GUIDE TO DEVELOPMENT IN A TRANSPORT ENVIRONMENT: RAIL

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Queensland Government

The Department of Transport and Main Roads is responsible for providing an integrated, safe, efficient and reliable transport system in Queensland.

An electronic copy of this report is available on the Department of Transport and Main Roads: **www.tmr.qld.gov.au**

CONTENT

CONTENT

CONTENT

Part A Context

1. Introduction

The Guide to Development in a Transport Environment: Rail (the guide) provides important information for those involved in the planning, design or delivery of development in the vicinity of railways in Queensland. It is intended for use as a technical reference document.

The guide provides specific technical guidance to assist development proponents to achieve compliance with the performance outcomes and acceptable outcomes in the Queensland State Development Assessment Provisions (SDAP) in relation to managing impacts of development on railway safety, structural integrity and operation.

The guide also provides useful information in relation to the operational constraints and requirements when undertaking construction work within the railway environment.

1.1 HOW TO USE THIS GUIDE

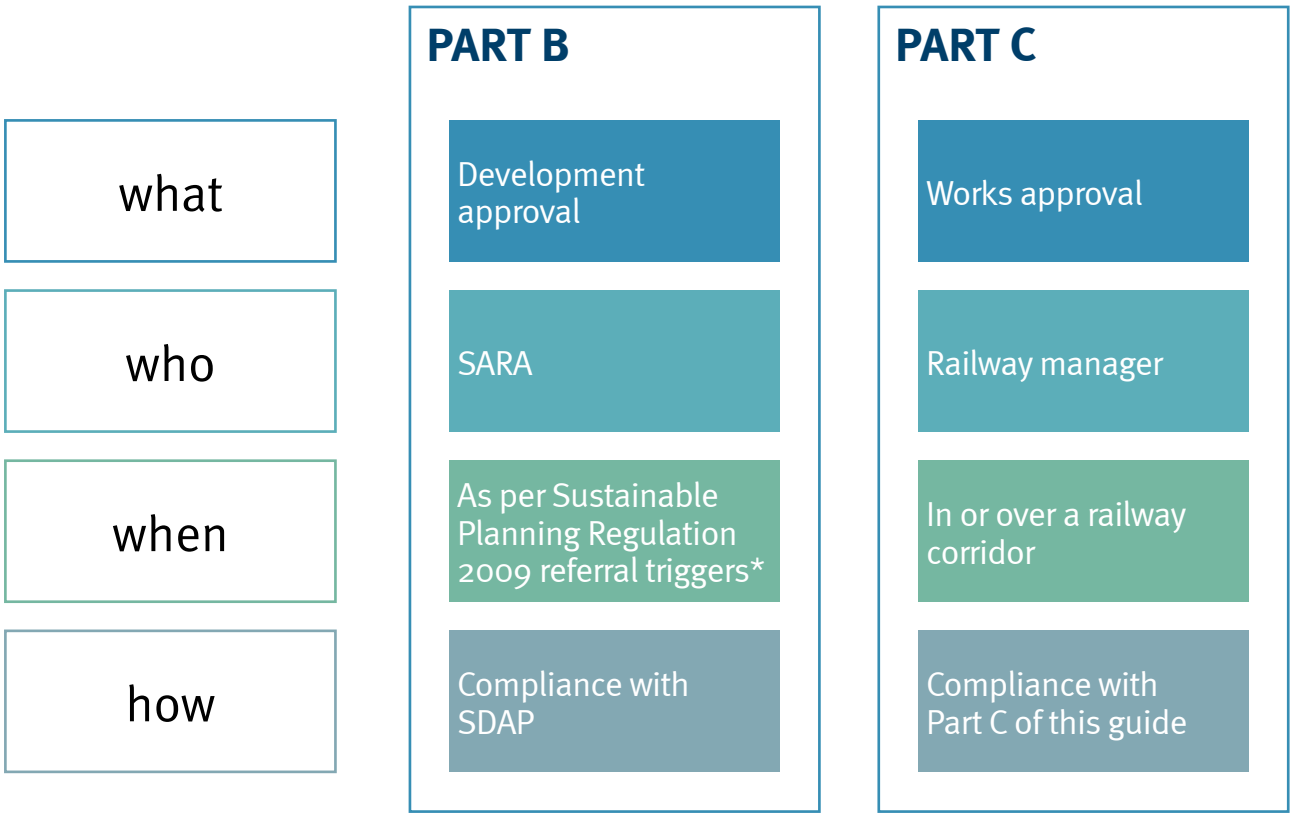
This guide is structured into four parts:

- **PART A:** provides the context for development in a railway environment.
- **PART B:** is relevant to development proposed on land adjacent to a railway. It provides supporting information about the key issues which need to be addressed if proposing development near a railway including information to assist in preparing development applications consistent with SDAP.
- **PART C:** is relevant to development or works proposed within a railway corridor. It outlines the approvals, processes and technical requirements which must be satisfied to comply with legislation governing works in a railway corridor.
- **PART D:** provides supplementary information to support this guide.

Figure 1 describes the difference between the content found in parts B and C of this guide.

FIGURE 1

EXPLANATION OF CONTENT OF PARTS B AND C



* Generally within 25m of a railway or future railway land, or on future railway land; or on a state-controlled transport tunnel, future state-controlled transport tunnel, or within 50m of a state-controlled transport tunnel or future state-controlled transport tunnel. Applicants should consult the Sustainable Planning Regulation referral triggers to determine whether their development is triggered for state assessment.

1.2 WHAT IS THE RAILWAY ENVIRONMENT?

The railway environment comprises the following:

- the area located in, over and below a railway or future railway land
- the area located adjacent to a railway or future railway land.

Definitions of 'railway', 'railway corridor' and 'future railway land' are contained in the glossary of this guideline.

The area adjacent to a railway should be determined with reference to relevant state referral triggers as per the *Sustainable Planning Regulation 2009*. In the majority of referrals, the area adjacent to a railway or future railway land is that land within 25 metres of the boundary of the railway.

The extent of the railway environment is illustrated in Figure 2. The Department of Infrastructure, Local Government and Planning (DILGP) provides online mapping that includes layers for existing railways, land within 25 metres of an existing railway, future railway land, and land within 25 metres of future railway land.

Where a railway includes a tunnel, the width of the land included in the railway environment increases to 50 metres from the boundary of an existing or future state-controlled tunnel.

1.3 ROLES AND RESPONSIBILITIES

1.3.1 Department of Transport and Main Roads

Generally, the Department of Transport and Main Roads (TMR) is the 'owner' of rail transport corridors on behalf of the State of Queensland. In this regard, TMR's role is to protect the safety, structural integrity and operation of railways.

TMR administers the *Transport Infrastructure Act 1994*, the governing legislation for the management and operation of state transport infrastructure, including railways. TMR also administers the *Transport Planning and Coordination Act 1994*, which seeks to achieve transport effectiveness and efficiency through strategic planning and management of transport resources.

1.3.2 Railway managers

Railway managers sub-lease rail transport corridors from the owners under section 240 of the *Transport Infrastructure Act 1994*. They also operate rail services and manage the rail transport corridor and/or rolling stock.

Railway managers liaise with applicants when applicants wish to access or undertake works within a railway corridor.

Key railway managers in Queensland include Queensland Rail, Australian Rail Track Corporation (ARTC), and Aurizon.

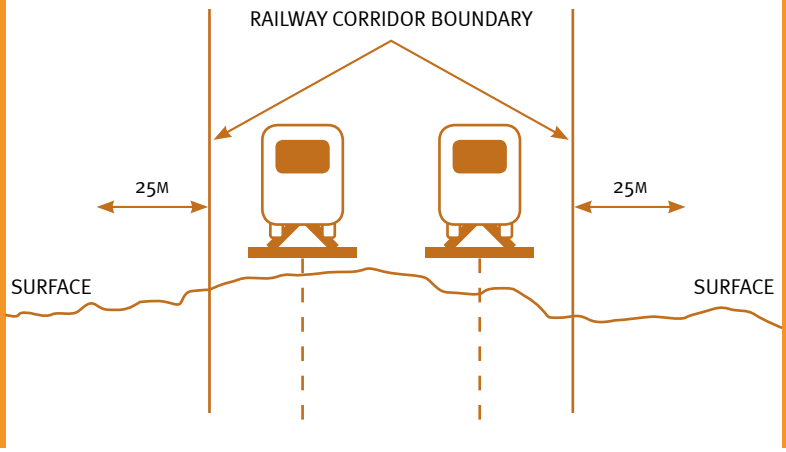


FIGURE 2
EXTENT OF THE RAILWAY ENVIRONMENT

The railway environment extends indefinitely above and below a railway. The area adjacent to the railway may extend beyond 25 metres, for example to 50 metres where land is within 50 metres of an existing or future state-controlled transport tunnel. Development located in this area is the subject of the information contained in this guide.

1.3.3 Department of Infrastructure, Local Government and Planning

The Department of Infrastructure, Local Government and Planning (DILGP) is the state government department responsible for regulating planning and development. The chief executive of DILGP is responsible for administering the *Sustainable Planning Act 2009* and for assessing development applications in relation to state interests, as outlined in the *Sustainable Planning Regulation 2009* (SPA).

State Assessment and Referral Agency

The State Assessment and Referral Agency (SARA) is an agency within DILGP. It is responsible for coordinating the assessment of development applications in relation to matters of state interest. SARA provides a single agency lodgement, assessment and decision point for development applications where the state has a jurisdiction.

SARA assesses relevant development applications by having regard to the State Development Assessment Provisions (SDAP) and seeks technical advice from agencies, such as TMR, for development applications that are of relevance. Typically, where an application involves development in a railway environment, SARA will consult TMR in relation to technical matters before finalising the assessment. As part of the process, TMR will also consult with other stakeholders to seek their input, for example, railway managers, such as Queensland Rail, Aurizon and the ARTC.

State Development Assessment Provisions

The State Development Assessment Provisions (SDAP) set out the matters of interest to the state for development assessment. SDAP applies where the chief executive administering the *Sustainable Planning Act 2009* (SPA), is responsible for assessing or deciding development applications through SARA.

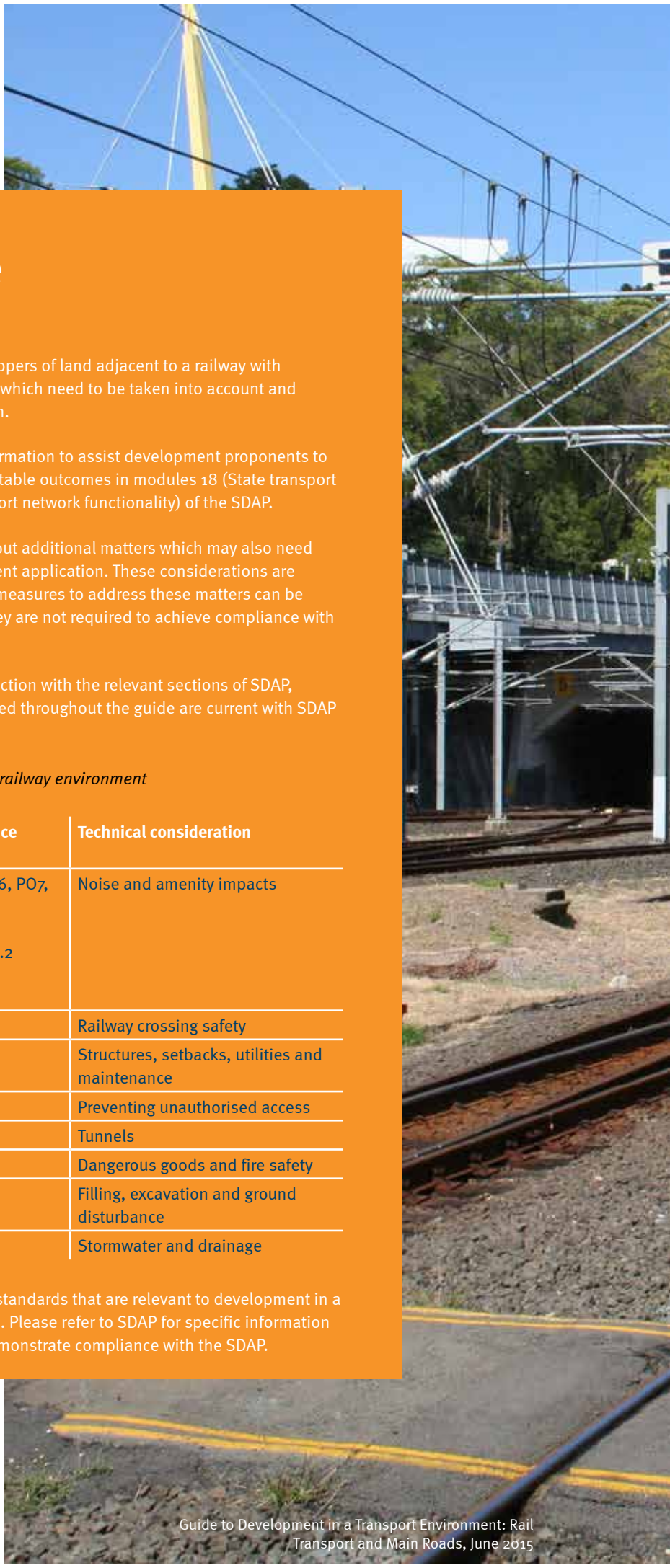
SDAP includes a number of modules containing codes which set out the assessment criteria for development applications where the development matter is of interest to the state.

The following SDAP modules are relevant to development in the railway environment:

- *Module 1 – Community amenity*
- *Module 18 – State transport infrastructure protection*
- *Module 19 – State transport network functionality.*

Each SDAP module includes a purpose which sets out the interests the state is seeking to protect. For the railway environment the state interests include the safety, structural integrity, and operation of railways and future railway land. The SDAP modules also comprise a number of state codes which outline performance outcomes and acceptable outcomes for development.

Part B Development adjacent to a railway



Part B: Purpose

The purpose of Part B is to provide developers of land adjacent to a railway with important information about the issues which need to be taken into account and addressed in a development application.

Section 2 of this part provides supporting information to assist development proponents to achieve the performance outcomes and acceptable outcomes in modules 18 (State transport infrastructure protection) and 19 (State transport network functionality) of the SDAP.

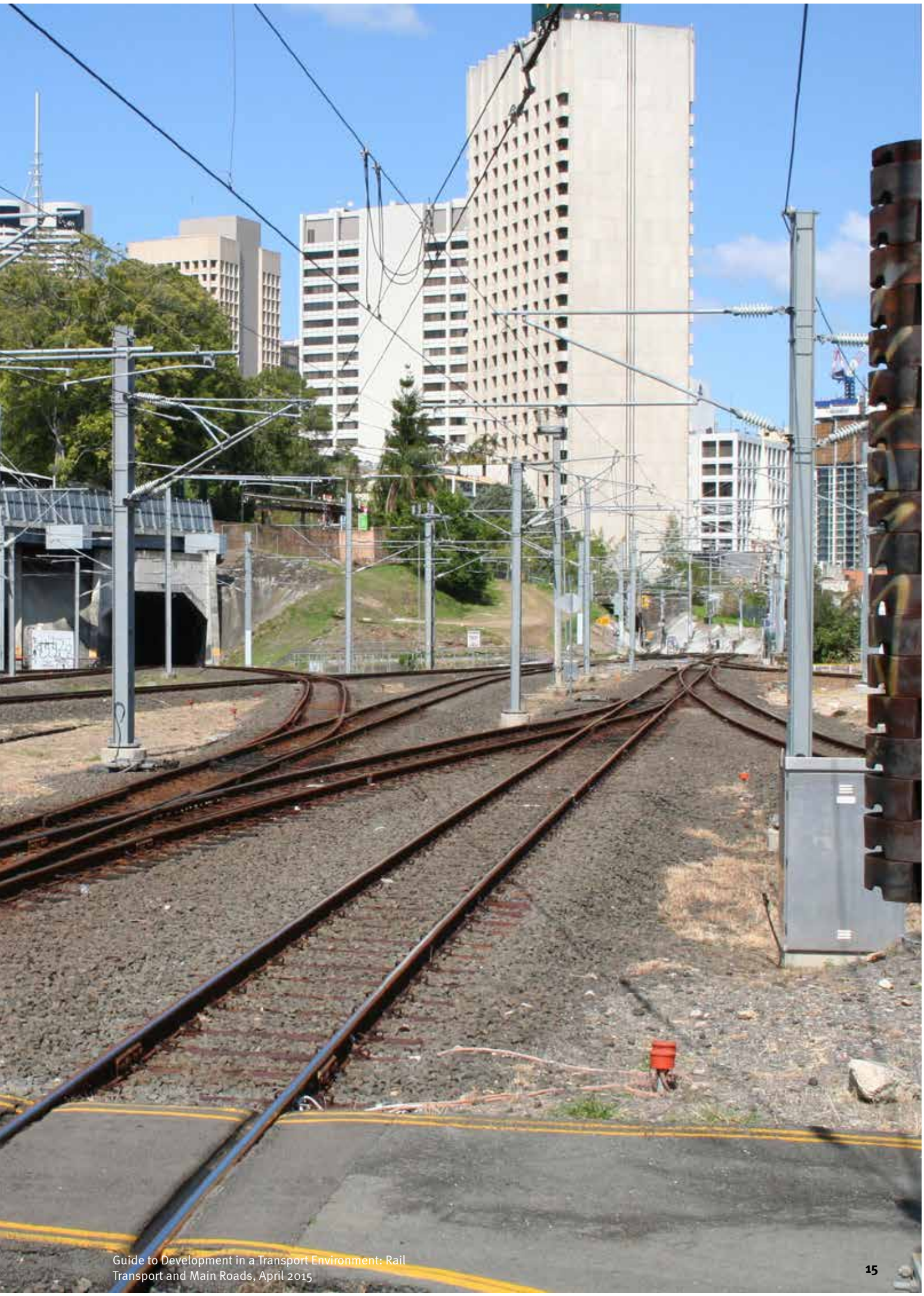
Section 3 of this part provides information about additional matters which may also need to be considered when preparing a development application. These considerations are only relevant in particular circumstances and measures to address these matters can be implemented at the applicant's discretion. They are not required to achieve compliance with the SDAP.

It is recommended this guide is read in conjunction with the relevant sections of SDAP, summarised in Table 1. References to SDAP used throughout the guide are current with SDAP version 1.6 at the time of publication.

Table 1
Technical considerations for development in a railway environment

Guide Section number	SDAP state code (performance outcome)	Technical consideration
2.1	1.1 (PO1, PO2, PO4, PO5, PO6, PO7, PO10, PO11) table 1.1.1 1.1 (PO1, PO2, PO4) table 1.1.2 1.2 (PO1, PO2)	Noise and amenity impacts
2.2	19.2 (PO3)	Railway crossing safety
2.3	18.1 (PO1)	Structures, setbacks, utilities and maintenance
2.4	18.1 (PO2)	Preventing unauthorised access
2.5	18.1 (PO4)	Tunnels
2.6	18.1 (PO5)	Dangerous goods and fire safety
2.7	18.1 (PO7, PO9)	Filling, excavation and ground disturbance
2.8	18.2 (PO1, PO2, PO3)	Stormwater and drainage

A list of Australian, TMR and railway manager standards that are relevant to development in a railway environment is provided in Appendix 2. Please refer to SDAP for specific information about the standards which may be used to demonstrate compliance with the SDAP.



2. Technical considerations for assessable development

The content in this section provides supporting information to assist applicants to achieve the performance outcomes and acceptable outcomes in modules 18 (State transport infrastructure protection) and 19 (State transport network functionality) of the State Development Assessment Provisions (SDAP).

2.1 NOISE AND AMENITY IMPACTS

Amenity impacts including noise considerations are not addressed in this guide as these matters are managed in a holistic manner for all transport modes such as state-controlled roads, railways, light rail and busways. For state assessment requirements in relation to amenity, refer to SDAP module 1 and TMR's *State Development Assessment Provisions Supporting Information: Community Amenity (Noise)* available on the TMR website.

2.2 RAILWAY CROSSING SAFETY

The content in this section supports the performance outcome (PO) as outlined in PO3 of 19.2 *Transport infrastructure and network design state code* in SDAP.

2.2.1 What is the issue?

The volume and type of traffic generated by a development, and location of road access points, has the potential to adversely impact on the safety, structural integrity and operation of railway crossings. Vehicles queuing across level crossings is a concern as it increases the risk to public safety, damage to property and infrastructure, as well as service disruptions.

Increases in traffic volumes in general, and, in particular of passenger buses and heavy vehicles, have the potential to increase safety risks at level crossings relative to existing safety controls. Additionally, heavy and over-dimensional road loads can result in damage to rail transport infrastructure.

The maximum size of vehicle used by the proposed development may cause queuing over the railway where there is insufficient clearance available between an intersection or proposed access point and the railway crossing.

2.2.2 What is the objective?

The objective of these provisions is to ensure the structural integrity, and safe operation of the rail network by ensuring the risks associated with vehicular crossing of a railway are minimised. The current level of safety risk at a railway level crossing should not be worsened by a development.

2.2.3 How to achieve the performance outcome

Railway crossing safety can be maintained by:

- avoiding the need for railway crossings as part of a development proposal, where practical and possible
- where a new railway crossing is required, ensuring the crossing is grade separated
- where impacts to an existing railway level crossing cannot be avoided, working with TMR and railway managers to implement mitigation measures at the railway crossing
- ensuring road access points for a development are located as far away from a railway level crossing as possible
- ensuring on-site vehicle circulation is designed to prevent traffic generated by a development from queuing across a railway level crossing.

The technical considerations in Table 2 provide further guidance and additional information to assist with achieving SDAP outcomes.

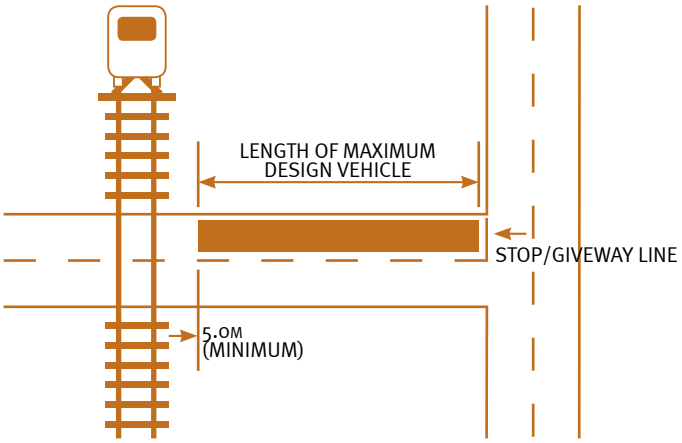


FIGURE 3

MINIMUM CLEARANCES FROM A RAILWAY LEVEL CROSSING FOR ROAD ACCESS POINTS AND CROSSOVERS

Figures 3 and 4 show the minimum clearances for road access points from a railway level crossing to achieve an appropriate clearance from a railway level crossing, in accordance with AS1742.7 – Manual of uniform traffic control devices, Part 7: Railway crossings, and detailed in SDAP.

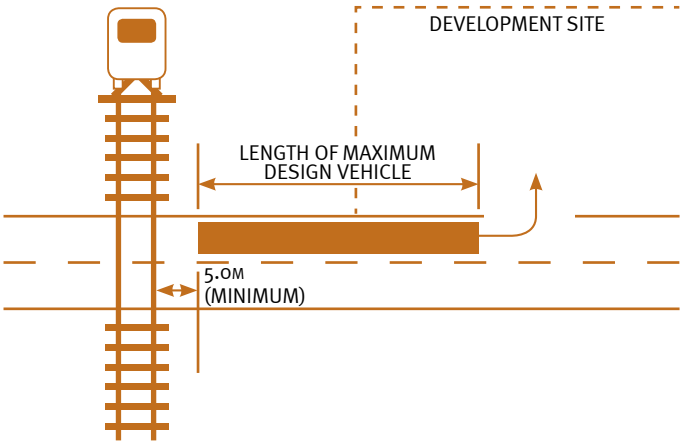


FIGURE 4

MINIMUM CLEARANCES FROM A RAILWAY LEVEL CROSSING FOR ROAD ACCESS POINTS AND CROSSOVERS

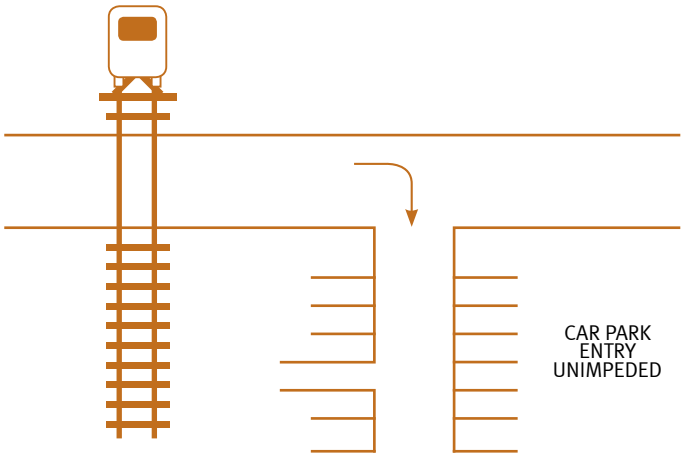


FIGURE 5

ON-SITE VEHICLE CIRCULATION DESIGNED TO PRIORITISE ENTERING VEHICLES AT ALL TIMES

On-site vehicle circulation is designed to allow vehicles to enter the development site at all times, as shown in Figure 5, and detailed in SDAP.

TABLE 2

TECHNICAL CONSIDERATIONS FOR RAILWAY LEVEL CROSSING SAFETY

Item	Technical considerations
Elimination of railway level crossings	
1	Development should consider the potential for railway level crossings to be eliminated, where possible, in accordance with the Department of Transport and Main Roads' *Queensland Level Crossing Safety Strategy 2012 – 2021*. All new public railway crossings require grade separation.
Traffic impact assessment	
2	A traffic impact assessment (TIA) certified by a Registered Professional Engineer of Queensland (RPEQ) may be required to be submitted with a development proposal to demonstrate the development will not worsen the safety risk of a railway crossing, or that the impacts can be mitigated to maintain the current level of safety of the railway crossing. The TIA should address the following: • the expected traffic distribution on the road network as a result of the proposed development • identification of railway level crossing/s likely to be impacted on by development generated traffic • the expected timeframe for the delivery of the proposed development including the commencement of construction, each stage and the ultimate development • existing traffic flows (expressed as vehicles per day) over the impacted railway level crossing/s, including daily (peak hour) fluctuations, and number and percentage of heavy vehicles and buses • the expected background traffic growth (expressed as vehicles per day) over the impacted railway level crossing/s, including the number and percentage of heavy vehicles and buses. This should include background traffic growth to a ten year design horizon from the anticipated commencement of each development stage • the expected development generated traffic (expressed as vehicles per day), including daily fluctuations (peak hour) and percentage of heavy vehicles and length and number of buses, that will pass over the impacted railway level crossing/s at construction and from the commencement of each stage to a ten year design horizon • the maximum size and type of vehicle (including length, width, height and weight) anticipated over the railway level crossing/s as a result of the development during construction and at the commencement of each development stage • demonstrate how the development generated traffic will not worsen vehicular queuing issues (short stacking) over the impacted railway level crossing/s. • demonstrate how the development will not adversely affect sight distances on each side of the impacted railway level crossings. In particular, demonstrate that there is sufficient clearance from the railway crossing to allow the maximum size of vehicle used in the operation to queue at any intersection or proposed access point perpendicular to the railway crossing.

Item	Technical considerations
Australian Level Crossing Assessment Model (ALCAM) assessments	
3	In certain cases, TMR may need to refer a development application, including the TIA, to the relevant railway manager for a rail safety assessment (incorporating comparative Australian Level Crossing Assessment Model (ALCAM) assessments). An ALCAM assessment would incorporate with and without development scenarios, and would be undertaken for each railway level crossing impacted on by a development proposal. The ALCAM assessment may identify the mitigation measures required to address any identified railway safety issues. Mitigation measures may include active controls (for example, flashing lights and boom gates) and/or passive controls or treatments (for example, signage and pavement marking). Such measures would need to be implemented in conjunction with TMR and the railway manager. A number of interrelated factors may influence when comparative ALCAM assessments are required to be undertaken. Some of these include the following: • The road network surrounding a site influences the distribution of development generated traffic. The road network may either cause development generated traffic to disperse or direct it towards railway level crossings, even at a substantial distance from the site. Sometimes only a proportion of development generated traffic may be likely to use a railway level crossing but may still impose a safety risk. • The nature of the proposed development may influence traffic distribution. For example, an industrial operation may receive raw materials from suppliers from a particular location and transport finished products to a particular destination, making use of highways and other major roads which traverse railway level crossings. • Any development generated increase in road and/or rail traffic over a railway level crossing impacts on the safety risk of that crossing. A proposal's potential impact on existing traffic volumes and background traffic growth over an impacted railway level crossing would need to be analysed. Any traffic figures provided would need to be verified by TMR to ensure accuracy. Some development proposals may also increase rail traffic. • The type of development generated traffic can influence the safety risk of a railway level crossing. In particular, increases in heavy vehicles and passenger buses have a greater influence on safety or damage to rail transport infrastructure due to the higher risks associated with an incident and higher likelihood of an incident occurring.
Upgrades to railway level crossings	
4	Where an existing railway level crossing is required to be upgraded as a result of the traffic impacts of a development proposal, the railway level crossing should be designed and constructed in accordance with *AS1742.7 – Manual of uniform traffic control devices, Part 7: Railway crossings* and applicable railway manager standard drawings. A list of railway manager standard drawings can be found in *Appendix 2: Reference standards* of this guide.
Clearances and setbacks	
5	Access points achieve sufficient clearance from a level crossing in accordance with AS1742.7 – Manual of uniform traffic control devices, Part 7: Railway crossing by providing a minimum clearance of 5 metres from the edge running rail (outer rail) plus the length of the largest vehicle anticipated on-site. Figures 3 and 4 demonstrate the requirements. On-site vehicle circulation is designed to give priority to entering vehicles at all times. Figure 5 demonstrates the requirement.

2.3 STRUCTURES, SETBACKS, UTILITIES AND MAINTENANCE

The content in this section supports the performance outcome (PO) and acceptable outcomes (AO) as outlined in PO1 of *18.1 Filling, excavation and structures state code* in SDAP.

2.3.1 What is the issue?

The inappropriate location and positioning of development in the railway environment can cause disruption to railway services, damage to railway infrastructure and physical harm.

2.3.2 What is the objective?

The objective of these provisions is to ensure development is designed and constructed to avoid safety risks to operations and infrastructure by maintaining structural integrity and sufficient clearances to the railway.

2.3.3 How to achieve the performance outcome

Ensuring the safe operation of railways and structural integrity of existing and future railway land can be achieved by:

- providing sufficient setbacks from rail transport infrastructure, including overhead line equipment (OHLE) and bridges
- maintaining existing railway access points or routes
- ensuring development can be maintained without access to the railway.

Figures 6, 7 and 8 provide further guidance and additional information to assist with achieving the SDAP outcomes.

Section 5.1 provides further information for development within a railway including relevant railway manager approvals under s255 of the *Transport Infrastructure Act 1994*.

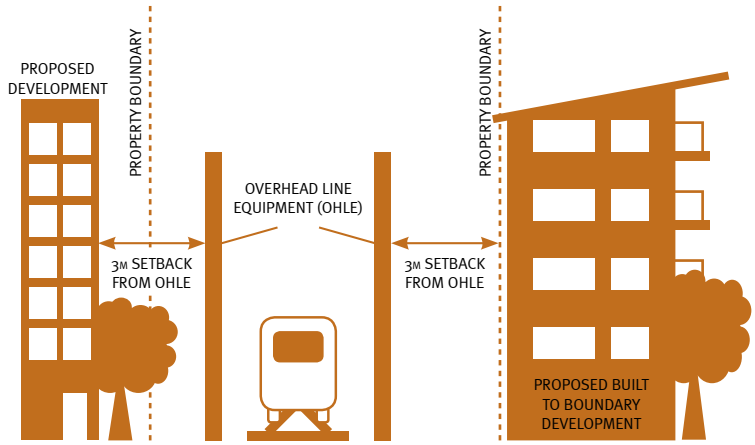
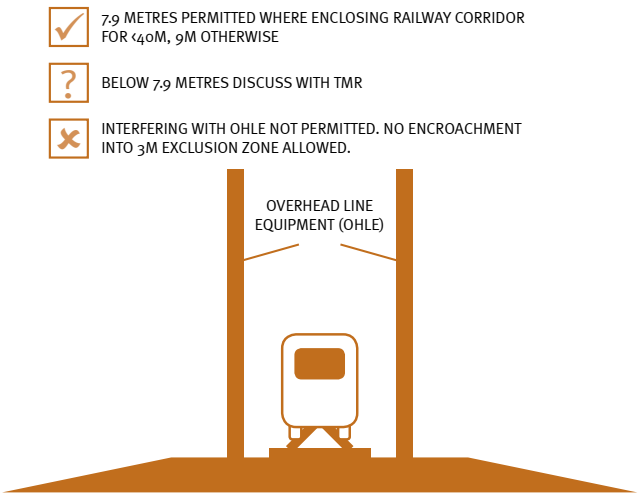


FIGURE 6
SETBACKS FROM OHLE ADJACENT TO A RAILWAY

Development adjacent to a railway should ensure the minimum clearances from OHLE detailed in SDAP are maintained at all times. Figure 6 demonstrates the requirements as outlined in SDAP. Further information about clearances from OHLE can be found in the *Electrical Safety Regulation 2013*.



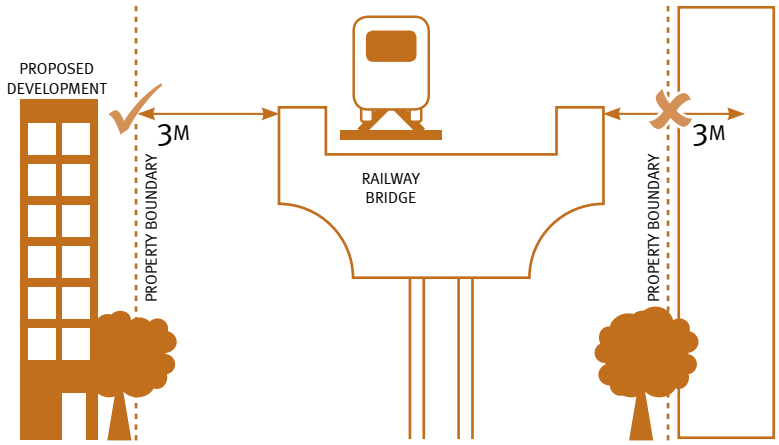


FIGURE 7

SETBACKS FROM RAILWAY TRACKS WHERE ENCLOSING A RAILWAY

Developments enclosing a railway should address the minimum clearances detailed in SDAP. Figure 7 demonstrates the requirements as outlined in SDAP and refers to the height of the lowest part of the development above the railway track.

A development that extends along a railway for more than 80 metres is considered to form a tunnel and is subject to other requirements as specified by the railway manager.

FIGURE 8

PROXIMITY TO RAILWAY BRIDGES

Development proposals should be designed to avoid risks to operations and infrastructure associated with a railway bridge. Access to railway bridges will be required for maintenance purposes and during potential emergency situations.

Figure 8 demonstrates the requirements as outlined in SDAP.

2.4 PREVENTING UNAUTHORISED ACCESS

The content in this section supports the performance outcome (PO) and acceptable outcomes (AO) as outlined in PO2 of *18.1 Filling, excavation and structures state code* in SDAP.

2.4.1 What is the issue?

Unauthorised access to a railway may result in disruption of railway services, damage to rail transport infrastructure or harm to railway staff, passengers or the public.

The main risks associated with unauthorised access in a railway include:

- *Electrocution* – this can be caused by contact with the electrical infrastructure including the OHLE.
- *Damage and injury from thrown objects* – damage can be caused to the OHLE and other rail transport infrastructure along with injury to railway staff and passengers if objects are thrown onto a railway.
- *Operational disruption and injury* – accidental access to or intentional trespass in a railway have the potential to disrupt services, result in damage and vandalism to rail transport infrastructure, or put trespassers at risk of being injured or killed.

2.4.2 What is the objective?

The objective of these provisions is to protect the railway from unauthorised access from publicly accessible areas by people, vehicles and projectiles to ensure its safety and operational integrity and to prevent harm to railway staff, passengers and the public.

2.4.3 How to achieve the performance outcome

The safety of both the public and railway can be safeguarded by designing development to minimise opportunities for unauthorised access by installing structures between the development and a railway to prevent unauthorised access. The type of protection required to prevent unauthorised access to a railway depends on the development type and the railway. Types of protection include:

- *Throw protection screens* – located adjacent to railway infrastructure (on assets such as buildings or bridges) to prevent injury and damage from objects being thrown at tracks, trains, platforms, OHLE and other infrastructure.
- *Electrification screens* – positioned adjacent to live components of the OHLE to protect personnel and members of the public from electrocution.
- *Road barriers* – located between a road and a railway to prevent intrusion into the railway by an errant vehicle or its load.
- *Rail interface barriers* – located on a development site where manoeuvring vehicles may generate a risk of entering into the railway.
- *Fencing* – located along a common property boundary with a railway.

The technical considerations in Table 3 provide further guidance and additional information to assist with achieving SDAP outcomes.

Further advice in relation to throw protection measures for private areas of a development is located in section 3.1. Throw protection for private areas is not required under SDAP but may be implemented at the proponent's discretion.

TABLE 3
TECHNICAL CONSIDERATIONS FOR PREVENTING UNAUTHORISED ACCESS

Item	Technical considerations
Throw protection	
1	Throw protection measures should be considered where an accommodation activity with a publicly accessible area (such as a communal recreation area) affords the opportunity for objects to be thrown onto a railway. The following factors may influence the need for throw protection: • location and position of communal areas in relation to the railway, for example roof top terraces and podium level recreation areas • presence of physical barriers, such as boundary and courtyard fencing, which may provide protection for certain building levels, depending on the height of the barrier, topography in the area and finished development levels • height (number of storeys) of the development and the number of windows and balconies facing the railway • design of communal windows and balconies in relation to the railway alignment, for example, the use of awning windows, security screens, louvres and transparent (glass) balcony screens and podium barriers that provide throw protection • proximity to train stations • existence and setback of OHLE from the property boundary.
2	An appropriate solution to address throw protection includes designing openings (for example, windows and balconies) that face the railway to provide throw protection screens in accordance with railway managers' technical requirements (refer to Appendix 2). For QR, refer to CIVIL-SR-008 – Protection screens.
Electrification screens	
3	Electrification screens should be provided for any part of a development (including buildings and structures such as stairs, ramps and retaining walls) that is within 3 metres of the OHLE. Electrification screens should be designed in accordance with railway managers' technical requirements (refer to Appendix 2). For QR, refer to CIVIL-SR-008 – Protection screens.
Rail interface barriers	
4	Where vehicle manoeuvring areas are situated adjacent to a railway, a RPEQ should determine whether a rail interface barrier is required and if so, the type, design (including spacing, height and materials) and location of the rail interface barrier. The RPEQ should consider the likely risk inherent by taking into account factors such as the maximum design vehicle, gradients, vehicle speeds, distance from rail transport infrastructure, and the railway formation amongst other considerations.

2.5 TUNNELS

The content in this section supports the performance outcome (PO) and acceptable outcomes (AO) as outlined in PO4 of *18.1 Filling, excavation and structures state code* in SDAP.

2.5.1 What is the issue?

Development in the vicinity of a railway tunnel has the potential to cause overloading or affect the structural integrity of the tunnel through the addition or removal of vertical and lateral pressures. This can include alteration to the groundwater regime which could impact on the integrity of a tunnel or track infrastructure. Excavation, drilling or other similar ground disturbance works may cause vibration impacts to a tunnel.

2.5.2 What is the objective?

The objective of these provisions is to ensure the safety and structural integrity of railway tunnels are not directly or indirectly impacted by development proposed within 50 metres of the tunnel.

2.5.3 How to achieve the performance outcome

The technical considerations in Table 4 provide guidance and additional information to assist with achieving SDAP outcomes.

TABLE 4
TECHNICAL CONSIDERATIONS FOR TUNNELS

Item	Technical considerations
Tunnels	
1	Where development is over, below or within 50 metres of a tunnel, a geotechnical assessment, groundwater assessment and structural engineering assessment including design drawings and associated technical documentation, certified by an RPEQ may be required. These assessments should demonstrate how the impacts of the development are to be managed to ensure the safety and integrity of the railway during construction and ongoing operation. In particular, development should demonstrate that the tunnel will not be adversely affected by: • the development's foundation design including the type, spacing location and depth of foundation structures such as footings, bored piles and columns • building framing elements which may include the design of building columns, lift cores and other structural elements • the development's loading configuration including building foundation structures, retention systems, other building elements and excavation methods • the use of retention structures such as rock anchors, bolts, soil nails, shoring, piles, piers, beams • earthworks (in particular, excavation, filling/backfilling/compaction and retaining walls), construction works and any other works, for example, installation of services or stormwater management measures. The closest structural element of the development will need to maintain a sufficient clearance from the tunnel external wall determined by factors such as the type of works, geotechnical considerations and the nature/design of the tunnel (including its foundations and retention structures). This may require, for instance, construction work method statements, dilapidation surveys of the railway tunnel, track or infrastructure survey monitoring, vibration monitoring, and ground water monitoring to be undertaken.

2.6 DANGEROUS GOODS AND FIRE SAFETY

The content in this section supports the performance outcome (PO) and acceptable outcomes (AO) as outlined in PO5 of *18.1 Filling, excavation and structures state code* in SDAP.

2.6.1 What is the issue?

Development that produces, manages or stores dangerous goods in the vicinity of a railway has the potential to increase the risk of a fire, explosion, spill, gas emission or other dangerous goods incident affecting the safety and operational integrity of a railway.

2.6.2 What is the objective?

The objective of these provisions is to ensure that in the event of a fire, explosion, spill, gas emission or other dangerous goods incident, potential risks to public safety and the safety and operational integrity of the railway are minimised.

2.6.3 How to achieve the performance outcome

Where a development produces, manages or stores dangerous goods, it should include design and/or management measures to minimise potential risks of a fire, explosion, spill, gas emission or dangerous goods incident.

The technical considerations in Table 5 provide further guidance and additional information to assist with achieving SDAP outcomes.

Section 5.2 provides further information on dangerous goods and fire safety for development in or over a railway which require relevant railway manager approvals under s255 of the *Transport Infrastructure Act 1994*.

TABLE 5
TECHNICAL CONSIDERATIONS FOR DANGEROUS GOODS AND FIRE SAFETY

Item	Technical considerations
Dangerous goods and fire safety	
1	It is recommended that a risk assessment is undertaken to evaluate the potential for adverse impacts on the safety and operational integrity of the railway from fire, explosion, chemical spill, liquid fuel spill, gas emission or other dangerous goods incident. Potential hazards associated with this risk may include: • types and quantities of dangerous goods being managed and handled within the development • location of the development in relation to the railway line (for example if a development that houses dangerous goods is closer to a railway it may present a greater risk). A risk assessment guide is provided in Appendix 1. The risk assessment should identify the mitigation measures required to minimise the risks to the railway. Measures that may need to be incorporated in the development (design, construction, management of ongoing use) include but are not limited to: • minimising or controlling the outbreak of fire including the provision of fire protection and alarm systems • controlling smoke and/or gas release and dispersion • minimising heat build-up in structures • limiting the possibility of structural components being damaged • providing structural stability or contingency measures • providing safe emergency access and egress to and from the railway and development • ensuring effective containment and clean-up of dangerous goods incidents • providing management measures to minimise the risks of flammable liquid pool fires, the spread of fire, explosions, and secondary hazards from flammable, combustible or toxic liquids. • preventing fire arcing to OHLE.

2.7 FILLING, EXCAVATION AND GROUND DISTURBANCE

The content in this section supports the performance outcomes (PO) and acceptable outcomes (AO) as outlined in PO7 and PO9 of *18.1 Filling, excavation and structures state code* in SDAP.

2.7.1 What is the issue?

Filling, excavation and other ground disturbance works can significantly affect the safety and operational integrity of railways such as causing de-stabilisation of rail transport infrastructure. Rock anchors and soil nails can potentially disrupt the safety, structural integrity, and operation of the railway and may constrain future railway upgrades.

2.7.2 What is the objective?

The objective of these provisions is to ensure that filling, excavation and retention structures do not adversely impact on the safety, structural integrity, and operation of a railway.

2.7.3 How to achieve the performance outcome

It may be necessary to undertake surveying, groundwater and geotechnical investigations to ensure the development or works will not adversely impact on the railway environment.

At the material change of use stage of a development application, it is important that the referral material provides details of whether rock anchors, soil nails and other retention structures are required for the development. Temporary rock anchors and soil nails within a railway will require an approval from the railway manager. These rock anchors or soil nails should be temporary in the sense that they are not required to support a development beyond the period of its construction.

The technical considerations in Table 6 provide further guidance and additional information to assist with achieving SDAP outcomes.

TABLE 6

TECHNICAL CONSIDERATIONS FOR FILLING, EXCAVATION AND GROUND DISTURBANCE

Item	Technical considerations
Filling and excavation	
1	An earthworks plan certified by a Registered Professional Engineer of Queensland (RPEQ) and including cross sections, elevations, and any required supporting technical details, should address the following: • the location and extent of proposed excavation and filling (earthworks), including likely volumes of cut and fill adjacent to the railway • the maximum depth of any excavation and maximum height of any proposed filling and the gradient and height of any proposed batters adjacent to the railway • the maximum height and intended form/design of any proposed retaining walls or structures adjacent to the railway • where proposed excavation, filling/backfilling or retaining walls will be greater than 1m in depth or height abutting the railway, RPEQ certified drawings should be provided demonstrating that the works will not de-stabilise rail transport infrastructure or the land supporting this infrastructure • demonstrate that any retaining structures, excavation, and filling/backfilling will be located outside the railway • provide design assumptions. Scaled cross sections and elevations should clearly show the interface with the railway, including the rail transport infrastructure, as a result of the proposed earthworks. The difference between existing site levels and finished/design levels should be clearly shown.
Retention systems associated with excavation	

Item	Technical considerations
2	RPEQ certified drawings and supporting information should address the following in relation to the proposed development's interface with the railway: • confirm whether shoring walls, rock anchors and/or soil nails will be used to construct the development, for example, to retain basement excavations, and whether these will be temporary or permanent • provide preliminary plans, sections and details showing the design, location, length, depth and angle of insertion of any proposed rock anchors and/or soil nails • ensure rock anchors and/or soil nails that are intended to remain in place after construction are de-stressed and released • slope stability of rail corridor land is to show a factor of safety of: – greater than 2.0 for temporary rock anchor treatments – greater than 2.5 for the permanent case, when the temporary rock anchors are de-stressed • demonstrate that the excavation and construction method for any proposed rock anchors and/or soil nails will not compromise the railway, such as through de-stabilising the land, vibration or disturbing groundwater.
Lateral Loads and Surcharge Loads	
3	A RPEQ certified geotechnical investigation and RPEQ certified structural engineering drawings, including cross sections/elevations and any required supporting technical details, will be required to demonstrate that retaining structures do not adversely impact on the railway through the addition or removal of lateral loads or additional surcharge load. Surcharge load refers to (vertical) applied pressure behind the retaining wall, arising from construction. Surcharge can be resulting from, but not limited to: construction traffic and material loads (for example, stockpiling); railway loads; and road traffic loads arising from construction works. Lateral load refers to (horizontal) pressure or force which can result from any horizontal pressure load on a retaining structure, for example, earth pressure or surcharge load.

2.8 STORMWATER AND DRAINAGE

The content in this section supports the performance outcomes (PO) and acceptable outcomes (AO) as outlined in PO1, PO2 and PO3 of *18.2 Stormwater and drainage impacts on state transport infrastructure state code* in SDAP.

2.8.1 What is the issue?

The stormwater and drainage impacts associated with development in a railway environment have the potential to adversely impact the safety, structural integrity, and operation of a railway.

Changes to the existing drainage and stormwater characteristics of a site as a result of new development may lead to worsening impacts which adversely affect railways.

2.8.2 What is the objective?

The objective of these provisions is to ensure that any stormwater and drainage impacts of development are managed to ensure no worsening or actionable nuisance to the railway.

2.8.3 How to achieve the performance outcome

The technical considerations in Table 7 provide guidance and additional information to assist with achieving SDAP outcomes.

Further advice on stormwater and drainage requirements is found in the TMR *State Development Assessment Provisions Supporting Information: Stormwater and Drainage Impacts* available on the TMR website.

TABLE 7

TECHNICAL CONSIDERATIONS FOR STORMWATER AND DRAINAGE

Item	Technical considerations
All applications	
1	Applicants are encouraged to provide basic stormwater information (including a suitable scaled drawing) showing the following: • existing site topography / levels. Contour information can be sourced from the relevant local government or prepared by a registered surveyor • proposed finished levels for the proposed development • information verifying whether the site is flood prone. Flood searches and mapping can often be obtained from the relevant local government • existing drainage infrastructure on the development site and in the immediate surrounding area. For example, culverts or kerb and channel in surrounding roads. This should include the location of all natural and constructed drainage features, such as pits, culverts, open channels, drains, detention or retention basins as well as, gullies, wetlands, waterways, and the like • proposed drainage infrastructure to be provided by the development. This will include any devices such as pipes, downpipes, pits, detention basins, tanks and drains that are proposed to be used to manage stormwater and connect it to the proposed point of discharge. The location where stormwater is proposed to be discharged should be clearly identified • proposed increase in impervious area of the site as a result of the development. This will include the location and extent of any proposed hardstand or sealed surfaces.
Stormwater management plans	
2	Stormwater management plans should be certified by a Registered Professional Engineer of Queensland (RPEQ) and prepared in accordance with SDAP and with consideration given to the Queensland Urban Drainage Manual. Where a site is flood prone, the stormwater management plan should include a flood impact assessment incorporating appropriate hydraulic and hydrological analysis demonstrating: • design flood peak discharges for the site and surrounding area which exist prior to the development for all flood and stormwater events up to a 1% Annual Exceedance Probability (AEP) (equivalent to 1/100 year Average Recurrence Interval (ARI)). This should include at least the following flood and stormwater events: 50%, 20%, 10%, 5%, 2% and 1% AEP (equivalent to 2, 5, 10, 20, 50 and 100 year ARI events) • design flood peak discharges for the site and surrounding area after the development has occurred for all flood and stormwater events up to a 1% Annual Exceedance Probability (AEP) (equivalent to 1/100 year Average Recurrence Interval (ARI)). This should include at least the following flood and stormwater events: 50%, 20%, 10%, 5%, 2% and 1% AEP (equivalent to 2, 5, 10, 20, 50 and 100 year Average Recurrence Interval (ARI) events).

Item	Technical considerations
	The stormwater management plan should include details of the mitigation measures proposed to address any potential stormwater impacts (including flooding impacts) of the proposed development. In particular, a stormwater management plan should ensure the following are achieved, where applicable: • all relevant legal points of discharge for the development site are identified • the impact of existing or proposed noise barriers on overland flow paths is taken into consideration • overland flow paths are identified and hydraulic conveyance is maintained on the site as part of the proposed development • flood storage capacity and hydraulic conveyance is maintained on the site as part of the proposed development • adverse impacts from sheet flow on the railway are prevented • retaining structures, filling and excavation, landscaping, construction activities or any other works to the land have been designed to include provision for drainage so as not to adversely impact on the railway • the proposed development does not impede or interfere with any drainage, stormwater or floodwater flows from the railway • stormwater or floodwater flows have been designed to maintain the structural integrity of the railway • existing stormwater drainage infrastructure on the railway is not interfered with or damaged by the proposed development such as through concentrated flows, surcharging, scour or deposition • the quality of stormwater discharging onto the railway is not reduced through erosion and sedimentation.

3. Other technical considerations

The content in this section provides information about additional considerations for development in a railway environment. These issues may be addressed in a development proposal at the proponent's discretion and are not required to achieve compliance with the SDAP.

3.1 PREVENTING UNAUTHORISED ACCESS

In addition to the considerations outlined in section 2.4, a development may also incorporate other measures to prevent unauthorised access to a railway from private areas of a development, for example private residential balconies.

The technical considerations in Table 8 provide further guidance and additional information in this regard.

TABLE 8

TECHNICAL CONSIDERATIONS FOR PREVENTING UNAUTHORISED ACCESS

Item	Technical considerations
Throw protection	
1	Throw protection measures should be considered where opening windows, doors, balconies or other areas afford the opportunity for objects to be thrown onto a railway. The following factors may influence the need for throw protection: • location and position of private open space in relation to the railway, for example balconies, decks and terraces • presence of physical barriers, such as boundary and courtyard fencing, which may provide protection for certain building levels, depending on the height of the barrier, topography of the area and finished development levels • use of rooms with which windows are associated, for example, bathroom and bedroom windows in contrast with living room windows • height (number of storeys) of the development and the number of windows and balconies facing the railway, for example, a house versus a medium to high rise apartment building • design of windows and balconies in relation to the railway, for example, the use of awning windows, security screens, louvres and transparent (glass) balcony screens and podium barriers that provide throw protection • proximity to train stations • existence and setback of OHLE from the railway.
2	As an alternative to throw protection screens, appropriate solutions to address throw protection include: • positioning balconies, terraces and unscreened windows away from the railway where possible • providing boundary fencing and barriers for private and open space.

3.2 COLLISION PROTECTION

An incident involving a derailed train could result in death or injury to people as well as significant damage to property and the railway. Development such as high rise buildings or buildings in close proximity to a railway station may need to be designed to ensure the structural integrity of the development is maintained in the event of an impact from a derailed train.

Collision protection walls and designing for structural redundancy may need to be provided in a proposed development in order to mitigate potential risks.

The technical considerations in Table 9 provide further guidance and additional information in this regard.

Section 5.3 provides further information on collision protection for development in or over a railway which requires relevant railway manager approvals under s255 of the *Transport Infrastructure Act 1994*.

TABLE 9
TECHNICAL CONSIDERATIONS FOR COLLISION PROTECTION

Item	Technical considerations
Collision protection	
1	In accordance with the clearances stated in *AS 5100 Bridge design*, if supporting structural elements are located within 10m of the rail centreline, the new structure should be designed for collision loads in accordance with *AS 5100*, or the rail manager's standards, whichever is the most stringent. or In accordance with the clearances stated in *AS 5100*, if supporting structural elements are located between 10m and 20m from the rail centreline, a risk assessment (refer to Appendix 1) should be undertaken considering all matters relating to the standard of collision protection required for the proposed development.
2	A proposed development may demonstrate as part of a risk assessment that any risks relating to train derailments and associated structural collisions have been mitigated. The level of risk may be influenced by factors such as: • location and position of the development in relation to the railway (distance from the closest railway track) • the height and scale of the development and its ability to fall onto a railway in the event of a collision • lack of physical barriers between a structure and railway line to prevent train derailment collision impacts • potential for a derailed train to fall onto infrastructure below (for example from a railway bridge or embankment) • geometry and formation of the railway • nature, frequency and speed of trains using the railway. A risk assessment guide is provided in Appendix 1.

Part C

Access and works within a railway corridor

Part C: Purpose

The purpose of Part C is to provide information in relation to railway managers' requirements when accessing railway land, designing structures on railway land or undertaking works in a railway corridor.

Under section 255 of the *Transport Infrastructure Act 1994*, the railway manager's written approval is required to carry out works in or on a railway corridor or otherwise interfere with the railway or its operations.

Where development adjacent to a railway also proposes development in or on a railway corridor, the railway manager's approval will be required for the works to be undertaken within the railway corridor.

Requirements in Part B: Development adjacent to a railway of this guide may also have relevance for works or activities within the railway corridor.

This part provides guidance only. The appropriate procedures and processes should be confirmed with relevant railway managers prior to undertaking the proposed works.

4. Access to railway land

As part of a development proposal, access may be sought to railway land, including airspace.

This section explains the parties, processes and requirements involved in obtaining temporary or permanent access to railway land.

4.1 RAILWAY LAND OWNERSHIP

The Department of Transport and Main Roads (TMR) holds the perpetual lease over railway land on behalf of the state government. As such, TMR is the 'owner' of the railway land, and other railway managers sublease railway land from TMR.

4.2 SALE OF CORRIDOR LAND, INCLUDING AIRSPACE

TMR can arrange freehold title for parts of the corridor, including the airspace, for the purposes of facilitating development.

The development of railway airspace in an operating railway environment requires certain design requirements to be met and necessary agreements to be in place to protect the railway, and enable airspace sale. For example, it may involve a development agreement, a contract of sale, a development lease and either a building management statement or a suite of easements. In some cases, short-term occupation of the corridor can be dealt with by way of a licence.

Transfer of title does not usually take place until the development is completed and the envelope of the building is accurately defined by survey. A long term leasehold arrangement may be more appropriate than a freehold arrangement, particularly where a plan for a future corridor may affect the site.

4.3 PRIVATE TREATY DEALINGS

Private treaty dealings (priority disposals under the Government Land Asset Management system) are rare and the disposal or sale of most government owned sites will be by way of a tender process. Owning or having an option to purchase land adjacent to a railway corridor will not necessarily be regarded as sufficient basis for a priority disposal.

4.4 APPROVAL FOR WORKS ON OR IN THE RAILWAY CORRIDOR

Certain works in the railway corridor are deemed to be exempt under schedule 4 of the *Sustainable Planning Regulation 2009*. These works generally involve rail transport and other rail infrastructure, including stations. In these cases, where railway infrastructure works are proposed as part of a development, TMR will advise the works that are exempt under the Sustainable Planning Regulation and therefore will not form part of the development application.

4.5 OWNER'S CONSENT

For development applications involving rail corridor land and non-rail corridor land, the applicant is required under section 263 of the *Sustainable Planning Act 2009* to obtain owner's consent from TMR. TMR is responsible for providing owner's consent for development applications involving rail corridor land and non-rail corridor land under section 247 of the *Transport Infrastructure Act 1994*.

The safety and operational integrity of the railway is the key issue assessed by TMR when deciding to provide owners' consent. To determine if a development will impact on rail corridor land, non-rail corridor land or associated rail transport infrastructure, TMR will seek input from relevant stakeholders, including the railway manager, local government, and other government departments.

Further information on the requirements for obtaining owner's consent can be found on TMR's website.

4.6 BUILDING MANAGEMENT STATEMENT

If the proposed development involves both private land and railway land in an integrated development, and involves shared access and services, a building management statement (BMS) may be required in accordance with Section 294D of the *Land Act 1994*. The state government and the railway manager will both be a party to the BMS.

The BMS may include certain development requirements to maintain light and ventilation to the railway.

4.7 ENCROACHMENT INTO THE RAILWAY CORRIDOR

A relevant railway manager may approve a temporary encroachment into the railway corridor by way of a licence. The licence will cover such matters as the conditions of use, security of the corridor, supervision (for railway safety purposes) and insurances or indemnities.

A permanent encroachment into the railway corridor will be subject to a negotiated commercial agreement between the applicant, the railway manager and the state government. This may involve a volumetric lease or excision / boundary realignment.

4.8 EASEMENTS

A permanent easement will generally not be granted over the railway corridor so as to preserve the ability to upgrade or relocate infrastructure in the corridor at any time.

Where provision needs to be made for a utility service, the preferred means of granting a right of occupation is by way of a licence or wayleave. A wayleave will usually allow the service to be altered or removed, at the grantee's expense, in the event that this is necessary to enable the railway infrastructure to be maintained or upgraded.

The state government may require an easement through a development to protect and preserve public access to a railway station.

4.9 INDEMNITIES, INSURANCES AND SECURITIES

If a proposed development integrates with the railway corridor, the current and subsequent owners will be required to:

- have adequate insurance cover
- indemnify the railway manager and TMR against any claims arising from events occurring during the life of the development.

Security may also need to be provided to cover such costs as the expense of rectification works required to maintain the operational efficiency of railway operations in light of the development.

4.10 NATIVE TITLE

Before entering into negotiations with a private party, a development applicant will need to undertake an assessment to determine if there is a need to address native title matters in relation to the railway corridor land.

4.11 COMMERCIAL DEALINGS PROCESS

The process for obtaining access to railway corridor land can occur in parallel with the consideration of the related development application. The processes by which access is secured to the railway corridor land will be coordinated by TMR, including negotiation of access arrangements, the necessary approvals and any associated development or infrastructure agreements.

A plan will need to be provided to TMR showing the nature and extent of the proposed encroachment onto or over the railway corridor. If a proposed development necessitates a station upgrade, TMR will establish an agreement to concurrently undertake concept design for the development and the station upgrade.

4.12 TEMPORARY ACCESS

Temporary access during construction will generally be subject to the same design requirements as permanent access (apart from durability), where these are designed for use by railway manager staff and the public. Temporary access for the construction of the development may encroach on the railway corridor, subject to conditions agreed with the railway manager. Co-use of railway manager's access roads may be acceptable. The railway manager may permit temporary crossings of the railway tracks under their control and supervision, if the safety, risk and operational impacts are acceptable.

5. Design of structures on railway land

This section provides technical advice regarding the design of structures proposed in or over a railway corridor. The railway manager's approval is required for all development in or on the railway corridor.

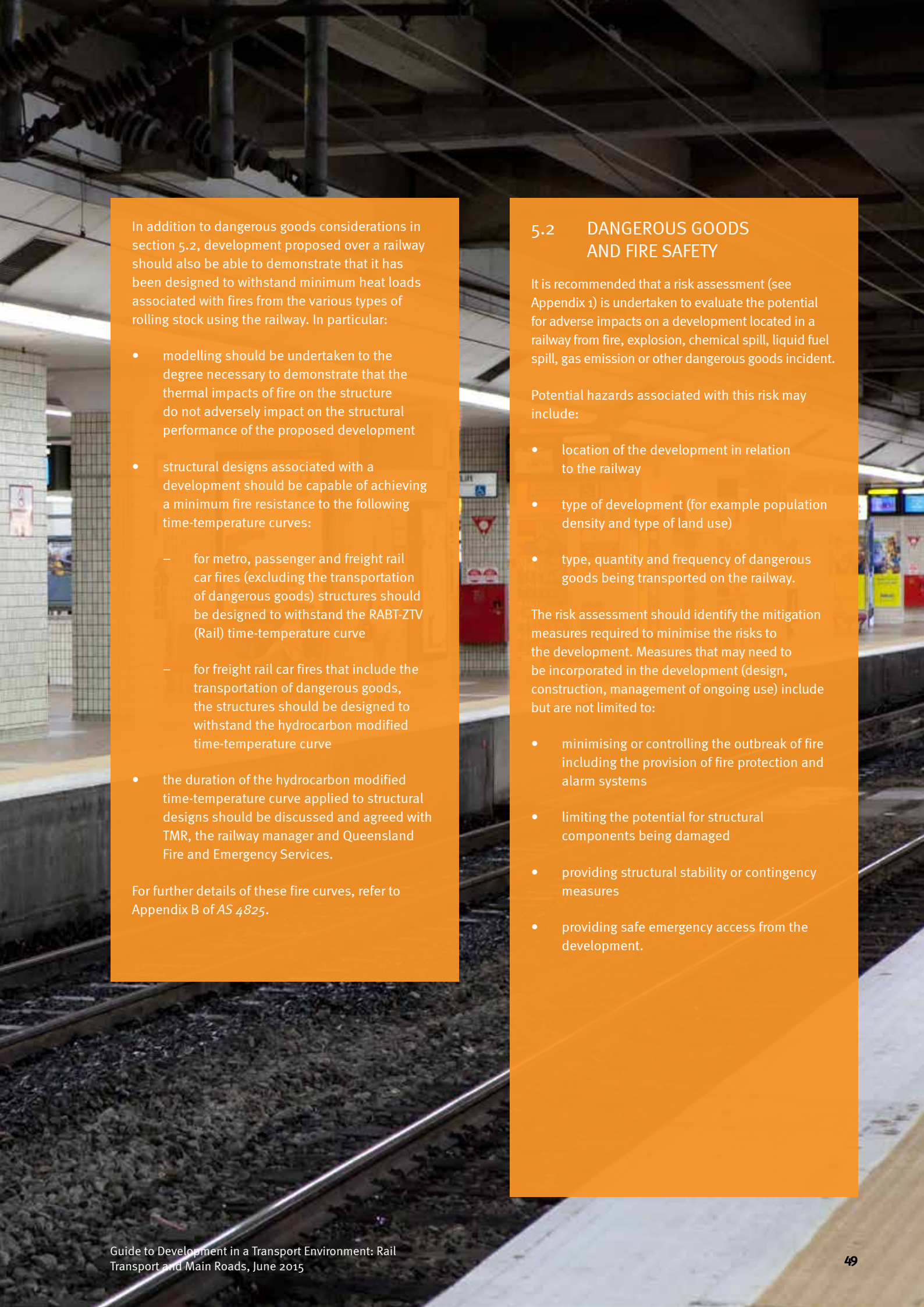
5.1 DEVELOPMENT OVER A RAILWAY

A development proposed to be over or enclosing a railway will need to consider a number of design considerations in consultation with the railway manager.

Development should be designed to allow access to natural light and ventilation in the corridor. This is especially important where a development is located above a railway station.

Ventilation design is intended to maintain railway operations during a fire emergency, by controlling smoke and allowing emergency response teams to enter safely with appropriate firefighting and protective equipment. For development over a railway, it is recommended that applicants:

- discuss and agree with the railway manager and Queensland Fire and Emergency Services on fire scenarios used as an input into the development of ventilation design
- ensure discharge points for ventilation shafts are designed and located in a position where escaping toxic plumes will not enter air-conditioning intake ducts or affect nearby sensitive uses such as residential, education and medical uses
- ensure air-conditioning intakes, where located above or in the vicinity of ventilation vents, are fitted with smoke detectors which automatically shut down air-conditioning fans and dampers.



In addition to dangerous goods considerations in section 5.2, development proposed over a railway should also be able to demonstrate that it has been designed to withstand minimum heat loads associated with fires from the various types of rolling stock using the railway. In particular:

- modelling should be undertaken to the degree necessary to demonstrate that the thermal impacts of fire on the structure do not adversely impact on the structural performance of the proposed development
- structural designs associated with a development should be capable of achieving a minimum fire resistance to the following time-temperature curves:
  - for metro, passenger and freight rail car fires (excluding the transportation of dangerous goods) structures should be designed to withstand the RABT-ZTV (Rail) time-temperature curve
  - for freight rail car fires that include the transportation of dangerous goods, the structures should be designed to withstand the hydrocarbon modified time-temperature curve
- the duration of the hydrocarbon modified time-temperature curve applied to structural designs should be discussed and agreed with TMR, the railway manager and Queensland Fire and Emergency Services.

For further details of these fire curves, refer to Appendix B of *AS 4825*.

5.2 DANGEROUS GOODS AND FIRE SAFETY

It is recommended that a risk assessment (see Appendix 1) is undertaken to evaluate the potential for adverse impacts on a development located in a railway from fire, explosion, chemical spill, liquid fuel spill, gas emission or other dangerous goods incident.

Potential hazards associated with this risk may include:

- location of the development in relation to the railway
- type of development (for example population density and type of land use)
- type, quantity and frequency of dangerous goods being transported on the railway.

The risk assessment should identify the mitigation measures required to minimise the risks to the development. Measures that may need to be incorporated in the development (design, construction, management of ongoing use) include but are not limited to:

- minimising or controlling the outbreak of fire including the provision of fire protection and alarm systems
- limiting the potential for structural components being damaged
- providing structural stability or contingency measures
- providing safe emergency access from the development.

5.3 COLLISION PROTECTION

Any structure located in a railway should be designed and constructed to withstand damage from a derailed train. Deflection walls and structural redundancy may need to be provided in a proposed development. Such measures should also be considered in situations where a development is located at the base of a railway embankment or has a basement that could be impacted by a derailed train.

Unless approved otherwise by the railway manager, all new development over the railway should utilise clear spans with no piers or supporting elements located in the railway corridor.

In accordance with the clearance stated in *AS 5100* Bridge design, if supporting structural elements are located within 10 metres of the rail centreline, the new structure should be designed for collision loads in accordance with *AS 5100*, or the rail manager's standards, whichever is the most stringent.

If supporting elements are located between 10 and 20 metres from the rail centreline, a risk assessment (refer to Appendix 1) should be undertaken considering all matters relating to the standard of collision protection required for the proposed development.

Where the proposed development involves existing piers and columns that do not meet the collision protection and collision load requirements specified in *AS 5100*, deflection walls should be provided. Where space permits, independent deflection walls should be provided.

Collision loads in *AS 5100* Bridge design do not cover the impact of explosions in the enclosed spaces underneath a development. Accordingly, the railway manager may require additional design measures be incorporated to protect against explosions beneath the development, including:

- selective location of supporting elements to avoid domino effects
- spacing of supporting elements of sufficient number to provide strength while still providing ventilation
- use of structural walls instead of columns where appropriate.

A structural redundancy analysis should be undertaken, and certified by an RPEQ, to verify the capacity to support the deck load at the ultimate limit state with one or more of the supporting columns removed.

An engineering report should be prepared by a RPEQ confirming that development can be classified as an 'importance level 2 structure' for the purposes of *AS 1170.4 Structural design actions: Part 4 Earthquake actions in Australia* and in accordance with *AS 5100* (noting that the lateral restraint force in *AS 5100.2 Cl. 9* is not applicable to footbridges), and with railway managers' technical requirements (for example, QR Technical Requirement CIVIL-SR-12 Collision protection of supporting elements adjacent to railways).

5.4 INTERFACE WITH STATIONS

Good practice urban design principles must be applied in the layout of the proposed development to promote seamless connectivity from the street to the station, from the proposed development to the station and between various transport modes.

Directional signage from the street to the station must meet TMR and railway manager requirements, with travel paths avoiding narrow choke points and complex or convoluted routes. Consideration must be given to egress in the event of emergencies or power failures.

Where a proposed development is over or adjoining a station, compliance with the *Disability Discrimination Act 1992* (DDA) is required to enable equitable access. Information about DDA compliance can be located at:

www.comlaw.gov.au/ComLaw/Legislation/Act1.nsf/asmade/bytitle/53071E1E3AC70505CA256F720017DABE?OpenDocument

Where a proposed development is in or over a station, crime prevention through environmental design (CPTED) principles should be incorporated in the proposed development. Information about CPTED can be located at: **http://www.police.qld.gov.au/programs/cscp/safetypublic/**

In addition, railway managers may also be able to provide CPTED design advice.

5.5 NEW OR ALTERED ASSETS

On completion, any new or altered assets must be transferred with full documentation to the state government or railway manager. This includes 'as built' drawings, specifications, manuals, quality assurance documentation and warranties.

6. Works in the railway corridor

This section provides technical advice on operational restrictions and construction requirements for development in or on a railway corridor. In accordance with section 255 of the *Transport Infrastructure Act 1994*, the railway manager's approval is required for works in or on the railway corridor.

The safety of railway operations and workplace health and safety in the railway corridor are paramount. Railway managers have safety policies, which extend to all works undertaken by third parties in the railway corridor. It is recommended that the development proponent liaise with the railway manager to ascertain construction requirements.

Approval to interrupt rail services and occupy track areas is limited and only permitted with written approval from the railway manager. A proposed development needs to take account of the practicalities of accessing the railway corridor and any potential interruptions to railway services.

A construction methodology should be devised that is appropriate to the available construction windows as part of the design process. Sufficient equipment and labour must be available to respond effectively to contingencies. It is strongly recommended that the construction methodology is planned collaboratively with the railway manager to avoid rework due to safety issues.

6.1 RAILWAY MANAGER STANDARDS

The railway manager has standards which need to be considered when undertaking works in the railway environment. It is recommended that the development applicant check with the railway manager to determine the relevant standards applicable to the development.

6.2 CONTAMINATED SOILS IN THE RAILWAY CORRIDOR

All soils in the railway corridor are deemed to be contaminated unless proven otherwise by sample testing. If excavation is being undertaken in or below the corridor, the applicant is responsible for testing the soils and treating or disposing of them using a method acceptable to the Department of Environment and Heritage Protection (DEHP), at the applicant's cost.

6.3 SAFETY

The railway manager has a legal duty of care to advise on, and approve, specific safety issues in the railway environment. Any breaches of safety requirements may result in severe penalties, including large fines and custodial sentences.

Access to the railway corridor is only permitted with the express permission in writing from the railway manager. All access to the railway corridor is undertaken with the railway manager's supervision, and at the applicant's expense.

Approval for work within the railway corridor, under section 255 of the *Transport Infrastructure Act*, will require:

- submission of a safety management plan
- submission of work method statements as part of the application under section 255 of the *Transport Infrastructure Act* (outlined in section 6.17)
- supervision as agreed with the railway manager, including the use of specialist railway manager safety personnel, such as protection officers, lookouts and electrical supervisory staff
- appropriate insurances and indemnities in favour of the railway manager
- the applicant meeting all reasonable costs incurred by the railway manager in managing safety issues

- maintenance of the security of the railway corridor to the required standard
- a quality assurance system and a quality plan approved by the railway manager
- a dilapidation survey of any railway manager infrastructure before construction commences.

The safety of the public is to be maintained at all times during construction. Any temporary arrangements, such as temporary access, must meet the railway manager's safety and operational requirements. The railway manager requires all personnel intending to work within the railway corridor to complete safety training. Some railway managers are aligned with the Rail Industry Worker program. Completion of this course is evidenced by a Railway Industry Worker (RIW) card and the competencies specific to the card owner, which must be provided upon request when working in the railway corridor.

Queensland Rail also require workers to complete the Safely Access the Railway Corridor (SARC) training, and be able to produce upon request a SARC qualification card showing competencies specific to the card owner.

6.4 SAFETY IN DESIGN

A risk assessment review (which incorporates a safe design and risk management approach) should be undertaken to examine the works to ensure 'as far as reasonably practicable' that the works are designed to be without risks to the health and safety of persons who:

- construct the works
- operate and maintain the works
- use the railway infrastructure including adjoining development
- demolish the works.

This is a legislative requirement in accordance with:

- *Work Health and Safety Act 2011*
- *Safe design of structures code of practice 2013*

A risk assessment guide is provided in Appendix 1.

6.5 EMERGENCY MANAGEMENT PLAN

For a development within the railway corridor, the applicant may also be required to submit an emergency management plan to detail how any emergency will be managed. The emergency management plan should include details of:

- fire detection and alarm systems that can operate independently of a buildings main power supply in the event of a power outage
- fire sprinklers and liquids to be used with the sprinklers (water may not be appropriate on dangerous goods railway lines that are known to carry materials/chemicals that combust when in contact with water)
- evacuation plans for the development in the event of an incident (fire and/or explosion) within the development or the railway
- emergency exits for the railway (where development encloses the railway creating a tunnel) suitable for the mass evacuation of passenger trains in the event of an incident (fire and/or explosion) caused by a train derailment or dangerous goods emergency
- location of emergency access points into the railway when emergency services may be required to attend to a situation within the railway either under or abutting the development.

6.6 ENVIRONMENTAL MANAGEMENT PLAN

During the construction phase, the applicant is to submit an environmental management plan and comply with all statutory requirements, including:

- preservation and rehabilitation of the environment
- control of noise and vibration
- control of air pollution
- waste disposal
- waterways
- vegetation removal
- contaminated land.

A safe and user-friendly environment must also be maintained for railway manager staff and customers.

6.7 PRINCIPAL CONTRACTOR

The contractor for the development construction must be the principal contractor for the development site. While the railway manager's workforce may be engaged on associated works on the site, the responsibility for workplace health and safety issues will remain with the principal contractor.

The railway manager may appoint the same building contractor, or another building contractor or principal contractor, in relation to any works being carried out on the railway corridor that is not part of the site.

6.8 APPOINTMENT OF TRACK PROTECTION OFFICERS AND SITE PROTECTION SUPERVISOR

Where work is being carried out in, over, below or adjacent to the operating railway, it should be under the direction of a track protection officer to ensure the safety of the operating railway. The railway manager may appoint the track protection officer or direct the applicant to appoint one. Track protection officers will be entitled to stop or direct the movement of construction workers and the location of plant and equipment in accordance with the safe working procedures.

Where the railway manager considers it necessary to coordinate the activities of several track protection officers appointed in connection with the work, the railway manager will appoint a site protection supervisor.

A requirement for track protection officers should be raised with the railway manager as early as possible. The costs of the protection officers and supervisor should be factored into construction costs.

6.9 CONTRACTOR'S SAFETY LIAISON REPRESENTATIVE

Depending on the railway manager's specific requirements, a contractor's safety liaison representative may need to be appointed with responsibility for:

- safety of the contractor's employees, plant and equipment during the execution of work in the railway corridor
- coordinating and programming the contractor's work in the corridor
- receiving directions from the railway manager's superintendent, the site protection supervisor or protection officers on matters relating to the safety of the operating railway
- ensuring that all plant and equipment is operated and all employees of the contractor act in accordance with such directions.

If required, the safety liaison representative is to be present on site at all times while works are being undertaken on railway property. If the safety liaison representative leaves the site at any time while works are being undertaken, a competent relief representative must be appointed.

6.10 TWENTY FIVE KILOVOLT (KV) ENVIRONMENT

Electrified railway infrastructure has overhead power systems and related cabling and cable support structures. Poles, masts, signals and substations all have power cabling associated with them. Safety issues associated with these electrical systems include risks of electrical arcing and electrocution.

Although the equipment is nominally energised to 25 kV, some items of equipment, such as transformers and feeder wires, may operate at much higher voltages.

Where construction is able to proceed without the OHLE being de-energised, metal items near the railway may have induced voltages that could give rise to electric shocks. Temporary or permanent earthing and bonding of elements may be necessary for safety both during construction and when in service.

Railway managers have standards for working near OHLE which must be complied with. The applicant should confirm the applicable standards with the railway manager.

An applicant is responsible for seeking advice from the railway manager or another competent electrical engineer. Early consultation with the railway manager's electrical engineers is essential.

6.11 WORK ADJACENT TO OVERHEAD LINE EQUIPMENT (OHLE)

Works associated with the proposed development may require construction activity within a defined exclusion zone of the 25 kV alternating current OHLE.

The railway manager is an electrical entity under the *Electrical Safety Act 2002* and must be contacted before any work around the OHLE commences. Any instructions given by the railway manager on how to perform the work around the OHLE must be complied with in full.

The railway manager may undertake all work on the OHLE required to facilitate the development, and will charge the costs to the applicant.

As none of the components of the OHLE have protective covering, they are potentially dangerous, and people must not encroach the defined exclusion zone either directly or indirectly with any item of material or equipment.

All OHLE must always be regarded as energised with 25 kVs of electricity unless an isolation has been carried out and a permit to work has been issued to the railway manager trained authorised person.

6.12 ELECTRO-MAGNETIC INTERFERENCE AND ELECTRO-MAGNETIC CONDUCTION

Electro-magnetic interference (EMI) and electro-magnetic conduction (EMC) can obstruct or interfere with OHLE and railway infrastructure.

Development in a railway corridor should ensure that EMI and EMC impacts do not adversely impact on railway infrastructure, rolling stock and public utility plants.

6.13 CLOSURES AND ISOLATIONS

If the railway manager is not satisfied that work near the OHLE can be safely performed, arrangements will be made to isolate the OHLE. Railway managers have access protocols which must be followed and are available upon request.

The railway manager does not permit anyone to walk or work within 3 metres of any operational track without special approval and controls and procedures being in place to ensure safety and avoid disruption of railway operations. Where work is required within the 3 metres, a track possession or line closure will be required.

As closures and isolations interfere with normal railway operations, they must be kept to a minimum. Generally, the railway manager maintains a rolling program of isolations and closures and the requirements of the proposed development will need to be incorporated into this program.

The risk of cancellation due to inclement weather means that contingency periods for closures and isolations should also be booked.

The applicant will incur the costs of closures, isolations and cancellations. There may be additional associated costs for bussing passengers, arranging for diesel haulage of freight trains or sending freight by road.

Detailed planning and efficient use of construction windows is vital, as a late finish to work will cause closures and isolations to over-run and may attract penalties.

6.14 EMERGENCY PROVISIONS

The applicant's safety management plan must align and comply with the rail manager's operational safety plans for any event that occurs in the railway corridor. This includes, but is not restricted to, notification of incidents, command and control of the incident site, and restoration of services.

As part of the development agreement or other agreement, in the event of an emergency the railway manager may need to resume services, regardless of any pre-arrangements. If this occurs, the applicant will be required to take all necessary steps to facilitate the restoration of services without any cost to the railway manager.

6.15 DELAYS TO TRAINS

Various railway operators have contractual obligations to meet in the transport of passengers, freight, livestock and minerals. Consequently, any unscheduled delays to trains, which are attributed to the proposed development, will result in penalties.

6.16 LIFTING / CRANE OPERATIONS OVER RAILWAY LINES

The railway manager will not permit lifting / crane operations over operational tracks or live OHLE without closures or the erection of protective structures in the corridor that will withstand the impact of a failure in lifting operations, without affecting the railway corridor.

Approval may be provided by the railway manager for the weather vaning of cranes over the corridor in some circumstances.

6.17 CONSTRUCTION MANAGEMENT PLAN AND WORK METHOD STATEMENTS

For construction over railway tracks, the contractor must provide a construction management plan detailing the construction procedure and interfaces with railway operations. For each package of work within the railway corridor, a detailed work method statement must be prepared and submitted to the railway manager for review. These will include detailed methodologies for excavations, installation of retaining systems, erection of supporting elements near the track, construction over the tracks and OHLE, and construction access around the railway, including hoardings, gantries and barriers to ensure public safety.

A program for construction of the development, with details of major track possessions and any required OHLE isolations, must be submitted with the construction management plan.

Construction must not commence until the railway manager has approved the construction management plan and individual work method statements, under section 255 of the *Transport Infrastructure Act*.

6.18 TRACK MONITORING

In circumstances where works for a development might affect track alignment, the railway manager will require monitoring of the track alignment to ensure rectification action is undertaken when movement is detected in order to avoid the alignment becoming unsafe. The monitoring may be required to be 'real time' remote telemetric monitoring, with independent access for railway manager staff.

6.19 RAILWAY OPERATIONAL ISSUES

The construction process must also consider railway operational issues such as signal sighting requirements. Train drivers' sighting of signals depends on factors such as train speed and track curvatures. Permanent structures (for example, columns) and temporary structures (for example, fences and scaffolding) must not obstruct the sighting of signals.

6.20 PRACTICAL COMPLETION

Railway managers address practical completion differently and the specific process should be confirmed by the applicant.

During construction and on practical completion of the proposed development, the railway manager or delegated representative such as an independent verifier will inspect any works that interface with the railway and issue a list of defects that affect their assets or may affect the operation of the transport facilities. Rectification should be immediate if the defect has the potential to affect the management, operation, maintenance or safety of the transport facilities. Otherwise, the period for rectification should be agreed by all parties. Depending on the urgency, the railway manager may elect to carry out the rectification and charge the costs to the applicant.

Part D

Supporting Information

Appendix 1: Development risk assessment guide

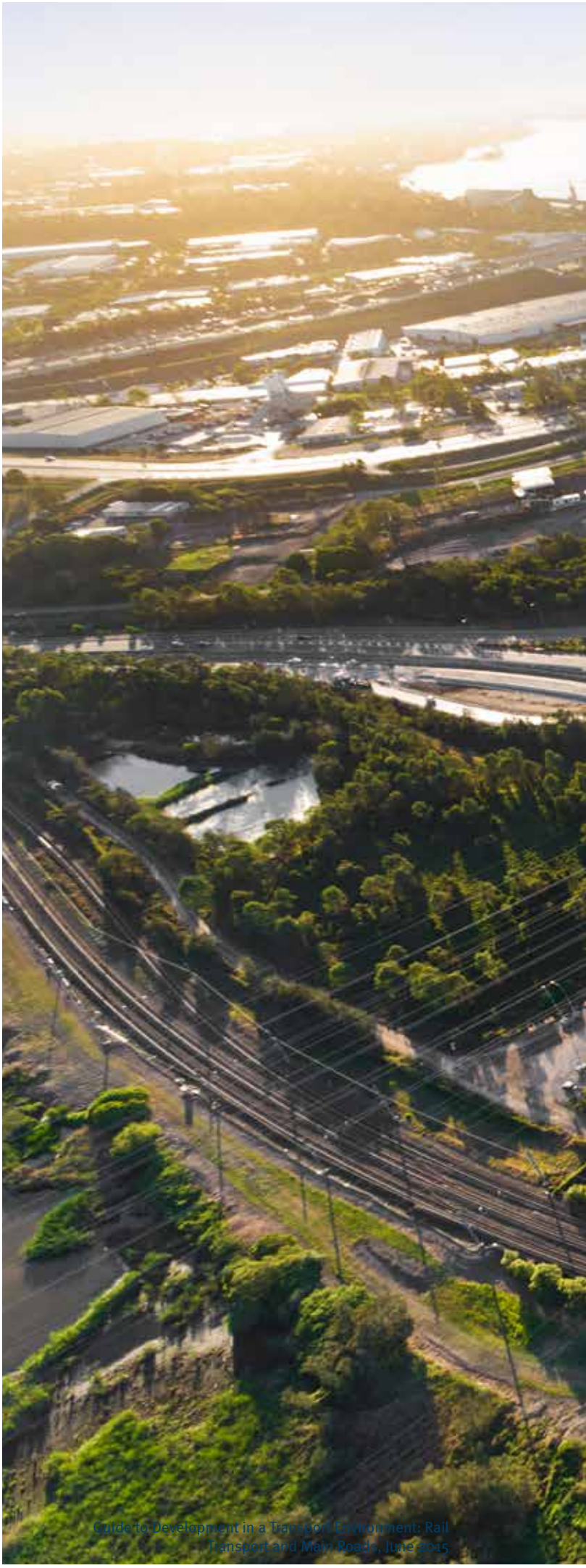
INTRODUCTION

Railway environment background

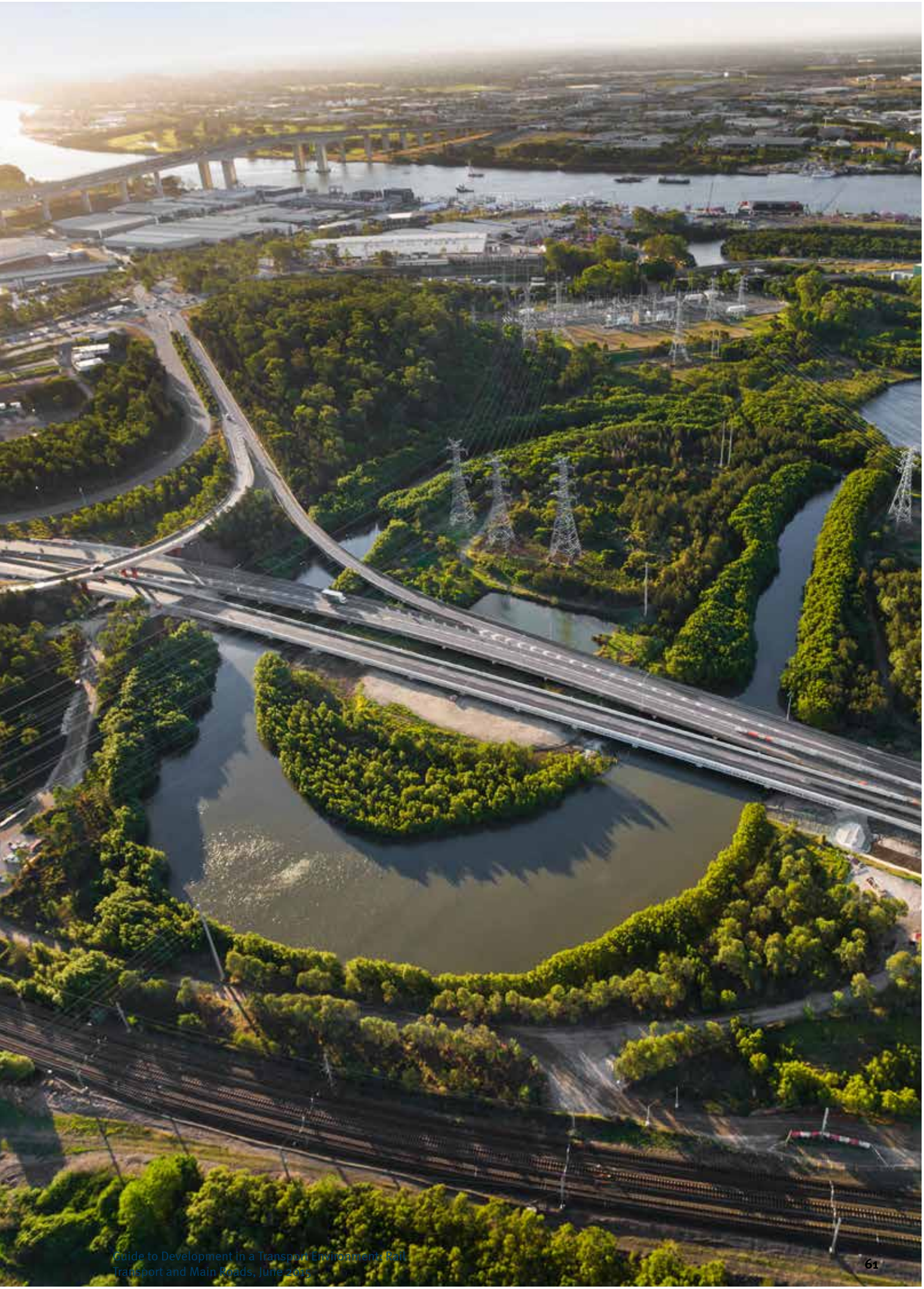
The railway environment is a challenging setting for development. The railway operation can impose hazards or risks on development such as impacts from a train derailment, potential amenity impacts, including noise, as well as risks associated with the transport of dangerous goods along the railway. Conversely, development can pose hazards or risks to the railway operation by interfering with the railway corridor and overhead line equipment (OHLE). It can also create the potential for vandalism of railway infrastructure and cause disruption to the safety, structural integrity, and operation of the railway corridor.

At all times, the operational safety and integrity of the railway must be protected and maintained when developing in, over, below or adjacent to a railway (an existing railway or future railway land). Development will not be permitted to proceed unless the risks to both the railway and the development itself are appropriately identified, managed and mitigated.

Where detailed risk assessments are carried out beyond the concept design stage they should be carried out in accordance with the rail manager's risk assessment system.



Guide to Development in a Transport Environment: Rail Transport and Main Roads, June 2015



Risk management integrated with safe design

A risk management approach integrated with safe design processes is the fundamental method to assist applicants in better designing development to address the potential impacts associated with building near a railway. This method should:

- identify all potential hazards to the operational railway, its staff, customers and the users of the development
- take into account the operational requirements of the railway and the whole life cycle of the development
- identify design and construction issues that may impact on the feasibility of development
- identify the potential risks and necessary safety controls and design measures required to reduce the risks to the safety and operational integrity of the railway and avoid long term disruptions to railway operations that would arise from a defect or failure of structure elements
- identify how an incident could be managed if it were to occur.

Safe design is to be conducted in accordance with Queensland Government's *Safe Design of Structures Code of Practice 2013* using a risk management approach. Risk management processes should be guided by ISO 31000 Risk Management – Principles and Guidelines 2009.

The Department of Transport and Main Roads (TMR) strongly recommends that applicants liaise with railway managers when planning safe design and risk management activities to ensure that all relevant matters are addressed.

This document sets out the minimum generic requirements to be addressed as part of a risk assessment accompanying a development application for land in, over, below or adjacent to a railway or future railway land. By no means does this document represent the ultimate content solution and, as such, additional topics may need to be addressed in safe design and risk management activities depending on the unique nature of the site and the proposed development.

Assessment of concept level design

It is acknowledged that during the development application stage the development may be at the concept design level which limits the amount of detailed information relating to design and construction.

The amount of detailed information should be consistent with the requirements of the Queensland Government's *Safe Design of Structures Code of Practice 2013* which specifies a systems approach integrating the risk management process as part of the design process.

To assist the development of information for a concept design level the following matters are detailed in this risk assessment guide:

- site details
- railway details
- development details
- construction details
- risk identification, analysis and evaluation approach
- control measures to mitigate risks.

The following sections set out the basic content to be addressed for the development at a concept level design.

SITE DETAILS

The risk assessment of the development should include a detailed understanding of the subject site in order to create a strong understanding of the context through which hazards or risks may arise. Matters to be considered include as a minimum:

- site condition, cutting, embankment etc
- soil type, geology
- topography
- prevailing drainage patterns over the site
- proximity to a railway and railway infrastructure/ utilities.

In addition, other impacts not addressed in this guide, such as the noise levels at the development site, should be considered.

RAILWAY DETAILS

The nature and details of the railway corridor itself will also be important in determining the potential hazards or risks associated with development in, over, below or adjacent to a railway. Key points of interest should include, as a minimum:

- track geometry and alignment (for example, straight or curved section of track)
- track speed
- type of railway rolling stock (for example, electric passenger or diesel freight locomotives)
- derailment history
- current and future estimated usage and growth in patronage (10-year horizon)
- details of any future/planned railway upgrades/works
- formation of the track (for example, in cut, on an embankment or at grade)
- potential for the carrying of freight and dangerous goods
- operational requirements of the railway.

DEVELOPMENT DETAILS

Details of the development itself, its design and operational components, are important in understanding whether the development, including any buildings or structures, has been designed to withstand potential hazards or risks as a result of the railway, as well as ensuring that the development will not pose any adverse risks upon a railway. The risk assessment should include the following information as a minimum:

- structural integrity/collision protection in the event of a train derailment, dangerous goods incident and/or explosion, other significant incident and/or explosions (for example, terrorist attack within, under or in close proximity to the development), or earthquake
- proximity of proposed development to the railway corridor, railway infrastructure and railway station access points
- potential traffic generation which may impact on the railway (e.g. increased traffic using a railway level crossing)
- clearances and setbacks from railway infrastructure
- demolition design of any existing buildings on site
- ventilation system design for development that encloses the railway corridor in the event of normal operation and an emergency event within the railway (involving smoke/gas emissions). Details to be provided must include:
  - the ability of the system to operate in an emergency situation to allow emergency crews to safely enter the enclosed area for firefighting or restorative purposes

  - details of the location of air intakes and external vents for the ventilation system
  - smoke modelling to demonstrate that the most appropriate ventilation system for the site and building has been designed.

- emergency management details are crucial and information detailed in section 6.5 *Emergency management plan* should be included
- details of the planned maintenance program for the development including whether access within the railway corridor will be required. This program should include trimming and management of landscaping as well as maintenance of the building itself
- details of the development's potential impacts on nearby (within 50 metres measured horizontally) railway tunnels. This must include design loads, geological implications of development, and impacts on ground water.

CONSTRUCTION DETAILS

Given the complexities involved with developing in the vicinity of a railway, there are a number of impacts associated with construction that need to be considered prior to development approval. Some impacts associated with construction are not acceptable to TMR and it is generally best to identify these prior to decision of a development application to determine whether viable alternatives are available.

Construction impacts involving the railway should be considered as part of the risk assessment. The railway manager will require an assessment to ensure that the railway, infrastructure, staff and general public railway users can be adequately protected from activities associated with the construction of development.

The information to be considered in this assessment includes:

- method of construction – for example, the use of pre-fabricated or pre-cast materials where building along the property boundary with the railway corridor to prevent track closures associated with construction
- timing of construction – specify staging and timing of proposed construction works to determine the impact of any disruption to services and make the state government aware of the timing of potential incidents impacting on the railway
- details of the use and storage of hazardous and dangerous goods on site during construction which have the potential to impact on the railway and operations
- describe the anticipated impact of construction on access:
  - for pedestrians using railway stations and associated interchange facilities such as bus stops, taxis, park 'n' ride and kiss 'n' ride
  - for public transport routes and the flow of traffic for people accessing railway stations
  - detail how the general public and surrounding residents will be informed of changes in access arrangements.
- railway encroachment – provide details with regard to:
  - whether access to the railway will be required
  - whether any materials will be lifted over the railway
  - whether any temporary vehicle-crossing points are required
  - whether there will be any disruption to services or other railway operations as a result of construction
  - whether there will be any requirement for de-energising of a section of the OHLE to accommodate construction within or adjacent to the railway.

Generally encroachment within a railway for construction is not permitted and alternative construction options will need to be identified.

- provide details of how the security of the railway will be maintained during construction. (for example, providing details about the type and

height of security fencing to be used)

- provide details of any planned demolition, excavation and retaining works within 25 metres of the railway and specify the type and quantity of works to be undertaken
- services and utilities – provide details of:
  - whether any services or utilities will be required to cross the railway or future railway land
  - whether any existing railway services/ utilities will be interfered with.
- stormwater, drainage, sediment and erosion control – provide details of how any temporary stormwater and drainage will operate during construction, and how sediment and erosion control will be managed.

RISK IDENTIFICATION, ANALYSIS AND EVALUATION APPROACH

A recommended minimum process for the identification, analysis and evaluation of hazards and risks (ie risk assessment) has been provided below to guide applicants at the concept level design. However, the context of the risk assessment process will vary according to the needs and circumstances of particular developments. Different risk assessment techniques may be needed to ensure suitability to the circumstances. *ISO 31010 Risk management – Risk assessment techniques* should be used as a guide for risk assessment techniques.

Identify hazards and risks

Hazard identification should take place as early as possible in concept development and design stages.

Once details unique to the site, railway, development design and construction have been determined, the individual hazards or risks should be identified and evaluated with control measures planned for each. Considerations for hazards and risks should include, but not be limited to:

- safety of people occupying the development
- safety of people on platforms or in trains under or near the building
- structural damage to the building and/or adjacent structures
- potential explosion or fire associated with loss of containment of dangerous goods, whether or not involving a train derailment
- increasing risks as a result of transporting dangerous goods by train through areas of increasing population and infrastructure density
- collision from a derailed train
- act of terrorism along the railway or within the development
- trespass by members of the public into the railway corridor
- vandalism of railway and/or development.

Hazards or risks in a railway environment may cause injury or loss of life and damage to public and private infrastructure including the following potential consequences:

- interference with railway infrastructure, especially OHLE
- impingement on railway operations and/or damage to the railway corridor itself
- business interruptions and financial loss to building occupants in the event of railway incidents affecting the building
- commercial losses including the potential loss of freight and passenger business in the event of incidents
- adverse public perceptions of the dangers of transporting dangerous goods through enclosed platforms, especially security related issues.

Step one

Identify all potential hazards to the operational railway and its staff and customers as well as the development and its users. This exercise is to link the risks with the source of the risk and identify potential consequences. Unique risks associated with the construction of development must also be addressed as construction can impose significant risks to the safety, structural integrity, and operation of the railway (for example lifting of building materials over the railway, excavation and retaining works along the railway corridor boundary). Table 10 provides examples of this process.

TABLE 10
IDENTIFICATION OF RISKS AS A RESULT OF DEVELOPMENT

Risk	Risk source	Potential outcome
Collision of rolling stock with proposed development.	Derailment of freight train due to broken wheel axle.	Derailed train collides with building. Potential for destabilisation of building's support elements and subsequent collapse resulting in injury, loss of life and damage to public and private property.
Throwing of objects onto OHLE.	Locating non-screened private balconies too close to the railway corridor boundary.	Damage to OHLE and potential for disruption to railway services/ operations. Risk of electrocution and harm to persons throwing the object.

Step two

Once the risks, their sources and potential consequences have been identified, the severity of the consequences should be determined. The severity of the risk is to be rated from 1 to 5 as indicated in Table 11.

TABLE 11
SEVERITY OF RISK

Risk	Risk source	Potential outcome	
1	Minor	• No harm to railway staff, customers, passengers, users of the development and external public. • No damage to railway infrastructure.	• No damage to development or structural elements. • No fire or blast.
2	Medium	• No harm to railway staff, customers, passengers, users of the development and external public. • No damage to railway infrastructure.	• No damage to development or structural elements. • Minor fire.
3	Major	• Minor injuries/harm to railway staff, customers, passengers, users of the development and external public. • Some damage to railway infrastructure.	• Some damage to development or structural elements. • Fire or blast.
4	Catastrophic	• Injuries/harm to railway staff, customers, passengers, users of the development and external public. • Death. • Major damage to railway infrastructure.	• Major damage to development or structural elements. • Major Fire or blast. • Impact largely contained to development/railway.
5	Catastrophic external	• Impact of a catastrophic event.	• Significant impact beyond the boundaries of the premises.

Step three

Once the risks and their severity have been identified, the likelihood of their occurrence should be determined in order to prioritise the risk. Table 12 indicates what values are to be assigned to risks.

TABLE 12
LIKELIHOOD VALUES

L	Likelihood of occurrence
0	Totally eliminated
1	Rare
2	Unlikely
3	Likely
4	Certain
5	Imminent

Step four

The identified risks should then be prioritised. Calculate the 'relative level of risk' (R), by multiplying the value obtained for the 'likelihood' (L) by the value obtained for the 'severity' (S):

$R = S \times L$

Step five

Once the relative level of risk has been obtained, assess the risks according to priority and identify the appropriate implications for development based on the criteria in Table 13.

TABLE 13
RISKS AND IMPLICATIONS FOR DEVELOPMENT

Relative risk (R)	Assessment of risk	Implications for development
1-2	Low	• Appropriate control measures should be in place to allow the development to proceed.
3-4	Medium	• Significant control measures should be in place to allow development to proceed. Such control measures may require design changes to components of the development.
5-9	High	• It is unlikely that suitable control measures can be put in place. Development is unlikely to be supported by TMR.
10 or more	Totally unacceptable	• Development cannot proceed.

CONTROL MEASURES TO MITIGATE RISKS

Once the risks of development in the railway environment have been identified, appropriate control measures should be designed to mitigate the risk and any associated impacts on the railway and the development. It is noted that mitigation is one control measure, elimination may also be an option to reducing the risk.

The necessary safety parameters required to reduce the risk of long term disruptions to railway operations that would arise from a defect or failure of structural elements should also be clearly identified.

Each risk may require multiple control measures and the applicant is strongly encouraged to provide as much information as possible when detailing the design and construction measures proposed to mitigate each risk.

To assist in documenting the control measures proposed, Table 14 is provided as an example.

Guide to Development in a Transport Environment, Rail Transport and Main Roads, June 2018

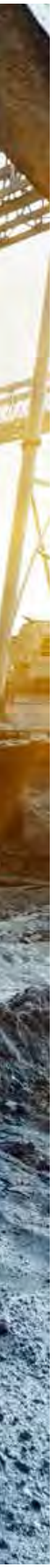


TABLE 14
DOCUMENTING CONTROL MEASURES

Risk	Assessment of risk	Control measures proposed	Supporting report/ evidence
Risk of collapse in the event of impact with derailed train-existing supporting piers of a building to be extended over the railway do not meet the requirements of AS5100 for collision protection.	3	Independent deflection walls to be constructed in front of existing supporting elements.	Civil engineering report and proposal plans.

NOTES

1. Risk assessments will be assessed on an individual basis and according to their merits. The amount of information required will be dependent on the proposed development, the location and logistics of the site, the nature and extent of works being undertaken and the level of impact on the railway and its operation. The information provided above is intended as a guide only for the concept design level and additional details may be required in some cases.

2. A site plan may need to be submitted with a risk assessment for assessment of the suitability of proposed mitigation measures. For instance, how access to the railway and stations and any other associated interchange function and park 'n' ride facility will be maintained during construction.

3. In rare instances where approval is given to access a railway for construction purposes, there may be a requirement for the applicant to indemnify the state government against all claims, damages or otherwise arising out of the use of railway land to facilitate construction.

Appendix 2: Reference standards

Australian Standards
– available through http://www.standards.org.au/Pages/default.aspx

AS 1158 – Lighting for road and public spaces

AS 1170 – Structural design actions

AS 1742.7 – Manual of uniform traffic control devices Part 7: Railway crossings

AS 2293 – Emergency escape lighting and exit signs for buildings

AS 2890 – Parking facilities

AS 4678 – Earth-retaining structures

AS 4799 – Installation of underground utility services and pipelines within railway boundaries

AS 4825 – Tunnel fire safety

AS 5100 – Bridge design

Queensland Rail civil engineering technical requirements and standard drawings
– selected standards available at http://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Guide-for-development-in-a-railway-environment.aspx.

Contact QR for additional standards.

CIVIL-SR-001 – Design of road overbridges

CIVIL-SR-002 – Work in or about Queensland Rail property

CIVIL-SR-003 – Work adjacent to overhead line equipment

CIVIL-SR-005 – Design of buildings over or near railways

CIVIL-SR-006 – Design of footbridges

CIVIL-SR-007 – Design and selection criteria for road/rail interface barriers

CIVIL-SR-008 – Protection screens

CIVIL-SR-012 – Collision protection of supporting elements adjacent to railways

CIVIL-SR-014 – Design of noise barriers adjacent to railways

CIVIL-SR-016 – Requirements for services under the railway corridor (non-QR services)

Standard Drawing 2542 – Standard high security fence 25 mm chain-link fabric with top and bottom rails

Standard Drawing 2543 – Standard heavy duty security fence 50 mm chain-link fabric with top and bottom rails

Standard Drawing 2544 – Standard security fence 50 mm chain link fabric

Standard Drawing 2545 – Standard timber fence 1800 mm high timber paling fence

Standard Drawing 2546 – Standard steel panel fence 1800 mm high colourbond fence

Standard Drawing 2573 – Standard 1200 mm high chain-link fabric fence for site with barrier and non-barrier loading 50 mm chain-link fabric with top rail

Standard Drawing 2677 – Standard station fencing dividing fence (non-structural) tubular, loop top fencing with optional tapping rail

Standard Drawing 2754 - Standard clearances for new structures

Standard Drawing QR-C-S3058 – Standard - fencing 2.5 m high '358' security mesh fence with optional razor tape extension general arrangement sheet 1 of 5

Standard Drawing QR-C-S3059 – Standard - fencing 2.5 m high '358' security mesh fence with optional razor tape extension general arrangement sheet 2 of 5

Standard Drawing QR-C-S3060 – Standard - fencing 2.5 m high '358' security mesh fence with optional razor tape extension general arrangement sheet 3 of 5

Standard Drawing QR-C-S3061 – Standard - fencing 2.5 m high '358' security mesh fence with optional razor tape extension general arrangement sheet 4 of 5

Standard Drawing QR-C-S3062 – Standard - fencing 2.5 m high '358' security mesh fence with optional razor tape extension general arrangement sheet 5 of 5

QR Level Crossing Standard Drawings:

2586 Level Crossings – Details of Public Road Grading and Sign Postings

2587 Level Crossings – Details of Private and QR Maintenance Road Grading and Sign Postings

2588 Level Crossings – Traffic Signs

2458 Traffic Signs – For Level Crossings with Overhead Live Wires

10698 Pedestrian Level Crossings – Asphaltic Concrete Pathway

2642, 2643, and 2479 – Maze for Pedestrian Track Crossings – Passive Protection Maze

2644 and 2645 – Pedestrian Track Crossings – Active Gated Enclosures

ARTC – standards available at http://extranet.artc.com.au/

Glossary

Term	Definition
Abutting	To be adjacent to or have a common boundary with and, for the purpose of section 2, applies to development located in the 25 metre wide strip of land running along each side of surface railway corridor or the 50 metre wide strip of land running along each side of tunnel.
Air space development	Any development that encroaches into or passes through the air space of a railway corridor. This term includes buildings, footbridges, road-over-railway bridges and any other structures.
Building Management Statement (BMS)	A document that is registered in the Titles Office. It is an encumbrance on the title of each of the lots to which the statement applies. The document contains terms and conditions that benefit and burden the land to which the statement applies. The owners of the lots must sign the BMS agreeing to its terms before the statement can be registered.
Development	Refer to the *Sustainable Planning Act 2009*. Development is any of the following— • carrying out building work; • carrying out plumbing or drainage work; • carrying out operational work; • reconfiguring a lot; • making a material change of use of premises.
Dilapidation survey	A survey that is usually undertaken immediately before a contractor commences site work. The purpose of the survey is to record the pre-construction condition of properties adjoining the contractor's site and/or which may be influenced by the contractor's work. The survey encompasses the external elements of these properties and may extend to the internal condition if deemed appropriate.

Term	Definition
Future railway land	Refer to the *Transport Infrastructure Act 1994*, section 242. Land becomes future railway land when the chief executive, by written notice to the relevant local government and in the gazette, indicates that the land is intended to be used for a railway. Future railway land ceases to be future railway land when it is subleased to a railway manager under section 240(4). If the chief executive decides that future railway land is no longer to be used for a railway, the chief executive must give written notice of that fact to the relevant local government and in the gazette.
Gantry	A type of bridging structure. For example, a signal gantry is a structure that carries signalling equipment above the railway tracks.
Grade separation	The process of aligning a junction of two or more transport axes at different heights (grades) so that they will not disrupt the traffic flow on other transit routes when they cross each other. This usually takes the form of an underpass/overpass.
Hoardings	Barriers to deny access to certain areas, or to provide construction noise barriers; often with a secondary role as advertising devices.
Lateral load	The (horizontal) pressure or force. Lateral loading can result from any horizontal pressure load on a retaining structure, for example, earth pressure or surcharge load.
Overhead line equipment (OHLE)	Overhead lines, cabling and associated structures used to provide power to electrical trains.
Queensland Rail (QR)	Queensland Rail Statutory Authority.
Railway	Refer to the *Sustainable Planning Regulation 2009*, schedule 26. Railway means — • land on which rail transport infrastructure or other rail infrastructure is situated as defined by the Sustainable Planning Regulation 2009, Schedule 26. A railway does not include a light rail or light rail transport infrastructure.
Railway bridge	A railway bridge means a structure which crosses a watercourse, land, road or other obstacle, on which rail transport infrastructure or other rail transport infrastructure is located.

Term	Definition
Railway corridor	Refer to *Transport Infrastructure Act 1994*, section 255. Railway corridor means — • land subleased to a railway manager under section 240; or • commercial corridor land; or • future railway land under the control of a railway manager; or • land described in schedule 4; or • a railway crossing.
Railway environment	The railway environment comprises the following: • the area located in, over and below a railway or future railway land • the area located adjacent to a railway or future railway land.
Railway manager	Refer to *Transport Infrastructure Act 1994*, schedule 6. Railway manager means— • for a railway—the person who is an accredited rail infrastructure manager in relation to railway operations relating to the railway; or • for rail corridor land—the person who is an accredited rail infrastructure manager in relation to railway operations relating to the railway or proposed railway on or proposed to be on the rail corridor land.
Registered Professional Engineer of Queensland (RPEQ)	Registered Professional Engineer of Queensland, under the *Professional Engineers Act 2002*.
Remote telemetric monitoring	The automatic transmission and measurement of data from remote sources by wire or radio or other means.
Rock anchor	A steel rod or cable placed in a hole drilled in rock, held in position by grout, mechanical means or both.
Safety in design	Legislative requirement in accordance with the Queensland Government *Work Health and Safety Act 2011 and Safe design of structures code of practice 2013* requiring a review to be undertaken during the design phase to ensure that the risks to health and safety are as low as reasonably practicable for persons who: • construct the works • operate and maintain the works • demolish the works

Term	Definition
Stormwater management plan (SMP)	A stormwater management plan demonstrates the likely stormwater and drainage impacts of a proposed development on state transport corridors, including the railway. It must be certified by a Registered Professional Engineer of Queensland (RPEQ) and demonstrate mitigation strategies to achieve no worsening impacts on the pre-development condition.
Structural redundancy	The replication of critical components of a building or structure with the intention of increasing its reliability, usually in the case of a backup or fail-safe in the case of an unlikely event.
Surcharge load	The (vertical) applied pressure behind a retaining structure. Surcharge load can result from, but not limited to, the following sources: construction traffic and material loads (for example, stockpiling), railway loads, and road traffic loads arising from construction works.
Track possession	The temporary closure of a section of the railway corridor for the purpose of carrying out construction or maintenance work.
Volumetric subdivisions	Three-dimensional subdivisions in the space above or below the railway corridor that can accommodate a development such as a building or carpark. A volumetric parcel must be bounded in all dimensions.
Zone of influence	An area in, over, below or adjacent to a railway corridor which has the ability to adversely impact a railway if impacted, and not appropriately managed. To determine the spatial parameters for the zone of influence, refer to the TMR Design Criteria for Bridges and Other Structures Manual.

References

Australian Government, *Disability Discrimination Act 1992* and the Disability Standards for Accessible Public Transport 2002, accessible at *www.austlii.edu.au*

Department of Energy and Water Supply, *http://www.dews.qld.gov.au/water-supply-regulations/urban-drainage*

Department of Transport and Main Roads, *www.tmr.qld.gov.au*

Department of Transport and Main Roads, Design Criteria for Bridges and Other Structures, *http://www.tmr.qld.gov.au/Business-industry/Technical-standards-publications.aspx*

Department of Transport and Main Roads specifications (including MRTS83 Anti-Graffiti Protection), *http://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Specifications.aspx*

Office of the Queensland Parliamentary Counsel, *https://www.legislation.qld.gov.au/Acts_SLs/Acts_SL.htm*

Queensland Police Service, Crime Prevention through Environmental Design – Guidelines for Queensland, *http://www.police.qld.gov.au/programs/cscp/safetypublic/*

Queensland Rail technical guidelines and drawings, accessible at *http://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Guide-for-development-in-a-railway-environment.aspx*

Standards Australia, can be purchased through *www.saiglobal.com/online*

State Assessment and Referral Agency (SARA), *http://www.dsdip.qld.gov.au/development-applications/state-assessment-and-referral-agency.html*

State Development Assessment Provisions (SDAP), *http://www.dsdip.qld.gov.au/development-applications/sdap.html*

Acknowledgements

Parts of this guide have been prepared utilising information from the following report:

- *GSM Information Paper No. 6: Carry out a risk assessment for dangerous goods under the Dangerous Goods Safety Management Act 2001– Department of Community Safety, October 2003.*

Contact details

A range of stakeholders may be involved in assessing and approving a development application for building in and around a railway, particularly transport agencies and railway managers. TMR is the first point of contact for those seeking to undertake development in a railway environment. The TMR contact is:

The Director, Development Facilitation

Transport Strategy and Planning Branch

Planning, Policy and Investment Division

Department of Transport and Main Roads

Telephone: 3066 1427