RYMAN HEALTHCARE

EXCAVATIONS

SAFELY CONTROLLING WORK
CRITICAL RISK DOCUMENT

May 2025 | Version #4

DOCUMENT CONTROL			
Document Name	**Excavations**		
Issue Date	01 May 2025		
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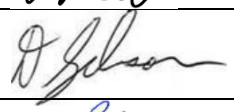
	David Gibson	Regional Construction Manager	
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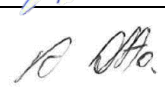
	Andrew Otto	Site Supervisor	
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DOCUMENT REVIEW			
Date	**Revision**	**Description of Change**	**Author**
1-Dec-2021	1	First document	**AE, MJ, OG**
1-Jun-2022	2	Previous version available on request.	**AE, MJ, OG, AVR, JB**
08/07/2024	3	• Page 4, Added contents page • Page 5, "Risks – what could go wrong," reworded/ laid out to remove duplicate wording. Injury types at beginning followed by information. • Added point 4 and removed two others with duplicate information. • Amended point 6 to removed unnecessary information. • Added Asbestos information as a link to Bullet 8. • Page 5, Removed hyperlinks from SCW docs and replaced with a general 'can be found here' link for ease of changes in future. • Page 6, changed "can be risky" in first sentence to "have the potential to cause serious harm if the the hazards involved are not managed correctly." Also added ground collapse examples. • Page 7, "Control Table" – Replaced with formatted version/ 1 pager. • Page 8, "Minimum control requirement," – Changed wording of first bullet point to read more clearly, added "destabilize structures" comment and removed duplicate point. • "Before you start working in excavation," added "or mitigate." • Page 9, "Minimum control requirements for all excavations," Bullet 7 – Added "at least 1-to-1 ratio (depth to distance away)." • Added reference to "permit to break ground section. • Removed duplicate bullet point referencing prestart inspections. • Page 11, "Permit to Break Ground," added entire section • Page 15 – 18, "Underground Services," Added entire section from previous Underground and Overhead Services document. • Removed all references to Overhead Services from section. • Page 18, "Minimum Control Requirements," Bullet 2 added As-built example and explanation text.	**LT, NR, SC, GM, GC, HA, AO, MB**

01/04/2025	4	• Updated intro to define what risks this SCW document covers • Update intro with risk and Golden rules	**JA**

Contents

Excavations

This SCW document covers two key risk areas:

1. Falling from heights from into an excavation
2. Contact with underground services

These golden rules are also related to this SCW document:

- We are always licenced and competent when operating plant.
- We always isolate all energy sources before working on equipment and systems.
- We come to work free from impairment, alcohol and drugs.
- We ensure plant and equipment is safe to use.
- We work safely at height.
- We store, handle and control hazardous substances safely.
- We always observe walkways, safe zones and exclusion zones.
- We always make sure loads are secure and within safe working load limits before moving them.
- We always follow the permit process when a permit is required.
- Our temporary works area appropriately designed, engineered and installed.

Excavation work generally means work involving the removal of soil or rock from a site to form an open face, hole or cavity, using tools, plant and/or machinery.

Activities on our construction sites that involve excavations include:

- Trenching
  - Open excavations
  - Potholing
  - Pit excavations
  - Landscaping
- Trenches and retaining walls
- Shafts and drives
- Services placement and setup
- Piling works

Related SCW (below) can be found here:

- Mobile Plant
- Work at Height, Dropped Objects and Temporary Work Platforms
- Scaffold and Mobile Scaffold
- Cranes, Hoists and Other Lifting Activities
- overhead services

Risks - What could go wrong?

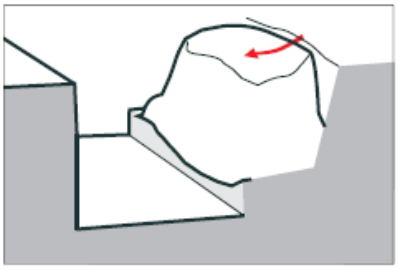
Excavations are identified as a critical risk at Ryman Healthcare. They present a risk of potential fatalities and many disabling injuries such as crushing, asphyxiation, fractures, dislocations, serious head injuries, amputation, sprains/ strains and bruising or lacerations to name a few. Below is a non-exhaustive list of what could go wrong:

- Trench/excavation collapse/cave in from ground instability, soil disturbance, water accumulation, erosion or earthquake.
- Striking underground services (e.g. power lines, cables, gas pipes) – see the underground services section below.
- Collapse of surrounding structures due to compromised integrity of structures such as scaffold or buildings around the excavation

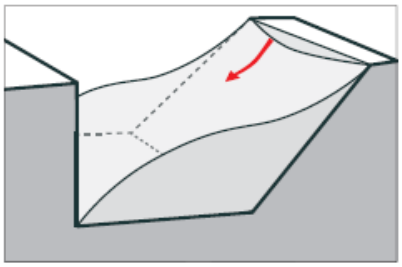
- Mobile plant overturning or colliding with people/ stationary objects or other vehicles.
- Fumes or noise causing a potential health injury (e.g. kidney damage, carcinogens, Noise Induced Hearing Loss, etc..)
- Fall from heights created by excavations (e.g. from inadequate access/egress).
- Dropped objects into excavation causing injury to others (see 'Work at Height, dropped objects and temporary work platforms' if your work poses a risk of dropped objects)
- Exposure to dust, asbestos or contaminated soil causing asbestosis, or fatality or serious illness through infection or hazardous substance
- Manual handling injuries such as strains and sprains from lifting of materials or use of tools and equipment
- Electrocution/Electric shock from water accumulation and workers using electrical items causing fatality/s or a potentially major injury such as burns, muscle spasm, respiratory distress, seizure, cardiac arrythmia, nervous system damage or delayed organ damage

All excavations, no matter the depth, have the potential to cause serious harm if the hazards involved are not managed correctly. Ground collapse can occur quickly and without warning, giving a person virtually no time to escape, especially if the collapse is extensive. A buried person is likely to die of suffocation before help arrives (either the head is buried, or the chest is so restricted by the ground's weight the person cannot breathe).

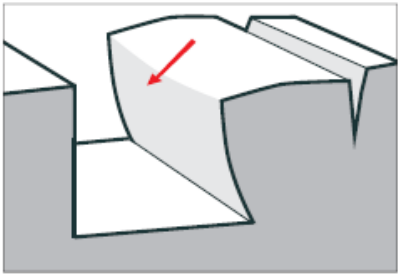
Some types of ground collapse are:



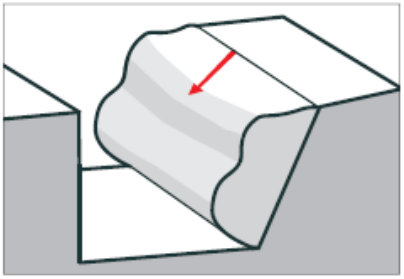
Tension Crack:
These usually form at a horizontal distance of 0.5 to 0.75 times the depth of the excavation, measured from the top of the vertical face of the excavation.



Sliding:
Sliding (or sloughing) may occur as a result of tension cracks.



Toppling:
In addition to sliding, tension cracks can cause toppling. Toppling occurs when a face shears along the tension crack line and topples into excavation.



Subsidence and Bulging:
An unsupported excavation can create an unbalanced stress in the soil which, in turn, causes a subsidence at the surface and bulging of the face. If uncorrected, this condition can cause a face failure and trap workers in the excavation.

Controls – How do I keep safe?

The identification of risks associated with excavations and appropriate control measures are to be fully detailed in a Safe Work Method Statement (SWMS) or similar risk-assessment document prior to commencing any work involving excavations. A Permit to Break Ground must also be in place for all activities that break ground.

Can I eliminate the risk?

Wherever work can be completed without the need to excavate, this should be the first consideration in eliminating risk.

The SWMS must be reviewed by an appropriate Ryman representative prior to any work commencing and following any changes to the task or environment.

Excavation controls include but are not limited to:

	Control Type	Control Measure	Control Level
Minimisation	**Elimination**	• Remove risk by not requiring excavation activities (e.g., construct at ground level and infill).	Most Effective
Minimisation	**Substitution**	• Substitute excavations for another method that presents less risk (where applicable) e.g., horizontal drilling, hydro blasting or tunnelling methods.	
Minimisation	**Isolation**	• Where there is a risk of falling from height into the excavation, isolate the excavation to control unauthorised personnel or plant access to the working area and collision with other plant. Create edge protection/ exclusion zones with fencing where practicable, the trench shoring/ shields themselves or cones, barriers, tapes and bunting. • Isolate (or demarcate) excavation 'zone of influence' a minimum of 1m from the excavation to help prevent mobile plant or material/ spoil compromising the excavation. • Isolate any adjacent underground services before starting to dig i.e., lockout tagout.	
	WORK ABOVE THE LINE WHERE POSSIBLE TO CONTOL RISK		
Minimisation	**Engineering**	• Use benching and battering techniques to prevent trench collapse. • Shore or use trench shields on excavations 1.5m deep or as determined by an engineer's soil analysis report. • Use hydro vacuum technique e.g., hydro trenching or potholing. • Ladders and accessways in place where workers are required to enter excavations. • Use detection equipment to locate underground services.	
Minimisation	**Administrative**	• Permit to break ground (required for all activities that break ground) – see below process on Permit to Break Ground. • Hand dig (with hand tools/ hydro vac) within 2m of the marked depth of any underground service. • Emergency rescue plan in place in case of trench collapse or service strike.	
Minimisation	**PPE**	• This includes the use of mandatory PPE including hard hat (AS/NZS 1801:1997), high visibility vest (AS/NZS 4602.1) and safety footwear (AS/NZS 2210.3:2002)	Least Effective

NOTE: Where the risk cannot be eliminated, a combination of control measures may be appropriate.

Before you start working in an excavation:

Before anyone enters an excavation, a competent person (See the following Training and Competency Section for information on 'a competent person'.) must assess the risks and identify what controls are required to eliminate or mitigate them.

Minimum Control Requirement

- For task planning review factors such as soil stability and its potential to destabilize nearby structures/ services, soil type, contamination and water table level. The Geotechnical report that was prepared during resource consent (or others) must be available on-site for reference as required. Additional Geotechnical report may be required if ground conditions change or for mobile plant use.
- Locate underground services (refer to Underground Services section below).
- Comply with the heritage management (NZHPT) and Wildlife requirements. Report any findings to Heritage NZ / Ministry of Culture and Heritage or relevant entity as soon as possible as the finding may need to be preserved.
- Test if the ground has been contaminated by previous activity.
- Identify the right plant or equipment for the job. Refer to 'Mobile Plant' if your work involves mobile plant.
- Confirm with Ryman Civil Representative that excavations planned is within site boundaries.
- Check weather forecast will not impact the safety of excavating or the stability of the excavation e.g flooding, ground collapse.

Considerations

Consider the risk that vibration created by moving plant, adjacent roads, railway lines or other processes or activity may impact the integrity of the excavation.

Confined spaces

Some excavations may be classified as a Confined Space. Refer to **'**Confined Spaces'. A permit is required for confined space entry. Refer to 'Permit to Work Procedures' for information.

A confined space is:

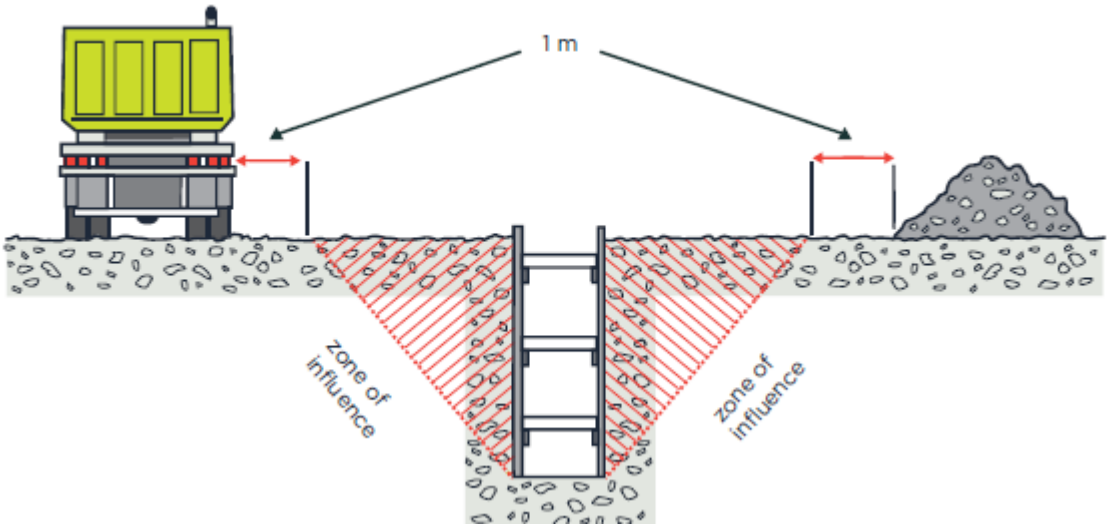
- is an enclosed or partially enclosed space and
- is not intended or designed primarily for human occupancy and
- may present a risk from one or more of the following at any time:
    - unsafe concentration of harmful airborne contaminants
    - unsafe concentration of flammable substances
    - unsafe levels of oxygen
    - substances that can cause engulfment.

Examples include: storage tanks, tank cars, process vessels, boilers, silos, pits, pipes, sewers, shafts, ducts and shipboard spaces.

If underground services are identified or may be present refer to 'Underground Services' section below.

Minimum Control Requirements for all excavations**:** (as per and in addition to Good Practice Guidelines for Excavation Safety)

- Permit to break ground must be in place for all excavation activities or other activities that break ground at any depth, including installation of waratahs (regardless of depth). Permit to break ground identifies the requirements for identifying underground services. See 'Permit to Work Procedures' for information. Permit to break ground does not include activities that does not break ground (e.g. using a spade to remove water after rain, etc..). See permit to break ground section below.
- Daily inspection of excavation to be completed for all excavation works in the Prestart.
- An Emergency Rescue Plan must be in place where there is a potential of an emergency arising from ground slips, gas leaks or floods.
- Services running through the excavation/trench must be physically protected where they are at risk of mechanical damage (see 'Underground Services' section below).
- Water build- up must be monitored and adequately controlled. This may require the use of a water pump or in some cases stopping work. Monitor weather conditions as storms/heavy rains can contribute to water build up.
- Upon identifying and locating underground services, the relevant close approach distances as specified by the asset owner must be adhered to and task only completed by hand digging (using hand tools/ hand-held tools) or by hydro excavation.
- Keep all spoil heaps, heavy vehicles, equipment, material, and plant away from the excavation edges at least 1-to-1 ratio (depth to distance away) plus 1m.



- Edge protection/exclusion zones must be put in place where there is a risk of fall from height, for example barriers or bunting to isolate the excavation.
- Excavations with a depth less than 1.5m may still require control measures to prevent collapse dependent on several factors including soil type, surcharge, time left open, weather conditions etc., e.g. benching/battering, shoring, shields. Involve a competent person when you believe there could be a risk of ground collapse.

Minimum Control Requirements for Excavations 1.5 metres or deeper:

- These excavations must be planned and overseen by a competent person (see the next section 'Training and Competency').
- Isolate (or demarcate) excavation 'zone of influence' (ZOI) a minimum of 1m from excavation to help prevent mobile plant or material/spoil compromising the excavation.
    - Spoil heaps positioned at least 1m from the ZOI of the excavation
    - Any mobile plant operations at least 1m from the edges of the excavation
- HSE Regulation 24 requires any excavated face more than 1.5 m high to be shored, so far as is reasonably practicable, unless:
    - the face is cut back to a safe slope or
    - the material in the face is of proven good standing quality under all reasonably foreseeable conditions of work and weather, or
    - by reason of the nature of the work and the position of any worker in the vicinity, there is no danger to any worker, or
    - shoring is impracticable or unreasonable and other precautions have been taken to make the face as safe as possible in the circumstances.
- Excavations deeper than 1.5m must be battered /benched/ shored as a minimum unless otherwise specified by a Geotechnical Engineer or other suitably competent person. Where this is not possible, the excavation must be inspected by a Geotechnical Engineer, certified safe in writing and regularly monitored.
    - Benching and battering is the horizontal stepping or sloping of the face, side, or wall of an excavation, complying to the Good Practice Guidelines for Excavations.
    - Shoring prevents collapse by maintaining positive pressure on the sides of the excavation, protecting workers.
    - Shields do not ensure ground stability but protect workers from ground collapse, by preventing the collapsing material falling onto them.
- Edge protection must be put in place where there is a risk of fall from height, for example barriers or bunting to isolate the excavation.
- When shields or a ground support system are not used to support an excavation in unstable ground conditions, the sides must be battered to the angle of repose of the spoil pile.
- Where workers are required to enter an excavation over 1.5m the following must be in place:
    - safe access/egress must be provided
    - shoring/battering/benching/sheet piling to prevent collapse, as much as reasonable and practicable and complying to the Good Practice Guidelines for Excavations
    - a stand-by person (not in the excavation) must be in place in case of an emergency
- No person is to ever enter an unsupported section of the excavation.
- No worker is to stand/walk/work under a suspended load.

If excavation works reveal objects of archaeological significance works are to be stopped and the Project Manager notified immediately.

Permit to Break Ground

Permits to break ground are required for all works involving the disturbance of ground, works can include but are not limited to excavations involving mobile plant, hand tools, Hydro excavation or putting anything into the ground such as waratahs or pegs. Permits are managed by our H&S management system Donesafe, instructions on how to complete a permit can be found here and instructions for the actioning can be found here.

The process for issuing a Permit to Break Ground is as Follows:

- **Step 1** Services must be physically marked and clearly visible. These markings should be maintained throughout the operation relevant to the permit.
- **Step 2** ONLY Civil Supervisor / Site Manager / Project Manager to review permit.
- **Step 3** Civil Supervisor / SM / PM to engage with contractor with drawings at proposed dig site for review and discuss any nearby services.
- **Step 4** If services are in proximity, these should be 'plotted' using ASBUILTS on file via the contractor/surveyor.
- **Step 5** Permit is applied for by the contractor(s) completing work (i.e., the machine operator).
- **Step 6** Civil foreman / SM / PM to approve permit once satisfied with the above.

It is critical that all services are physically marked out on the ground prior to starting any works under a "Permit to break ground," these must also be maintained during the life cycle of the works – this can be done with spray paint and signage initially progressing to physical pegs if needed once locations have been marked. The permit process must not start without this confirmation.

The approval process above is essential for ensuring all due diligence has been completed prior to this type of work commencing. This type of permit holds a caveat based on the potential risk that it should only be approved by the civil foreman onsite who has a clear understanding of all cable and service locations onsite based on up to date as-builts. In the absence of a civil foreman the most senior site manager is to take responsibility for works, failing this the Project Manager should sign off. As-builts to be used for approval process should be as specific to work area as physically possible and not an overall site plan.

Note: Hand tools/ Hydro Excavation must be used within a minimum of 2.0m distance of any services, no exceptions. Always treat all services as live unless proven otherwise.

Training and Competency

Any workers trained and competent should plan and oversee excavations. Refer to the WorkSafe NZ Good Practice Guidelines below.

If operating mobile plant refer to 'Mobile Plant' for information on safe operating and training and competency.

If using a harness refer to 'Work at Height' for information on safe use and training and competency.

Table 1: Recommended competencies for excavation work

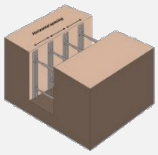
Excavation Depth and Type – Normal Conditions[1]	Recommended Competency
Up to 1.5m • Shored[2], benched, and/or battered	• Recent experience in carrying out or supervising excavation work
1.5m – 3m • Flat, open ground, no surcharge • Shored[2], benched, ad/or battered  Battering.  Benching.  Shoring.  Trench Shields. •	• Recent experience in carrying out or supervising excavation work at these depths. • Technical or trade qualification (e.g. as a civil engineer or drainlayer)
3m – 6m • flat, open ground, no surcharge • Shored[2], benched, and/or battered • (e.g shored as per table 6, waler and brace solutions up to 6m in depth)	• Technical or trade qualification (e.g. as a civil engineer or drain layer) • Recent experience in carrying out or supervising excavation work in similar ground at these depths • Experienced temporary works designer able to interpret the site's soil information

Table 2: Recommended competencies for more complex excavation work

Excavation Depth and Type – Complex conditions not covered in table 1[4]	Recommended Competency
Up to 3m • Shored[2], benched, and/or battered	• Experienced temporary works designer[3] able to judge whether it is safe
Over 3m • Requiring detailed analysis of site, significant structural design analysis and sound engineering judgement • Shored[2], with benched and/or battered sides • All sheet piled excavations (cantilevered, propped, or ground anchored), and excavations shored with H-pile shoring and lagging • Shafts and drives framed with timber or steel with poling boards, lagging or laths. Supported by pre-cast concrete, steel caissons/plates etc.	• Experienced temporary works designer[3] able to judge whether it is safe • Can provide producer statements: PS1-design, and PS4 - construction review

1	Generally flat open ground, with little or no surcharge loading, favourable ground conditions, off set from nearby structures and sensitive infrastructure. Groundwater can be controlled with simple methods, such as a sump pump arrangement.
2	Shoring that comes with documents stating what depths or soil pressure it can be used to (e.g. slide-rail shoring). Alternatively, shoring designed to specific soil load profiles (e.g. trench shields).
3	Through training qualifications or experience, has acquired the knowledge and skills to competently excavate to this depth, for example: - someone who has industry training and expertise, experience, knowledge and skills to excavate to this excavation's depth and type - Chartered Professional Engineer with experience designing temporary works, holding formal Engineering qualifications (e.g. Civil, Structural or Geotechnical).
4	The conditions may include very weak or sensitive soils, groundwater that require specialist dewatering or locations near structures and sensitive infrastructure. These conditions would result in an elevated risk when constructing the excavation.

Notifiable Work:

In line with legal requirements, below listed excavations/ related works is to be notified to WorkSafe NZ prior to commencement of activities:

- Work in any pit, shaft, trench, or other excavation in which any person is required to work in a space more than 1.5 meters deep and having a depth greater than the horizontal width at the top
- Work in any drive, excavation, or heading in which any person is required to work with a ground cover overhead
- Work in any excavation in which any face has a vertical height of more than 5 meters and an average slope steeper than a ratio of 1 horizontal to 2 verticals

Notifications must be made by Ryman and the contractor. Ryman is not required to make a new notification for each stage of the project, if an all-encompassing hazardous work notification is in place for the project for Notifiable Excavation. For any excavations that pose a risk of falling from height i.e. into the excavation refer to 'Work at Height'.

Any work that meets these criteria must be notified to WorkSafe via the online form: https://forms.worksafe.govt.nz/hazardous-work-notification.

Underground Services

Underground services are an element of building service, such as an electrical cable or a pipe, that is buried in the ground.

Activities on our construction sites that involve underground services include:

- Excavations (of any depth)
- Services placement and setup
- Any penetration of the ground, including:
  - Installation of waratahs
  - Piling work

Related safely controlling work documents can be found here:

Risks - What could go wrong?

- Contact with underground gas lines causing harmful health effects and fire and/or explosion resulting in fatality or major injury such as burns or property damage that may also affect the company reputation.
- Contact with underground electricity services causing electrocution or electric shock causing death or serious injury such as burns, arrythmia and/or loss of consciousness or property damage.
- Contact with water mains/Fibre lines causing leak and property damage.

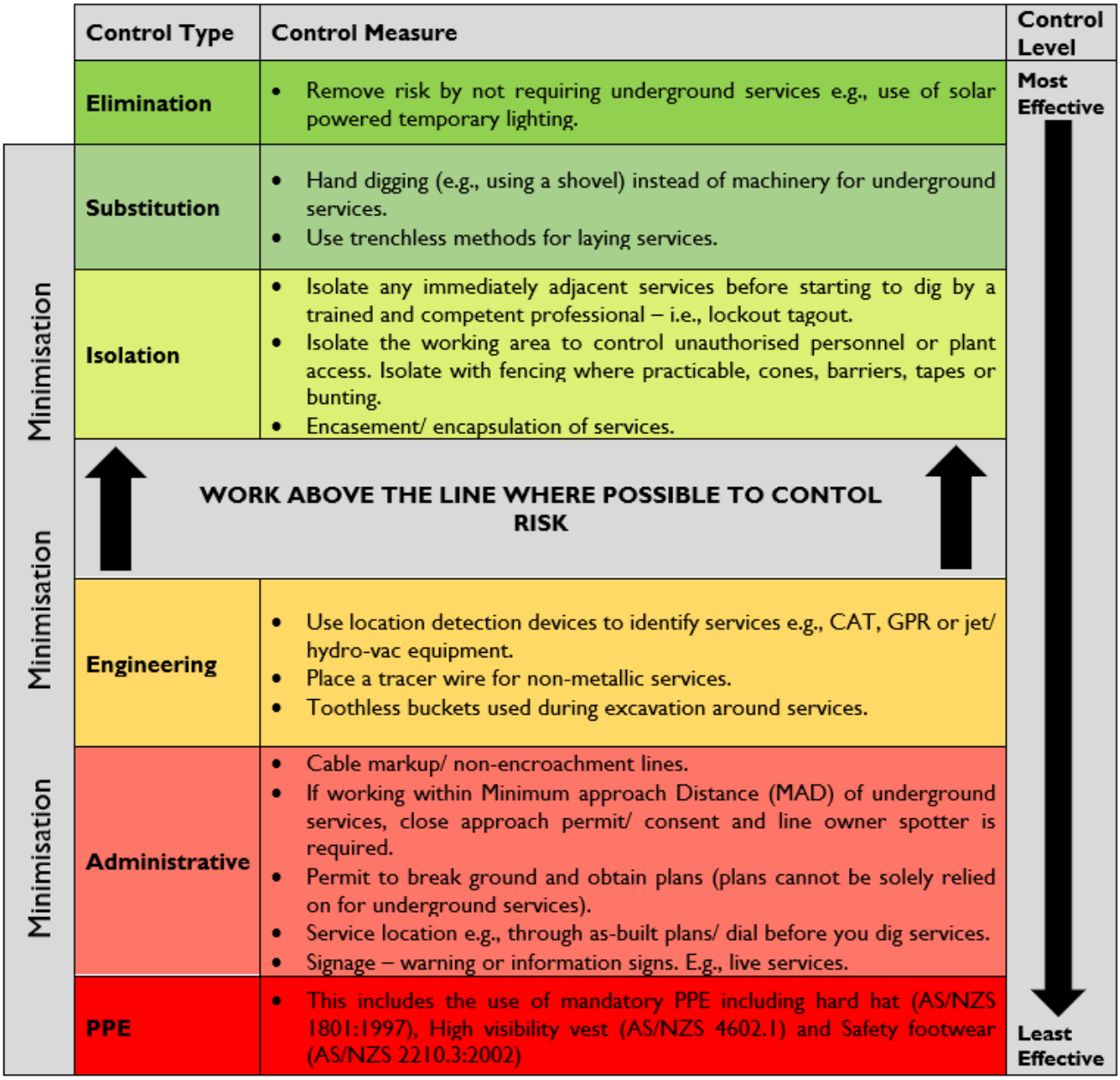
Controls – How do I keep safe?

The identification of work where there is a risk of contact with underground and overhead services and appropriate control measures are to be fully detailed in a Safe Work Method Statement (SWMS) or similar risk-assessment document prior to commencing any work.

The SWMS must be reviewed by an appropriate Ryman representative prior to any work commencing and following any changes to the task or environment.

Note: Outside consultation may be required for government owned utilities, Vector/Electrix, dial before you dig, etc..

Underground services controls include but are not limited to:



Control Type	Control Measure	Control Level
Elimination	• Remove risk by not requiring underground services e.g., use of solar powered temporary lighting.	Most Effective
Substitution	• Hand digging (e.g., using a shovel) instead of machinery for underground services. • Use trenchless methods for laying services.	
Isolation	• Isolate any immediately adjacent services before starting to dig by a trained and competent professional – i.e., lockout tagout. • Isolate the working area to control unauthorised personnel or plant access. Isolate with fencing where practicable, cones, barriers, tapes or bunting. • Encasement/ encapsulation of services.	
WORK ABOVE THE LINE WHERE POSSIBLE TO CONTOL RISK		
Engineering	• Use location detection devices to identify services e.g., CAT, GPR or jet/ hydro-vac equipment. • Place a tracer wire for non-metallic services. • Toothless buckets used during excavation around services.	
Administrative	• Cable markup/ non-encroachment lines. • If working within Minimum approach Distance (MAD) of underground services, close approach permit/ consent and line owner spotter is required. • Permit to break ground and obtain plans (plans cannot be solely relied on for underground services). • Service location e.g., through as-built plans/ dial before you dig services. • Signage – warning or information signs. E.g., live services.	
PPE	• This includes the use of mandatory PPE including hard hat (AS/NZS 1801:1997), High visibility vest (AS/NZS 4602.1) and Safety footwear (AS/NZS 2210.3:2002)	Least Effective

Minimisation

Minimisation

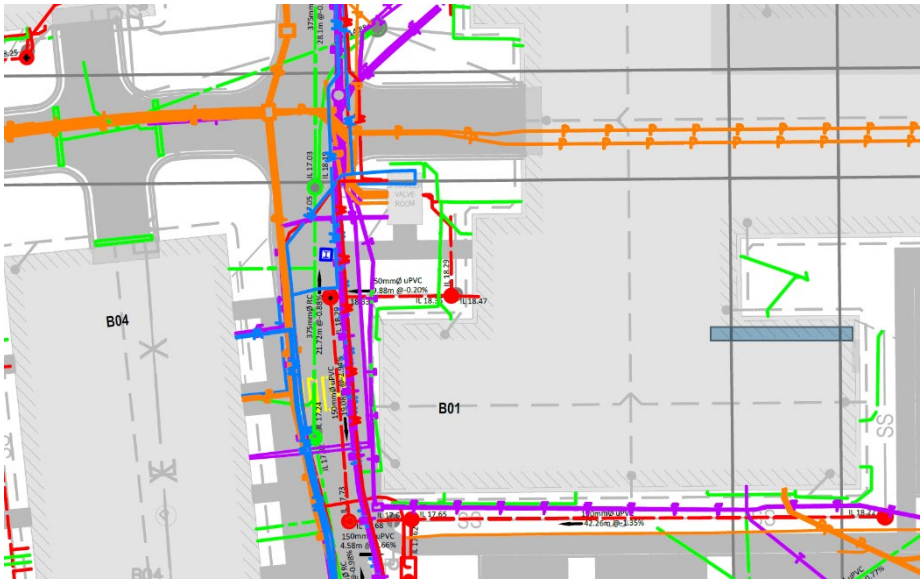
Minimisation

Note: Where the risk cannot be eliminated, a combination of control measures may be appropriate.

<u>Minimum control requirements for identification and management of underground services</u> (see 'Excavations' for information on safe excavation practices):

- Existing services should be identified prior to commencing works on site wherever possible. This may be done, but not limited to the following:

- Dial before you dig services (0800 248 344)
- Underground service scanning to identify location of all services. This may require a number of scanning methods including radar detection and CAT scanning. Personnel scanning must be trained (e.g. CAT/jenny trained)
- Obtain services 'as-built' drawings from facility/landowner/occupiers.
- Non-destructive digging or potholing
  - An underground Services Drawing must be marked up showing the location of all underground services and prominently displayed onsite. Remember, drawings and service plans may be different (location and depth) from what is underground. This plan should be made available to all workers that may penetrate the ground (excavator operators, mobile crane and concrete boom pump operators etc) Below is an example of the level of detail required for the underground services as-built's to be displayed – remember to always consult designers/ engineers index for the key of color coding as this may vary.



  - Accurately trace and mark out underground services. Underground services should be marked onsite to identify their location to others wherever deemed necessary e.g. spray-painting footpath. Remember, drawings and service plans may be different from what is underground.
  - The 'No Go' zones for each underground service must be determined before commencing work in the location of the service. This can be obtained by contacting the asset owner.
  - Introduction of or discovery of unchartered services:
  - Maintain the Ryman Underground Service Plan which identifies all as laid services during construction including temporary services. If they are not Ryman services, notify the council so services can be chartered.

- Permit to break ground must be in place for all excavation activities or other activities that break ground e.g. installation of waratahs (regardless of depth). Permit to break ground identifies the requirements for identifying underground services.
- Close approach permit/consent required if within the minimum approach distance (MAD) of services. If working within MAD a spotter may be required as per the electricity act/regulations. 48 hours notice is required for electricity service owner/spotter and up to 10 days notice is required for gas service owner/spotter.
- Isolate any immediately adjacent services before starting to dig (wherever possible) - i.e. lock out tag out. All electrical work, live or dead, must be carried out by electrically trained and competent workers to ensure the work is completed safely. Isolation to be verified through means of written confirmation and/or use of service detection device.
- Isolate the working area to control unauthorized personnel or plant access the working area. Isolate with fencing where practicable, or cones, barriers, tapes, bunting etc..
- Hand tools and/or hydro/jet-vac excavation method must be used within a minimum of 2.0m distance of any services.
- Potholing method used to confirm the location of any underground services as per as-built plans.

References and Resources:

- Good Practice Guidelines for Excavation Safety
- Heritage New Zealand Pouhere Taonga Act 2014
- New Zealand Code of Practice for Electrical Safe Distances
- Vector Close approach consent
- Vector Guide to working safely around Vectors Electricity, gas and communications networks
- Vector – Gas Pipeline Safety Guide