5 August 2024

Independent Hearing Panel
Gore Proposed District Plan
PO Box 8
Gore 9740

By email to: lcrazywolf@goredc.govt.nz

Dear Commissioners,

Gore Proposed District Plan – Hearing Stream 4B (Residential Zones)

KiwiRail Holdings Limited (**KiwiRail**) is the State-Owned Enterprise responsible for the management and operation of the national railway network. This includes managing railway infrastructure and land, as well as rail freight and passenger services within New Zealand. KiwiRail is also the Requiring Authority for land designated "Railway Purposes" in District Plans throughout New Zealand.

Setbacks

KiwiRail made a submission on the Gore Proposed District Plan (**Proposed Plan**) on 27 November 2023. KiwiRail's submission sought a 5 metre setback for buildings and structures from the rail corridor boundary in all zones adjacent to the rail corridor and associated matters of discretion.[1] KiwiRail filed corporate and planning evidence for Hearing Stream 2 (Commercial, Open Space and Recreation, and Special Purpose Zones) of the Proposed Plan on 10 June 2024, which addressed the need for safety setbacks from the rail corridor. KiwiRail also provided legal submissions and presented at the hearing for Hearing Stream 2 on 24 June 2024, and filed supplementary planning evidence on 5 July 2024.

KiwiRail has reviewed the Right of Reply evidence from the Council Officers dated 19 July 2024 (**Right of Reply evidence**), which recommends a stepped setback ranging from 1 metre (for buildings under 3 metres in height) to 3.5 metres (for buildings greater than 8 metres in height). These are reduced setbacks compared to the position set out in KiwiRail's supplementary evidence which proposed setbacks ranging from 2.5 metres (for buildings under 3 metres in height) to 5 metres (for buildings greater than 9.5 metres in height).

KiwiRail opposes the Council Officer's recommendations in the Section 42A Report to adopt the reduced setback standard contained in the Right of Reply evidence in the General Residential Zone, Medium Density Residential Zone, and Large Lot Residential Zone (**Residential Zones**) of the Proposed Plan. KiwiRail seeks the setback standards set out in the supplementary evidence of Louise Taylor dated 5 July 2024.

I refer to my earlier evidence and the evidence presented by Ms Taylor for Hearing Stream 2 which sets out the importance of providing an adequate plan-based setback adjacent to the rail corridor across all zones in the Gore District, including in the Residential Zones that are the subject of Hearing Stream 4B. A sufficient safety setback is critically important to enable landowners to safely access their properties,

[1] Submission 132 of KiwiRail Holdings Limited dated 27 November 2023.

avoid significant safety risks, and protect the rail corridor from interference.[2] Setback controls need to be of a sufficient distance to appropriately manage the health and safety of communities and ensure the ongoing operation of KiwiRail's network as nationally and regionally significant infrastructure.

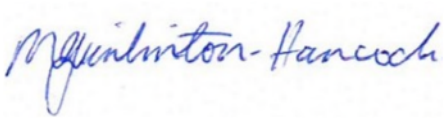
The Right of Reply evidence sets out comments on the dropped object methodology used in the diagram provided by KiwiRail. The authors state that the tool is primarily to protect personnel within a high-risk work site, not to protect infrastructure.[3] The intent of the dropped object methodology is to demonstrate a trajectory for objects if dropped off scaffolding. This applies regardless the type of site. Objects can, and do, fall from scaffolding. If they fall onto the rail corridor there is a safety risk to trains passing though, and people working within, the rail corridor. A section 32 report is attached as **Appendix 2** which contains more detail around the context in which the diagram was prepared.

Objectives and Policies

There are other KiwiRail submission points addressed in Hearing Stream 4B which relate to objectives and policies for the Residential Zones. I have set out KiwiRail's position regarding the Council Officer's recommendations on each of these submission points in the table in **Appendix 1** to this letter.

I am available to answer any questions from the Hearing Panel either in writing or via videoconference if required.

Yours faithfully,



Michelle Grinlinton-Hancock

Manager RMA Team

KiwiRail Holdings Limited

[2] Statement of Evidence of Michelle Grinlinton-Hancock dated 10 June 2024 at [4.17].
[3] Right of reply evidence at [11].

Appendix 1 – KiwiRail's position on Hearing Stream 4B submission points

Provision	Relief sought in KiwiRail's submission	Provision recommended by the Council Officer	Comments on the Council Officer's recommendation
LLRZ-P2	Where reticulated services are not available, require activities to be self-sufficient and ensure appropriate on-site service provisions is provided, having particular regard to: 1. the method of sewage and stormwater treatment and disposal that does not result in increased flooding and erosion risk.[4] […]	Where reticulated services are not available, require activities to be self-sufficient and ensure appropriate on-site service provision is provided, having particular regard to: 1. the method of sewage and stormwater treatment and disposal;[5] […]	The Council Officer considers a Code of Practice document is a more appropriate means of managing the adverse effects of stormwater runoff through the detailed design of systems.[6] As such, the Council Officer makes no amendments to LLRZ-P2 in this regard. KiwiRail accepts the Council Officer's position and will not pursue this relief further.
GRZ-O4	Retain as proposed.[7]	Development is provided with appropriate infrastructure and adverse effects on infrastructure networks are managed so that the operation, maintenance, upgrade and development of the infrastructure is not compromised ~~mitigated~~.[8]	The Council Officer accepted the amendment sought by Transpower,[9] citing its clarity and specificity and points out that it indicates a proactive approach to handling adverse effects on infrastructure, ensuring that they do not hinder its ongoing functioning or future improvement.[10] KiwiRail supports the Council Officer's position.
GRZ-P7	Ensure development is designed consistent with the capacity of existing infrastructure networks and, where practicable, incorporates low impact approaches to stormwater management that does not result in increased	Ensure development is designed consistent with the capacity of existing infrastructure and transportation networks or will be appropriately upgraded and, where practicable, incorporates low impact approaches to	KiwiRail accepts the Council Officer's position and will not pursue this relief further.

[4] Submission point 132.98.
[5] Section 42A Report, pg 79.
[6] Section 42A Report, pg 79.
[7] Submission point 132.115.
[8] Section 42A Report, pg 53.
[9] Transpower submission point 101.079.
[10] Section 42A Report, pg 53.

Provision	Relief sought in KiwiRail's submission	Provision recommended by the Council Officer	Comments on the Council Officer's recommendation
	flooding and erosion risk.[11]	stormwater management.[12]	
MRZ-O5	Retain as proposed.[13]	Development is provided with appropriate infrastructure and adverse effects on infrastructure networks are mitigated.[14]	KiwiRail supports the Council Officer's position.
MRZ-P11	Ensure development does not compromise existing infrastructure networks, including infrastructure capacity, and, where practicable, incorporates low impact approaches to stormwater management that does not result in increased flooding and erosion risk.[15]	Ensure development does not compromise existing infrastructure and transportation networks, including infrastructure capacity, or will be appropriately upgraded, and, where practicable, incorporates low impact approaches to stormwater management.[16]	KiwiRail accepts the Council Officer's position and will not pursue this relief further.

[11] Submission point 132.116.
[12] Section 42A Report, pg 55.
[13] Submission point 132.113.
[14] Sectoin 42A Report, Appendix A, pg 3.
[15] Submission point 132.122.
[16] Section 42A Report at pg 69.

Assessment under Section 32 of the Resource Management Act 1991

Rail Safety Setback

July 2024

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1. Summary

KiwiRail Holdings Limited (KiwiRail) is a network utility operator and the Requiring Authority[1] for the railway network throughout New Zealand. The rail network is an asset of regional and national importance and is fundamental to the safe and efficient movement of people and goods throughout New Zealand. KiwiRail operates over 3500km of rail network and infrastructure within the rail corridor.

In recent years, there has been an increased focus on enabling housing and intensification in urban areas, particularly in and around transport nodes. From a planning perspective, higher density development has been enabled through the National Policy Statement for Urban Development and the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021. As a result, we can expect to see increased intensification occurring adjacent to the rail corridor. The interface between the rail network and adjoining land uses needs to be carefully managed. In addition to noise and vibration effects (which are outlined in the *Standard Railway Noise and Vibration Reverse Sensitivity Provisions and Section 32 Report* (dated 16 August 2023)), there are critical health and safety issues for both communities and users of the rail network which can arise as a result of this interface without good management.

In addition to the more commonly understood risk of people entering the rail corridor, there are also risks for people undertaking activities on properties adjoining the rail network (e.g. building construction or maintenance, objects falling onto tracks). Interference with the rail corridor can have significant consequences and compromise the levels of service on the rail network. An integrated planning approach is critical to ensure that our urban environments are developed in a way that both provides for the ongoing operation and future development of our transport network while also ensuring that our communities are protected from health and safety effects.

KiwiRail proposes to introduce District Plan setback provisions for buildings and structures on sites adjoining the rail corridor to:

a. manage health and safety effects on communities from the potential conflict between the rail corridor and people; and
b. minimise rail operation and efficiency being compromised due to disruption resulting from unplanned incursions into rail corridor.

The provisions apply only where a new building is proposed or existing building extended on a site adjoining a rail designation boundary.

This assessment has been prepared in accordance with Section 32 and Schedule 1 of the Resource Management Act 1991 (RMA) to assess the inclusion of building setback provisions within District Plans. This report is informed by:

- the Galvin Consulting Ltd report *Advice for KiwiRail on the safety implications of*

[1] New Zealand Gazette, No. 31, 14 March 2013, page 943.

construction and maintenance-related activities adjacent to rail (Galvin Consulting Report) (Attachment 2); and

- the Insight Economics *High Level Assessment of Proposed Building Setbacks Adjacent to the Rail Network* (Insight Report) (Attachment 3).

As part of the section 32 analysis, this report identifies the issues to be addressed, being:

- community health and safety; and
- protection of the rail corridor as a physical resource / significant infrastructure.

This report also considers options beyond district plan provisions[2].

[2] Section 2 and Attachment 4.

2. Issue identification

2.1 Context

As set out in the Galvin Consultancy Report, buildings and structures involve construction activities and, once construction is complete, maintenance, repair and replacement activities throughout a building's life (50+ years).

During construction and ongoing maintenance/repair, people interacting with (including simply walking around) construction equipment and temporary structures require space to undertake these activities safely. These activities are undertaken on sites adjoining the rail corridor.

KiwiRail manages its infrastructure generally within a designated rail corridor. Infrastructure contained within the corridor includes tracks, bridges, tunnels, overhead gantries and signalling systems designed to facilitate the efficient movement of freight and passengers. While KiwiRail primarily focuses on freight transportation and scenic journeys, it also provides infrastructure for urban commuter services in certain regions (eg Auckland and Wellington) and parts of its network are electrified.

The rail corridor has a very different risk profile compared to other sites or land uses. The rail corridor is a hazardous environment. Entry into the rail corridor poses a high consequence risk and significant safety issue to both the person accessing the corridor, and to the rail operations being undertaken. Inappropriate land use and development can adversely impact the safe and efficient operation of the rail corridor.

In addition, it is a common public perception that the rail corridor is 'public' land (without access limitation), particularly where there is no physical barrier to entry and/or trains volumes are lower.

Land adjacent to the rail corridor is increasingly being developed for higher density uses in our urban environments. Among other things, this is a result of the introduction of the National Policy Statement on Urban Development 2020 which directs certain local authorities to enable multi-storey developments in and around transport nodes.[3]

2.2 Risk

Risk arises in a range of circumstances where activities are located in close proximity to the rail corridor boundary. They include:

- building construction;
- building maintenance (including where there is insufficient space between the building and rail corridor to complete maintenance without entering the rail corridor, people installing, moving around and using mobile plant or temporary access structures); and
- falling objects from construction, maintenance and daily use of buildings and spaces.

[3] National Policy Statement on Urban Development 2020, Policy 3.

Sections 4 to 8 of the Galvin Consulting Report describe in detail the types of activities undertaken within[4] and adjacent[5] to the rail corridor along with the types of risk which arise[6]. All of these risks occur where buildings are too close to the corridor, resulting in landowners being unable to safely build, maintain or manage their structures without encroaching into the corridor.

Hazards with the potential to cause significant harm or fatalities include working at height, dropped objects, electricity, unstable ground, and mobile plant including rail vehicles. Events which can harm construction and maintenance workers can also damage the rail network and impact the safety of those working on or using rail. As set out in the Galvin Consulting Report, in New Zealand, there is a lack of situational awareness with respect to rail i.e. people are not aware of the safety hazards presented by rail operations and how their work may affect rail operations and the network. Compounding this limited awareness are particular characteristics of small businesses and DIYers who carry out construction and maintenance work.

Examples of resulting risks include:

a. if a person or object encroaches onto the rail corridor there is a risk of electrocution where there are electrified lines and / or risk of injury or worse from rail activities (this includes spray drift from water blasting which can be a risk to electrified lines);
b. the risk of injury (or death) to people from rail activities is also present where there are not electrified lines. Trains are large, travel at speed, and cannot quickly stop;
c. the potential for physical encroachment by ladders / scaffolding etc into the rail corridor;
d. items from adjoining land inadvertently falling into the rail corridor, such as items dropped from scaffolding, ladders or windows; and
e. safety issues for rail employees who need to remove obstructions, as well as train drivers and other people on trains if the obstruction is not removed in time

This assessment focuses on maintenance activities and falling objects as a result of building proximity.

2.3 Existing approaches to issue

It is common for District Plans to include provisions which limit uses of land to protect the operation of infrastructure beyond the designation boundary and also to provide safe and healthy environments for people. For example, a national grid corridor overlay is included in a range district plans[7] which restricts activities within a specified spatial extent of Transpower's network (around both pylons and lines). Airports and ports are another common infrastructure type which have restrictions on activities and/or required mitigation for certain activities included in District Plans for surrounding private land[8].

[4] Section 4.
[5] Section 5.
[6] Sections 6, 7 and 8.
[7] For example, Chapter D26 of the Auckland Unitary Plan.
[8] For example, Chapters D24 Aircraft Noise Overlay and D25 City Centre Port Noise Overlay of the Auckland Unitary Plan.

In addition to setbacks for infrastructure, setbacks for managing other environmental effects are also common. Examples include building setbacks (by yard and height in relation to boundary controls) between business (particularly industrial) zones and residential or open space zones.

KiwiRail commonly seeks a 5 metre setback for buildings and structures from the rail corridor boundary during plan change and review processes. A number of District Plans[9] include setback controls. The plan provisions are a permitted activity standard (meeting a setback). Where the permitted activity standard is not met a restricted discretionary activity status is triggered with matters of discretion, requiring engagement with KiwiRail to consider whether the encroachment can be safely accommodated and consideration of the safety of the rail network.

The proposed provisions are set out in full In **Attachment 1**.

2.4 Other Options

Where building owners are unable to complete maintenance within their site boundaries, as a land owner and requiring authority, other potential methods available to KiwiRail to manage effects (not including district plan provisions) include:

a. increasing the width of the KiwiRail designation;
b. rail corridor fencing; and
c. managing access to the rail corridor via corridor access request processes.

For the reasons detailed in **Attachment 4**, these options are considered less effective than the district plan provisions proposed.

3. Section 32 Requirements

Under the RMA, a section 32 evaluation must:

a. examine whether the proposed objectives are the most appropriate way to achieve the purpose of the RMA (s32(1)(a));

b. examine whether the proposed provisions are the most appropriate way to achieve the objectives by identifying other reasonably practicable options, assessing their efficiency and effectiveness and summarising the reasons for deciding on provisions (s32(1)(b));

c. relative to considering the efficiency and effectiveness of the provisions in achieving the objective, include an assessment of the benefits and costs of the effects anticipated from implementing the provisions (s32(2)); and

d. contain a level of detail that corresponds to the scale and significance of the environmental, economic, social, and cultural effects that are anticipated from implementing the proposal (s32(1)(c)).

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[9] For example, Christchurch City District Plan Rule 14.4.2.7 *Minimum building setbacks from internal boundaries and railway lines* requires 4m setback

For plan changes, the proposal is to be evaluated against both the objectives of the proposed plan change and the objectives of the existing plan (s32(3)). Each of these matters is assessed in this report (other than s32(3)).

4. Objectives Assessment

Section 32(1)(a) of the RMA requires an examination of whether a proposed objective is the most appropriate way to achieve the purpose of the RMA. The purpose of the RMA is set out in Part 2, Section 5 of the Act.

> *5 Purpose*
> *(1) The purpose of this Act is to promote the sustainable management of natural and physical resources.*
> *(2) In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—*
> > *(a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
> > *(b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
> > *(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

Section 5 of the Act specifically enables *people and communities to provide for their social, economic, and cultural well-being and for their health and safety*. The rail network is a significant *physical resource* which makes an essential contribution to the social and economic wellbeing of communities through the movement of people and goods across the country. The sustainable management purpose of the RMA also requires adverse effects to be avoided, remedied or mitigated. These can include potential adverse effects on peoples' health and safety.

The proposed objective will assist with achieving the *sustainable management* purpose of the RMA.

KiwiRail has prepared an objective and policy for inclusion in district plans (included in Attachment 1) to address the interface between the rail corridor and adjoining sites. It is anticipated the proposed objective and policy would be included within the District Wide Matters - Urban Form Chapter of the plan.

An assessment of the proposed objective against RMA section 5 is set out in Table 1, below.

Table 1: Assessment of Objective under Section 5	
Proposed Provision	**Reason**
Objective 1: Protect communities and infrastructure by mitigating: a. the adverse health and safety impacts associated with accessing the rail corridor; and b. risk of disruptions to the safe and efficient operation of regionally significant rail infrastructure. Policy 1 Require buildings and structures adjoining the rail corridor designation boundary to be setback to provide for the health and safety of people and communities and the safe and efficient operation of rail infrastructure.	Section 2.2 of this report describes health and safety effects where buildings are located on/in close proximity to the rail designation boundary. The objective (and supporting policy) is the most appropriate way to achieve the purpose of the RMA as it will enable buildings and structures to be maintained from within their own sites and therefore minimise health and safety effects associated with entering the rail corridor and provide for the safe and efficient operation of rail as a physical resource. Not having such an objective would not ensure sufficient consideration is given to these important matters. No other objective obviously appears to be a more appropriate way of achieving these outcomes.

The balance of Part 2 of the RMA provides the framework for the sustainable management of natural and physical resources. Section 6 lists matters of national importance that shall be recognised and provided for, section 7 lists other matters that all persons exercising functions and powers under the RMA shall have particular regard to and section 8 addresses matters relating to the principles of the Treaty of Waitangi. No relevant matters in sections 6 or 8 have been identified. The proposed objective has been assessed against the following provisions of section 7 in Table 2.

Table 2: Assessment of Objective under Part 2 Section 7	
RMA Provision	**Objective 1**
s7(b) (the efficient use and development of natural and physical resources)	Objective 1 will provide for the efficient use and development of physical resources (land and the rail network) by enabling the proximity effects of buildings and transport infrastructure to be managed appropriately. Management of this interface will protect the

	rail network and the safe and efficient movement of people, goods and services by rail.

The proposed objective addresses the identified resource management issues, is consistent with Part 2 of the Act and will result in the sustainable management of physical resources. It also appropriately reflects Council's obligations under s31 of the RMA, in particular its obligation to achieve integrated management of the effects of the use, development, or protection of land and associated natural and physical resources of the district.

The National Policy Statement – Urban Development is also a relevant consideration, given that the purpose of national policy statements under Section 45(1) of the RMA is to state objectives and policies for matters of national significance that are relevant to achieving the purpose of the Act. In this respect, national policy statements can be considered to give greater meaning to the purpose of the RMA on particular resource management issues.

Objective 1 of the NPS-UD promotes well-functioning urban environments. Policy 1 of the NPS sets out what, as a minimum, well-functioning urban environments constitute. In addition to these mandatory aspects, the safe, secure and efficient operation of rail infrastructure is considered to be an element of a well-functioning urban environment.

5. Provisions Assessment

Sections 32(1)(b) and 32(2) require assessment of the proposed plan provisions to be undertaken, specifically:

a. whether the proposed provisions are the most appropriate way to achieve the objectives by identifying other reasonably practicable options, assessing their **efficiency and effectiveness** and summarising the reasons for deciding on provisions; and
b. relative to considering the efficiency and effectiveness of the provisions in achieving the objective, include **an assessment of the benefits and costs of the effects** anticipated from implementing the provisions.

The cost and benefit assessment must identify and assess the costs and benefits associated with environmental, economic, social, and cultural effects including economic growth and employment that are anticipated to be provided or reduced. If practicable, these are to be quantified.

Section 32(2)(b) also requires an assessment of the risk of acting or not acting if there is uncertain or insufficient information. In this case, there is sufficient information about the subject to determine the range and nature of effects of the options set out and which confirms the need to act. The risk of acting or not acting does not need to be evaluated as the location of and safety requirements for the rail corridor are well understood. Not acting will increase risks to public safety as well as increasing the risk to the efficient operation of New Zealand's rail network, , due to unexpected shutdowns as a result of interference with the rail corridor.

5.1 Setback

5.1.1 Identifying reasonably practicable options

The reasonably practicable alternative options are identified as:

a. **Do nothing:** Rely on (any) yard setbacks and/or height in relation to boundary controls existing in district plans where adjoining rail designation boundary.
b. **Setback of 2.5m:** Require buildings and structures to be setback by 2.5m where adjoining rail designation boundary.
c. **Setback of 5m:** Require buildings and structures to be setback by 5m where adjoining rail designation boundary.

A. Do Nothing

A 'do nothing' option is essentially maintaining the status quo or choosing not to take any action in a given situation.

B. Setback of 2.5m

District Plans (notified and operative) include a variety of setbacks ranging from the 1m (MDRS minimum) to, for example, 4m[10]. A 2.5m setback has been selected as an indicative option to represent an option greater than MDRS but less than Option C (5m setback).

C. Setback of 5m

The Galvin Consulting Report assesses variable building heights, separation from boundaries and a common access method (scaffolding). As illustrated in Figure 1, for maintenance to be undertaken (particularly at height), there needs to be sufficient space available for access within the site boundaries. It concludes the distance from the face of the cladding is:

- 3.7 – 4.6 metres for two, three, and four-storey buildings; and
- 6.5 metres when including a zone for (some) dropped objects.

Figure 1 also shows the potential trajectory for dropped objects.

[10] For example, Operative Christchurch City District Plan Rule 14.4.2.7 *Minimum building setbacks from internal boundaries and railway lines* requires 4m setback

Figure 1: Separation and Trajectory

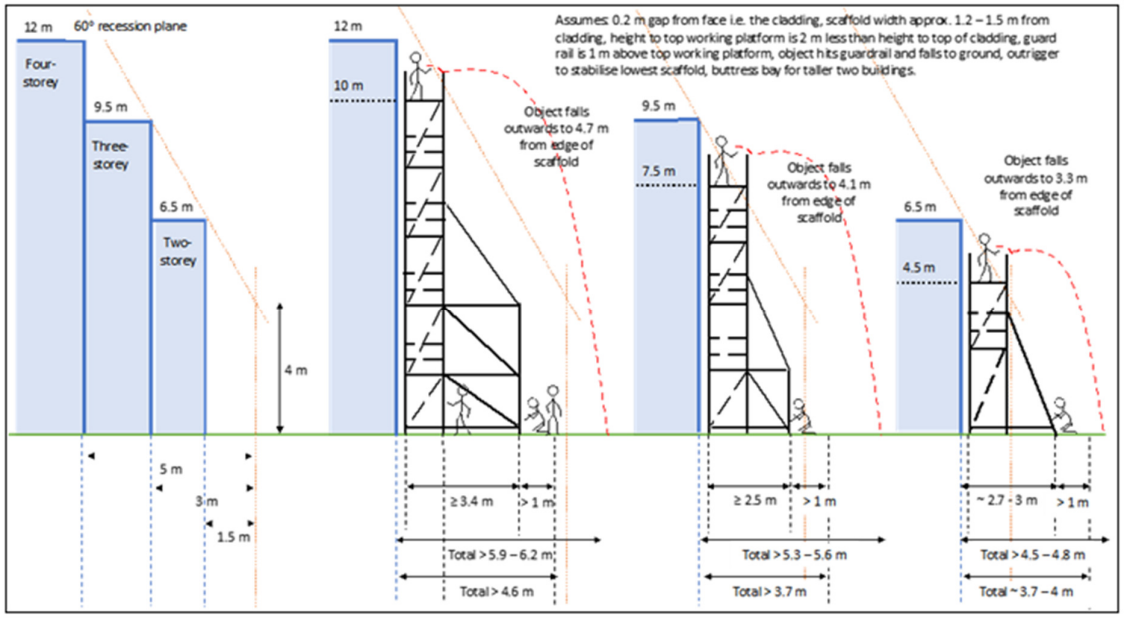

Figure 1 assumes a level site, good ground conditions and no other structures disrupting access. While the Galvin Consulting Report acknowledges other access methods are available, scaffolding has been selected as an access methodology as it is widely available (easily hired or purchased).

Figure 1 also demonstrates the variability in space required for scaffolding/drop zones for a variety of building forms. There is no 'one-distance' which reflects all circumstances. Given the range of setbacks and building form, 5m is considered to be a pragmatic approach to balance risk and impacts on land.

An assessment of the *efficiency and effectiveness* of the options assessed in terms of Sections 32(1)(b) and 32(2) is included in Table 3.

Table 3: Alternative Option Assessment

Option	Effectiveness and Efficiency	Costs	Benefits
Option A: Do Nothing	Not effective in addressing issue as buildings could be located in positions which require access to the adjoining rail corridor to undertake maintenance. Does not address risk of dropped objects entering the rail corridor or inadvertent interference as a result of	Health and safety effects on communities as a result of conflict between transport infrastructure and people (with resultant costs). Decisions made during the design of a	No change in development yield. No costs resulting from change in building design to accommodate setback. No regulatory costs to implement.

Table 3: Alternative Option Assessment			
Option	Effectiveness and Efficiency	Costs	Benefits
	buildings/structures being located close to the rail corridor. Providing no (or insufficient) setback will not support an efficient outcome as incursions can lead to disruption / inefficient operation of the rail network and reduced health and safety of communities. Doing nothing requires no action from the territorial authority or applicant so could be efficient for authorities.	building can transfer risk (including cost) to those constructing, using and maintaining property adjacent to rail, and to those using or working on rail infrastructure and premises. Compromised rail operation and efficiency due to disruption resulting from unplanned incursions into rail corridor.	
Option B: Setback of 2.5m	More effective than Option A, however some buildings could be located in a position which requires access to the adjoining rail corridor to undertake maintenance in addition to an increased risk of dropped objects entering the rail corridor. Providing an insufficient setback will not support an efficient outcome as incursions can lead to disruption / inefficient operation of the rail network and reduced health and safety of communities. Reasonably efficient for territorial authorities, as some changes to setback provisions are required. Rules are effective in that they provide a high level of	Lower risk than option A but still risk of health and safety effects on communities as a result of conflict between transport infrastructure and people (with resultant costs). Some extra regulatory costs to implement 2.5m setback in district plans. Rules may potentially limit some activities and development. However, the Insight Economics assessment indicates a very limited range of sites will be impacted by the setback (less	No material change in development yield. Likely less costs relating from change in design to accommodate setback than Option C. Reduces health and safety effects on communities from conflict between transport infrastructure and people when compared with Option A. Reduces risk of rail operations and efficiency being compromised due to disruption resulting from unplanned incursions into rail corridor when

Table 3: Alternative Option Assessment			
Option	Effectiveness and Efficiency	Costs	Benefits
	certainty regarding the nature and scale of work and activities that can be undertaken with / without resource consent. They are also efficient as they enable a case by case assessment of the appropriateness of each proposal to be undertaken.	than 0.9%[11]) and of those 0.9% of sites, around 70% are already developed[12]. Actual cost will be low in terms of reduction of development capacity. As the provisions apply where a new building is proposed or existing building extended (on a site adjoining a rail designation boundary), costs will be low. Still risk of compromised rail operation and efficiency due to disruption resulting from unplanned incursions into rail corridor. Potential costs of applying for resource consent when setback standard is breached. Potentially some costs resulting from change in building design to accommodate setback.	compared with Option A. Provides some maintenance area available for building owners to safely undertake maintenance within site boundaries. Tailored rules, standards and assessment matters provide a clear framework to manage activities adjacent to the rail corridor and seek to strike a balance between efficient use and development and avoiding or minimising adverse effects on neighbouring areas.
Option C: Setback of 5m	Option C is effective as it: • provides a safer and more efficient rail network with reduction of the potential cost to railway operations	Some extra regulatory costs to implement 5m setback in district plans.	No material change in development yield. Minimises health and safety effects on

[11] Insight Report, Table 1: Number of Properties Adjacent to Rail Network by Territorial Authority (May 2024)
[12] Insight Report, Section 3.3

Table 3: Alternative Option Assessment			
Option	Effectiveness and Efficiency	Costs	Benefits
	that otherwise might be affected via obstructions within the railway corridor. • ensures there is sufficient space for people to safely and efficiently conduct their activities within their own land, whilst minimising the potential interference with the railway corridor. As set out in the Galvin Consulting Report, the Health and Safety at Work (General Risk and Workplace Management) Regulations 2016 (New Zealand Government, 2016) providing for separation of activities and engineering controls is more effective than administrative controls in managing risk. Reasonably efficient for territorial authorities, as some changes to setback provisions are required. Rules are effective in that they provide a high level of certainty regarding the nature and scale of work and activities that can be undertaken with / without resource consent. They are also efficient as they enable a case by case assessment of the appropriateness of each proposal to be undertaken.	Rules may potentially limit some activities and development. However, the Insight Economics assessment indicates a very limited range of sites will be impacted by the setback (less than 0.9%[13]) and of those 0.9% of sites, around 70% are already developed[14]. Actual cost will be low in terms of reduction of development capacity. As the provisions apply where a new building is proposed or existing building extended (on a site adjoining a rail designation boundary), costs will be low. Potential costs of applying for resource consent when setback standard is breached. Potentially some costs resulting from change in building design to accommodate setback.	communities from conflict between transport infrastructure and people when compared with Options A and B. Minimises risks to rail operations and efficiency being compromised due to disruption resulting from unplanned incursions into rail corridor when compared with Options A and B. Provides reasonably sufficient maintenance area available for building owners to undertake maintenance within site boundaries. Tailored rules, standards and assessment matters provide a clear framework to manage activities adjacent to the rail corridor and seek to strike a balance between efficient use and development and avoiding or minimising adverse effects on neighbouring areas. The matters of discretion for an infringement of the

[13] Insight Report, Table 1: Number of Properties Adjacent to Rail Network by Territorial Authority (May 2024)
[14] Insight Report, Section 3.3

Table 3: Alternative Option Assessment			
Option	Effectiveness and Efficiency	Costs	Benefits
			setback standards enable a dialogue to occur between landowners and KiwiRail to determine how development within the setback could proceed without compromising the safe and efficient operation of the rail corridor and health and safety of communities. This enables development to proceed on sites adjoining the rail corridor where it can be demonstrated the development can be undertaken safely.

5.1.2 Assessing reasonably practicable options

Based on the cost benefit analysis presented in Table 3:

- Option A: Will not achieve the objective and will result in adverse effects both on the health and safety of communities and on the safe and efficient operation of regionally and nationally significant infrastructure
- Option B: Would have increased health and safety effects on people and communities and on the safe and efficient operation of regionally significant infrastructure compared to Option C
- Option C: Would best achieve the outcome of the objective, with very limited costs.

6. Conclusion

The operation, maintenance and development of the rail network is critical to the safe and efficient movement of freight and passengers throughout New Zealand, and forms an essential part of the national transportation network.

In the context of work being undertaken adjacent to a railway corridor, separation of activities (designing-in an appropriate space) can be achieved through the use of a setback standard.

The proposed provisions will ensure there is sufficient space for people to safely conduct their activities within their own land, while minimising the potential interference with the railway corridor and risks to health and safety. This planning approach is appropriate to ensure the increasing growth and development around the rail network is managed in an integrated way.

Consistent with section 32 of the Act, the proposed objective and policies have been developed and analysed against Part 2 and it is considered that the proposed objective is the most appropriate way to achieve the purpose of the Act. The objective recognises the need to protect important physical infrastructure from incompatible land use and development to provide for the health and safety, and social and economic wellbeing of communities and to meet the foreseeable neds of future generations in accordance with s5(a) of the Act.

Option C (5m setback) is identified as the preferred approach to manage the potential health and safety effects, and to and provide a reasonable and appropriate balance between cost and benefit. The provisions apply only where a new building is proposed or existing building extended on a site adjoining a rail designation boundary.

Option C has been detailed and compared against alternatives in terms of their costs, benefits, and efficiency and effectiveness in accordance with the relevant clauses of section 32 of the RMA.

Option C is considered to represent the most appropriate means of achieving the proposed objective and of addressing the underlying resource management issues relating to the transport environment, human health and amenity.

There is sufficient information about the subject to determine the range and nature of effects of the options set out and which confirms the need to act. For completeness, the risk of not implementing Option C is that resource management issues relating to health and safety and protecting the operation of regionally and nationally significant infrastructure would continue to be inadequately addressed. It would also result in Council failing to comply with the provisions of Part 2 of the RMA (particularly s5(a) and s7(b).

Cath Heppelthwaite

Attachment 1: Plan Provisions (Option C)

Objective

Protect communities and infrastructure by mitigating:

a. the adverse health and safety impacts associated with accessing the rail corridor; and

b. risk of disruptions to the safe and efficient operation of regionally significant rail infrastructure.

Policy

Require buildings and structures adjoining the rail designation to be setback to provide for the health and safety of adjacent communities and efficient infrastructure operation.

Permitted Activity Standard – Building setback from Rail Designation Boundary

Buildings and structures must be set back 5 metres from the rail designation boundary.

Rule – Restricted discretionary activities

Buildings and structures not set back 5 metres from the rail designation boundary.

Matters of Discretion

Discretion is restricted to:

(a) The location and design of the building or structure as it relates to the ability to safely use, access and maintain buildings without requiring access on, above or over the rail designation boundary.
(b) The extent to which the reduced setback will compromise the safe and efficient functioning of the rail network, including rail corridor access and maintenance
(c) The outcome of any consultation with KiwiRail.

Matters of Assessment

(a) Location of the building or structure.
(b) Methods of providing for building maintenance within site boundaries on a permanent basis.
(c) The outcome of any consultation with KiwiRail.

Attachment 2: Galvin Consulting Ltd – Advice for KiwiRail on the safety implications of construction and maintenance-related activities adjacent to rail

Advice for KiwiRail on the safety implications of construction and maintenance-related activities adjacent to rail

24 July 2024

Prepared by Anna Galvin BE(Hons) CPEng IntPE(NZ) CMEngNZ

Galvin Consulting Ltd

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1 Introduction

Design decisions begin early in a construction project, and include the location and layout of a development. Proximity of buildings to boundaries can impede the ability of owners and others to undertake construction and maintenance within the site. Allowances need to be made to provide adequate space for people, plant and equipment, and temporary structures to undertake work. This is particularly the case when adjacent to an operating railway.

This report outlines activities undertaken inside and adjacent to the rail corridor, and significant safety hazards which can arise from the interaction of these activities. The report considers scenarios for maintenance activities undertaken at height. These scenarios provide illustrations of the widths utilised by temporary structures, and space for the movement of workers and others around the structure.

The Health and Safety at Work Act 2015 requires that hazards are identified and that reasonably practicable actions address these hazards, and includes duties of designers with regards to this. The hierarchy (i.e. effectiveness) of controls are included in the Health and Safety at Work (General Risk and Workplace Management) Regulations 2016. The definition of a workplace in the Health and Safety at Work Act 2015 includes temporary workplaces such as those found on residential properties.

There are also international legislation and guidelines dealing specifically with development near rail.[1] These support taking account of particular considerations when managing the potential effects of work near rail on the rail operations, on the rail network, and on those living and working next to the railway.

[1] For example, NSW Government (2021) *State Environmental Planning Policy (Transport and Infrastructure) 2021;* Railway Association of Canada and the Federation of Canadian Municipalities (2013*) Guidelines for New Development in Proximity to Railway Operations; VicTrack Rail Development Interface Guidelines* (2019)

2 Executive Summary

Due to changes in national investment in rail and to relevant planning frameworks, the volume of activity both adjacent to and inside the rail corridor is forecast to increase. Adjacent to the corridor this includes multi-storey developments. Inside the rail corridor this includes the development of rail infrastructure as well as increased rail traffic volumes.

Safety hazards may arise from construction and maintenance activities undertaken adjacent to and inside the rail corridor. People (both workers and others) need to be protected from these hazards in accordance with applicable legislation, standards and good practice guidelines. Hazards with the potential to cause significant harm or fatalities include working at height, electricity, unstable ground, and mobile plant including rail vehicles. Events which can harm construction and maintenance workers can also damage the rail network and impact the safety of those working on or using rail.

Government entities in Victoria and New South Wales (Australia) more explicitly address works near rail and regulate certain activities. For example, the Government of New South Wales and the City of Melbourne require notification to the rail operator of certain works adjacent to rail corridors (Government of New South Wales, 2021) (City of Melbourne, 2022). Guidelines in Australia and Canada facilitate healthy and safe developments near rail.

In New Zealand, there is a lack of situational awareness with respect to rail i.e. people are not aware of the safety hazards presented by rail operations and how their work may affect rail operations and the network. This issue is demonstrated by incidents observed by KiwiRail.

Compounding this limited awareness are particular characteristics of small businesses and DIYers who carry out construction and maintenance work.

Firstly, organisations providing construction (including maintenance) services are predominantly small businesses (97.9% in 2020) (Ministry of Business, Innovation & Employment, 2022), and they commonly lack formal governance arrangements, are resource constrained, and have owners who do not seek specialist advice or know where to access it (Small Business Council of New Zealand, 2019). ACC explains that DIYers have a high incidence of injuries, they tend to rush (ACC, n.d.), and WorkSafe does not expect them to have a detailed knowledge of construction risks (WorkSafe New Zealand, 2019).

Secondly, there are limited legislative and regulatory regimes governing these types of activities.

- The Health and Safety at Work Act 2015, section 34 requires Persons Conducting a Business or Undertaking (PCBUs)[2] (e.g. organisations and in some circumstances homeowners (WorkSafe New Zealand, 2019)) to consult with other PCBUs when their duties overlap (New Zealand Government, n.d.). For example, a building company operating near the railway would be expected under the legislation to consult with KiwiRail as a PCBU also having duties in respect of the railway. This consultation can be used to identify hazards and manage risks in a design or during physical works. However, the Act does not provide any specific actions required to be undertaken to manage risks. There is a reliance on organisations and other PCBUs being aware of their statutory obligations, the risks, and being motivated to make arrangements with the other party/parties.

[2] Refer section 17 under the Health and Safety at Work Act 2015 for the full definition of PCBU.

- The New Zealand Building Code does not specify physical design features (including location) for buildings to ensure construction and maintenance work can be conducted safely. It also does not prescribe how maintenance is to be carried out (e.g. utilising certain plant and/or equipment) (Ministry of Business, Innovation & Employment, 2020). However, the Building Code does require regular maintenance as an ongoing requirement.
- In addition to the Building Code maintenance requirements, warranties for building elements such as wall cladding, and most house insurance policies require maintenance to be undertaken (Insurance Council of New Zealand, 2019).

Decisions made during the design of a building can transfer risk (including cost) to those constructing, using and maintaining property adjacent to rail, and to those using or working on rail infrastructure and premises. For example, a site configuration that locates a building very close by an operational rail corridor, compared to designing the site with a sufficient setback to allow for safe, efficient movement.

The Health and Safety at Work (General Risk and Workplace Management) Regulations 2016 (New Zealand Government, n.d.) considers that providing for separation of activities and engineering controls are more effective than administrative controls in managing risk. An example of administrative controls is individual awareness and use of spotters to ensure there is no person interacting with a safety hazard and causing an event e.g. a spotter watching for an impact with an electrical line, or arrival of a train on a live track. This is not deemed as effective as carrying out the work safely beyond the movement of people, plant or equipment that could come into conflict with the activity. That is, designing a physical environment for safe work is more effective than relying on controls to manage poor design.

In the context of work being undertaken adjacent to a railway corridor, separation of activities (designing-in appropriate space) can be achieved through a setback.

To establish a reasonable setback (of a building from the rail corridor), a variety of access methods have been considered. Scaffold is a common method (readily available and suitable/flexible) of accessing a building for maintenance. Accordingly, it is reasonable to consider scaffold when assessing access methods for maintenance activities. There are different configurations for accessing buildings using scaffold. The freestanding options for scaffold need to be assessed, not only the most narrow options. This is because a number of factors may limit the ability of a structure to be stabilised using other methods.

Designing for adequate space for work around buildings also needs to include the movement of people and recognise the context; work adjacent to a railway presents particular hazards, risks and working requirements.

The assessment summarised in this report for scaffold, including the motion of people around these structures, concludes the distance used from the face of the cladding is:

- 3.7 – 4.6 metres for two, three, and four-storey buildings; and
- 4.2 – 6.5 metres when including a zone for (some) dropped objects.

Provisions that require engagement with KiwiRail where encroachment of a building setback is proposed ensure that KiwiRail can provide input into whether the encroachment can be safely accommodated. This includes KiwiRail's knowledge of its current and future rail operations and network for a particular location. Engagement enables hazards to be identified, and risks assessed

and managed as part of the development's design in relation to physical works. Maintenance work and the setback are the focus of this report; controls directly associated with construction and demolition are not included in its recommendations.

In conclusion, an adequate building setback provision is a prudent control, particularly for property adjoining a railway corridor, and is consistent with principles in the Health and Safety at Work Act 2015.

3 Scope of report

3.1 Scope

The purpose of this report is to inform KiwiRail's review of appropriate building setbacks adjacent to the rail corridor.[3] KiwiRail requested advice on the appropriate setback distance to allow for construction and maintenance activities to be undertaken safely adjacent to the rail corridor, in particular with respect to maintenance activities undertaken at height.

This report outlines the context in which these activities are undertaken, including the physical environment. People's awareness of the risks posed by rail and the risks they present to those within the rail corridor are also relevant.

The report includes an assessment of horizontal space (in metres) used from the cladding of a building to accommodate certain activities undertaken adjacent to the rail corridor. The assessment considers a selection of scenarios, primarily freestanding scaffold for accessing a building (but not its roof).

The advice in this report is for KiwiRail to consider alongside its knowledge of the rail operations and network.

Specific access needs for each project, and therefore the amount of space and protections required, will depend on a range of variables that will need to be considered for any particular situation. These include:

a) the physical environment, including the nature of the rail premises and infrastructure
b) the activities being undertaken and their sequencing
c) the capabilities of those involved in the activities, including homeowners and scaffolders
d) the forms of access being adopted
e) footprints (including overhanging/cantilevered components) of temporary structures, plant, and equipment when established
f) movement of materials, plant, equipment, and people during activities, including: transport/mobilisation, construction, installation, commissioning, operation and use, maintenance, repair, decommissioning, demolition, dismantling
g) the potential for, and nature of, falling objects (including debris) during (f)
h) the risk to people and property from falling objects

3.2 Limitations

The report and assessment has been undertaken on a desktop basis, in reliance on relevant literature, and advice from various subject matter experts. A specific set of access scenarios has been assessed for activities expected to occur adjacent to the rail corridor, in order to provide an illustration of widths needed to accommodate these activities safely.

While information from construction sector participants has been sought in addition to referenced material, the results presented in the report are provided on a general basis, for the purposes of

[3] References to rail corridor in this report are references to the area within the boundary of designations for railway purposes contained within district plans in New Zealand.

plan provisions being applied at a district level, as opposed to definitive guidance for the specific projects.

This report excludes health hazards due to rail operations including noise, vibration and particulates, and it is not a comprehensive study of safety hazards. Tilt slab construction/modern methods of construction are not included in the analysis below as they are variable and the focus of this report is primarily on maintenance activities.

The author has relied on and referenced a range of documents in the preparation of this report; these are listed in Appendix 1 Bibliography.

The author acknowledges and is grateful to have received advice regarding scaffold, from certified scaffolder Wain Chambers, Senior Industry Co-ordinator, Scaffolding, Access & Rigging NZ Inc (SARNZ).

4 Activities within the rail corridor

New Zealand's rail network is used by trains carrying freight, commuters and tourists. The volume and nature of traffic on the individual railway lines differs, depending on its location. KiwiRail operates trains as required to meet demand, and this can result in changes to the timing, frequency, or length of trains passing along the route. KiwiRail manages a variety of rail infrastructure and premises. Part of the North Island's network is electrified using overhead line equipment (Figure 1). Signalling equipment is critical for KiwiRail's railway operations and the safety of those working on or using the railway lines.

The planning horizon for the *Government Policy Statement on Land Transport* is 10 years (New Zealand Government, 2021). Investment in KiwiRail has been significantly increased over the past several years in order to create a more resilient railway service with greater capacity.

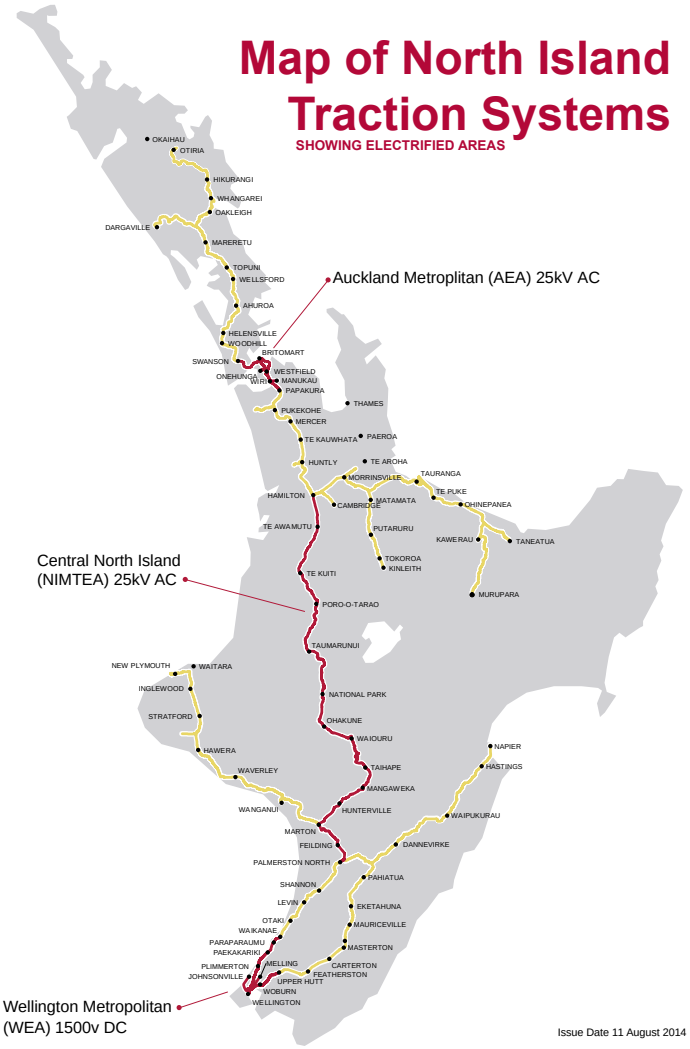

Figure 1 Electrification of rail network as at 11 August 2014 (Unknown, 2014)

KiwiRail manages its network in the context of a range of legislative, regulatory and planning frameworks including those under the Resource Management Act 1991 (RMA). KiwiRail is a requiring authority under the RMA and holds various designations within district plans. A designation is a RMA method which authorises works and activities undertaken by a requiring authority on a particular site(s), without the need for land use consent.

KiwiRail's rail designation boundaries generally encompass rail infrastructure (the railways lines and equipment) and premises as defined by the Railways Act 2005.

The areas within rail designation boundaries vary significantly in width. Sometimes the rail infrastructure, including overhead line equipment, is at the edge of the designation boundary. In other instances, the rail infrastructure is placed broadly within the centre of the designated area and is well-framed on either side by designated land (see Figure 2 and Figure 3).

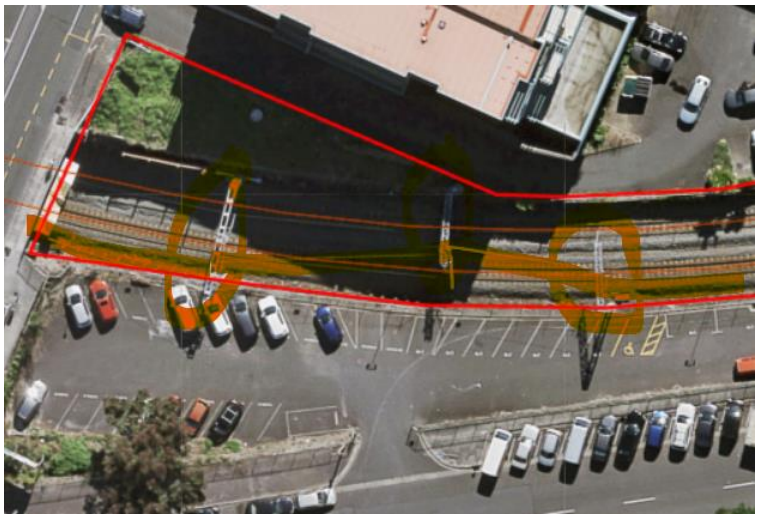

Figure 2 Enfield Street, Mt Eden, Auckland

Figure 3 West Coast Road, Canterbury

5 Activities adjacent to the rail corridor

Construction and ongoing building maintenance activities undertaken adjacent to the rail corridor can impact both the safety of people and the integrity of the rail network. People carrying out construction or maintenance activities include:

- Constructors (general contractors and specialist trades)
- Engineers and other technical advisors
- Materials suppliers
- Maintenance providers
- Operators of plant
- Property managers
- Landowners, homeowners and tenants, and their friends and families.

District plan changes to enable increased density of buildings are required under the *Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021* and the *National Policy Statement for Urban Development*. As a consequence, it is anticipated there will be more:

- development of multi-storey buildings adjacent to the railway network;
- demand for access services (e.g. scaffold) for these higher residential buildings, both in their construction, and throughout the life of the structure, including maintenance. This means it is likely more work will be carried out at height by workers in the construction sector and homeowners (which includes repairs and maintenance).

People interacting with (including simply walking around) mobile plant, construction equipment and temporary structures require space. Movement of people is incorporated in Regulation 10 Duty in relation to general workplace facilities in the Health and Safety at Work (General Risk and Workplace Management) Regulations 2016:

> (1) A PCBU[4] must ensure, so far as is reasonably practicable, that—
>
> > (a) the layout of the workplace allows, and the workplace is maintained to allow, persons to enter and exit the workplace and to move within it without risks to health and safety, both under normal working conditions and in an emergency:
> >
> > (b) work areas have sufficient space for work to be carried out without risks to health and safety: (New Zealand Government, n.d.)

WorkSafe has published a Policy Clarification for people building a house or working on their own homes. If you are building a house yourself, having a house built, or doing DIY work on a rental property you own, you are a PCBU as defined in Section 20 of the Health and Safety at Work Act 2015 (i.e. you are regulated under the Act). If you are doing DIY work on your own house, you are not a PCBU (i.e. you are not regulated under the Act).

In a report published in 2022 on the New Zealand building and construction sector, MBIE stated that 97.9% businesses employed fewer than 20 people (Ministry of Business, Innovation & Employment, 2022, p. 12). The Small Business Council, in 2019, noted that these businesses commonly are operating without formal governance, they have limited resources, and their owners do not usually seek specialist advice, or know where to find this advice (Small Business Council of New Zealand,

[4] Person Conducting a Business or Undertaking as defined in HSWA 2015

2019). These characteristics affect their capacity to meet obligations under the Health and Safety at Work Act 2015, and their understanding of specific contexts such as working near railways.

Construction activities typically involve building contractors and multiple specialist trades; these trades are generally subcontracted. The activities to complete the exterior of a building may include: initial siteworks, laying the foundations, completing the framework and external drainage, roof and wall cladding and windows.

After a building is complete, maintenance is an ongoing requirement. Under the Health and Safety at Work Act 2015, section 39 (2), a PCBU that makes design decisions[5] needs to consider all foreseeable activities associated with a structure "such as inspection, cleaning, maintenance, or repair", and any building must be designed without risk to those who will interact with it, so far as is reasonably practicable (New Zealand Government, n.d.).

Clause B2 Durability of the Building Code requires a building to be designed for a minimum of 50 years, with some building elements requiring a life of 15 or 5 years. These elements need maintenance, repair, or replacement throughout a building's life. Clause E2 External Moisture provides the nature of this maintenance in general terms, stating (emphasis in original):

> Regular maintenance of a *building* will include:
> a) Washing exterior surfaces,
> b) Inspecting surfaces and junctions, and repairing or replacing items when necessary, in order to preserve the *weathertightness* of the *building*.
> c) Maintaining clearances between *cladding* and external ground or paving…
> e) Maintaining finish coatings especially for *stucco*, *EIFS* and fibre cement *claddings*. (Ministry of Business, Innovation & Employment, 2020)

The Building Research Association of New Zealand (BRANZ) notes that, in addition to the legal requirement in the Building Code for maintenance of properties, many warranties for materials also demand specific maintenance (Building Research Association of New Zealand). Most house insurance policies exclude gradual damage, which can be caused by deferred maintenance (Insurance Council of New Zealand, 2019). A selection of well-known products and the maintenance required for these is provided in Table 6, in Appendix 3.

BRANZ provides a general maintenance schedule for homeowners on their *Maintaining My Home* website and a number of activities that require working at height are scheduled yearly, including inspections and cleaning of the roof, gutters, walls and windows. Wall repainting is scheduled every 8-10 years, roof repainting or recoating every 8-15 years (Building Research Association of New Zealand). Repairs are to be carried out as needed. Specialist services do exist for cleaning guttering, and these can use equipment that remove the need to work from height. Whether homeowners choose to use these services or complete the works themselves is unpredictable.

[5] WorkSafe's Guide to Health and Safety by Design "'designer' means any person who prepares or modifies a design, or arranges for or instructs a person under their control to do so." (2018, p 7)

6 Understanding of rail operations and network

In New Zealand, there is a lack of situational awareness with respect to rail i.e. people are not aware of

a) the safety hazards presented by rail operations – the TrackSAFE Foundation[6] was established due to this issue, and
b) how their work and other activities may affect rail operations and the rail network.

The following comments were noted in discussion with the KiwiRail Corridor Team:

> *"Contractors bid for work without factoring in the rail corridor that restricts the windows that work can be done in. When KiwiRail become aware of the work, the contractors often find it will go well over the project timeline accepted by the client, as they need to work to KiwiRail's schedule and not theirs."*

> *"The majority of contractors working adjacent to the electrified areas do not complete any inductions and are not aware of the high voltage system nor the minimum approach distances."*

The photographs (Figure 4, Figure 5) below show a site where the scaffold and scrim (the green netting) obscured the signals at a level crossing – the alarms could not be seen by road traffic approaching the crossing. Despite requests for the scaffold to be removed, it remained in place for over a week, and a Temporary Speed Restriction (TSR) was implemented to reduce the risk of a vehicle collision.

The rail corridor is not fully fenced, and even with fencing, plant and equipment can slew over the property boundary. Without physical segregation, people tend to freely move around when carrying out their work. This is normal behaviour and is often exhibited to improve efficiency; it is described by Hollnagel in *Understanding Accidents - From Root Causes to Performance Variability*: "As far as the level of individual human performance is concerned, the local optimisation – through shortcuts, heuristics, and expectation-driven actions – is the norm rather than the exception" (Hollnagel, 2022, p. 4).

[6] The TrackSAFE Foundation NZ is a not for profit that conducts research and data analysis; and is involved in publicity, media, and education about safety around tracks and trains. TrackSAFE aims to prevent harm and reduce the number of collisions and near misses between people and vehicles and trains. https://www.tracksafe.co.nz/about

Figure 4 Scaffold obscuring signals for road traffic at a level crossing – view from rail

Figure 5 Scaffold obscuring signals for road traffic at a level crossing – view from the road

7 Working at height

Preferences and availability of plant and equipment will differ, and it is reasonable to consider the options that a scaffolder, another worker, or homeowner, may have for construction and maintenance projects. For example:

- The homeowner or their neighbour may be reluctant to give permission for the scaffolder to breach or abut cladding for the purposes of providing stability due to concerns about weathertightness or other damage. Therefore, the base must be widened to ensure its stability.
- A homeowner may purchase and use ladders and mobile scaffold from a hardware store or hire service.

7.1 Types of access for working at height

Access for working at height includes ladders (equipment), scaffold (temporary structures), elevating work platforms (mobile plant).

Only scaffold and ladders are illustrated in this report as mobile plant tends to be used on paved surfaces, such as roads and driveways.

Photographs of scaffold are supplied in section 7.3. Diagrams of scaffold are provided in Figure 9 and Figure 10, and a ladder is shown in Figure 6. All the scenarios in the diagrams assume flat, stable ground.

Minor and tower scaffold are more likely to be used for smaller, localised, shorter duration work (e.g. installing a light fitting or flashing).

Mobile scaffold has castors which allow it to be moved around the building on a smooth, level surface. Access to two, three or four-storey buildings would require bracing. The diagonal bracing, where necessary, must be re-established at each move (Scaffolding, Access and Rigging New Zealand, 2018).

Proprietary mobile towers are available at hardware stores such as Bunnings and Mitre 10 - the scaffold advisor has concerns about the quality of some of the mobile scaffold products available to the public. WorkSafe guidelines advise that mobile scaffold is prone to tipping during use (WorkSafe New Zealand, 2016). Reasons for this can include sudden stops after movement of the scaffold, the structure being narrow and lightweight, and use on inappropriate (uneven, unstable) ground. The guide for an Equiptec scaffold (a type of mobile scaffold) provides a base: height ratio is 1:3 (Equiptec, n.d.), which is the same as for required for other scaffold by WorkSafe(see section 7.3 on stabilising scaffold, below).

Ladders beyond those used to access two-storey buildings have not been illustrated as they are difficult to handle (and most people would not feel comfortable climbing up a ladder to those heights), also, they have limited application. WorkSafe states that ladders are for light work of short duration and they are to be 1 metre out for every 4 metre of height. If ladders cannot be fixed at the top and bottom, the user needs a second person to hold the ladder (WorkSafe New Zealand, 2022).

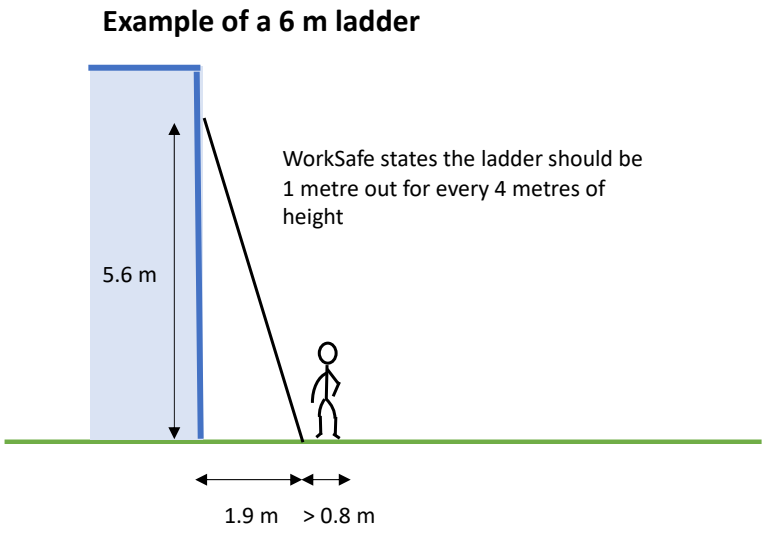

Figure 6 A ladder being used to access a two-storey building includes width of a person, forearm to forearm (Kolose, et al., 2021, p. 175)

7.2 Site-specific factors

Site specific factors may require alternative approaches to (a) the design of the temporary works and (b) the activities - its installation, use, reconfiguring, and dismantling; as well as the design of the permanent building project. The WorkSafe good practice guide for *Scaffolding in New Zealand* (WorkSafe New Zealand, 2016) includes considerations for site assessments and a selection of these are included below:

- Design of the building to be accessed (existing or to be constructed) and adjacent buildings
- Ground conditions: A slope/uneven ground and/or unstable/poor ground conditions
- Environmental loads: e.g. funnelled wind
- Method(s) to be used for stabilising
- Space to erect and store scaffold materials
- Transport of equipment and materials to storage area and final site [impeded access results in additional manual handling, time and cost]
- Pedestrians
- Proximity to electrical conductors or cables; potential for contact with these during any activities

7.3 Stabilising scaffold

Stabilising elements may add width to a scaffold. Stabilising elements are required for scaffold when the height of the highest working platform is more than three times the base width. This is referred to as the “minimum tip factor ratio” by WorkSafe (WorkSafe New Zealand, 2016, p. 51). Stabilising will be necessary for a scaffold to access the full height of a two-storey building. Options for this include:

- tying-in (attaching) the scaffold to the building to be worked on (including ‘reveal ties’);
- outriggers and buttress bays; and
- butting up to adjacent buildings.

The choice of methodology - which stabilising elements to use - depends on site-specific factors including the design of the building and its surrounding buildings, and other matters such as available materials, and the competency of, and decision making by, the scaffolder and/or engineer.

For **tying-in**, although scaffolders can use openings e.g. windows to create 'reveal ties', these are only allowed to make up 50% of the total ties for the scaffold (WorkSafe New Zealand, 2016, p. 70). The preferred method is to bolt into the structure. However, breaching the cladding is not recommended due to the effect it may have on weathertightness; and monolithic cladding is particularly problematic in this regard.

An example of an **outrigger** (the diagonal element) is shown in Figure 7, and it can be seen that bracing and sole plates also protrude beyond the bay width. A **buttress bay** is shown in Figure *8*.

Butting up to adjacent buildings is not usual practice and is not recommended by SARNZ, as it uses the neighbouring building and can damage that building. The scaffold relies on the other building(s) for stability and may stress its external cladding or structure. Permission to use this method is required from the owner of the neighbouring building.

Figure 7 Photograph scaffold with outriggers, credit: Wain Chambers

Figure 8 Photograph of a scaffold with buttress bay, credit: Wain Chambers

7.4 Falling or dropped objects

Falling or dropped objects are a significant and ongoing issue for the construction sector. They are explicitly addressed in the Health and Safety at Work (General Risk and Workplace Management) Regulations 2016. An exclusion zone is provided for in these regulations (New Zealand Government, n.d.) with different controls that can be adopted e.g. toe boards, catch fans (WorkSafe New Zealand, 2016). These controls are typically prompted by an awareness of pedestrians in the vicinity of the temporary works.

Attempting to retrieve objects from the rail corridor places people at risk of being hit by a train, and KiwiRail has concerns regarding other effects of falling or dropped objects, including the impacts on its levels of service that can be provided when there is an interference with rail operations.

The Dropped Objects Prevention Scheme[7] has developed the *Dropped Objects Exclusion Zone Tool* to help determine the width of an exclusion zone, and it has been used to determine the trajectory on the dropped item (using the 75th percentile i.e.75% of steel objects are predicted to land within this distance, see the Appendix for outputs). This tool is a guide only (DROPS Online: Dropped Objects Prevention Scheme Global Resource Centre). Advice from SARNZ is that exclusion zones are typically 3 – 4 metres wide from the base of the scaffold.

Figure 9 shows scaffold providing access to different heights of buildings, and includes an object dropped by a person on the top working platform with the object deflecting off the top rail, which is one metre above the working platform. Distances shown from the building originate from the

[7] The Dropped Objects Prevention Scheme is a worldwide initiative focused on preventing dropped objects.

cladding, not the framing lines of the building. WorkSafe's *Scaffolding in New Zealand* states the distance from face needs to be as close as practicable, ideally less than 300mm. A gap any wider requires full edge protection (guardrails) (WorkSafe New Zealand, 2016).

7.5 Diagrams of scaffolds and falling object zones

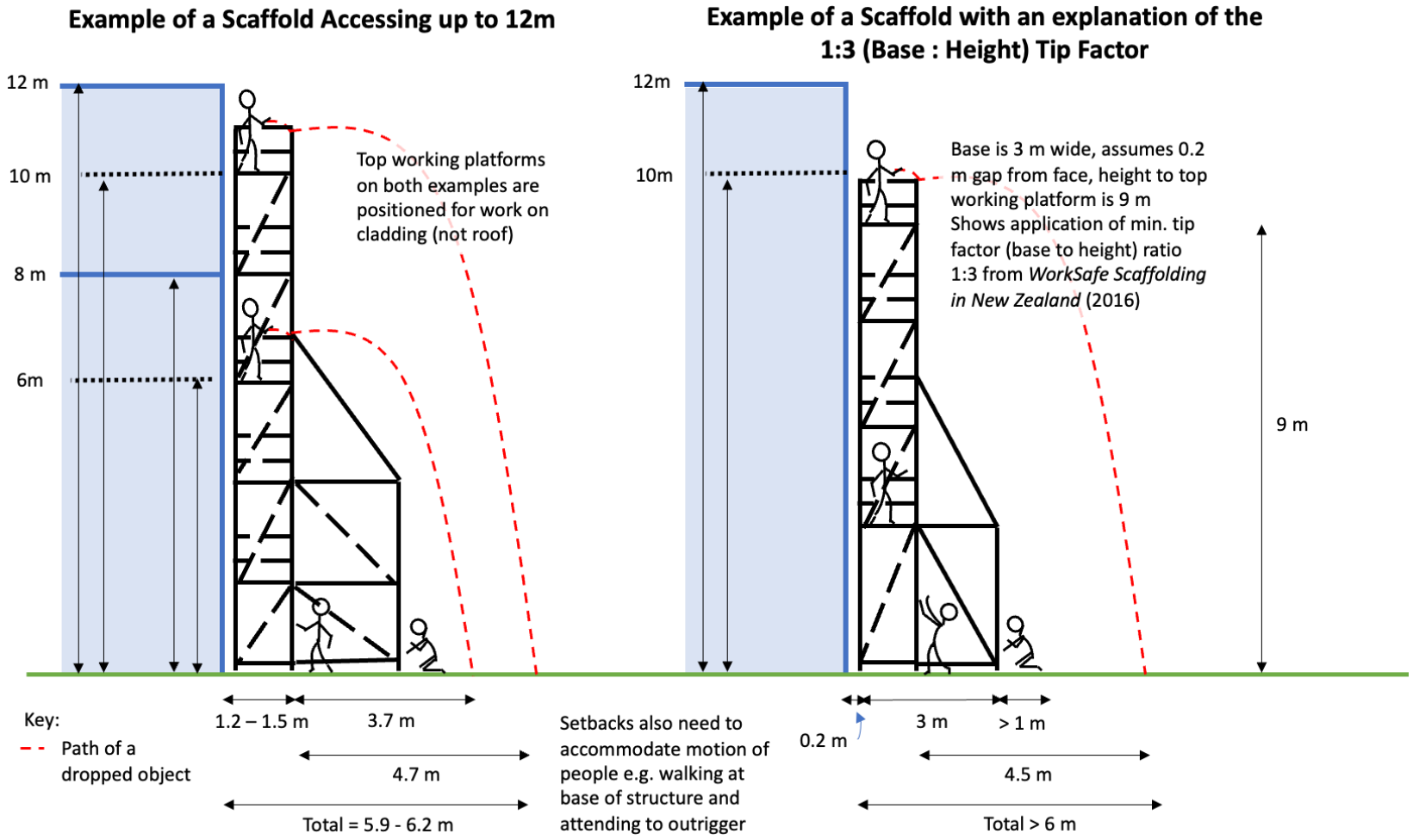

Figure 9 Distances from cladding to periphery of structures, space for people to work/move and predicted zones for dropped objects

8 Additional hazards associated with work adjacent to rail

8.1 Electricity

Figure 1 shows the extent of KiwiRail's electrified rail network. The New Zealand Electrical Code of Practice for Electrical Safe Distances, NZECP 34:2001, sets "safe distance requirements for the construction of buildings and other structures near existing conductors, to prevent inadvertent contact with or close approach to conductors", avoiding electrocution (or damage to equipment) (Ministry of Consumer Affairs, 2001, p. 8).

For 25 kV, which is the voltage of the majority of the electrified rail network, the minimum distance to the side of conductors to a building under normal conditions is 8.5 metres. This safe distance is applied without the need to take engineering advice and obtain approval of the electric line owner (Ministry of Consumer Affairs, 2001).

8.2 Mobile Plant

When loads or components of a machine move above the rail corridor, there is the potential for a collision with rail infrastructure including electrified lines. The risk of a collision with a rail vehicle depends on factors including the volume of rail traffic and the length of time the machine is operating on the site. If the KiwiRail Corridor Team is notified of construction adjacent to rail, their considerations include:

- The construction worker's operation of a crane and its capacity to slew across KiwiRail's rail operational area (this operational area is generally five metres beyond the track, or eight metres from overhead line equipment). KiwiRail asks for slew (horizontal movement) restrictions, requesting operators to lock the machine's ability to slew in certain areas while rail traffic is operating, or to stop works if they cannot lock its motion. KiwiRail verifies these mitigations on site.
- The constructor's use of plant that has the potential to foul the track, for example, if the plant being used can change shape from its work position and foul the track even if there is no intention to do so.
- Construction activities with potential to foul the track, such as erection and propping of concrete panels/lifting structural steel [as these could inadvertently fall on to the track].

Telehandlers and diggers are common plant on smaller building sites. Plant have different ranges of motion (see Table 1 for an example) and their loads add to spatial considerations. Specific project risk assessments and plans would identify the areas of influence of the plant and their loads. Knowledge of managing constrained sites and rail hazards are needed for an appropriate plan. However, whether work proceeds safely often rests on the judgement of the operator of the plant rather than the implementation of a plan with additional/multiple controls e.g. lift advisor.[8]

[8] *Pers. comm.* M. Riding, ConstructSafe

Table 1 Example working area of a machine without a load

Machine	Width beyond front wheels	Height
Telescopic forklift's/telehandler's boom[9]	3 m	11 m
	7 m	5 m

8.3 Excavation and earthworks

Excavation and earthworks include any soil or rock removal that creates a void, preparation and filling of foundations, and filling and construction of retaining walls. Poorly designed and executed excavation and earthworks may cause subsidence, deterioration of existing structures, and stress changes in soil and rock. These issues can negatively impact the rail network and increase safety risks (VicTrack, 2019). A small distortion (misalignment) of the track may result in a derailment. The National Corridor Manager states that:

> *"Monitoring rail track formation is crucial when undertaking works for settlement issues that may result in geometry exceedance. Here are a few reasons why it is important:*
>
> *1. Safety: Monitoring the rail track formation helps ensure the safety of train operations. Settlement issues can lead to track misalignment, which can increase the risk of derailments or accidents. By monitoring the track formation, any potential geometry exceedance can be identified and addressed promptly, reducing the risk of safety incidents.*
>
> *2. Infrastructure integrity: Settlement issues can affect the integrity of the rail infrastructure. Excessive settlement can cause track misalignment, uneven surfaces, or uneven load distribution, leading to accelerated wear and tear on the track components. By monitoring the track formation, any settlement-related issues can be detected early, allowing for timely repairs or adjustments to maintain the integrity of the rail infrastructure.*
>
> *In summary, monitoring rail track formation during works for settlement issues is essential for ensuring safety, maintaining infrastructure integrity, enhancing passenger comfort, optimizing operational efficiency, and achieving cost-effectiveness in rail operations."*

KiwiRail regularly monitors track and uses parameters such as

- Twist: The variation in cross level over a base length of four metres.
- Top: The longitudinal level of the running surfaces of the rail measured on both rails.
- Cant: The height of one rail above another.

Geometry exceedances are measured from highest to lowest priority in five categories. As shown in Table 2, the track only needs to be a little out of alignment before train speeds may need to be reduced until the track is fixed. (KiwiRail, 2017)

Table 2 KiwiRail's geometric parameters – examples of actions required for twist, top and cant for lines with the highest speed category

Action required	Maintenance tolerances		
	Twist	Top	Cant

[9] Lull *Model 1044C-54 Series II Operator & Safety Manual* (2009, p. 40)

P1 - Apply immediate 25 km/h Temporary Speed Restriction (TSR) and repair within 48 hours.	Greater than 24 mm	Greater than 22 mm	Greater than 24 mm
P2 - Apply immediate 40 km/h TSR and repair within seven days.	18 – 23 mm	19 – 21 mm	19 – 23 mm
P3 - Consider need for TSR and repair within four weeks.	16 - 17 mm	16 - 18 mm	17 - 18 mm
P4 - Consider need for TSR and repair within 26 weeks.	14 - 15 mm	13 - 15 mm	15 - 16 mm
P5 - Repair within 52 weeks.	12 - 13 mm	10 - 12 mm	13 - 14 mm

Higher buildings have increased foundation requirements; and ground conditions will vary from project to project, throughout New Zealand. An example of excavation controls (New South Wales and Victoria, Australia) is provided in Table 3, below.

Table 3 Excavation when approval is required by the rail operator, in New South Wales and Victoria

	When approval is required by rail operator	
Document Title	**Depth of excavation**	**And distance from rail corridor***
State Environmental Planning Policy (Transport and Infrastructure) 2021, NSW (Government of New South Wales, 2021)	> 2 m	≤ 25 m
VicTrack Rail Development Interface Guidelines, Victoria (VicTrack, 2019)	Any excavation	Any development adjacent to rail corridor

*The rail corridor comprises land and infrastructure, including maintenance access tracks either side of any supports for signalling or electricity, formation under the railways tracks and the railway tracks themselves, or land approved for development by Government.

The *New Zealand Electrical Code of Practice for Electrical Safe Distances*, NZECP 34:2001, sets minimum safe distances for excavation near overhead electric line supports, and content from this standard is included in Table 4 below. Prior written consent of the pole or tower owner is required for certain excavations. Architects and others can lack of awareness of the requirements in this document; compliance to all the design regulations and guidance that applies is not a given (Hackitt, 2018).

Table 4 Excavation when approval is required by electrical line support (pole or tower) owner (Ministry of Consumer Affairs, 2001)

Depth of hole	**Distance to pole or stay wire**	**Distance to visible foundation of tower**
> 300 mm	Within 2.2 m	Within 6 m
> 750 mm	2.2 – 5 m	-
> 3 m	-	6 – 12 m
Or any excavation that creates an unstable batter	Within 8 m	-

8.4 Demolition

During demolition, plant or materials may strike electrified line or foul the railway track, and demolition also may affect ground stability. The *VicTrack Rail Development Interface Guidelines* state that any demolition on land adjacent to the rail corridor requires approval from VicTrack and the Accredited Rail Operator, and the application is to include a demolition management plan (VicTrack, 2019).

9 Controls (hazard mitigation), including setbacks

Physically separating workers and others from hazards, and adopting design features/engineering controls are both considered more effective than administrative controls. That is, it is preferable to manage risk in design. This is explained as the "Hierarchy of control measures" in regulation 6 of the Health and Safety at Work (General Risk and Workplace Management) Regulations 2016 (emphasis in bold added)*:*

> (3) The PCBU must minimise [if they cannot eliminate] risks to health and safety, so far as is reasonably practicable, **by first taking 1 or more of the following actions** that are the most appropriate and effective taking into account the nature of the risk:
>
> (a) substituting with a lower risk activity or substance:
> **(b) isolating people from the hazard/preventing people being exposed to the risk:**
> **(c) applying engineering control measures.**
>
> (4) If a risk then remains, the PCBU must minimise the remaining risk, so far as is reasonably practicable, by implementing administrative controls.
>
> (5) if a risk then remains, the PCBU must minimise the remaining risk by ensuring the provision and use of suitable personal protective equipment (PPE). (New Zealand Government, n.d.)

Section 34 of the Health and Safety at Work Act 2015 states that a PCBU (an organisation) must consult other PCBUs with same duty e.g. when they have a shared or adjacent work area, or during design (Galvin & Donnelly, 2022). *Work health and safety consultation, cooperation and coordination: Code of Practice* by Safe Work Australia (WorkSafe New Zealand's Australian equivalent, the Health and Safety at Work Act 2015 was heavily based on Australian legislation) comments on the usefulness of written arrangement to clarify parties' roles and responsibilities (Safe Work Australia, 2023). Formal mechanisms/triggers are important when people or organisations have a lack of awareness of how their work could present risks to other organisations and there are other barriers that discourage engagement.

The New Zealand Building Code, the Health and Safety at Work Act 2015 and the Health and Safety at Work Act Regulations do not specify engineering controls for access to ensure a building is able to be maintained in a safe manner. If hazards associated with maintenance are not identified and managed appropriately in design, including the location of the building on the property, the risk is transferred to those downstream, with potential cost and safety implications for KiwiRail, its workers and their customers, property owners, constructors, occupants, maintenance workers and others.

Managing risk that has been designed into a system

When there is inadequate width for the activities adjacent to rail infrastructure, or activities could impact rail operations, KiwiRail, as an Access Provider, relies on notifications that trigger their processes including: Permit to Enter, Electrical Access Permit and/or Track Access Request. Reliance on the homeowner or contractor to come forward or KiwiRail workers to observe potentially risky work contributes to this being a weak control.

Designing-in safety i.e. mitigating hazards in design

KiwiRail's knowledge of current and future operations and the network is an important input for the design process where planned/future work adjacent to rail may have effects beyond the shared

property boundary. A review of a development's design may result in KiwiRail accepting the design, or it may request conditions.

When considering building maintenance, any setback distance between the building and the boundary with the railway needs to be adequate to keep its effects within the adjacent site to avoid impacting the safety of people and the operating railway. Figure 10 has been prepared considered the following factors:

a. ongoing maintenance requirements under the Building Code and BRANZ recommendations;
b. human behaviour;
c. common types of access methods (scaffold and ladders) to buildings of the specified size/location and scaffold stability requirements;
d. falling/dropped objects;
e. size and location of buildings adjacent to the rail designation boundary (including as provided for by the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021);

The diagrams illustrate a range of 3.7 to 4.6 metres for a person to construct scaffold, enabling access for maintenance of wall cladding (not roof cladding) and 4.5 to 6.2 metres allow for (some) falling objects (see 7.4 Falling or dropped objects). This assumes level, stable ground conditions.

A building setback provision does not directly address other risks identified in section 8; however, it can be helpful in mitigating some risk. Where a proposed building obtains consent to encroach into a setback, it will provide KiwiRail with visibility of construction work and hazards that could impact the rail operations and network.

Table 5 Summary of widths needed for standalone scaffold from Figure 10

Scenario	**Two-storey**	**Three-storey**	**Four-storey**
Person installing scaffold with outrigger (two-storey) or buttress bay	~ 3.7 – 4 m*	> 3.7 m	> 4.6 m
Person dropping an object from scaffold	> 4.5 – 4. 8 m	> 5.3 – 5.6 m	> 5.9 – 6.2 m
Person using a ladder for access	> 2.7 m	-	-

* For accessing the full height of a two-storey building, the outrigger protrudes more than the buttress bay illustrated for accessing the full height of a three-storey building. See also note with figure.

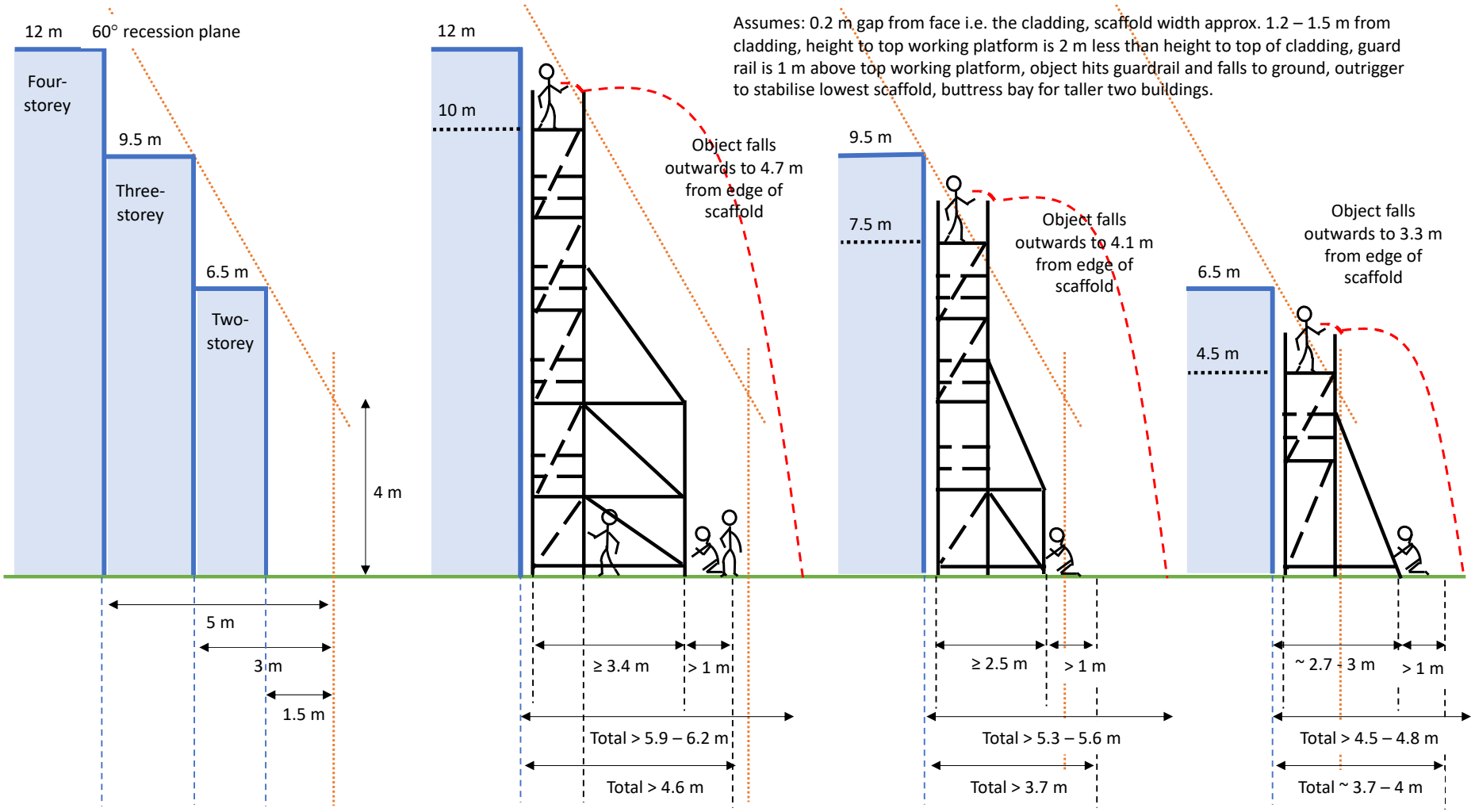

Figure 10 Diagram showing building meeting the 4m + 60° recession plane and setbacks for four, three and two-storey buildings, the two-storey structure has a 4m raker because this is a common component utilised by scaffolders

International Examples

Countries including Australia and Canada consider development adjacent to rail premises and infrastructure by factoring in distances from assets, and prompt engineering assessments that may result in the introduction of particular design features (such as setbacks).

The City of Melbourne in Victoria, Australia, requires the rail operator's approval for any excavations and earthworks, and demolition, where these are undertaken adjacent to their railway corridors (defined as land and infrastructure including a maintenance access track). This requirement is contained in the *Code of Practice for Building, Construction and Works,* a document which "regulates the conduct of all works that affect public space, ensuring the safety and amenity of our community and the protection of municipal assets". It states:

> You must have a permit to undertake works that could impact land and assets managed by VicTrack, generally any works activities occurring within 5 m of a rail or tram corridor. (City of Melbourne, 2022, p. 40)

The Government of New South Wales requires, in planning legislation, that any excavation greater than two metres deep within 25 metres horizontal distance of a corridor is to be approved by the rail operator (Government of New South Wales, 2021).

Construction and demolition activities adjacent to rail merit further consideration in New Zealand, given the increased potential for multi-storey development and the consequences of poorly managed works.

10 Conclusion

This report has outlined activities within and adjacent to the rail corridor including the increasing volumes of both. It is noted there Is limited awareness of the rail operations and network.

Building maintenance is an ongoing requirement: it is legislated under the Building Code, necessary for warranties of building elements, and to avoid gradual decline generally excluded in insurance.

Working at height is necessary to conduct maintenance. Scaffold is commonly used for accessing cladding and other elements of a building, and there are various ways to stabilise the structure, with multiple factors influencing its installation. Diagrams of freestanding scaffold against buildings are provided, with zones for dropped objects. These illustrate the widths utilised for work.

Construction works near rail introduce further hazards, including electricity, mobile plant, excavation and earthworks, and demolition. A building setback does not directly address construction or demolition effects.

Construction and maintenance next to a rail corridor require particular consideration. Both Australia and Canada have guidelines for these works in this environment, and Australia regulates some activities.

The Health and Safety at Work Act 2015 states that certain controls are more effective than others - it is better to manage risk during design, and consider the location of a building and engineering controls rather than relying on permits and legal deterrents.

In designing activities adjacent to the rail corridor, a setback is an appropriate tool to separate activities and manage risks of interference with the rail corridor. This report has considered a

variety of access methods to determine an appropriate setback distance for inclusion in district plans around New Zealand.

Appendix 1 Bibliography

WorkSafe, the regulator for the Health and Safety at Work Act 2015, describes the first step in the design process as "Identify solutions from regulations, good practice guidance and recognised standards". Drawing on these documents is considered necessary to determine appropriate and suitable design solutions. WorkSafe has various resources to assist people to comply with the Act: Good practice guidelines (GPGs) "Provide clear good practice guidance for certain work activities" [10].

Industry standards: The development and publication of standards is carried out by Standards New Zealand, a business unit within the Ministry of Business, Innovation and Employment (MBIE). Standards can be:

> incorporated into non-regulatory material as examples of leading practice or guidance for industry… promoted as a means of dealing with legal liability issues, for example, compliance with… standards may be cited in court as proof that all reasonable steps were taken[11].

Other references that contain good practice include industry guidance e.g. guidance produced by industry bodies, such as Scaffolding, Access and Rigging New Zealand (SARNZ) or Engineering New Zealand (ENZ). International guidelines can also be useful references as New Zealand does not always have applicable, specific guidance.

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[10] Description of resources from WorkSafe's fact sheet *What resources are available to help?* (2013)
[11] https://www.standards.govt.nz/about/explaining-standards/regulations-and-standards/

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Appendix 2 Outputs from *Dropped Objects Exclusion Zone Tool*

Outputs from *Dropped Objects Exclusion Zone Tool* for the paths on the diagrams of scaffold.

Inputs		
STEP 1: Select Metric or Imperial		Metric
STEP 2: Input Height of Object	(meters)	11.5
STEP 3: Input Height of Deflection	(meters)	11.0
Approximate Outputs (Distance to strike the ground)		
100th Percentile Distance	(radius in meters)	5.0
75th Percentile Distance	(radius in meters)	4.7
50th Percentile Distance	(radius in meters)	3.7
25th Percentile Distance	(radius in meters)	2.1

Inputs		
STEP 1: Select Metric or Imperial		Metric
STEP 2: Input Height of Object	(meters)	7.5
STEP 3: Input Height of Deflection	(meters)	7.0
Approximate Outputs (Distance to strike the ground)		
100th Percentile Distance	(radius in meters)	4.0
75th Percentile Distance	(radius in meters)	3.7
50th Percentile Distance	(radius in meters)	2.9
25th Percentile Distance	(radius in meters)	1.7

Inputs		
STEP 1: Select Metric or Imperial		Metric
STEP 2: Input Height of Object	(meters)	10.5
STEP 3: Input Height of Deflection	(meters)	10.0
Approximate Outputs (Distance to strike the ground)		
100th Percentile Distance	(radius in meters)	4.8
75th Percentile Distance	(radius in meters)	4.5
50th Percentile Distance	(radius in meters)	3.5
25th Percentile Distance	(radius in meters)	2.0

Inputs		
STEP 1: Select Metric or Imperial		Metric
STEP 2: Input Height of Object	(meters)	9.0
STEP 3: Input Height of Deflection	(meters)	8.5
Approximate Outputs (Distance to strike the ground)		
100th Percentile Distance	(radius in meters)	4.4
75th Percentile Distance	(radius in meters)	4.1
50th Percentile Distance	(radius in meters)	3.2
25th Percentile Distance	(radius in meters)	1.8

Inputs		
STEP 1: Select Metric or Imperial		Metric
STEP 2: Input Height of Object	(meters)	6.0
STEP 3: Input Height of Deflection	(meters)	5.5
Approximate Outputs (Distance to strike the ground)		
100th Percentile Distance	(radius in meters)	3.6
75th Percentile Distance	(radius in meters)	3.3
50th Percentile Distance	(radius in meters)	2.6
25th Percentile Distance	(radius in meters)	1.5

Appendix 3 Building Elements and their maintenance requirements

Table 6 Building elements and their maintenance requirements

Building element	Most common product types and examples of these	Maintenance requirements (where available in product/company documentation)		
		Clean	**Re-coat**	**Inspections**
Roof cladding[12]	Metal sheet e.g. Colorsteel Endura[13]	Rainwashing & every three months clear garden detritus off the roof and clear gutters	Every 15 years, or as required	At least twice a year
Wall cladding[12]	Timber weatherboard e.g. Southern Pine Products[14]	Every 12 months	Every 10 years, or as required	Inspect after cleaning (every 12 months)
	Fibre-cement weatherboard and Non-weatherboard fibre-cement e.g. HardieTM Plank Weatherboard[15] and AxonTM Panel	Every 6 - 12 months Use low pressure water and a brush. Refer to your paint manufacturer for washing down requirements.	Refer to paint manufacturer for re-coating requirements.	*Regular inspection… of the cladding joints, sealants, nail head fillers*
	Metal e.g. Colorsteel Endura[13]	Every 12 months	Assume as above	Assume as above
	Exterior insulation and finish systems (EIFS) e.g. Caviteclad[16]	At least annually Mould and algae must be removed. This can be done by scrubbing with detergent or spraying with a proprietary cleaner.	*5 to 8 yearly intervals or sooner if required to maintain weathertightness.*	*Regular checks, at least annually, must be made of the system to ensure that the weather resistant coating is maintained watertight, and that the sealant, flashings, and other joints continue to perform their function* and are watertight.

[12] https://www.branz.co.nz/pubs/research-reports/sr465/
[13] https://www.colorsteel.co.nz/assets/Brochures/Environmental-Categories-Brochure-Mar2022-WEB.pdf and https://www.colorsteel.co.nz/resources/colorsteel-care/
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[16] https://www.specialized.co.nz/file/caviteclad-installation-manual/open https://www.specialized.co.nz/file/file56df3a0d7f518/open

Building element	Most common product types and examples of these	Maintenance requirements (where available in product/company documentation)		
		Clean	**Re-coat**	**Inspections**
Gutters, down pipes, overflow pipes	PVC (Vinyl)[17]	*Regularly clear the inside of the spouting of leaves, silt, or other debris to reduce the risk of blockage and overflow.* (Not in warranty.)		
Windows[18]	Aluminium[19]	Every three months *A soft brush with warm water and a mild household detergent are recommended.*	Powder coated and anodised joinery have warranties of 10-20 years. Joinery can be re-coated.	
	uPVC[20]	At least once every two months		
Paint	Resene[21]	Every 12 months	Acrylic system on weatherboards lasts for 7–10 years. An oil-based or alkyd system may only last 4–6 years. *5–7 years and 1–5 years respectively on window sills and other slanted surfaces with greater exposure to… sun.*	
	Dulux[22]	Every two years *Apply [prepared house wash] to the entire painted area with a soft bristle brush, broom or soft cloth, you will need ladders, scaffolding and a long-handled applicator to reach some of the higher parts of your home's*	~ 8 years (UK), NZ sites do not specify re-painting requirements.	

[17] From *Marley Rainwater Systems Maintenance Schedule* at https://www.marley.co.nz/products/rainwater/spouting/stormcloud/
[18] https://www.wganz.org.nz/guides/joinery-materials/#:~:text=New%20Zealand%20window%20and%20door,is%20also%20reusable%20and%20recyclable.
[19] https://nzwindows.co.nz/wp-content/uploads/2022/07/Vantage-Care-Maintenance-and-Warranty.pdf
[20] https://www.ameribuild.co.nz/documents/Maintenance%20and%20Care%20Guide.pdf
[21] https://www.resene.co.nz/homeown/problem-solver/maintaining_exterior_painted_surfaces.htm
[22] https://www.dulux.co.nz/how-to/general/how-to-care-for-dulux-paint/
https://www.duluxdecoratorcentre.co.uk/product/paint/exterior-paints/exterior-trim/dulux-trade-weathershield-exterior-high-gloss

Building element	Most common product types and examples of these	Maintenance requirements (where available in product/company documentation)		
		Clean	**Re-coat**	**Inspections**
		exterior, under eaves, along fascias, etc.		

Attachment 3: Insight Economics - High Level Assessment of Proposed Building Setbacks Adjacent to the Rail Network

INSIGHT | ECONOMICS

Draft Report: 24 July 2024

High-Level Assessment of Proposed Building Setbacks Adjacent to the Rail Network

Prepared for:
KiwiRail Holdings Limited

Authorship

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Disclaimer

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KiwiRail Holdings Limited

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About the Author

This report was written by Fraser Colegrave, who founded Insight Economics in 2013.

He has 27 years commercial experience, the last 24 of which he has worked as an economics consultant. During that time, he has successfully led more than 600 consulting projects.

Fraser holds a first-class honours degree in economics from the University of Auckland (1996).

His main fields of expertise are land-use and property development. He has worked extensively in these areas for many of the largest companies in New Zealand. In addition, he regularly advises local and central Government on a range of associated policy matters, and therefore understand the issues from multiple perspectives.

Current and recent clients include: Auckland Airport, Argosy Property, Christchurch City Council, Crown Infrastructure Partners, Foodstuffs, Fulton Hogan, Infinity Group, Kiwi Property, Kmart, the Ministry of Transport, Neil Group, New Zealand Productivity Commission, Ngai Tahu, Queenstown Airport, Tauranga City Council, and Woolworths.

Over the last 15 years, Fraser has helped secure plan changes and/or resource consents for dozens of major projects providing more than 40,000 dwellings in both brownfield and greenfield areas.

Since 2014, he has performed numerous forensic examinations of the housing and business capacity assessments completed for or by Councils under the National Policy Statement on Urban Development 2020 (NPS-UD), and accordingly has a high level of expertise with the concepts and policy framework of the NPS UD.

Recently, Fraser has been closely involved with the intensification planning processes for various Tier 1 areas, including Tauranga City, Western Bay of Plenty District, Christchurch City, Selwyn District, Waimakariri District, and Queenstown-Lakes District.

In his previous role at Covec Limited, Fraser completed a wide range of transport-related assessments for various central Government agencies and therefore has a sound understanding of the sector and its vital contribution to economic prosperity. His work included the development of detailed fleet models to test different policy options, and initiatives to encourage more environmentally friendly mode choices.

More generally, Fraser has provided expert evidence on various economic matters at more than 120 hearings before Councils, Independent Hearing Panels, the Land Valuation Tribunal, the Environment Court, Boards of Inquiry, the Family Court, and the High Court of New Zealand.

1. Introduction

1.1 Background

KiwiRail is responsible for the development and operation of New Zealand's rail network. To ensure that the rail network remains free to grow and operate without undue disruption, and to ensure the safety of those who work within the rail corridor and neighbouring occupants, KiwiRail seeks a five-metre setback for new buildings and structures, or alterations to existing ones, adjacent to the rail corridor. This high-level report briefly considers the likely economic effects of the proposal.

1.2 Strategic Context

New Zealand, like all developed nations, is highly dependent on trade. This trade creates a massive freight task, with approximately 280 million tonnes moved around NZ annually.[1] While rail plays a key role in the freight sector, particularly for certain goods like timber, dairy, and meat[2], most of the national freight task is performed by diesel trucks. These generate harmful emissions, including CO_2, and are therefore the target of a concerted effort to decarbonise the transport fleet. For example, the New Zealand freight and supply chain strategy seeks to move 20% more freight by 2035 while generating 25% lower emissions, including via modal shifts to rail.

In parallel, the New Zealand Government has recognised the need to maximise the value of its existing investments in the rail network, including making rail a more attractive mode for freight. Previously, investment in the rail network lacked a long-term view about its role in the transport system. This caused short-term thinking and investment decision-making, so a new approach was needed.[3]

The New Zealand Rail Plan[4] was developed in 2021 to articulate the investment needed to achieve identified priorities for rail. In June 2021, the Rail Network Investment Programme (RNIP) was created to fund various planks of the Rail Plan that will help renew the network, restore it to a resilient and reliable state, and support freight and passenger rail growth and productivity.[5]

1.3 Structure of Report

The remainder of this report is structured as follows.

- Section 2 describes the problem at hand plus KiwiRail's proposed solution.
- Section 3 considers the likely effects on development capacity under the NPS UD.
- Section 4 describes the economic value of protecting rail's growth and operation.
- Section 5 summarises and concludes.

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[1] https://www.transport.govt.nz/assets/Uploads/Freight-and-supply-chain-issues-paper-full-version.pdf

[2] https://www.kiwirail.co.nz/our-business/freight/

[3] https://www.transport.govt.nz/area-of-interest/infrastructure-and-investment/the-new-zealand-rail-plan/

[4] ibid

[5] ibid

2. About the Proposed Setbacks

2.1 Problem Statement

New Zealand's rail network spans nearly 4,000 kilometres of track, which runs through various rural and urban communities. If sufficient space is not provided on adjoining land for certain activities (particularly property repairs and maintenance), they cannot be completed without encroaching onto the rail corridor, including the risk of dropped objects falling onto the track and disrupting operations.

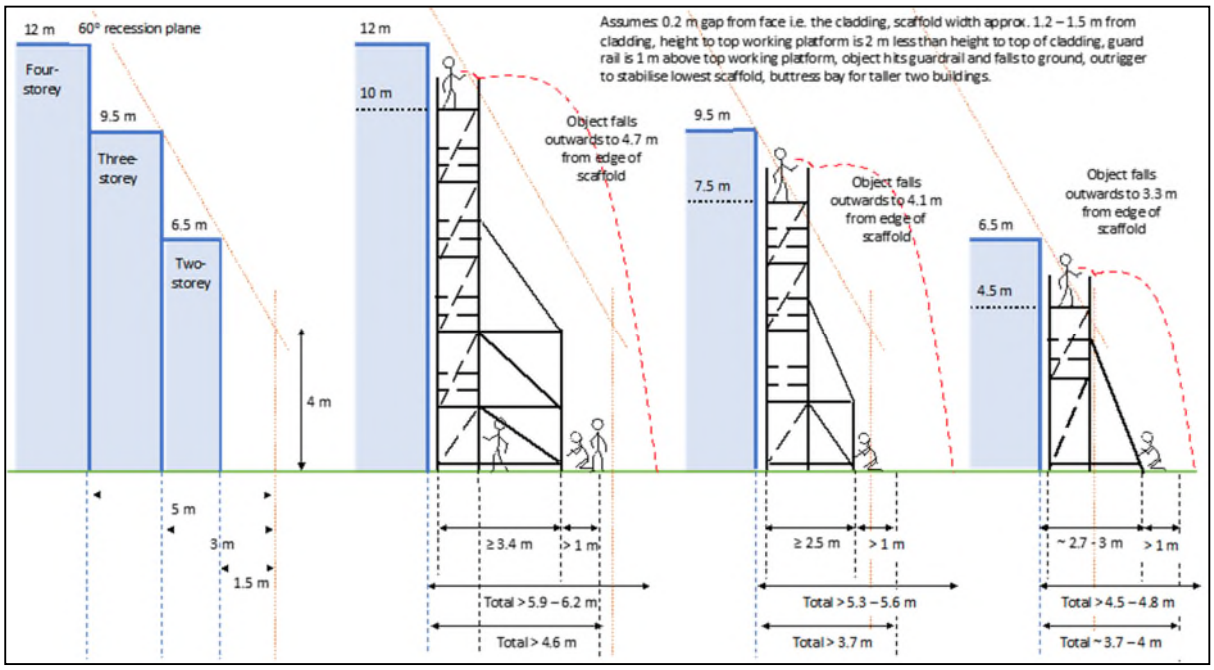
2.2 KiwiRail's Proposal

To ensure a safe distance for repairs and other maintenance activities on properties adjacent to the railway corridor, and to protect it from unforeseen hazards, KiwiRail seeks a five-metre setback for new buildings and structures, or alterations to existing ones, adjacent to the rail corridor. The rationale for this is illustrated in the diagram below, which demonstrates the space required to:

1. Install and move a basic/common scaffold structure for maintenance purposes and

2. Avoid dropped objects falling on the track from different building heights and varying scaffolding configurations.

Figure 1: Illustration of Dropped Object Paths from Different Height Buildings/Scaffolding



The diagrams above show that 3.7 to 4.6 metres is required to construct scaffolding of different sizes, with 4.5 to 6.2 metres required to enable access for maintenance of wall cladding (not roof cladding) and to allow for (some) falling objects. These diagrams assume level, stable ground conditions.

While the proposed five-metre setback may not fully protect the network from dropped object risks (with some potentially falling further), KiwiRail consider it to strike a good balance between protecting the rail network and preserving the property rights of landowners. Accordingly, five metre setbacks are preferred by KiwiRail.

2.3 Likely Situation Otherwise (aka the Counterfactual)

It is important to note that, absent the five-metre setback proposed, most sections would be required to set new buildings back from the rail network to some degree anyway under district planning rules. For example, I understand that the Medium Density Residential Standards (MDRS) impose a one-metre default setback. In lower density residential zones, though, larger setbacks are common, while some zones – like centres – may have no setback requirements at all.

Accordingly, the practical impact of KiwiRail's proposed relief is the difference between the proposed five-metre setback and the one that would apply otherwise, which is known as the counterfactual.

In this report, we assume that a one-metre setback would apply by default, so the impact of KiwiRail's relief is the difference between that and the larger five-metre setback proposed.

3. Impacts on Development Capacity

3.1 Introduction

Having set the scene, we now consider potential impacts on development capacity. This is a key consideration given the strongly enabling ethos of the NPS-UD and the need to ensure 'at least' sufficient capacity 'at all times.'

3.2 Number of Properties Affected

To put the issue in context, we used GIS to identify properties adjacent to the rail corridor in each territorial authority, which we then expressed as a percentage of all land parcels in each area. While the results vary, overall, only 0.9% of New Zealand properties are adjacent to the rail network. Accordingly, **99.1% of properties are unaffected**. Table 1 presents the details by territorial authority.

Table 1: Number of Properties Adjacent to Rail Network by Territorial Authority (May 2024)

TA Name	Total Land Parcels	Adjacent Properties	Adjacent Share of Total
Ashburton District	27,400	84	0.3%
Auckland	579,800	3,409	0.6%
Buller District	18,100	326	1.8%
Carterton District	8,300	166	2.0%
Central Hawke's Bay District	14,900	239	1.6%
Christchurch City	183,200	1,353	0.7%
Clutha District	41,900	593	1.4%
Dunedin City	85,800	1,028	1.2%
Far North District	61,400	129	0.2%
Gisborne District	37,300	350	0.9%
Gore District	12,700	126	1.0%
Grey District	17,700	621	3.5%
Hamilton City	64,500	276	0.4%
Hastings District	43,500	383	0.9%
Horowhenua District	24,900	349	1.4%
Hurunui District	18,400	290	1.6%
Invercargill City	33,300	518	1.6%
Kaikoura District	5,300	367	6.9%
Kaipara District	28,500	258	0.9%
Kapiti Coast District	29,500	408	1.4%
Kawerau District	3,400	2	0.1%
Lower Hutt City	46,700	625	1.3%
Manawatu District	26,800	53	0.2%
Marlborough District	42,200	473	1.1%
Masterton District	20,100	251	1.2%
Matamata-Piako District	23,100	332	1.4%
Napier City	29,400	920	3.1%
New Plymouth District	49,500	402	0.8%
Otorohanga District	11,300	145	1.3%
Palmerston North City	41,300	464	1.1%
Porirua City	23,500	271	1.2%
Rangitikei District	18,600	509	2.7%
Rotorua District	35,800	105	0.3%

TA Name	Total Land Parcels	Adjacent Properties	Adjacent Share of Total
Ruapehu District	19,800	622	3.1%
Selwyn District	47,400	241	0.5%
South Taranaki District	27,700	361	1.3%
South Waikato District	15,400	382	2.5%
South Wairarapa District	12,300	124	1.0%
Southland District	57,400	463	0.8%
Stratford District	10,800	462	4.3%
Tararua District	26,300	268	1.0%
Taupo District	29,100	1	0.0%
Tauranga City	62,000	522	0.8%
Timaru District	35,300	340	1.0%
Upper Hutt City	19,800	384	1.9%
Waikato District	54,500	807	1.5%
Waimakariri District	38,500	377	1.0%
Waimate District	10,900	95	0.9%
Waipa District	32,400	156	0.5%
Wairoa District	11,700	299	2.6%
Waitaki District	32,500	653	2.0%
Waitomo District	12,500	170	1.4%
Wellington City	74,800	924	1.2%
Western Bay of Plenty District	34,300	340	1.0%
Westland District	16,800	295	1.8%
Whakatane District	22,600	215	1.0%
Whanganui District	29,700	522	1.8%
Whangarei District	60,100	840	1.4%
New Zealand Total	**2,718,800**	**25,688**	**0.9%**

3.3 Impacts on Adjacent Properties

We now consider potential impacts on the 0.9% of New Zealand properties that are adjacent to the rail network. According to our GIS analysis, 70% of these properties are already developed, with only 30% being vacant. Given that some vacant properties represent public open spaces and other non-developable land types, not all will be developed over time. As a result, the number of developable sites affected by the proposed setback will be only a small fraction of the 0.9% flanking the rail network in the first place. For example, assuming – just for arguments sake – that *all* vacant land along the rail network is developable, it represents less than 0.3% of total NZ properties.

However, even for that 0.3%, the proposed setback may not materially affect yields. In practice, it depends on how easily the proposed building's bulk and location (B&L) could be reconfigured to account for the larger setbacks proposed by KiwiRail. If B&L can be readily changed to comply while still achieving the same overall site yields, the proposal will again have no effect.

To test this working assumption, I considered a handful of "representative development examples" with KiwiRail and its advisors to examine the potential impacts of larger setbacks on likely site yields. In virtually all cases, we found workable B&L tweaks that would preserve yields while maintaining the proposed five metre setback. In one case, for example, it simply meant reorienting the dwelling away from the track and swapping front yard space for backyard space. However, there was no impact on overall yields.

3.4 Summary and Conclusion

The discussion above has shown that:

1. 99.1% of properties will not be affected by the proposed setback because they are not adjacent to the rail network.

2. Of the 0.9% that are adjacent, only 30% are vacant (but not all of those are developable).

3. The true number of affected properties is therefore only a fraction of the 0.9%.

4. Finally, many prospective developments along the rail corridor can likely be reconfigured to comply with the proposed five-metre setback without foregoing yields.

Accordingly, overall, the proposal will have immaterial impacts on development capacity.

4. The Value of Network Protection

4.1 Introduction

Development yields aside, the primary economic effect of the proposal will be to preserve the safe and ongoing operation of the rail network. This section briefly discusses that.

4.2 The Value of Rail to New Zealand

The New Zealand rail network delivers significant value to its freight and passenger customers, and also generates significant benefits for all New Zealanders. These wider benefits are far-reaching, but the most significant are lower road congestion, fewer road accidents, and lower carbon emissions that result from less road traffic.

In 2021, Ernst & Young were commissioned by the Ministry of Transport to evaluate the value of rail to New Zealand.[6] Their study built on an earlier analysis from 2016 and considered the benefits of (i) national freight rail, and (ii) passenger rail in Auckland and Wellington.[7] Two scenarios were modelled. The first assumed that all rail services were cancelled, with all rail freight and passengers shifted to the road network. The second scenario also assumed that all rail services were cancelled and shifted to the road network, but with 20% higher rail traffic to capture the impacts of projected future growth. For both scenarios, the value of rail equals the costs of road traffic avoided.

The table below summarises the study's estimates of rail's benefits for the first scenario, where rail volumes match today. In short, the value of rail is estimated to be $1.7 to $2.1 billion per annum.

Table 2: Estimated Annual Value of Rail to New Zealand

Benefit	Low Estimate	High Estimate
Time (congestion) savings	$939	$1,054
Reduced air pollution	$170	$474
- NOx emissions	$92	$394
- SOx emissions	**<$1**	<1
- Brake & tire (PM10)	$21	$22
- Exhaust (PM2.5)	$57	$58
Reduced fuel use	$211	$222
Reduced GHG emissions	$178	$182
Maintenance benefits	$104	$107
Safety	$94	$98
- Death	$63	$65
- Serious injuries	$25	$27
- Minor injuries	$5	$6
Totals	**$1,695**	**$2,137**

In the words of the Ernst & Young study, as demonstrated above, rail transportation provides the largest benefits to the road sector and society through:

[6] Ernst & Young, the Value of Rail in New Zealand, 2021.

[7] i.e. it excluded inter-island ferries and long-distance passenger rail services, which are also operated by KiwiRail.

- Time and congestion savings (49% - 55% of benefits)
- Reduced air pollution (10% - 22% of benefits)
- Reduced fuel use and maintenance costs (14% of benefits)
- Reduced greenhouse gas (GHG) emissions (9% to 10% of benefits).

To continue realising rail's substantial value to New Zealand, as per above, and to maximise its potential to limit growth in road traffic over time, the network must be available for operations 24/7 just like the road network.

5. Summary and Conclusion

Rail is an important part of New Zealand's current transport mix. It provides significant value to New Zealand. However, encroachment – including dropped objects – from neighbouring properties could affect the efficient operation of rail and limit its contribution to long-term economic prosperity. KiwiRail's proposal recognises this and seeks appropriate precautions that also recognise the property rights of adjacent landowners.

Overall, I consider KiwiRail's proposal to strike an appropriate balance between those competing interests. It is unlikely to have any material impacts on development capacity, while helping to protect the value of rail to New Zealand. Accordingly, I support it on economic grounds.

Attachment 4: Other Options Considered

For completeness, other methods (outside of District Plan controls) have also been considered. These include:

a. increase in designation width;
b. fencing of the urban rail network; and
c. providing for building maintenance via access from the rail corridor.

Increase Designation Width

KiwiRail could increase the width of its designation to manage health and safety effects. This would require a range of applications for new or altered notices of requirement and KiwiRail to demonstrate (among other things):

a. the designation was required for a 'project or work' (Section 168(2)(a));
b. adequate consideration has been given to alternative sites, routes, or methods where the requiring authority does not have an interest in the land sufficient for undertaking the work (Section 171(1)(b)(i)); and
c. that the work / designation are reasonably necessary for achieving the objectives of the requiring authority (Section 171(1)(c).

Should a designation be confirmed it imposes limitations on what works a person may undertake on the designated land without written approval of the requiring authority (Section 176(1)(b)). This adds a layer of control over land which would not exist under the preferred option of district plan standards.

Further, the requiring authority may be required (by the Environment Court) to acquire land subject to a designation (Section 185) where certain 'tests' are met. This creates a significant and ongoing financial obligation on the requiring authority as it is unpredictable when / if land owners would seek acquisition.

Discussions with KiwiRail indicate that it does not consider an increase in designation width would be "reasonably necessary" (per s171(1)(c) of the RMA) to justify designating all land within 5 metres of the rail corridor nor would it meet the sustainable management purpose of the RMA.

Overall, applying a designation is considered to be a disproportionately restrictive approach to managing this issue. Alternative methods are considered available (ie. plan provisions) with a lower impact on enjoyment of land than a designation. The proposed provisions will be more efficient and effective than designating a wider corridor to provide a setback as it provides flexibility of use by resource consent in situations where building within the setback is acceptable. Applying a wider designation means land will not be available for use (without approval of the requiring authority) for purposes other than for rail.

Fence/Physical Barrier

Fencing the rail corridor boundary throughout urban areas of the district to prevent access potentially reduces 'casual' encroachment but does not solve the issue of insufficient space for

building owners to undertake maintenance within their own site boundaries. It is likely that it will not manage the effects of falling objects entering the rail corridor.

Fencing also has a range of significant costs which (as well as the establishment costs for building the fences) include ongoing maintenance (damage/graffiti) and visual amenity impacts.

Access Requests for Adjoining Building Maintenance

KiwiRail manages requests for access to its rail corridor via a formal permit and Track Access Request process (TAR)[15]. A permit provides a permission to enter whereas a TAR sets the specific parameters of entry.

KiwiRail has advised that the majority of these requests come from utility operators who wish to access the utilities located within the rail corridor, for example, telecommunications, electricity, water / wastewater etc. It is uncommon for private landowners to request a permit/TAR to access to the corridor.

In KiwiRail's experience, adjacent landowners do not contact KiwiRail for permission before undertaking building maintenance activities, primarily because:

a. landowners do not perceive their encroachment into the rail corridor to be a concern;
b. KiwiRail land is perceived to be public property;
c. landowners are unaware that they should be seeking permission; or
d. there are concerns or uncertainty about process and costs of seeking permission (or that it may be declined).

Regardless of whether land owners seek approval, if buildings are built too close to the rail corridor, then landowners will not be able to maintain them without entering the rail corridor.

In the event there is a request to access the rail corridor, and this required KiwiRail to alter or suspend its services, this would be a cost for the landowner and also for KiwiRail in terms of the impacts on its services.

Setting plan provisions which effectively require permission to access the rail corridor to undertake maintenance and other activities is also poor and uncertain planning. Plan provisions should provide for landowners to be able to use and maintain their properties within their own property, rather than having to encroach onto the rail corridor.

Allowing for building setbacks which ensure encroachment onto adjoining sites to undertake maintenance not required are more appropriate, and safer, method of addressing this issue.

[15] https://www.kiwirail.co.nz/our-network/access-our-network/permit-to-enter/permits-and-tars-portal/