in businesses:

- Stage 1 – manual handling activities (published August 2024):
  - Screening tools for lifting/lowering, carrying, pushing/pulling, and manual handling-while-seated
  - New Zealand manual handling assessment charts (NZMAC)
  - Contributing factors for musculoskeletal risks checklist that can be used for any manual task.
- Stage 2 – repetitive upper limb activities (published February 2025):
  - Screening tool for repetitive upper limb tasks
  - New Zealand assessment of repetitive tasks (NZART).
- Stage 3 – pushing and pulling – manual handling activities (published February 2025):
  - New Zealand risk assessment of pushing and pulling (NZRAPP).

Future stages might be needed to develop other newly created tools such as the *Back injury risks in driving (BIRD)* tool (Health and Safety Executive, 2023) or to investigate how the APHIRM toolkit (La Trobe University, 2018) could be implemented. This report only outlines the development process of the NZRAPP completed in Stage 3.

Figure 1 shows different types of hazardous manual tasks divided into manual handling and repetitive upper limb tasks and shows the matching screening and risk assessment tools. These manual tasks could be considered hazardous if certain characteristics are present. For example, there are high, sudden, repetitive, or sustained forces, there are repetitive movements, sustained or awkward postures, or exposure to vibration. The figure shows the tool development stages with Stage 3, NZRAPP (in grey) discussed in this report. It also shows the relationships between the screening tools (risk filters), the risk assessment tools, and the contributing factors checklist. Development reports are available for the Stage 1 tools (WorkSafe, 2025a) and Stage 2 tools (WorkSafe, 2025d).

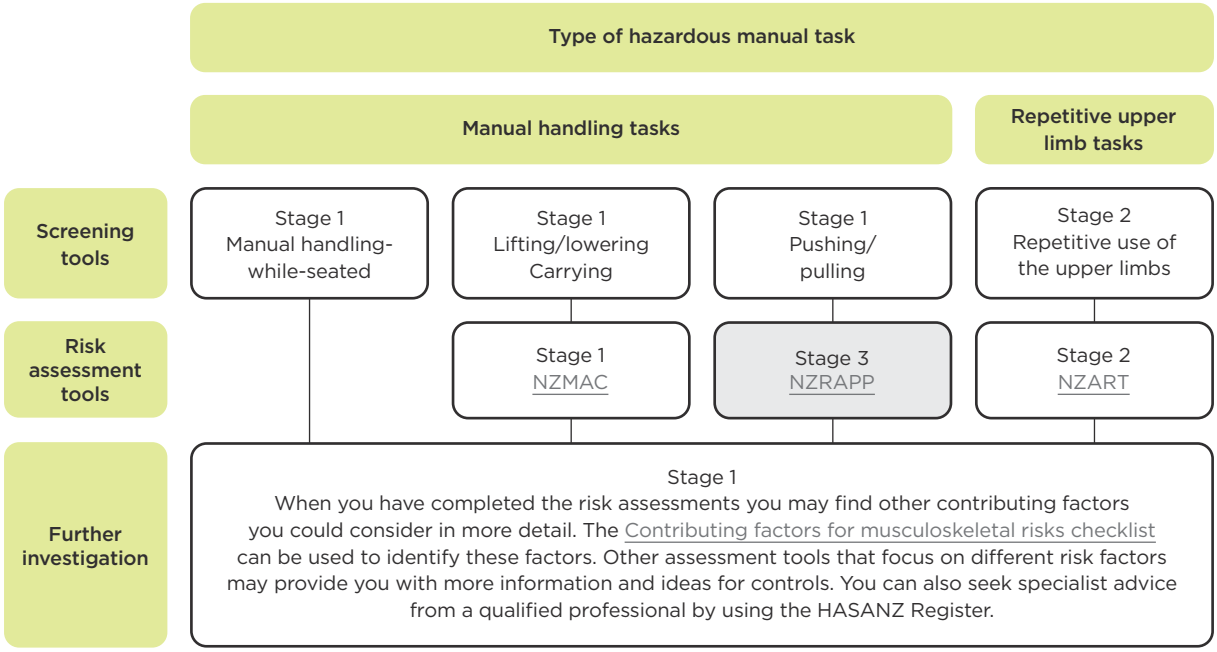


FIGURE 1: Development stages of the hazardous manual task screening and risk assessment tools

2.2 Reasons for developing NZRAPP at Stage 3

Development of the pushing and pulling screening tool along with the other manual handling screening tools occurred at Stage 1. It made sense to develop all the screening tools at the same time as they were part of the initial set of 'manual handling' tools. For more information on how the pushing and pulling screening tool was developed refer to WorkSafe New Zealand (2025a).

The NZRAPP was developed last because we were aware that the Health and Safety Executive were in the process of reviewing and updating the RAPP (Health and Safety Executive, 2016b). The reason for this review was that the HSE found RAPP may underestimate the level of risk when some risk factors combine, such as when pushing a heavy load up a steep slope.

The initial plan was to await the revised UK version of RAPP before creating a New Zealand version. But in September 2024 the HFE team decided to develop NZRAPP alongside NZART. This was done due to the ongoing internal organisational change and the suspicion that the HFE team would be disestablished (which was the case and occurred at the end of March 2025). This ensured that there was a complete initial set of screening and risk assessment tools. NZRAPP is based on the original 2016 HSE version of RAPP. The HSE estimates that a revised version of RAPP will be published in early 2026, at which time WorkSafe should revise and update NZRAPP.

2.3 The Stage 3 development activities

Figure 2 shows the activities carried out at Stage 3, which were:

- **Initial tool development**: The Human Factors/Ergonomics (HFE team) reviewed RAPP (Health and Safety Executive, 2016b) and developed an initial draft. The intention was to make the supporting text within RAPP relevant for a New Zealand audience and reflecting the Health and Safety at Work Act (HSWA), 2015. It was important that the assessments remained scientifically robust. We avoided large changes to the risk assessment as this could alter its validity and reliability.
- **Internal review**: The initial draft was reviewed by the Guidance team for plain language and novice user considerations, and by the Regulatory Practice team for inspectorate practice application considerations.

- **Review of internal feedback and tool design**: Following the reviews from the Guidance and Regulatory Practice teams, the HFE team reviewed, refined, and edited NZRAPP. Support from the Communications team to design NZRAPP was requested.
- **Final review, editing and publication**: The Design team developed NZRAPP to align with the WorkSafe design guidelines and the previously developed tools (NZMAC and NZART). The HFE team worked with the Designer to modify and finalise the tool. Unlike the NZMAC and the screening tools, we were unable to trial the NZRAPP at workshops. We had to miss this step because of the internal organisational change process and the need to publish before the HFE team were disestablished. We worked with the Communications team to publish the tools on the WorkSafe website in February 2025.

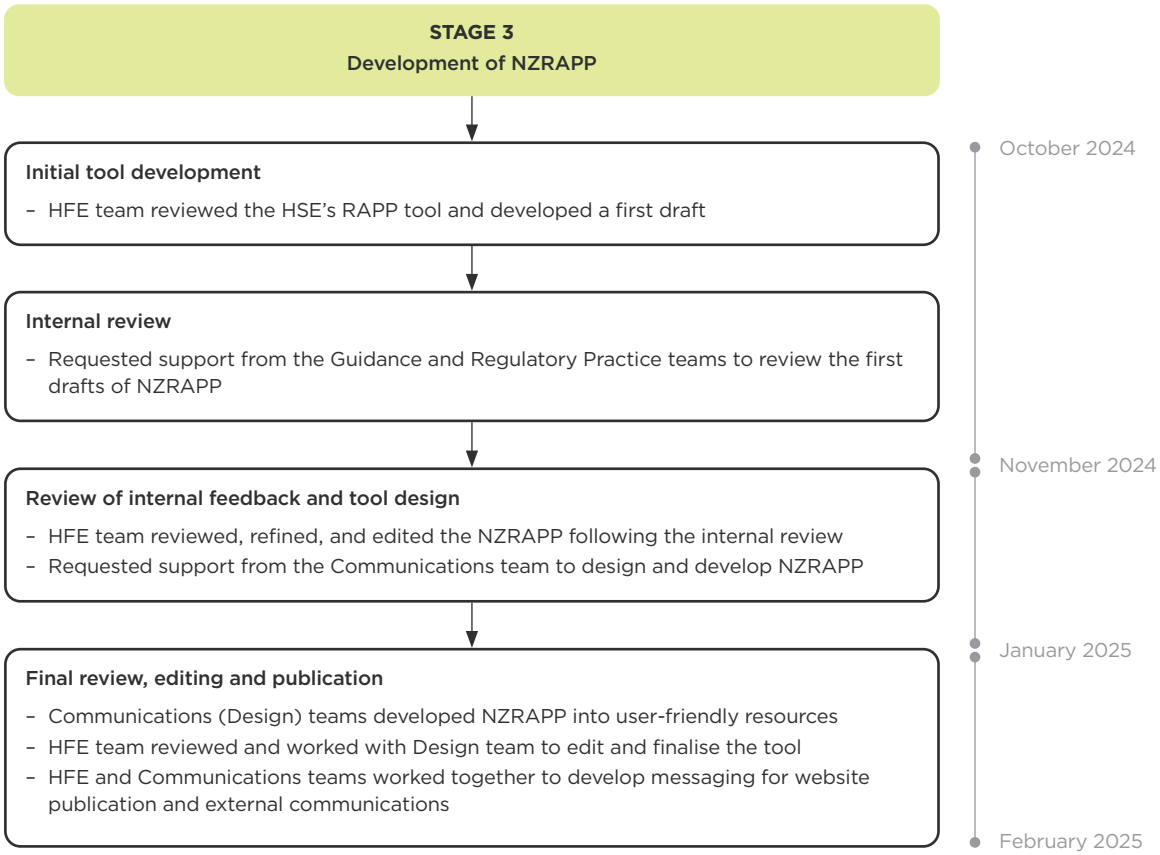


FIGURE 2: Outline of the Stage 3 development process and timeline for NZRAPP

3.0
Key differences between NZRAPP and RAPP

IN THIS SECTION:

The ‘New Zealand risk assessment of pushing and pulling’ (NZRAPP) was adapted and developed from the HSE’s ‘Risk assessment of pushing and pulling’ (RAPP) tool.

3.1 General differences between the NZRAPP and RAPP

Because we had trialled the NZMAC at workshops we had a good idea of what worked for the New Zealand audience. We had then used this established format to develop NZART. The main differences between the RAPP (Health and Safety Executive, 2010) and NZRAPP (WorkSafe New Zealand, 2025b) are outlined here as ‘general’ differences. Section 3.2 outlines the key specific differences between RAPP and NZRAPP that are relevant to particular areas of the assessment or score sheet.

Title change

In keeping with the style of NZMAC and NZART, we called this tool NZRAPP to distinguish from the HSE version.

As we are still relying on the HSE website for supporting resources, and referring users to the HSE online RAPP tool, it was important to distinguish between the versions.

Overall design

The overall design of the NZRAPP remains like the HSE version with the most significant changes occurring in the introductory section and with the score sheet.

The WorkSafe design guidelines were followed resulting in a slightly different overall look compared to RAPP:

- at this initial stage only a PDF version was designed so we decided on an A4 sized document that could be printed easily
- minor formatting changes were made to align with the WorkSafe design guidelines. For example, the colours used in NZRAPP are slightly different to RAPP but still take the ‘traffic light’ system approach
- the term ‘operations’ is used in RAPP, whereas in NZART we have used the term ‘tasks’ or ‘activities’
- a contents page was developed that identifies the two types of risk assessments (pushing or pulling loads on non-powered wheeled equipment and pushing or pulling loads without wheels), the risk categories, and each of the risk factors assessed. Each risk factor has changed from an individual letter identifying it to a number identifier. For example, A1 – Type of equipment/load weight (kg) (in RAPP) has become 2.1 (in NZRAPP)

- the instructions followed the style of NZMAC and NZART and were broken into bullet points to help users identify and understand what needs to be done, but remained very similar to the HSE version
- coloured banners on the top of the pages were used, like NZMAC to distinguish between the two different types of risk assessments
- in NZRAPP the first assessment 'pushing or pulling loads on wheeled equipment' has been renamed to 'pushing or pulling loads on non-powered wheeled equipment'. Using non-powered equipment was one of the main criteria for using the pushing and pulling assessment so it made sense to include it in the assessment title
- the individual risk factor layout in NZRAPP is slightly different to RAPP and aligns more closely to NZMAC and NZART. For example, the images have been moved so they are above the descriptor text and then the risk level scoring boxes are underneath the text. The scoring boxes have also been divided so that the text is in the brighter coloured box and the score is in the smaller lighter coloured box. A comparison is shown in Figure 3 and Figure 4
- in NZRAPP the flowcharts have been moved to the end of each of the two assessments. This means they align with the layout of NZMAC compared to having them at the start of the assessments as they are in RAPP
- New Zealand references were added in and the score sheet was modified to align better with NZMAC and NZART. Both are in the appendices, with a standalone fillable PDF score sheet also available. Changes made to the score sheet are outlined in more detail in Section 3.3

A-2 Posture

Observe the general positions of the hands and the body during the operation.

Good G/0	Reasonable A/3	Poor R/6
Torso is largely upright, and	Body is inclined in direction of exertion, or	Body is severely inclined, or worker squats, kneels or needs to push with their back against the load, or
Torso is not twisted, and	Torso is noticeably bent or twisted, or	Torso is severely bent or twisted, or
Hands are between hip and shoulder height	Hands are below hip height	Hands are behind or on one side of body or above shoulder height

FIGURE 3: Example of individual risk factor layout in RAPP

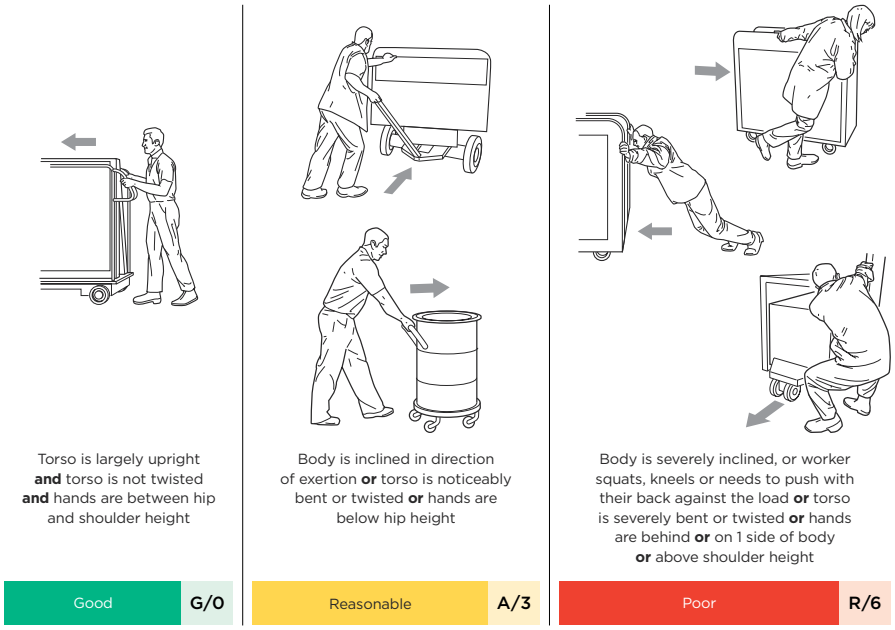


FIGURE 4: Example of individual risk factor layout in NZRAPP

Introductory text

The NZRAPP follows a similar layout in the introductory section with some slight re-ordering of content. The key differences compared to RAPP are:

- we adapted the language and references to guidance, making it relevant for a New Zealand audience
- some of the introductory sections were presented in a different order compared to RAPP
- the introduction of a numbering system, with bold text and a clear statement of what to do at each step
- we slightly altered the wording in the 'risk assessment levels' to reflect the New Zealand context, shown in Figure 5. For example:
  - green – low level of risk. The NZRAPP uses the same criteria for vulnerable workers that is outlined in the WorkSafe manual handling screening tools and NZMAC (WorkSafe New Zealand, 2025a)
  - purple – unacceptable level of risk. The NZRAPP replaced the text '...and must be improved' to '...should be improved urgently.' This was because the term 'must' means that a business has an obligation to act, whereas 'should' is considered as a recommendation. The United Kingdom has the Manual handling operations regulations (Health and Safety Executive, 2016a), but because we have no specific regulations in New Zealand we can only say 'should'
- the addition of a table to show when to use, and not use the NZRAPP (with links to other risk assessments)
- the added reference to the Privacy Act 2020 to make sure users are aware of their responsibilities if they record workers
- the addition of 'Step 10' – further investigation. This will be discussed in more detail in Section 3.4

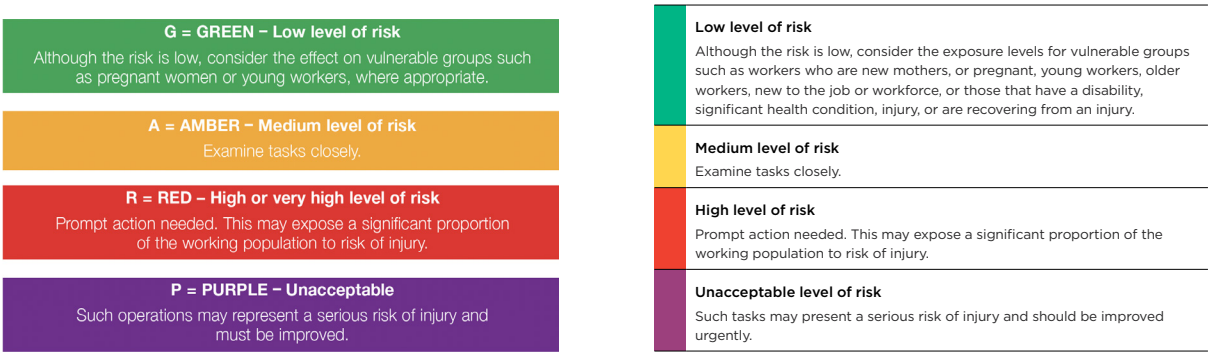


FIGURE 5: Comparison of the RAPP risk levels (left) with the NZRAPP risk levels (right)

3.2 Key changes made to specific risk factors

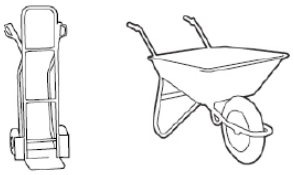
This section outlines the changes made to specific risk factors within NZRAPP.

Type of equipment/load weight (kg) for non-powered wheeled equipment

The text in NZRAPP remains largely unchanged, but minor layout changes were made. All three equipment types are shown on one page with dividers between each category (small, medium, large equipment). These are laid out so the text descriptor is presented first, then there is a picture of the type of equipment, and then the scoring boxes. Changes were made to some of the pictures, as the original quality was poor when reproduced. A comparison is shown of RAPP (Figure 6) and NZRAPP (Figure 7).

A slight change was made in to the 'purple' risk factor in NZRAPP in section 2.1. Instead of having 'Unacceptable, P' in RAPP (Figure 6) this was changed to 'Stop Work' (Figure 7) in NZRAPP. This should provide assessors with a clearer understanding of what to do if this situation occurs. If a 'purple/stop work' score is given, then users do not need to complete any further parts of NZRAPP until this aspect is corrected.

Small with one or two wheels: *eg wheelbarrows, wheelie bins or sack trucks. With this equipment the worker supports some of the load.*



Less than 50 kg	Low G/0
50 kg to 100 kg	Medium A/2
100 kg to 200 kg	High R/4
More than 200 kg	Very high R/8
Load exceeds equipment's rated capacity (manufacturer's recommended maximum weight)	Unacceptable P

Medium, with three or more fixed wheels and/or castors: *eg roll cages, Euro bins.*

Less than 250 kg	Low G/0
250 kg to 500 kg	Medium A/2
500 kg to 750 kg	High R/4
More than 750 kg	Very high R/8
Load exceeds equipment's rated capacity (manufacturer's recommended maximum weight)	Unacceptable P

Large, steerable or running on rails: *eg pallet truck or overhead rail system.*

Less than 600 kg	Low G/0
600 kg to 1000 kg	Medium A/2
1000 kg to 1500 kg	High R/4
More than 1500 kg	Very high R/8
Load exceeds equipment's rated capacity (manufacturer's recommended maximum weight)	Unacceptable P

FIGURE 6:
RAPP assessment for the 'Type of equipment/load weight (kg)' risk factor

Small

This equipment has 1 or 2 wheels, and the worker supports some of the load. For example, wheelbarrows, wheelie bins, or sack trucks.

Less than 50kg	G/0
50kg to 100kg	A/2
100kg to 200kg	R/4
More than 200kg	R/8
Load exceeds equipment's rated capacity	Stop work

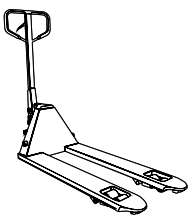
Medium

This equipment has 3 or more fixed wheels and/or castors. For example, roll cages, 4-wheeled medium-sized wheelie bins, 4-wheeled trollies, and Euro bins.

Less than 250kg	G/0
250kg to 500kg	A/2
500kg to 750kg	R/4
More than 750kg	R/8
Load exceeds equipment's rated capacity	Stop work

Large

This equipment is steerable or can run on rails. For example, pallet trucks or overhead rail systems.



Less than 600kg	G/0
600kg to 1,000kg	A/2
1,000kg to 1,500kg	R/4
More than 1,500kg	R/8
Load exceeds equipment's rated capacity	Stop work

FIGURE 7:
NZRAPP assessment for the 'Type of equipment/load weight (kg)' risk factor

Changes to the 'warning' statement were also made so that it was clear that work should stop until changes are made. The 'must' in RAPP was changed to 'urgently consider' in NZRAPP, so it was similar to NZMAC. These are compared in Figure 8 and 9.

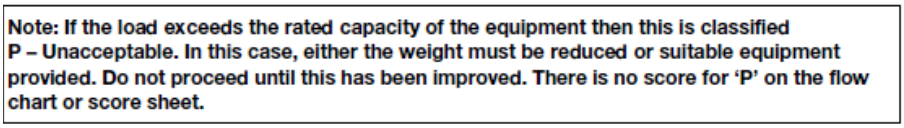


FIGURE 8:
RAPP warning for type of equipment/load when pushing or pulling tools on wheeled equipment

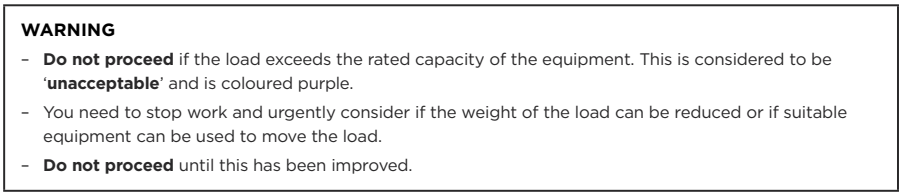


FIGURE 9:
NZRAPP warning for type of equipment/load when pushing or pulling tools on non-powered wheeled equipment

Obstacles along the route (NZRAPP Section 2.8 and 3.7)

One of the main differences between NZRAPP and RAPP is in the wording of the 'obstacles along the route' risk factor. These risk factors are assessed in both NZRAPP pushing and pulling risk assessments in 2.8 and 3.7. A similar change was made in NZMAC and could lead to the NZRAPP scoring slightly higher than RAPP for this risk factor.

In RAPP the assessor is asked to only count each type of obstacle once, '...no matter how many times it occurs.' In NZRAPP (like in NZMAC) we believe that every time an obstacle is encountered that the risk increases. In NZRAPP assessors are asked to 'count the number of obstacles...'. It doesn't matter what type of obstacle they are, just the number of times an obstacle needs to be negotiated when performing the pushing or pulling task. For example, there may be one type of obstacle such as pushing or pulling over cables that are found at three different locations, so these should be counted as three obstacles which would give a score of R/3 (poor). A comparison is shown between RAPP Figure 10 and NZRAPP, Figure 11.

A-8 Obstacles along the route

Check the route for obstacles. Note if the equipment is moved over trailing cables, across raised edges, up or down steep ramps (gradient of more than 5°), up or down steps, through closed/narrow doors, screens or confined spaces, around bends and corners or objects. Each type of obstacle should only be counted once no matter how many times it occurs.

Good G/0	Reasonable A/2	Poor R/3
No obstacles	One type of obstacle but no steps or steep ramps	Steps, steep ramps or two or more other types of obstacle

FIGURE 10: Example of the layout and wording used in RAPP for 'obstacles along the route'

2.8 Obstacles along the route

- Count the number of obstacles that occur along the pushing/pulling route.
- Obstacles may include pushing or pulling:
  - over cables
  - across raised edges
  - through closed doors, narrow doorways, screens, or confined spaces
  - around bends and corners or objects
  - up or down steps
  - up or down steep ramps (for example, with a gradient of more than 5°).
- If there is 1 obstacle but it is not steps or a steep ramp, the colour band is amber and the score is 2.
- If there are at least 2 obstacles, or loads are pushed or pulled up or down steps or steep ramps, the colour band is red and the score is 3. For example, if you push a load over 3 cables this is considered as 3 different obstacles and would be scored as R/3.

No obstacles	G/0	1 obstacle **but** no steps or steep ramps	A/2	At least 2 obstacles **or** up or down steps **or** up or down steep ramps	R/3

FIGURE 11: Example of the layout and wording used in NZRAPP for 'obstacles along the route'

Environmental and other factors (NZRAPP Sections 2.9 and 3.8)

During the review of RAPP under the 'other factors' heading (A-9, and B-8) shown in Figure 12, we observed that several of the risk factors are considered as a standalone section under 'environmental factors' in NZMAC. For example, extreme lighting, hot or cold temperatures, and strong winds. This led to the decision to change the heading from 'other factors' to 'environmental and other factors' for NZRAPP so that they are more easily identified (Figure 13).

Under the 'extreme lighting conditions' point we also added in some examples such as 'dark, bright, or poor contrast' to help assessors.

A-9 Other factors

Identify any other factors, for example:

- the equipment or load is unstable;
- the load is large and obstructs the worker's view of where they are moving;
- the equipment or load is sharp, hot or otherwise potentially damaging to touch;
- there are poor lighting conditions;
- there are extreme hot or cold temperatures or high humidity;
- there are gusts of wind or other strong air movements;
- personal protective equipment or clothing makes using the equipment more difficult.

None G/0	One A/1	Two or more R/2
No other factors present	One factor present	Two or more factors present

FIGURE 12: Example of 'other factors' in RAPP

2.9 Environmental and other factors

Identify any other factors, for example:

- the equipment or load is unstable
- the load is large and obstructs the worker's view of where they are moving
- the equipment or load is sharp, hot or otherwise potentially damaging to touch
- there are extreme lighting conditions (dark, bright, or poor contrast)
- there are extreme hot or cold temperatures, or high humidity
- there are gusts of wind or other strong air movements
- personal protective equipment or clothing makes using the equipment more difficult.

No factors present	G/0	1 factor present	A/1	2 or more factors present	R/2

FIGURE 13: NZRAPP showing 'environmental and other factors'

3.3 Changes made to the NZRAPP flowcharts

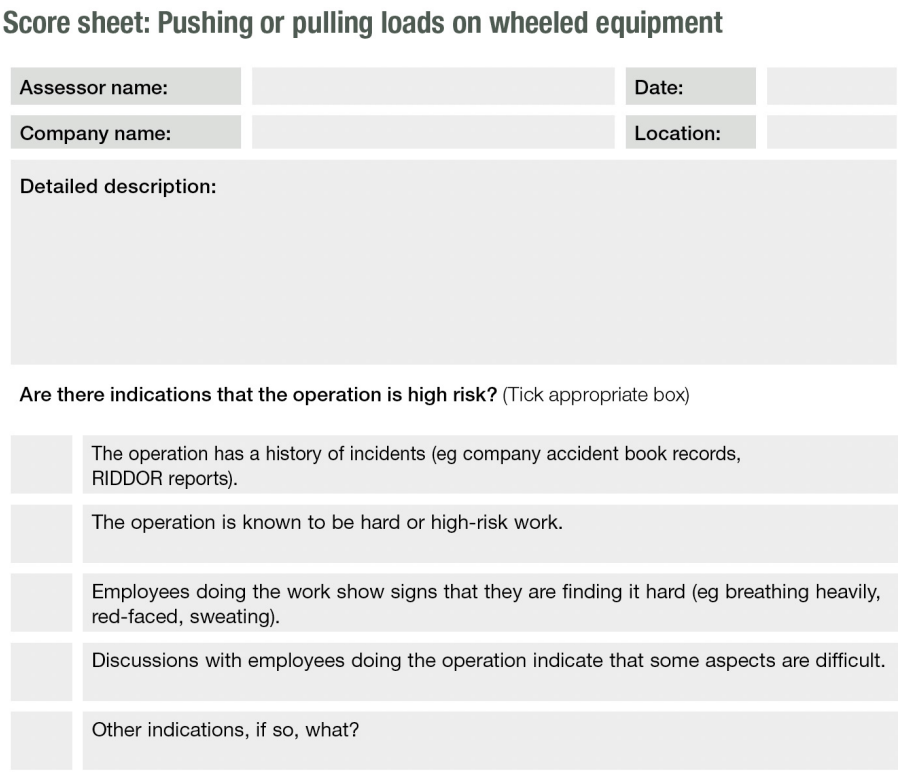
Minor changes were made to the flowcharts for both pushing and pulling risk assessments.

- In the pushing or pulling loads on non-powered wheeled equipment flowchart a 'purple' box was added in for the load weight (2.1) risk factor. This was done to help users to capture the score and to prompt them to stop work until the load has been reduced or suitable equipment used. In RAPP this information could potentially get lost as there is no way of recording it.
- In the 'travel distance' boxes instead of just stating the distances as 'short, medium, or long' we added in the travel distance criteria as we thought that would be more helpful for users.
- For the 'obstacles along the route' boxes we added in the definition criteria so that users could quickly see what they were scoring against, rather than just having 'good, reasonable, or poor'.
- We added to the last box that simply instructed users to 'complete the score sheet' so that it more closely like the instructions in NZMAC. We also wanted to remind users that they need to consider the full range of contributing factors that may be present.

3.4 Changes made to the NZRAPP score sheet

There are two separate score sheets in RAPP which are located at the end of each individual assessment. In NZRAPP we decided to combine these into one score sheet. This is similar to the combined score sheet for the three different assessments (lifting, carrying, team handling) in NZMAC.

The first part of the score sheet includes all the information about the task. This was the same for both assessments. An example of the 'pushing or pulling loads without wheels' is shown in Figure 14. It made sense to align the NZRAPP format with NZMAC to aid user familiarity, so we decided to record this information on the first page of the score sheet, as shown in Figure 15.



Score sheet: Pushing or pulling loads on wheeled equipment

Assessor name:		**Date:**	
Company name:		**Location:**	

Detailed description:

Are there indications that the operation is high risk? (Tick appropriate box)

	The operation has a history of incidents (eg company accident book records, RIDDOR reports).
	The operation is known to be hard or high-risk work.
	Employees doing the work show signs that they are finding it hard (eg breathing heavily, red-faced, sweating).
	Discussions with employees doing the operation indicate that some aspects are difficult.
	Other indications, if so, what?

FIGURE 14: RAPP score sheet outlining the 'task description'

NZRAPP score sheet

Company and task details

Company name:

Name/purpose of task:

Location of activity:

Team/individuals involved:

What items are pushed or pulled:

What is the total weight of items pushed or pulled (per load):

When does the task take place (shift/time of day):

Are there indications that the task is high risk for WRMSDs?

- ○ The task or similar tasks have a history of incidents of discomfort, pain, or injury. For example, reports in the accident register, lost time, or week away from work reports
- ○ The task is known to be strenuous, high-risk, or can only be done by a few people
- ○ Workers doing the work appear to be struggling or find it hard work (for example, breathing heavily, red-faced, sweating) or ask for help
- ○ Workers complain about WRMSD risk or identify some aspects of the task are difficult
- ○ Other indications. If so, what:

Are there other factors present that may contribute to the overall risk?

- ○ High workloads
- ○ Tight deadlines
- ○ Lack of control over the work and working methods
- ○ Lack of support from colleagues or managers
- ○ Machine-paced work
- ○ Other if so, what:

Notes

Assessment completed by

Name of assessor:

Signature:

Date: DD / MM / YEAR

FIGURE 15:
The 'task description page of the NZRAPP score sheet

The main differences with the score sheets when pushing or pulling on non-powered wheeled equipment or without wheels are:

- Pushing or pulling loads on non-powered wheeled equipment (Figure 16). The assessor must first decide what size of equipment is being used (small, medium, or large). Once this has been decided they enter the colour band and numeric score into the relevant column for each of the risk factors.
- Pushing or pulling loads without wheels (Figure 17). The assessor must first decide how the load is being moved (rolling, dragging, churning). Then they enter the colour band and numeric score into the relevant column for each of the risk factors.
- The only other difference between the assessments is the inclusion of the 'condition of equipment' which only applies when handling equipment is used.

Identify the type of equipment and insert the colour band and numerical score for each of the risk factors in the boxes below

Factors	Small equipment		Medium equipment		Large equipment	
	Colour band (G, A, R)	Numeric score	Colour band (G, A, R)	Numeric score	Colour band (G, A, R)	Numeric score
A-1 Load weight						
A-2 Posture						
A-3 Hand grip						
A-4 Work pattern						
A-5 Travel distance						
A-6 Condition of equipment						
A-7 Floor surface						
A-8 Obstacles on route						
A-9 Other factors						
Total score						

Note individual capability, eg vulnerable workers, or psychosocial issues

FIGURE 16: RAPP score sheet for pushing or pulling loads on wheeled equipment

Identify the activity and insert the colour band and numerical score for each of the risk factors in the boxes below

Factors	Rolling		Churning		Dragging	
	Colour band (G, A, R)	Numeric score	Colour band (G, A, R)	Numeric score	Colour band (G, A, R)	Numeric score
B-1 Load weight						
B-2 Posture						
B-3 Hand grip						
B-4 Work pattern						
B-5 Travel distance						
B-6 Floor surface						
B-7 Obstacles on route						
B-8 Other factors						
Total score						

Note individual capability, eg vulnerable workers, or psychosocial issues

FIGURE 17: RAPP score sheet for pushing or pulling loads without wheels

Given that all except the 'condition of equipment risk factor' appear in both assessments we combined the two score sheets into one, shown in Figure 18. For example, users do not need to assess the 'condition of equipment' when loads are moved without wheels as they do not use equipment. This was done by following the steps in the original score sheets:

- Step 1: Assessors decide how the load is being pushed or pulled. This meant having two columns – one for 'moving loads on non-powered wheeled equipment' and one for 'moving loads without wheels'.
- Step 2: In the 'moving non-powered loads on wheels' column decide on the size of the equipment used. In the moving loads without wheels column decide on the type of activity.
- Step 3: Complete the score sheet by entering in the colour band and numerical score for each of the risk factors.
- Step 4: The last column has been added in like in NZMAC and NZART so that users can record possible risk control measures.

RISK FACTORS	**MOVING NON-POWERED LOADS ON WHEELS** SECTION 2 **Size of equipment** ○ Small ○ Medium ○ Large	**MOVING LOADS WITHOUT WHEELS** SECTION 3 **Type of activity** ○ Rolling ○ Dragging ○ Churning	**POSSIBLE CONTROL MEASURES TO REDUCE THE RISK OF PURPLE/ RED/AMBER FACTORS**
	Score (colour band and numerical score)	**Score** (colour band and numerical score)	
Load weight			
Posture			
Hand grip			
Work pattern			
Travel distance			
Condition of equipment		N/A	
Floor surface			
Obstacles on route			
Environmental and other factors			
TOTAL SCORE			
Other factors present (for example, psychosocial, organisational, or individual)	List the factors present:		

FIGURE 18: NZRAPP combined score sheet

On the last page of the NZRAPP score sheet we added in an additional set of questions that prompt the assessor if further investigation is needed (see Figure 19 below). This is like the approach used in the NZMAC and NZART, but some questions differ. These questions are grouped into the five risk factors (individual, biomechanical and physical, work organisation, environmental, psychosocial) outlined in WorkSafe's *Contributing factors for work-related musculoskeletal disorders* model (WorkSafe New Zealand, 2023b).

The questions in the 'further investigation' section prompt assessors to consider the full range of contributing factors and if they need to investigate further. For example, by discussing the specific risks with workers, supervisors, and managers and to determine how the risks can be managed to reduce exposure and the likelihood of musculoskeletal harm occurring. These questions are not an exhaustive list and other more detailed risk assessments might be appropriate.

Is further investigation needed?

Use the checklist below to identify if you need to complete further assessment.

CONSIDER FURTHER ASSESSMENT IF ANY OF THE FOLLOWING APPLY	TICK IF ANY APPLY
Individual factors The task is carried out by workers who may be at significant risk. For example, workers who: - are new mothers or pregnant - are young workers - are older workers - are new to the job or workforce - have a disability, significant health condition, injury, or are recovering from an injury.	○
Biomechanical and physical factors For example: - high forces are required to get the load moving or to keep it moving - there are sudden movements (for example, to get the load started, stopped or to manoeuvre) - the pushing or pulling tasks are repetitive or require workers to push or pull the loads with their hands below waist height or above shoulder height - the loads are pushed or pulled over long distances - the loads are pushed or pulled along unsuitable floor surfaces, or the wheels/castors are not suitable for the floor surface they are used on - equipment used is hard to steer, damaged, poorly maintained, or not on a maintenance schedule - the load is scored as 'medium/amber' or worse in NZRAPP **and** pushed or pulled up a slope of 3° or more - the load is pushed, pulled, or levered, where there is a risk of falling from height. For example, a pallet truck is used to remove items from off the back of a truck onto an automated tail lift during home deliveries.	○
Work organisation factors For example, the jobs or tasks: - require workers to keep up with a rate of work imposed by a process - are monotonous, workers repeat the same work tasks over-and-over - have pay incentives that affect how workers complete the work (such as, piece work) - have shiftwork or workers regularly work additional overtime shifts/hours - require special information, training or require high levels of attention or concentration for its safe performance - need workers to wear personal protective equipment (PPE) or clothing and the movement, posture, or grip is hindered.	○
Environmental factors Environmental factors, clothing, PPE, and work activities may combine to place additional physiological demands on workers. For example: - workers are sweating a lot which may lead to dehydration - the work is carried out in cold environments or draughts, particularly if cold air is blowing over the hands - cold tools, work items, or objects are held or used.	○
Psychosocial factors Workers consistently identify the same types of psychosocial factors. For example: - high job demands or workloads (mental or emotional) - lack of control over how they complete their work (freedom or autonomy) - lack of support (from managers or colleagues) - low job satisfaction (unsatisfied with their jobs or have poor work-life balance) - low role clarity (unclear of their responsibilities and expectations).	○

If you have ticked that any of the factors apply you may want to investigate these further. The Contributing factors for musculoskeletal risks checklist can be used. Other assessment tools that focus on different risk factors may provide you with more information and ideas for controls.

FIGURE 19:
NZRAPP 'Is further investigation needed?' questions

4.0
Discussion – the need for updated resources

Up until the recent publication of NZRAPP there has been no up-to-date guidance about how to assess pushing or pulling tasks.'

Previous research (WorkSafe New Zealand, 2024b) indicated there was a need to improve hazardous manual task risk management in New Zealand. Resources and guidance such as the outdated *Code of practice for manual handling* (Department of Labour et al., 2001) did not reflect current work health and safety legislation. Up-to-date resources and tools are needed to help businesses and those supporting them, such as professionals working across a range of health and safety disciplines. The aim is to allow businesses to manage the risks associated with hazardous manual tasks, including the risks associated with pushing and pulling. The need for updated resources was discussed in greater detail in the Stage 1 development report titled *Development of hazardous manual task risk assessments* (WorkSafe New Zealand, 2025a). It also discussed the concerns raised by some researchers about the effectiveness and limitations of risk assessment tools. We recognise that there are limitations with all types of risk assessment tools but due to the lack of fit-for-purpose, easy to use New Zealand resources currently available we needed to start somewhere.

Described within this current report is the development of the Stage 3 risk assessment tool, NZRAPP. The pushing and pulling screening tool had previously been developed as part of the manual handling screening tools completed in Stage 1 (WorkSafe New Zealand, 2025a). The development of NZRAPP, like NZART was completed in a much shorter timeframe than anticipated. This was due to an organisational restructure that saw the disestablishment of the HFE team responsible for delivering this work. Due to time and budget restrictions, we were unable to trial the NZRAPP. Instead, we used the feedback and principles we had learnt during Stage 1 to inform its development. For example, we used a similar layout and style for the NZRAPP that was used for the NZART.

The NZRAPP was selected for development last, in Stage 3, because we wanted to wait until after the HSE had completed their review and update. But even if there was no urgency to develop it, we would have been waiting until early 2026 for an updated HSE version. So, the decision was made to develop the NZRAPP from the existing 2016 UK tool.

New Zealand users should therefore be aware that NZRAPP may underestimate the overall level of risk for some risk factors when they combine. The beauty of the HSE risk assessments and the New Zealand versions of NZMAC, NZART, and NZRAPP is that they break down each of the individual risk factors, so they are assessed one at a time. But the HSE are aware that this simplistic approach has created an issue in RAPP when people are pushing or pulling heavy loads on slopes/ramps, resulting in an underestimation of the overall risk. For example, pushing or pulling a pallet truck weighing 900kg (including the weight of the

pallet truck) up a 5° slope. Individually the force risk factor results in a moderate score of 'A/2', and the 'floor surface' risk factor also results in a moderate score of 'A/1'. When this is considered as a whole task, pushing or pulling that much weight up a 5° slope is more likely to result in a high level of risk. It is this specific area that the HSE are trying to correct, while aiming to keep the simplicity of the tool.

An updated HSE version of RAPP is not expected until 2026. In the meantime, we recommend that assessors undertake further investigation if they have any tasks that involve workers pushing or pulling loads on slopes. Particular attention should be paid if the 'load weight' risk factor is scored as 'moderate/medium' or worse (amber, red, or purple) and the 'floor surface' risk factor is scored as 'reasonable or poor' (amber or red). To help prompt assessors to consider this combination of risk factors we have a question in the 'further investigation' section of the NZRAPP score sheet under the 'biomechanical and physical risk factors' section: 'the load is scored as 'medium/amber' or worse in NZRAPP) **and** pushed or pulled up a slope of 3° or more.' (WorkSafe New Zealand, 2025c). The *Contributing factors for musculoskeletal risks checklist* (WorkSafe New Zealand, 2024a) could also be used to prompt businesses to investigate the range of contributing factors but other methods may also be suitable. Methods such as APHIRM that take a job-based approach rather than a hazard-by-hazard approach might also be helpful and consider both physical and psychosocial risks' (La Trobe University, 2018).

We agree with authors who have suggested that a risk management approach that considers all the contributing risk factors and includes meaningful worker engagement is necessary to reduce the high rates of work-related musculoskeletal harm. While observation-based approaches have their limitations (Lind et al., 2014; Macdonald & Oakman, 2015; Oakman et al., 2022) we recommend that NZMAC, NZART, and NZRAPP are used as part of a toolkit that supports a risk management approach. These tools must be completed with workers to understand the risks, how the work is done, and where improvements could be made. Additional methods such as the *Contributing factors for musculoskeletal risks checklist* (WorkSafe New Zealand, 2024a) may be used to support these assessments. By using the tools in this way, we suggest that businesses will be able to assess the level of risk that workers are exposed to, and to better control the risk using good work design principles. This will help businesses to meet their obligations under the Health and Safety at Work Act (2015).

The NZRAPP (like the NZMAC and NZART) is currently only offered in a PDF format with a separate fillable PDF score sheet. There is not yet an online New Zealand version. However, anyone can use the online UK RAPP tool, and the assessment scores should mostly be the same. There are some layout and wording differences between RAPP and NZRAPP including how 'obstacles along the route' are scored (with NZRAPP possibly scoring higher than RAPP). Overall, the New Zealand tool's presentation does make it feel slightly different from the HSE version. While most changes are not significant (apart from the inclusion of a 'further investigation' section in the score sheet) it would be ideal to have a standalone online New Zealand version.

Development of the full suite of online tools (screening tools and NZMAC, NZART, and NZRAPP, and the *Contributing factors for musculoskeletal risks checklist*) would assist businesses to assess and manage musculoskeletal health risks. Most people use smartphones so an app that automatically presents the findings and suggests possible control measures would enhance their use and uptake. A similar approach could be taken as with the UK online tools (MAC, ART, RAPP) where the tool is hosted on a survey site. It is expected that this should be relatively cost-effective and easy to set-up.

5.0
Conclusions

The publication of NZRAPP completes the final stage of the initial set of risk assessment tools that businesses can use to manage musculoskeletal health risks.

There was a clear need to provide New Zealand businesses and those working across the work health and safety disciplines with manual task risk assessment tools that are up-to-date, quick and easy to use, and scientifically robust (WorkSafe New Zealand, 2024b).

Like the screening and assessment tools developed in Stage 1 and Stage 2, the NZRAPP was adapted from the suite of tools from the Health and Safety Executive (HSE), United Kingdom (UK).

The tools were developed in a staged approach:

- Stage 1 saw the completion of the manual handling set of tools that included four screening tools for lifting/lowering, carrying, pushing/pulling, and manual handling-while-seated, the risk assessment tool NZMAC, and the contributing factors for musculoskeletal risks checklist. These were published on the WorkSafe website in August 2024.
- Stage 2 resulted in the development of an upper limb screening tool and a more detailed risk assessment, NZART. These were published on the WorkSafe website in February 2025.
- Stage 3 involved the development of the pushing and pulling risk assessment, NZRAPP, outlined within this report. It was published on the WorkSafe website in February 2025.

The NZRAPP was developed last in Stage 3 because the HSE were reviewing and updating RAPP. Originally we wanted to wait until the HSE had made the updates to the 2016 tool, but the WorkSafe organisational restructure created urgency to develop a New Zealand version. This meant that we developed NZRAPP alongside NZART. Due to the time and budget constraints we could not conduct user trials for NZART and NZRAPP like we did for NZMAC. But we used the lessons learned from that process and applied them to the these tools. The updated HSE version of RAPP is expected in 2026. We suggest that following the HSE update, WorkSafe should review and update NZRAPP to reflect any changes.

It is important to remember that there are limitations with all types of risk assessments. The tools developed in Stages 1 (NZMAC), 2 (NZART), and 3 (NZRAPP), mainly focus on physical risk factors. This is why we developed the *Contributing musculoskeletal risk factors checklist* to prompt users to consider a range of contributing factors. These tools, plus the screening tools can be used by any size of business as part of a toolkit to manage their musculoskeletal risks.

They are quick and relatively easy to use and provide a structured approach to help assessors and businesses consider and manage musculoskeletal risks. Workers are at the heart of any health and safety risk management system. So, to ensure success worker engagement and participation is key.

These tools should be used as part of a health risk management approach. The aim of any risk assessment should be to identify where the risk occurs and how it can be controlled. Businesses have a primary duty of care under the Health and Safety at Work Act (2015) and this includes the management of musculoskeletal risks. Businesses need to understand how to apply the hierarchy of control measures and good work design principles to manage their musculoskeletal risks. Where practical, higher order controls such as removing the risk altogether (elimination) should be considered first. If not possible, substitution or engineering controls to minimise the risk will then be the most effective methods (WorkSafe New Zealand, 2023a, 2023b).

To make a real difference to reducing New Zealand's rates of musculoskeletal harm we need to focus on reducing the risk exposures. We have tended to focus on 'injury prevention' and 'return to work strategies' which have a place, but rely on individual workers managing the risk. If we are serious about reducing musculoskeletal harm, all system partners need to focus on risk management, using high order controls. WorkSafe has a role to engage and educate businesses to understand musculoskeletal risks. This includes provision of updated guidance and resources such as the risk assessments NZMAC, NZART, and NZRAPP. Businesses need to apply a risk management approach, where effective controls are implemented just as they would with any other hazard or risk. And there must be a move away from the reliance on ineffective manual handling training as the primary control measure.

These approaches will help businesses to effectively reduce worker exposure to musculoskeletal risks and subsequently from harm occurring.

6.0 Recommendations and next steps

Further resources and training are needed to support businesses to effectively use NZRAPP.

The closure of the ACC discomfort, pain, and injury (DPI) programme and removal of all supporting resources by 2018 left a gap that has only just started to be filled.

The Stage 1 manual handling screening tools and NZMAC were published in August 2024. This was followed by the Stage 2 repetitive upper limb tools and Stage 3 pushing and pulling tool, NZRAPP which were published in February 2025. This completes the first set of hazardous manual tasks risk assessment tools available for use in New Zealand.

The following list of activities are recommendations for the next steps in the development of tools and resources to support businesses manage the risks associated with work-related musculoskeletal disorders. They identify the need for more work to be done:

- deliver focussed risk assessment training on all the musculoskeletal risk assessment tools across the work health and safety disciplines, sector, and industry groups
- create an online version of the NZRAPP to increase uptake of the tool
- develop New Zealand case studies and other resources to support businesses use NZRAPP
- develop resources to support inspectors' awareness and potential use of NZRAPP
- consider the development of future stages, beyond Stage 3. For example, as outlined in WorkSafe New Zealand, (2025a) there may be opportunity to adapt the *Back injury risks in driving (BIRD)* tool (Health and Safety Executive, 2023) for New Zealand use, or, to recommend other participative approaches such as the APHIRM toolkit (La Trobe, 2018)
- develop an updated code of practice for manual handling, or a new hazardous manual tasks code of practice (or similar). This would provide businesses with updated guidance on work-related musculoskeletal disorders risk management and provide the Inspectorate with a benchmark standard to support their work
- update NZRAPP once the HSE have completed their review and update of RAPP, expected to be published in 2026.

These recommendations are unlikely to be acted upon at this time due to a lack of focus on health topics within the organisation. In 2024 the WorkSafe strategy was published which saw a subsequent organisational restructure take place to align with the strategy (WorkSafe New Zealand, 2024c). Musculoskeletal risk management was not a priority for the organisation at this time. As a result, the HFE team responsible for delivering the musculoskeletal work programme, were disestablished as part of the restructure. Our hope for the future is that at some stage this important work will continue so that WorkSafe can support businesses to better manage their risks associated with musculoskeletal disorders and reduce harm to workers in Aotearoa New Zealand.

Appendices

IN THIS SECTION:

Appendix 1: Glossary

ABBREVIATION	TERM
ACC	Accident Compensation Corporation
APHIRM	A participative hazard identification and risk management toolkit
ART	Assessment of repetitive tasks of the upper limbs
BIRD	Back injury risks in driving tool
DPI	Discomfort, Pain, and Injury
HSE	Health and Safety Executive (United Kingdom)
HSWA	Health and Safety at Work Act
HFE	Human Factors/Ergonomics (team)
HWSA	Heads of Workplace Safety Authorities (Australia and New Zealand)
Kaimahi	Workers
MAC	Manual Handling Assessment Charts
MSDs	Musculoskeletal disorders
NZART	New Zealand assessment of repetitive tasks of the upper limbs
NZMAC	New Zealand manual handling assessment charts
NZRAPP	New Zealand risk assessment of pushing and pulling
PCBU	Person conducting a business or undertaking
RAMP	Risk management assessment tool for manual handling proactively
RAPP	Risk assessment for pushing and pulling
UK	United Kingdom
ULD(s)	Upper limb disorder(s)
WEPR	Worker engagement, participation, and representation
WRMSDs	Work-related musculoskeletal disorders

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Notes

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