

Guide to Development in a Transport Environment

Light Rail

November 2018

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Part A. Context and Purpose

1. Introduction

The Guide to Development in a Transport Environment: Light Rail (the Light Rail Guide) provides important information for those involved in development, works or activities in the vicinity of light rail in Queensland. It is intended for use as a technical reference document.

The Light Rail Guide provides specific technical guidance on how to demonstrate compliance with the State Development Assessment Provisions (SDAP) in relation to managing impacts of development on the safety and operational efficiency of light rail.

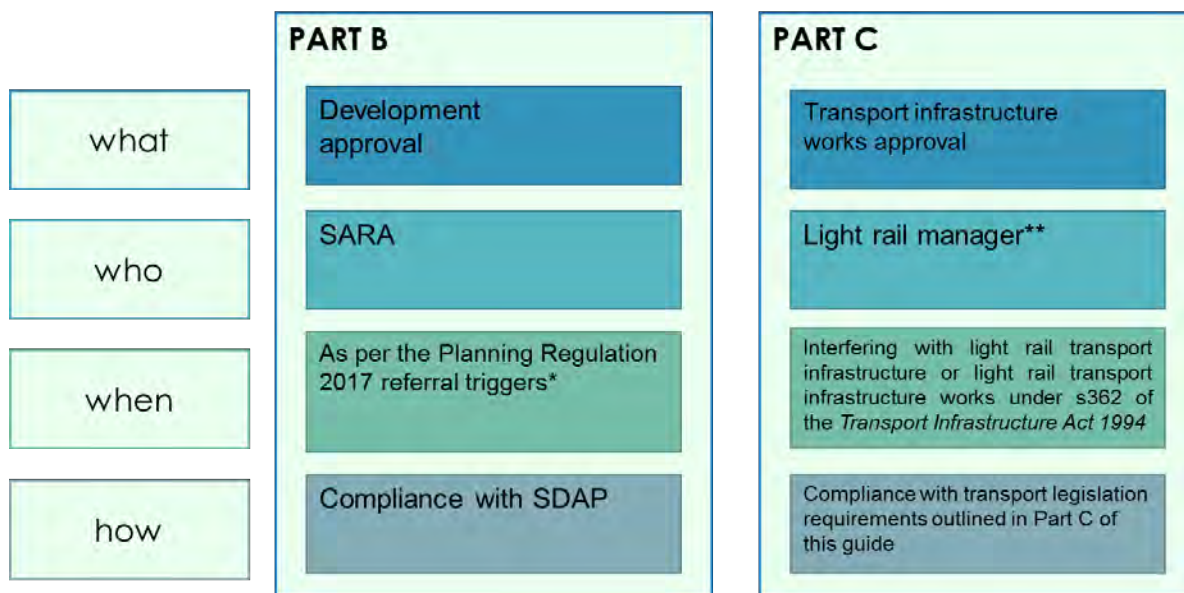
The Light Rail Guide also provides useful information about the operational constraints and requirements when undertaking works or activities within the light rail environment.

1.1 How to use this guide

The Light Rail Guide is structured in four parts:

- A: provides the context for development in a light rail environment.
- B: is relevant to development proposed on land adjacent to a light rail corridor or in a future light rail corridor. It outlines the key issues which need to be considered when developing land near a light rail corridor or in a light rail corridor. It provides information for proponents about how to ensure development applications demonstrate compliance with SDAP.
- C: is relevant to development, works or activities proposed in a light rail corridor. It outlines the approvals, processes and technical requirements which must be satisfied to comply with legislation governing activities, works and public utility plants in a light rail corridor.
- D: provides supplementary information to support the Light Rail Guide.

Figure 1 describes the differences between Parts B and C of the Light Rail Guide.



* Generally within 25m of light rail corridors or land identified as a future light rail transport corridor. Applicants should consult the Planning Regulation 2017 referral triggers to determine whether their development is triggered for state assessment.

** In some instances, for example, where there is no light rail manager, this approval would be granted by the Director-General of the Department of Transport and Main Roads, or their delegate.

Figure 1 Explanation of content of parts B and C

1.2 Development process

The *Planning Act 2016* provides the legislative framework for planning and development assessment in Queensland. Development that may impact on the safety or efficient operation of state transport infrastructure, state transport corridors or future state transport corridors is triggered under the *Planning Regulation 2017* and referred to the State Assessment and Referral Agency (SARA) for assessment.

SARA, in consultation with the Department of Transport and Main Roads (TMR), will assess a triggered application against planning legislation and state planning instruments including SDAP.

SDAP is structured in a performance-based code format, whereby applicants can address assessment criteria to demonstrate that a development appropriately manages any impacts on a matter of state interest, and/or protects a development from impacts of matters of state interest. *State code 4: Development in a light rail environment* includes the assessment criteria for applications triggered because of their proximity to a light rail corridor. The code seeks to protect light rail, future light rail and other infrastructure in a light rail environment from the adverse impacts of development. In addition, the code seeks to protect the safety of people using, and living and working near, light rail.

The development process is dependent on the circumstances of the development itself. However, in order to provide basic guidance, the following flow chart (see Figure 2) outlines typical steps in the process for applications for development in a light rail environment.

Step 1	Where relevant, pre-lodgement meetings with, or advice from, SARA and technical agencies.
Step 2	Applicant prepares development application having regard to SDAP and guidance provided in the Light Rail Guide.
Step 3	Applicant submits development application to assessment manager. Application is referred to SARA where triggered by state referral triggers.
Step 4	SARA, in consultation with TMR and the light rail manager, assess the development application. Additional information may be requested from the applicant and/or an applicant may be advised of any identified issues relating to the development proposal.
Step 5	After assessing all information SARA finalises state response taking into account TMR and other state agencies' technical advice.
Step 6	The assessment manager (for example local government) issues the development decision. Any approval may be subject to conditions.
Step 7	Where required, the applicant seeks approval from the light rail manager for works in a light rail corridor in accordance with requirements outlined in Part C of the Light Rail Guide.
Step 8	Light rail manager assesses works requirements and provides a decision. Any approval provided by the light rail manager may be subject to conditions.
Step 9	TMR, the light rail manager, the applicant or other authorised entity undertakes development and works in accordance with conditions.
Step 10	Certification of works undertaken by light rail manager or relevant authority.

Figure 2 Typical process flowchart for development in a light rail environment

As noted in *Part C: Advice for works within a light rail corridor*, where any works interferes with light rail transport infrastructure, the light rail manager may seek to enter into an agreement with the applicant for these works. In these situations, discussions should occur as early as possible with TMR and the light rail manager. Ideally these matters should be raised during pre-lodgement discussions (step 1) or during formulation of a proposal.

1.3 Roles and responsibilities

The following section outlines the roles and responsibilities of government agencies involved in decisions regarding planning, development and works in the light rail environment.

Department of Transport and Main Roads

TMR is the Queensland Government department with overall responsibility for light rail and light rail transport infrastructure. TMR administers the *Transport Infrastructure Act 1994* and the *Transport Operations (Passenger Transport) Act 1994*, the governing legislation for the provision, management and operation of state transport infrastructure, including light rail. 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 which also includes light rail.

TMR's primary role in planning and development assessment processes is to ensure the safety and operational efficiency of light rail. TMR provides SARA and other government agencies with technical advice about the potential impacts of development on light rail and how such impacts can be mitigated to ensure light rail infrastructure can continue to operate safely and efficiently.

Light rail managers

Light rail managers sub-lease light rail land from the State under section 355 or are granted a licence to light rail land from the State under section 355A, of the *Transport Infrastructure Act 1994*. The State will sub-lease or licence land to a light rail manager to manage, maintain and operate light rail transport infrastructure. Light rail managers may contract the management, maintenance and operation of light rail transport infrastructure to a light rail operator.

Light rail managers are responsible for managing works and activities in a light rail corridor. *Part C: Advice for works in the light rail corridor*, provides information about the operational constraints and requirements that must be considered when seeking to undertake works or activities within the light rail corridor.

For the Gold Coast light rail (G:link), GoldLinQ Pty Ltd is the light rail manager and contracts the maintenance and operation of the light rail transport infrastructure and light rail vehicles to KDR Gold Coast Pty Ltd.

Department of State Development, Manufacturing, Infrastructure and Planning

The Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) is the Queensland Government department responsible for regulating planning and development. The chief executive of DSDMIP is responsible for administering the Planning Act and for assessing development applications in relation to state interests, as outlined in the Planning Regulation.

State Assessment and Referral Agency

The State Assessment and Referral Agency (SARA) is an agency within DSDMIP. It is responsible for coordinating the assessment of development applications for state agencies 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 against SDAP and seeks technical advice from state agencies, such as TMR for development applications that are of relevance. Typically, where an application involves development in a light rail environment, SARA will consult with TMR regarding technical matters before finalising the assessment. As part of the process, TMR may also consult with other stakeholders to seek their input.

Economic Development Queensland

Operating under the *Economic Development Act 2012*, Economic Development Queensland (EDQ) is a specialist land use planning and property development agency within DSDMIP. EDQ is responsible for engaging with state and local government, the development industry and the public to identify, plan, facilitate and deliver property development and infrastructure projects.

EDQ's responsibilities include the assessment of development applications located within priority development areas (PDA). EDQ will assess all development on land within the boundary of the PDA against a supporting PDA development scheme. In addition, EDQ will likely consider the development considerations in Part B of this Guide.

Local government

Local governments are responsible for land use planning and the built environment in accordance with local government planning schemes. Local governments may also be responsible for roads on which a light rail operates as well as public utilities in the vicinity such as water and sewerage. Accordingly, local governments through their planning scheme and associated local laws and policies are responsible for matters that may be relevant in the light rail environment.

1.4 Key terms and concepts

The following section outlines key terms and concepts used throughout the Light Rail Guide.

The light rail environment

The light rail environment comprises the following:

- the light rail corridor, including the light rail hazard zone. This encompasses the land on which light rail transport infrastructure or light rail transport infrastructure works are situated, the land below the infrastructure or works and the airspace above.
- the area adjacent to the light rail corridor, including the zone of influence, where development can affect light rail transport infrastructure and light rail transport infrastructure works.

Definitions of *light rail corridor*, *light rail transport infrastructure* and *light rail transport infrastructure works* are contained in the Light Rail Guide glossary of terms. The extent of the light rail environment is illustrated in Figure 3.

The area adjacent to the light rail corridor should be determined with reference to the relevant state referral triggers in the Planning Regulation. In the majority of referrals, this area will be land within 25 metres of a state transport corridor, as illustrated in Figure 3. A state transport corridor includes land identified as a light rail corridor.

DSDMIP provides [online mapping](#) which includes layers depicting the light rail environment, that is, light rail corridors and land within 25 metres of a light rail corridor.

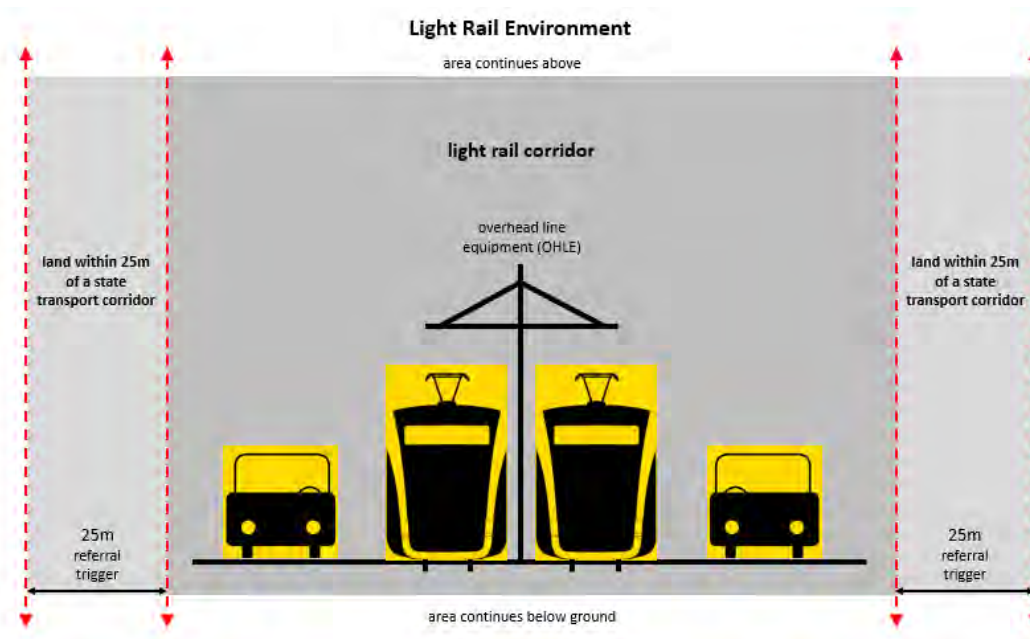


Figure 3 Extent of the light rail environment

The future light rail environment

The future light rail environment comprises land identified for a future light rail corridor. This includes land on which light rail transport infrastructure or light rail transport infrastructure works will be located in future. Note, the future light rail environment does not include land adjacent to a future light rail corridor unless part of the land is located in the corridor.

DSDMIP provides [online mapping](#) that includes layers depicting future light rail corridors.

Light rail hazard zone

The light rail hazard zone is an area within the light rail environment that contains light rail transport infrastructure including overhead line equipment (OHLE), rail lines and the track slab and light rail vehicles. The light rail hazard zone encompasses both the electrical exclusion zone and the developed kinematic envelope (DKE). Within the hazard zone, construction, works and activities are constrained and closely supervised in order to ensure safety (see Part C for further advice on undertaking works or activities in a light rail hazard zone).

The extent of the light rail hazard zone is illustrated in Figure 4. Below the ground and up to 3 metres above ground, the light rail hazard zone extends 1.75 metres horizontally either side of the outer most rail. At 3 metres or more above ground, the light rail hazard zone extends 3 metres horizontally from the outer most rail.

Development in a light rail hazard zone is subject to certain requirements outlined in Part B and C of the Light Rail Guide.

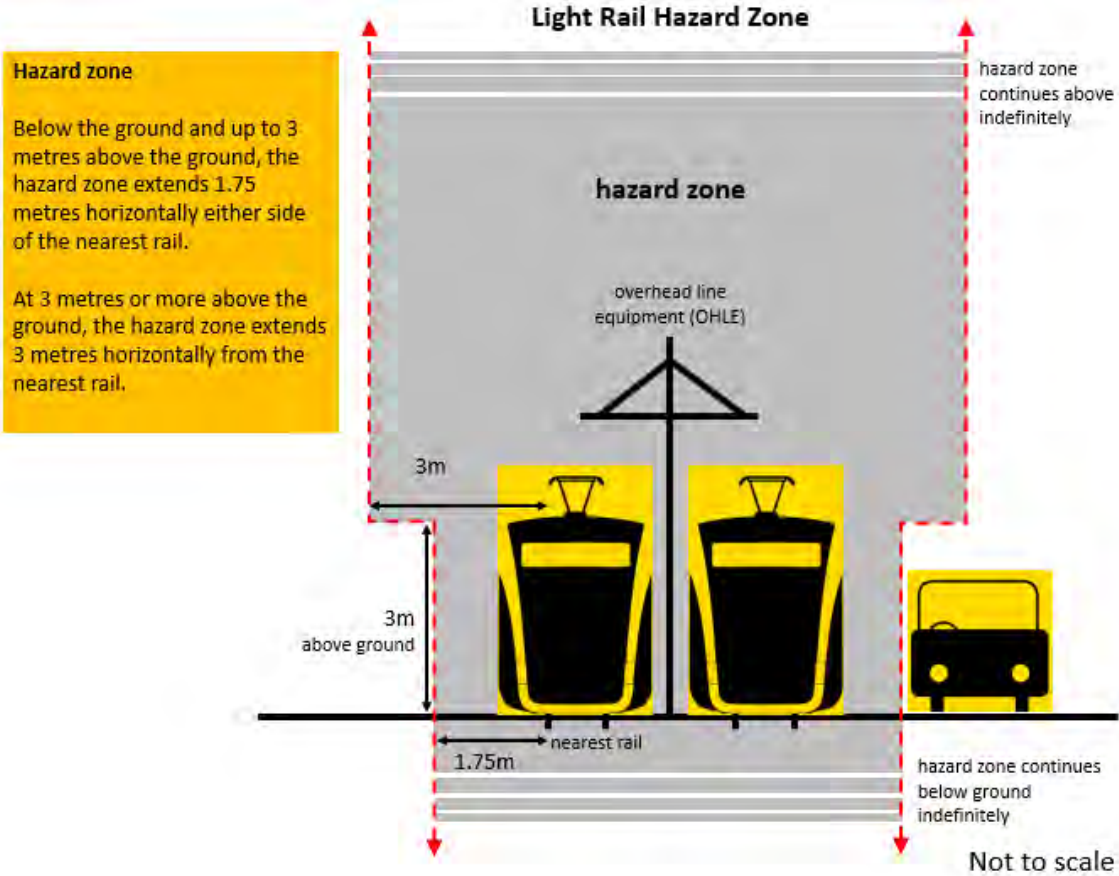


Figure 4 Light rail hazard zone

Zone of influence

The zone of influence is an area below ground where development, works and activities pose an increased risk to the safety and structural integrity of light rail corridors, future light rail corridors and light rail transport infrastructure. The zone of influence extends below ground from the outer most rail at an angle of 35 degrees from the horizontal (regardless of soil conditions). The extent of the zone of influence is illustrated in Figure 5.

Any works and activities in the zone of influence, especially excavation and construction activities, are closely managed in order to ensure the structural integrity and safety of light rail corridors, future light rail corridors and light rail infrastructure. Development in a light rail zone of influence is subject to certain requirements outlined in Part B and C of the Light Rail Guide.

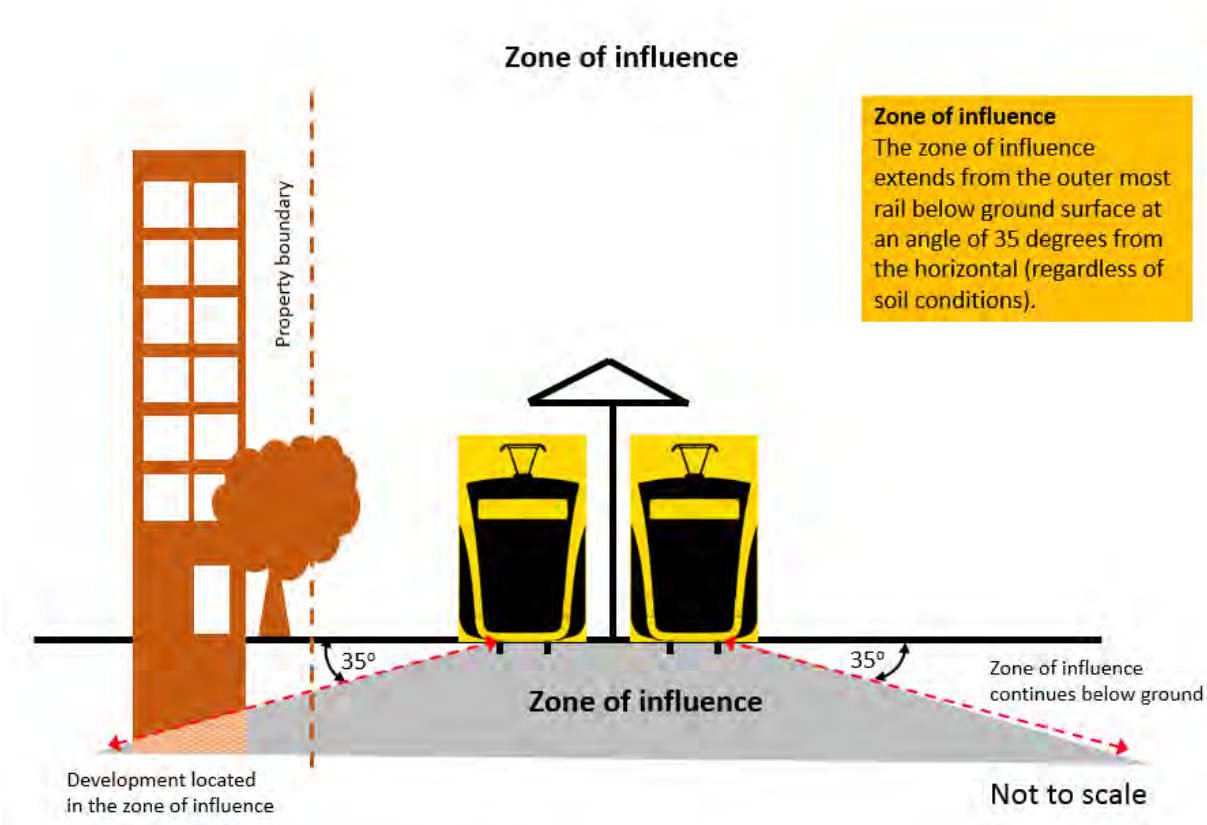


Figure 5 Zone of influence

Part B. Development in a light rail environment

1. Relationship between SDAP and the Light Rail Guide

Part B of the Light Rail Guide provides important information about the issues which need to be considered when developing land in a light rail environment. It also provides specific guidance to applicants on how to demonstrate compliance with SDAP *State code 4: Development in a light rail environment* when preparing a development application.

State code 4: Development in a light rail environment contains a purpose statement, performance outcomes and acceptable outcomes. If a development application complies with all the relevant acceptable outcomes of the code, it complies with the purpose statement of the code and therefore the code itself. If an application does not comply with one or more of the acceptable outcomes, an alternative means of meeting the performance outcomes should be proposed.

Acceptable outcomes are provided for some, but not all performance outcomes. In instances where an acceptable outcome/s is not provided, a development application must demonstrate it complies with all the relevant performance outcomes and therefore the code itself.

Table 1 describes how the provisions in SDAP relate to relevant sections of the Light Rail Guide.

It is strongly recommended the Light Rail Guide is read in conjunction with the relevant sections of SDAP, summarised in Table 1.

SDAP Provision	Relevant sections in the Light Rail Guide								
	2.1 Buildings and structures	2.2 Filling, excavation and retaining structures	2.3 Stormwater and drainage	2.4 Vehicular access to a light rail corridor	2.5 Access to public transport infrastructure and services	2.6 Future light rail corridors and planned upgrades	2.7 Environmental emissions	3.0 Future light rail corridors	
State code 4: Development in a light rail environment									
Table 4.2.1: Development in a light rail environment									
Building and structures	PO1 - PO5	✓							
Filling, excavation and retaining structures	PO6 - PO11		✓						
Stormwater and drainage	PO12 - PO13			✓					
Access	PO14 - PO15				✓	✓			
Planned upgrades	PO16						✓		
Table 4.2.2: Environmental emissions									
Noise	PO17 - PO21							✓	
Vibration	PO22							✓	
Air and light	PO23							✓	
Table 4.2.3: Development in a future light rail environment									
Building and structures	PO24								✓
Filling, excavation and retaining structures	PO25 - PO26								✓
Stormwater and drainage	PO27								✓

Table 1 Relationship between SDAP and the Light Rail Guide

2. Development in a light rail environment

2.1 Building and Structures

The content in this section supports the POs outlined in:

State code 4: Development in a light rail environment

- Table 4.2.1: Development in a light rail environment
 - Building and structures (PO1-PO5)

What is the issue?

Development in a light rail environment, including the siting of buildings and structures, can compromise the safety and structural integrity of a light rail corridor, light rail transport infrastructure or light rail transport infrastructure works. Settlement or movement of light rail tracks or other infrastructure during construction of development in a light rail environment represents a significant risk to light rail users and operators. In particular, development in the light rail hazard zone may interfere, or come into contact, with light rail transport infrastructure causing property damage, service disruptions and create a risk to public safety. For further information on the light rail hazard zone see section 1.4: *Key terms and concepts*.

In addition, road, bikeway or pedestrian bridges, if not designed and constructed appropriately, can provide opportunities for projectiles to be thrown onto a light rail corridor. This may create a safety hazard for users of light rail or damage light rail transport infrastructure.

What is the objective?

The objective of the performance outcomes is to ensure that development does not:

- create a safety hazard for users of light rail
- compromise the structural integrity of light rail, light rail transport infrastructure or light rail transport infrastructure works
- compromise the state's ability to maintain and operate light rail, or significantly increase the cost to maintain and operate light rail
- compromise the state's ability to deliver light rail infrastructure.

How to achieve the performance outcomes

Performance outcome 1

Acceptable outcomes have been provided for this performance outcome. An application can demonstrate it is compliant with the acceptable outcomes by providing the following information as part of the application:

- **Scaled and sufficiently detailed plans** clearly identifying all aspects of the proposed development in relation to the light rail corridor and light rail transport infrastructure including any intended staging for the development. The plan should clearly show the site's property boundaries and the location and setbacks of all proposed buildings, structures, infrastructure, services, utilities and other works from the light rail corridor and light rail transport infrastructure. Typical elements that should be shown include buildings, structures such as fences, earthworks, temporary and permanent retaining structures, stormwater management measures, vehicular and pedestrian access and manoeuvring areas, recreational areas, pipework, service and utility connections and the like.

- **Scaled and sufficiently detailed plans** with cross sections and/or sections illustrating the development's interface with the light rail corridor and the light rail hazard zone.
- **Technical information** demonstrating that the proposed development will not compromise the safety and structural integrity of light rail transport infrastructure or light rail transport infrastructure works. The application should demonstrate that all works associated with the development will be outside the light rail corridor and that pipework, services and utilities can be maintained without requiring access to the light rail corridor.
- **Technical information** demonstrating that any construction and maintenance activities will not divert vehicle, pedestrian or cycle traffic into the light rail hazard zone.
- **Technical information** demonstrating the proposed development, including the outermost projection of all development (including buildings, structures and landscaping), maintains minimum clearances from the light rail hazard zone, specifically:
 - buildings, structures and infrastructure are set back horizontally a minimum of 3.0 metres from overhead line equipment
 - vegetation is set back horizontally a minimum of 1.0 metre from the light rail hazard zone and does not exceed 5.0 metres in height at maturity.

Further information about clearances from OHLE can be found in the *Electrical Safety Regulation 2013*.

It is strongly recommended applicants consult the light rail manager when seeking to undertake construction or maintenance activities in proximity to the light rail hazard zone.

If an application does not comply with the acceptable outcomes, details of the alternative means of meeting the performance outcome should be provided.

Performance outcome 2

Acceptable outcomes have been provided for this performance outcome. An application can demonstrate it is compliant with the acceptable outcomes by providing the following information as part of the application:

- **Technical information, plans or drawings** demonstrating that the facades of buildings and structures facing the light rail corridor are made of non-reflective materials and will not reflect any point light sources into the face of oncoming light rail vehicles.
- **Information such as plans or drawings** demonstrating that external lighting is not directed into the face of oncoming light rail vehicles and does not involve flashing or laser lights.

Where a building or structure has the potential to create a safety hazard by distracting drivers of light rail vehicles, supporting information must be provided detailing how potential impacts will be mitigated. Possible mitigation options include, but are not limited to:

- landscaped buffers between a light source and the light rail corridor
- shields on light sources to prevent direct light being emitted into a light rail corridor
- automated dimming in accordance with ambient light conditions/levels.

Performance outcome 3

No acceptable outcome has been provided. Therefore, an application must demonstrate compliance with the performance outcome which is about adding or removing loading. Demonstrating compliance with the performance outcome may include, but is not limited to, providing the following:

- **A RPEQ certified geotechnical assessment** identifying the design parameters for the structural aspects of the development, namely loadings, footings and the like, to ensure the safety and operational integrity of light rail transport infrastructure or the light rail corridor.

Guidance on preparing a geotechnical assessment is provided in Part D: Supporting information, Appendix 1.

- **RPEQ certified earthworks drawings** providing details of excavation and filling works. Guidance on preparing earthworks drawings is provided in Part D: Supporting information, Appendix 2.
- **RPEQ certified structural engineering drawings** demonstrating that the loading implications of the proposed development will not compromise the structural integrity of light rail transport infrastructure and light rail transport infrastructure works. The loading configuration of the proposed development should be provided.

Performance outcome 4

An acceptable outcome has been provided for this performance outcome. An application can demonstrate it is compliant with the acceptable outcome by providing RPEQ certified drawings showing that any road, pedestrian and bikeway bridges are designed to include throw protection screens in accordance with Civil Engineering Technical Requirement CIVIL-SR-008 Protection screens, Queensland Rail.

If an application does not comply with the acceptable outcome, details of the alternative means of meeting the performance outcome should be provided.

Performance outcome 5

No acceptable outcome has been provided. Therefore, an application must demonstrate compliance with the performance outcome which is about construction activities not causing ground movement or vibration impacts. Demonstrating compliance with the performance outcome may include, but is not limited to, providing the following:

- **A RPEQ certified geotechnical assessment** identifying the potential for construction activities to cause ground movement and vibration issues in a light rail corridor. Guidance on preparing a geotechnical assessment is provided in Part D: Supporting information, Appendix 1.
- **RPEQ certified structural engineering drawings** showing the design of temporary retaining structures (such as rock anchors, soil nails, shoring walls, batters and the like) and all permanent structures and buildings, above and below ground. Note, this technical information may be required where the development proposal includes retaining structures such as a basement or retaining walls adjacent to the light rail corridor that extends into the zone of influence (refer Figure 5) and/or involves temporary and permanent retention systems. Guidance on preparing structural engineering drawings for retaining structures is provided in Part D: Supporting information, Appendix 3.
- **A RPEQ certified vibration monitoring and management plan** which investigates any demolition, excavation and construction work impacts on the light rail corridor and light rail transport infrastructure. Note, this may be required post detailed design stage. Acceptable movement limits for light rail track and other infrastructure will vary and specific advice should be sought from the light rail manager prior to undertaking technical assessments. Guidance on preparing a vibration and movement monitoring plan is provided in Part D: Supporting information, Appendix 4.
- **A RPEQ certified groundwater monitoring and management plan** which investigates construction impacts (including earthworks, boring, piling and the like) on the light rail corridor. The plan should establish a management and monitoring program which ensures the light rail corridor is not adversely affected by the construction of the development. Note, this may be required post detailed design stage. Guidance on preparing a groundwater monitoring and management plan is provided in Part D: Supporting information, Appendix 5.

- **Dilapidation surveys** of the light rail transport infrastructure demonstrating there has been no worsening impact on the pre-development condition of the light rail transport infrastructure. Guidance on preparing dilapidation surveys and the extent of the survey area is provided in Part D: Supporting information, Appendix 6.

Note, if dilapidation surveys are required, the pre-survey report should be submitted prior to the commencement of demolition and construction works. The post-survey report will be required to be submitted to TMR within 10 business days of the completion of works.

2.2 Filling, excavation and retaining structures

The content in this section supports the POs as outlined in:

State code 4: Development in a light rail environment

- Table 4.2.1: Development in a light rail environment
 - Filling, excavation and retaining structures (**PO6-PO11**)

What is the issue?

Filling, excavation and the use of retaining structures in a light railway environment (including in the zone of influence) can impact on the structural integrity of light rail transport infrastructure. Filling, excavation and retaining structures can also undermine or cause subsidence of land in a light rail corridor.

Specifically, works involving ground disturbance can de-stabilise or undermine light rail transport infrastructure and the land supporting this infrastructure. This may be through vibration impacts, ground movement, subsidence, changes to loading such as lateral and vertical loading and groundwater impacts. Settlement or movement of light rail tracks or other infrastructure during construction of a development in a light rail environment represents a significant risk to light rail users and operators.

Filling and excavation may be associated with creating a level building pad, excavation for basement car parking, the installation or insertion of temporary and permanent retention systems, constructing footings for fences and building foundation structures, amongst other forms of ground disturbance.

What is the objective?

The objective of the provisions is to ensure development does not compromise the structural integrity of a light rail corridor, light rail transport infrastructure or light rail transport infrastructure works.

Where development is proposed in a light rail environment, assessment, monitoring, management plans and the like may be required to demonstrate that filling, excavation and retaining structures will not cause adverse impacts or groundwater disturbance and achieve no worsening of the light rail during construction phase.

Note that due to the risk of adverse impacts, permanent or temporary retention systems (such as shoring walls, rock anchors and/or soil nails) will not be permitted to extend into a light rail corridor.

How to achieve the performance outcomes

Performance outcome 6

No acceptable outcome has been provided. Therefore, an application must demonstrate compliance with the performance outcome. Demonstrating compliance with the performance outcome may include, but is not limited to, providing the following:

- A **site plan** demonstrating how the development will be serviced with services and utilities, including any proposals to connect to existing services and utilities, the proposed augmentation or relocation of services and utilities and the like. This plan should clearly detail whether any proposed works or connections are intended in the light rail corridor or will otherwise interfere with the light rail corridor.
- A **site detail and contour survey** prepared by a registered surveyor identifying the relevant service and utility connections available to the site.
- A **RPEQ certified geotechnical assessment** prepared in accordance with the Road Planning and Design Manual demonstrating that the filling and excavation associated with the development will not interfere with, or result in damage to, infrastructure or services in the light rail corridor. Guidance on preparing a geotechnical assessment is provided in Part D: Supporting information, Appendix 1.
- **RPEQ certified earthworks drawings** demonstrating the proposed earthworks and retaining structures are located outside the light rail corridor and do not interfere with the corridor such as through loading implications, instability and similar adverse impacts. Guidance on preparing earthworks drawings is provided in Part D: Supporting information, Appendix 2.
- **RPEQ certified drawings** showing the structural engineering design of the development. This should detail the design of temporary retaining structures (such as rock anchors, soil nails, shoring walls, batters, retaining walls and the like), foundation structures (such as footings, bored piles, piers and the like) and all permanent structures and buildings, above and below ground. Guidance on preparing structural engineering drawings is provided in Part D: Supporting information, Appendix 3.

Should access be required to the light rail corridor to prepare survey plans, approval will need to be obtained from the Light Rail Manager. See *Part C: Advice for works within a light rail corridor* for further details.

General information on the location of services and public utilities can be obtained from the Dial Before You Dig service and other mapping tools that may be provided by a local government.

If development proposes to connect to services and utilities in a light rail corridor approval under the Transport Infrastructure Act will be required.

Where development will impact on a service or public utility plant in light rail corridor such that the service or plant will need to be relocated, the applicant will need to contact the relevant service or plant provider for standards and design specifications for the alternative alignment. Any costs of relocation are to be borne by the applicant.

Performance outcome 7

No acceptable outcome has been provided for this performance outcome. Therefore, an application must demonstrate compliance with the performance outcome. Demonstrating compliance with the performance outcome may include, but is not limited to, provide the following:

- A **RPEQ certified geotechnical assessment** identifying the sub-surface profile and providing recommendations for the structural engineering design of the development. Guidance on preparing a geotechnical assessment is provided in Part D: Supporting information, Appendix 1. Note, this may be required at the material change of use stage.

- **RPEQ certified earthworks drawings** clearly demonstrating that the proposed earthworks and retaining structures are located outside the light rail corridor and do not adversely impact the light rail corridor such as through loading implications, instability and similar adverse impacts. Guidance on preparing earthworks drawings is provided in Part D: Supporting information, Appendix 2.
- **RPEQ certified drawings** showing the structural engineering design of the development. This should detail the design of temporary retaining structures (such as rock anchors, soil nails, shoring walls, batters, retaining walls and the like), foundation structures (such as footings, bored piles, piers and the like) and all permanent structures and buildings, above and below ground. Note, any approved rock anchors and/or soil nails outside the corridor that are intended to remain in place after construction will be required to be de-stressed and released. Guidance on preparing structural engineering drawings is provided in Part D: Supporting information, Appendix 3.
- A **RPEQ certified vibration monitoring and management plan** which investigates any demolition, excavation and construction work impacts on the light rail corridor and light rail transport infrastructure such as tunnels, retaining walls and retaining structures. Note, this may be required post detailed design stage. Guidance on preparing a vibration and movement plan is provided in Part D: Supporting information, Appendix 4.
- A **RPEQ certified groundwater monitoring and management plan** which investigates construction impacts (including earthworks, boring, piling and the like) on the light rail corridor. The plan should establish a management and monitoring program which ensures the light rail corridor will not be adversely affected by the construction of the development. Guidance on preparing a groundwater monitoring and management plan is provided in Part D: Supporting information, Appendix 5. Note, this plan may be required post detailed design stage.
- **Dilapidation surveys** of the light rail transport infrastructure demonstrating there has been no worsening impact on the pre-development condition of the light rail transport infrastructure. Guidance on preparing dilapidation surveys and the extent of the survey area is provided in Part D: Supporting information, Appendix 6.

Note, if dilapidation surveys are required, the pre-survey report should be submitted prior to the commencement of demolition and construction works. The post-survey report will be required to be submitted to TMR within 10 business days of the completion of works.

Performance Outcome 8

No acceptable outcome has been provided. Therefore, an application must demonstrate compliance with the performance outcome. Demonstrating compliance with the performance outcome may include, but is not limited to, providing the following:

- A **RPEQ certified geotechnical assessment** identifying the sub-surface profile and providing recommendations for the structural engineering design of the development. Guidance on preparing a geotechnical assessment is provided in Part D: Supporting information, Appendix 1.
- **RPEQ certified earthworks drawings** clearly demonstrating that the proposed earthworks and retaining structures are located outside the light rail corridor and do not interfere with the light rail corridor such as through loading implications, instability and similar adverse impacts. Guidance on preparing earthworks drawings is provided in Part D: Supporting information, Appendix 2.
- **RPEQ certified drawings** showing the structural engineering design of the development. This should detail the design of temporary retaining structures (such as rock anchors, soil nails, shoring walls, batters, retaining walls and the like), foundation structures (such as footings, bored piles, piers and the like) and all permanent structures and buildings, above and below

ground. Note, this technical information may be required where the development proposal includes retaining structures, such as a basement or retaining walls adjacent to the light rail corridor that extends into the zone of influence (refer Figure 5) and/or involves temporary and permanent retention systems. Guidance on preparing structural engineering drawings for retaining structures is provided in Part D: Supporting information, Appendix 3.

- A **RPEQ certified groundwater monitoring and management plan** which investigates construction impacts (including earthworks, boring, piling and the like) on the light rail corridor. The plan should establish a management and monitoring program which ensures the light rail corridor is not adversely affected by the construction of the development. Guidance on preparing a groundwater monitoring and management plan is provided in Part D: Supporting information, Appendix 5.

Performance Outcome 9

No acceptable outcome has been provided. Therefore, an application must demonstrate compliance with the performance outcome. Demonstrating compliance with the performance outcome may include, but is not limited to, providing the following:

- A **RPEQ certified geotechnical assessment** identifying the sub-surface profile and providing recommendations for the structural engineering design of the development. Guidance on preparing a geotechnical assessment is provided in Part D: Supporting information, Appendix 1.
- **RPEQ certified earthworks drawings** clearly demonstrating that the proposed earthworks and retaining structures are located outside the light rail corridor and do not interfere with the light rail corridor such as through loading implications, instability and similar adverse impacts. Guidance on preparing earthworks drawings is provided in Part D: Supporting information, Appendix 2.
- **RPEQ certified drawings** showing the structural engineering design of the development. This should detail the design of temporary retaining structures (such as rock anchors, soil nails, shoring walls, batters, retaining walls and the like), foundation structures (such as footings, bored piles, piers and the like) and all permanent structures and buildings, above and below ground. Note, this technical information may be required where the development proposal includes retaining structures, such as a basement or retaining walls adjacent to the light rail corridor that extends into the zone of influence (refer Figure 5) and/or involves temporary and permanent retention systems. Guidance on preparing structural engineering drawings for retaining structures is provided in Part D: Supporting information, Appendix 3.
- A **RPEQ vibration monitoring and management plan** which investigates any demolition, excavation and construction work impacts on the light rail corridor and light transport infrastructure such as tunnels, retaining walls and retaining structures. Note, this may be required post detailed design stage. Guidance on preparing a vibration and movement plan is provided in Part D: Supporting information, Appendix 4.
- **Dilapidation surveys** of the light rail transport infrastructure demonstrating there has been no worsening impact on the pre-development condition of the light rail transport infrastructure. Guidance on preparing dilapidation surveys and the extent of the survey area is provided in Part D: Supporting information, Appendix 6.

Note, if dilapidation surveys are required, the pre-survey report should be submitted prior to the commencement of demolition and construction works. The post-survey report will be required to be submitted to TMR within 10 business days of the completion of works.

Performance outcome 10

Acceptable outcomes have been provided for this performance outcome. The application can demonstrate it is compliant with the acceptable outcomes by providing:

- **Technical information** demonstrating that fill material from the development is free of contaminants. The testing of soil or rocks should be undertaken in accordance with *AS1289 – Methods of testing soils for engineering purposes* and *AS 4133-2005 – Methods of testing rocks for engineering purposes*.
- **Technical information** about the fill compaction methods that will be used during construction of the development and their consistency with the requirements of *AS 1289.0 2000 – Methods of testing soils for engineering purposes*.

Performance outcome 11

Acceptable outcomes have been provided for this performance outcome. The application can demonstrate it is compliant with the acceptable outcomes by providing:

- Supporting information about the fill compaction methods that will be used during construction of the development and their consistency with the requirements of *AS 1289.0 2000 – Methods of testing soils for engineering purposes*.
- Supporting information about the dust suppression measures which will be used during filling and excavation activities to prevent wind-blown dust nuisance.

2.3 Stormwater and drainage

The content in this section supports the POs outlined in:

State code 4: Development in a light rail environment

- Table 4.2.1: Development in a light rail environment
 - Stormwater and drainage (**PO12-PO13**)

What is the issue?

Stormwater and drainage impacts associated with development have the potential to adversely impact the safety and operational integrity of a light rail corridor or light rail transport infrastructure.

Development including works during construction and operation has the potential to:

- concentrate stormwater flows or increasing flood levels resulting in a worsening of impacts or an actionable nuisance
- increase run off from the development causing sedimentation which interferes with and/or causes damage to light rail transport infrastructure. This affects the operational integrity and safety of light rail transport infrastructure.
- cause erosion which results in the de-stabilisation of a light rail corridor or light rail transport infrastructure.

Adverse impacts can be caused by changes to peak discharge, flood levels, the frequency/duration of flooding, flow velocities, water quality, sedimentation and scour effects.

What is the objective?

The objective of these provisions is to ensure:

- development does not create a safety hazard for users of a light rail
- development does not compromise the structural integrity of a light rail corridor, light rail transport infrastructure or light rail transport infrastructure works
- development does not compromise the state's ability to maintain and operate light rail, or significantly increase the cost to maintain and operate light rail.

How to achieve the performance outcomes

Performance outcome 12

No acceptable outcome has been provided. Therefore, an application must demonstrate compliance with the performance outcome. Demonstrating compliance with the performance outcome may include but is not limited to, providing the following:

- **Basic stormwater information** to enable development assessment officers to establish whether the proposed development will result in stormwater and drainage impacts on a light rail corridor. Guidance on preparing basic stormwater information is provided in Part D: Supporting information, Appendix 7.
- **A RPEQ certified stormwater management plan** including a flood impact assessment where relevant, that demonstrates the development will not result in an actionable nuisance or worsening of stormwater, flooding or drainage impacts in a light rail corridor. Guidance on preparing a stormwater management plan is provided in Part D: Supporting information, Appendix 8.

Performance outcome 13

An acceptable outcome has been provided for this performance outcome. An application can demonstrate compliance with the acceptable outcome by providing basic stormwater information demonstrating that stormwater will not be discharged to stormwater infrastructure for a light rail corridor. Guidance on preparing basic stormwater information is provided in Part D: Supporting information, Appendix 7.

If an application does not comply with the acceptable outcome, details of the alternative means of meeting the performance outcome should be provided. This may include but not limited to, providing the following:

- **Basic stormwater information** to enable development assessment officers to establish whether the proposed development will result in stormwater and drainage impacts on a light rail corridor. Guidance on preparing basic stormwater information is provided in Part D: Supporting information, Appendix 7.
- **A RPEQ certified stormwater management plan**, including an erosion and sediment control plan, that demonstrates the development will not result in an actionable nuisance or worsening of stormwater, flooding or drainage impacts in a light rail corridor. Guidance on preparing a stormwater management plan is provided in Part D: Supporting information, Appendix 8. An erosion and sediment control plan should be prepared in accordance with:
 - Chapter 13 of the *Road Drainage Manual*, TMR, 2015
 - the *Best Practice Erosion and Sediment Control Document*, International Erosion Control Association, Australasia.

2.4 Vehicular access to a light rail corridor

The content in this section supports the POs outlined in:

State code 4: Development in a light rail environment

- Table 4.2.1: Development in a light rail environment
 - Access (**PO14**).

What is the issue?

Vehicle movement in and around the light rail environment can potentially result in collisions between light rail vehicles and private vehicles, as well as causing damage to property and risk to public safety. In addition, vehicles traversing across the light rail corridor can impact on the efficiency of light rail resulting in service disruptions.

What is the objective?

The objective of the provisions is to ensure:

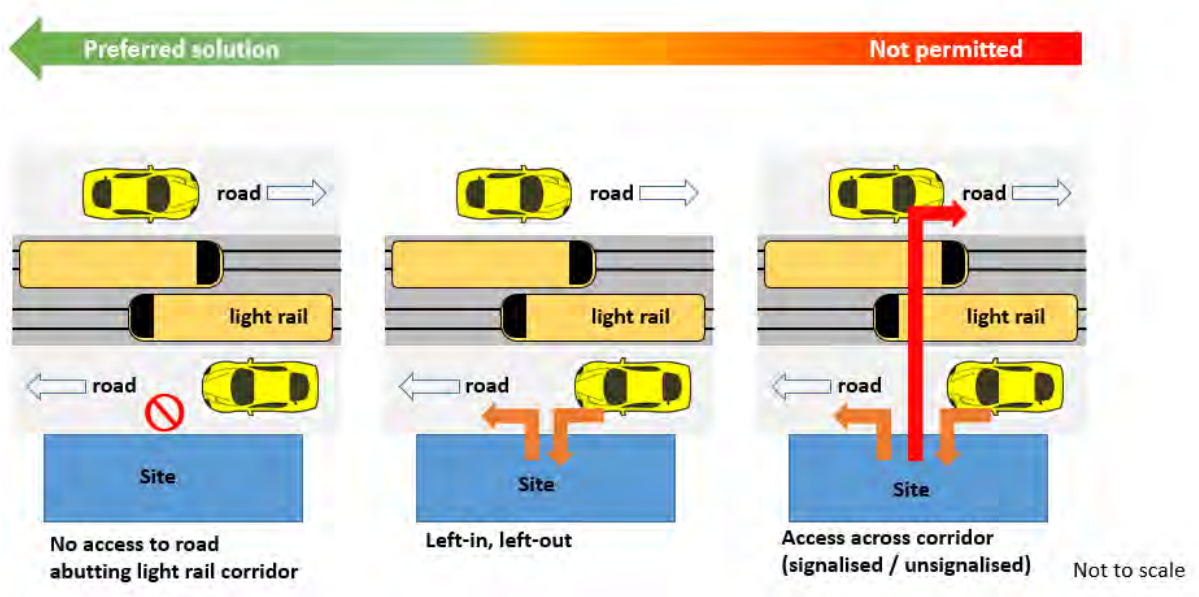
- development does not create a safety hazard for users of a light rail
- development does not compromise the state's ability to maintain and operate light rail.

The safety of people, pedestrians, private vehicles and light rail transport infrastructure can be safeguarded by appropriately managing access to the light rail corridor. In terms of managing access, TMR has adopted a hierarchy of preferred vehicle access configuration:

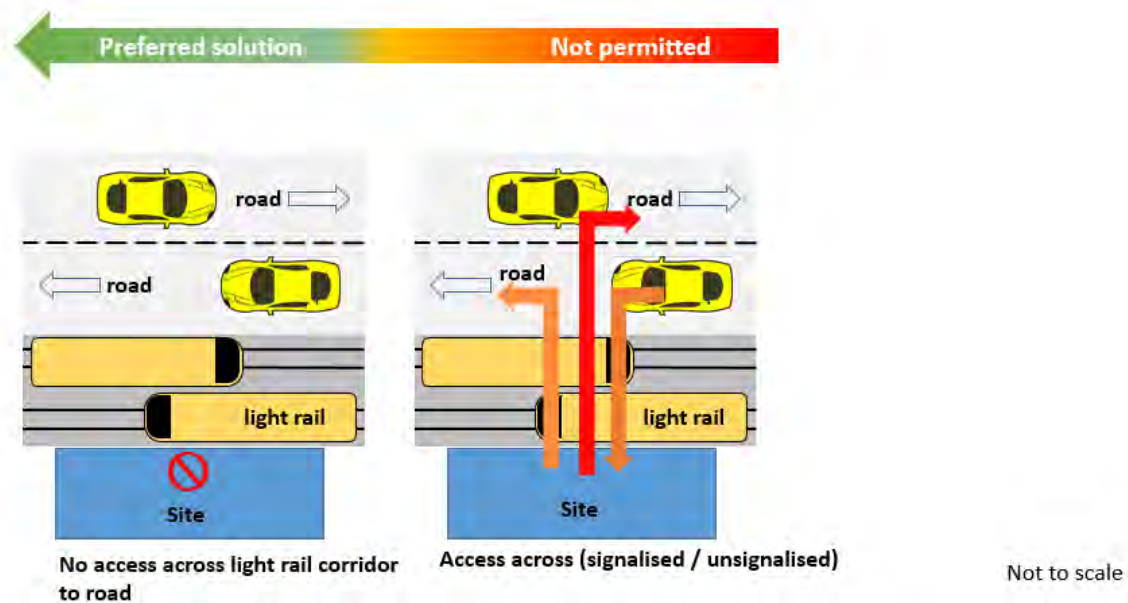
- avoiding access to the light rail corridor where access to an alternative road is available
- where access is required to the light rail corridor, requiring a left-in, left-out turning movement configuration
- where access is required across the light rail corridor, ensuring access (whether signalised or un-signalised) achieves appropriate safety and network efficiency objectives.

The preferred vehicle access configuration is illustrated below:

- **Scenario 1:** shows the preferred solution for properties abutting a road located adjacent to a light rail corridor



- **Scenario 2:** shows the preferred solution for properties directly abutting a light rail corridor and within the light rail hazard zone.



How to achieve the performance outcome

Performance outcome 14

Acceptable outcomes have been provided for this performance outcome. The application can demonstrate it is compliant with the acceptable outcomes by providing:

- **a site plan** showing the location of any existing or proposed vehicle access points to the development and the light rail corridor in proximity to the subject site.
- **supporting information** demonstrating that:
 - development does not involve new or changed access between the premises and the light rail corridor, or
 - vehicular access is configured for left in and left out turning movements only where the property directly abuts a road that is adjacent to the light rail corridor, and
 - on site vehicle circulation is designed to give priority to entering vehicles at all times.

It should be noted that vehicle movements across light rail tracks from a property facing light rail tracks will not be permitted unless exceptional circumstances exist. An example of an exceptional circumstance may be that a subject site cannot be accessed (i.e. will be landlocked) without crossing the light rail tracks.

2.5 Access to public passenger transport infrastructure and services

The content in this section supports the POs outlined in:

State code 4: Development in a light rail environment

- Table 4.2.1: Development in a light rail environment
 - access to public passenger transport infrastructure (**PO15**).

What is the issue?

The design and construction of a development can damage or interfere with public passenger transport infrastructure or public passenger services. In addition, the design and construction of a development can impede the ability of pedestrians and cyclists to access transport infrastructure and services.

What is the objective?

The objective of this provision is to ensure development does not adversely impact public passenger transport infrastructure and maintains safe, efficient and legible pedestrian and cyclist access to light rail stations and other public passenger transport infrastructure.

A development proposing to alter the gradient of paths and access ramps to a light rail station would be unlikely to meet the objective of this performance outcome as it would impede public access and disability access to light rail transport infrastructure.

How to achieve the performance outcome

Performance outcome 15

Acceptable outcomes have been provided for this performance outcome. To demonstrate compliance with the acceptable outcomes it is recommended the following information is provided as part of an application:

- **A site plan** of the development showing the location of proposed vehicle access points to the development, existing public passenger transport infrastructure and services, and existing and proposed pedestrian and cycle access to the public passenger transport infrastructure.
- **Information and plans** showing how the development will maintain safe, efficient and legible access to public passenger transport infrastructure for pedestrians and cyclists.
- **RPEQ certified traffic information** demonstrating how vehicle access, vehicular circulation, swept paths and development generated traffic will not compromise the safety, efficiency and operation of public passenger transport services and infrastructure.
- **A construction management plan** outlining:
 - how impacts on public passenger transport infrastructure such as bus stops and pedestrian and cycle paths will be mitigated during the construction of the development
 - proposed consultation with the TMR's TransLink Division and any other relevant third parties regarding temporary arrangements affecting public passenger transport services and routes.

Guidance on preparing a construction management plan is provided in Part D: Supporting information, Appendix 10.

If an application does not comply with the acceptable outcome, details of the alternative means of meeting the performance outcome should be provided.

2.6 Planned upgrades

The content in this section supports the PO outlined in:

State code 4: Development in a light rail environment

- Table 4.2.1: Development in a light rail environment
 - Planned upgrades (**PO16**)

What is the issue?

Development, especially buildings, structures and operational works, can affect the state's ability to construct planned upgrades to existing light rail transport infrastructure. In particular, buildings, structures and operational works can impact the form, cost and delivery of light rail transport infrastructure.

A planned upgrade can include any extension, upgrade or duplication of light rail transport infrastructure for which affected land has been identified in a publicly available government document, or in written advice to affected land owners. Land required for planned upgrades is identified in the [DA Mapping System](#).

What is the objective?

The objective of the provision is to ensure that development does not compromise the State's ability to cost effectively deliver planned upgrades to existing light rail transport infrastructure.

How to achieve the performance outcome

Performance outcome 16

Five acceptable outcomes have been identified as a way for applications to meet the performance outcome. If a development does not involve land required for a planned upgrade an application may be able to demonstrate compliance with the first two acceptable outcomes. An alternative is the application can demonstrate it complies with all of the final three acceptable outcomes.

To demonstrate compliance with the acceptable outcomes it is recommended the following information is provided as part of an application:

- **Scaled and sufficiently detailed plans** clearly showing:
 - all aspects of the proposed development (buildings, structures and works and their setbacks) in relation to the planned upgrade
 - the boundaries of the area of land affected by the planned upgrade in relation to the site boundaries.
- **Supporting information** detailing which buildings, structures or works are temporary including information on when and how structures will be removed from the site or demolished.
- **RPEQ certified earthworks drawings** demonstrating the development does not involve filling and excavation of, or substantial changes to land affected by the planned upgrade. Guidance on preparing earthworks drawings is provided in Part D: Supporting information, Appendix 2.
- **Supporting information** demonstrating how TMR's future infrastructure has been considered in the site layout of the development.

If an application does not comply with the acceptable outcomes, details of the alternative means of meeting the performance outcome should be provided.

2.7 Environmental emissions

2.7.1 Noise

The content in this section supports the POs outlined in:

State code 4: Development in a light rail environment

- Table 4.2.2: Environmental emissions
 - Noise (**PO17-PO21**)

What is the issue?

Light rail transport infrastructure and light rail vehicles generate noise. Noise can have an adverse impact on the health, wellbeing and quality of life of communities located in a light rail corridor environment if development is not located, designed and constructed to reduce the exposure of occupants of the affected buildings to noise from light rail operations and infrastructure.

What is the objective?

The objective of the provisions is to ensure that development affected by noise from light rail transport infrastructure is designed and constructed in a way that reduces the community's exposure to adverse noise impacts.

How to achieve the performance outcomes

Important note: Where a light rail is co-located in the same transport corridor as a state-controlled road, development should instead comply with Table 1.2.2 Environmental emissions of *State code 1: Development in a state-controlled road environment*.

Where a light rail is co-located in the same transport corridor as a railway, development should instead comply with Table 2.2.2 Environmental emissions of *State code 2: Development in a railway environment*.

Performance outcomes 17 – 21

Applications proposing new sensitive uses are responsible for ensuring significant noise impacts on the proposed development are mitigated to appropriate levels. Sensitive uses are accommodation activities, educational establishments, child care centres and hospitals.

To demonstrate compliance with the acceptable outcomes, specific information about the proposed development and surrounding acoustical environment must be provided with an application in order for the State to determine whether the development can mitigate noise to acceptable levels for residents, visitors, workers and patrons.

The type of information that needs to be provided with an application depends on the extent to which the proposed development is likely to be affected by noise generated by transport operations and infrastructure. The State has sought to minimise the costs of demonstrating compliance with noise criteria by only requiring detailed noise assessment reports to be prepared when there is a medium to high probability of the development being impacted by noise from transport operations and infrastructure.

Table 2 identifies the likelihood of a development being adversely impacted by noise (based on the type and location of the proposed development) and the corresponding level of information, which must be provided with an application.

Probability of Impact	Development Proposed	Information Required
Low	Development not involving a sensitive use.	Standard information
	Development involving a sensitive use that is located greater than 100 metres from a light rail corridor.	
Medium	Development involving a sensitive use impacted by noise generated from light rail transport infrastructure but the level of impact does not exceed the relevant criteria for the development listed in the <i>Environmental Emissions Policy</i> .	A report outlining the noise assessment findings and conclusions. (Noise Assessment Report - Part A)
High	Development involving a sensitive use that is located within 100 metres of a light rail corridor and the level of impact will exceed the relevant noise criteria for the development listed in the <i>Environmental Emissions Policy</i> .	A report detailing the noise attenuation measures required as per the results of Part A. (Noise Assessment Report - Part A and Part B)

Table 2 Information required as part of a development application

For **low impact** development, an application should include the following supporting information:

- the type of development proposed (i.e. whether the development is a sensitive use)
- the intensity of development proposed (e.g. maximum floor area, maximum building height)
- the location of development on the subject site
- building layouts showing sensitive areas and uses and their distance from a light rail corridor
- contours for the subject site and transport corridor showing any physical embankments/buildings/existing noise barriers located between the light rail corridor and the proposed buildings
- the volume of traffic using the light rail corridor daily. This can be obtained from TMR.

For **medium impact** development an application should be supported by a Noise Assessment Report Part A, prepared by an appropriately qualified acoustic consultant and certified by a RPEQ, and which demonstrates the relevant noise criteria will not be exceeded and therefore no attenuation measures are required. Note, where the Noise Assessment Report Part A demonstrates the relevant noise criteria will be exceeded, a Noise Assessment Report Part B will need to be prepared. Guidance on preparing a Noise Assessment Report is provided in Part D: Supporting information, Appendix 9.

For **high impact** development an application should be supported by a Noise Assessment Report Part A and Part B, prepared by an appropriately qualified acoustic consultant and certified by a RPEQ, and which demonstrates that noise attenuation treatments can be included in the development to ensure that noise levels are reduced to an acceptable level. Guidance on preparing a Noise Assessment Report is provided in Part D: Supporting information, Appendix 9.

Application of noise criteria in development assessment

The performance outcomes in SDAP include three types of criteria for noise generated by light rail operations and infrastructure:

- a) external (façade corrected) noise criteria for buildings
- b) external (free field) noise criteria for outdoor spaces for passive recreation, outdoor education areas and outdoor play areas, and
- c) internal noise criteria.

The impact of noise generated by light rail operations and infrastructure external to buildings is a prime concern. These areas are the building facades, outdoor areas for passive recreation, outdoor education areas and outdoor play areas. The external criteria are therefore referred to as the 'primary noise criteria', while the internal criteria are referred to as the 'secondary noise criteria'.

Where a new sensitive development is proposed on land near light rail operations and infrastructure and an application is referred to the state for assessment, the state will seek to ensure that the primary noise criteria are achieved in the first instance. By way of example, if a new childcare centre is proposed next to a light rail, the state will require the application to demonstrate that the following noise criteria can be achieved:

- a) at all facades: ≤ 55 dB(A) Leq (1h) facade corrected (maximum hour during normal opening hours)
- b) in all outdoor education areas and outdoor play areas: ≤ 52 dB(A) Leq (1h) free field (maximum hour during opening hours).

In some circumstances, where the noise criteria for building facades (facade corrected) can be achieved, the criteria for outdoor areas for passive recreation, outdoor education areas and outdoor play areas may be achieved simultaneously. This is because the building façade criteria is always more stringent than the criteria for outdoor spaces for passive recreation, outdoor education areas and outdoor play areas. The logic follows that if the more stringent criteria can be achieved, the less stringent criteria is likely to be achieved also.

The state will only apply noise criteria for outdoor space for passive recreation, outdoor education areas and outdoor play areas where these types of open space are included in a development proposal.

The primary noise criteria in SDAP can be achieved using noise barriers, earth mounds, separation distances/setbacks, topography and site design (building location and orientation) (see section 7.2 of the Environmental Emissions Policy for more information on these strategies).

However, near a light rail corridor, when a new sensitive development is proposed and a noise barrier is technically feasible and reasonable, it will always be TMR's preferred method for achieving the primary noise criteria. This means that the state will require the proponent of a development near a light rail corridor to provide a noise barrier as a condition of development approval where it is both technically feasible and reasonable.

In contrast, construction of large noise barriers and earth mounds are generally not supported on sites in the vicinity of a light rail station due to safety and security concerns. Applicants should refer to the Crime Prevention through Environment Design Guidelines for Queensland (CPTED Guidelines) for more information about designing environments to lessen or prevent the incidence of crime. The CPTED Guidelines are available from Queensland Police.

Where an application can demonstrate that the primary noise criteria can be achieved with recommended noise attenuation treatments, compliance with the secondary noise criteria in SDAP will not be assessed by the state.

Where an application cannot demonstrate compliance with the primary noise criteria (façade corrected), the state will take into consideration whether the secondary criteria can be achieved with recommended noise attenuation treatments. In some circumstances the secondary criteria will not be achievable without the use of noise barriers, earth mounds and/or separation distances/setbacks to reduce the impact of noise emissions at the building facade.

An application which demonstrates compliance with the secondary noise criteria must still demonstrate that significant adverse impacts on the development's outdoor space for passive recreation, outdoor education areas and outdoor play areas will be attenuated to the maximum extent practicable and explain why further attenuation measures to achieve the primary criteria were not considered to be reasonable, feasible or cost effective to the satisfaction of the state.

2.7.2 Vibration

The content in this section supports the PO outlined in:

State code 4: Development in a light rail environment

- Table 4.2.2: Environmental emissions
 - Vibration (**PO22**)

What is the issue?

Light rail transport operations have the potential to generate vibration which can have an adverse impact on the treatment of patients in hospitals. In particular, patient care areas in hospitals must be located, designed and constructed to reduce or mitigate exposure to vibration from light rail operations and infrastructure.

What is the objective?

The objective of the provisions is to ensure that patient care areas in hospitals are developed in a way that reduces these area's exposure to adverse vibration impacts from light rail transport infrastructure.

How to achieve the performance outcome

Performance outcome 22

An acceptable outcome has been provided for this performance outcome. An application can demonstrate compliance with the acceptable outcome by providing a RPEQ certified vibration assessment report which demonstrates that the vibration dose values in patient care areas of hospitals does not exceed the levels specified in the acceptable outcomes.

If an application does not comply with the acceptable outcome, details of the alternative means of minimising vibration impacts from a light rail in patient care areas should be provided.

2.7.3 Light

The content in this section supports the PO outlined in:

State code 4: Development in a light rail environment

- Table 4.2.2: Environmental emissions
 - Light (**PO23**)

What is the issue?

Light emissions from light rail operations have the potential to have an adverse impact on the health, wellbeing and quality of life of nearby communities. In particular, development should be located, designed and constructed to reduce or mitigate the community's exposure to light emissions from light rail operations and infrastructure.

What is the objective?

The objective of these provisions is to ensure that hospitals and accommodation affected by light from light rail transport infrastructure is developed in a way that reduces the community's exposure to adverse light impacts.

How to achieve the performance outcome

Performance outcome 23

An acceptable outcome has been provided for this performance outcome. To demonstrate compliance with the acceptable outcome it is recommended an application provide the following information:

- **building layout plans and designs** demonstrating that the number of windows or transparent/translucent panels facing a light rail have been minimised, and/or that windows for habitable rooms do not face the light rail, or that windows facing a light rail include treatments, such as blinds or curtains that enable light from a light rail to be blocked during the night time hours.

3. Development in a future light rail environment

The content in this section supports the POs outlined in:

State code 4: Development in a light rail environment

- Table 4.2.3 Development in a future light rail environment
 - Development in a future light rail environment (**PO24 - 27**)

What is the issue?

The Queensland Government is responsible for planning future transport infrastructure to meet community needs. This process involves undertaking studies and technical assessments to identify land on which transport infrastructure will be built in future. Future transport infrastructure may be constructed on greenfield sites (that is, land that has never been developed) or brownfield sites (that is, land that has already been developed for other uses).

The state's objective is to provide transport infrastructure for the community as cost effectively as possible. Certain types of development on land that has been identified as required for future transport infrastructure can affect the state's ability to achieve this objective. For example:

- Construction of permanent and/or large scale buildings and structures which have to be demolished to construct transport infrastructure increases project costs.
- Intensification of land use on a site can increase the cost to the state to acquire land required for transport infrastructure.
- Operational works can destabilise land so that it can no longer support transport infrastructure in future, or may result in considerable works needing to be undertaken to re-stabilise land so that it can support transport infrastructure.
- Impacts from development such as stormwater runoff and groundwater seepage can lead to the need for costly engineering solutions to ensure the safety of transport infrastructure constructed on the land.

The state also acknowledges that displacement of existing land uses for new transport infrastructure can have adverse impacts on affected land owners. Therefore, the state also aims to reduce impacts on affected land owners by minimising conflicts between development proposals and future transport infrastructure planning as much as possible.

Land required for a future light rail corridor is identified in the [DA Mapping System](#).

What is the objective?

The objective of the provisions is to ensure that development does not compromise the state's ability to cost effectively deliver new light rail transport infrastructure and to minimise the state's impact on land owners affected by future transport infrastructure plans.

How to achieve the performance outcomes

Performance outcome 24

Five acceptable outcomes have been identified as a way for applications to meet the performance outcome. If the development is not on the section of land required for a future light rail corridor, an application may be able to demonstrate compliance with the first two acceptable outcomes. An

alternative is the application can demonstrate it complies with all of the final three acceptable outcomes.

To demonstrate compliance with the acceptable outcomes it is recommended the following information is provided as part of an application:

- **Scaled and sufficiently detailed plans** clearly showing:
 - all aspects of the proposed development (buildings, structures and works and their setbacks) in relation to the future light rail corridor
 - boundaries of the future light rail corridor in relation to the site boundaries.
- **Supporting information** detailing which buildings, structures or works are temporary including information on when and how structures will be removed from the site or demolished.
- **Supporting information** demonstrating how TMR's future infrastructure has been considered in the site layout of the development.
- **RPEQ certified earthworks drawings** demonstrating the development does not involve filling and excavation of or material changes to the future light rail. Guidance on preparing earthworks drawings is provided in Part D: Supporting information, Appendix 2.

If an application does not comply with the acceptable outcomes, details of the alternative means of meeting the performance outcome should be provided.

Performance outcome 25

This purpose of this performance outcome is to ensure filling, excavation, building foundations and retaining structures do not undermine, cause subsidence, or groundwater seepage into, a future light rail corridor. No acceptable outcomes have been provided. Therefore, an application must demonstrate compliance with the performance outcome. Demonstrating compliance with the performance outcome may include, but is not limited to, providing the following:

- **A RPEQ certified geotechnical assessment** identifying the sub-surface profile and providing recommendations for the structural engineering design of the development. Guidance on preparing a geotechnical assessment is provided in Part D: Supporting information, Appendix 1.
- **RPEQ certified earthworks drawings.** Guidance on preparing earthworks drawings is provided in Part D: Supporting information, Appendix 2.
- **RPEQ certified drawings** showing the structural engineering design of building foundations and retaining structures. This should detail the design of temporary retaining structures (such as rock anchors, soil nails, shoring walls, batters, retaining walls and the like), foundation structures (such as footings, bored piles, piers and the like) and all permanent structures and buildings, above and below ground. Guidance on preparing structural engineering drawings for retaining structures is provided in Part D: Supporting information, Appendix 3.
- **A RPEQ certified groundwater monitoring and management plan** which investigates construction impacts (including earthworks, boring, piling and the like) on the future corridor. The plan should establish a management and monitoring program which ensures the future corridor is not adversely affected by the construction of the development. Note: this may be required post detailed design stage. Guidance on preparing a groundwater monitoring and management plan is provided in Part D: Supporting information, Appendix 5.

For further information on the issues associated with filling, excavation and retaining structures see Part B section 2.2 of this guide.

Performance outcome 26

Acceptable outcomes have been provided for this performance outcome. An application can demonstrate compliance with the acceptable outcome by providing a statement certified by an RPEQ:

- Showing fill, spoil or any other material associated with the development is free of acid sulphate content. The testing of soil or rocks should be undertaken in accordance with *AS1289 – Methods of testing soils for engineering purposes* and *AS 4133-2005 – Methods of testing rocks for engineering purposes*.
- Detailing the methods of compaction which will be used and that it is in accordance with *AS1289.0 2000 – Methods of testing soils for engineering purposes*.

Performance outcome 27

No acceptable outcome has been provided. Therefore, an application must demonstrate compliance with the performance outcome. Demonstrating compliance with the performance outcome may include, but is not limited to, providing the following:

- **Basic stormwater information** to enable development assessment officers to establish whether the proposed development will result in stormwater and drainage impacts on a future light rail corridor. Guidance on preparing basic stormwater information is provided in Part D: Supporting information, Appendix 7.
- A **RPEQ certified stormwater management plan** including a flood impact assessment where relevant, that demonstrates the development will not result in an actionable nuisance or worsening of stormwater, flooding or drainage impacts in a future light rail corridor. Guidance on preparing a stormwater management plan is provided in Part D: Supporting information, Appendix 8.

For further information on the issues associated with stormwater and drainage see Part B section 2.3 of this guide.

4. Other technical considerations

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

4.1 Stray current

Direct current (DC) traction power systems such as those employed by light rail systems can be a source of stray current. Stray current is current used to operate a light rail vehicle that would normally return to a light rail traction power station via the light rail tracks. In some cases this current leaves the tracks and travels through the ground or through other metal assets running parallel to the tracks.

Where stray current leaves a metal asset it has the potential to cause electrolysis corrosion to the metal on that asset. In some circumstances damage to metal assets may represent a safety concern for people, for example, where a hole may develop in a pipe which then fails. The impacts of stray current may be relevant for structures such as underground car parks, retaining walls, bridges, electricity and telecommunication cables, and pipelines such as gas, oil and water pipelines.

In addition, development should avoid generating new sources of stray current which may impact on light rail transport infrastructure and light rail transport infrastructure works.

Where a development includes a structure that incorporates continuous metal components (for example, reinforcing steel, handrails etc.) in excess of 75 metres in length adjacent to a light rail corridor, an application should include a stray current report certified by a chartered professional engineer. The stray current report should include:

- an assessment of the risk to the development from existing or likely levels of stray current
- where such a risk exists, propose mitigation measures to be provided by the development. Mitigation measures may include (but are not limited to) selection of suitable building materials such as non-metal finishes for infrastructure in the vicinity of a light rail corridor, as well as use of monitoring points, drainage bonds or cathodic protection systems.

It is strongly recommended that applicants consult with the light rail manager in assessing the stray current risk and in formulating mitigation measures.

Part C. Advice for works in the light rail corridor

1. Overview

The purpose of Part C of the Light Rail Guide is to provide information about the constraints and requirements for undertaking works within a light rail corridor. The type of work may include site access, construction over light rail land or works where any machine could come within the light rail hazard zone.

The timing for when applicants should seek approval to carry out works within a light rail corridor will depend on the nature of the development. It is recommended the light rail manager be contacted early in the planning stages of a development. Section 1.2 of this guide provides further information about the development process.

It is important to note the information outlined in this part is intended as general guidance only. The appropriate procedures and processes should be confirmed with the light rail manager prior to undertaking any works.

2. Interfering with light rail transport infrastructure

The following section provides guidance regarding undertaking works which can potentially interfere with a light rail corridor or light rail transport infrastructure. Section 362 of the *Transport Infrastructure Act 1994* establishes that a person must not interfere with light rail transport infrastructure or light rail transport infrastructure works (for example, by carrying out works or undertaking activities) unless they have obtained the written approval of the relevant light rail manager.

2.1 Approval for works in a light rail corridor

Authorisation from the relevant light rail manager is needed prior to any works being undertaken in a light rail corridor. For the Gold Coast light rail, the light rail manager is GoldlinQ.

All work in and around the light rail corridor, particularly works within the light rail hazard zone or within 6m of the edge of the hazard zone, need to be carefully considered.

Examples of works which will need approval include:

- construction or maintenance works including overhead crane operations
- bore works or excavations beneath light rail tracks or within 3 metres of any pole supporting OHLE
- erecting or dismantling scaffolding
- maintenance or extensions to awnings and other overhead structures including advertising signs
- landscaping and maintenance of vegetation
- activities such as outdoor dining and other pedestrian activity
- development within the zone of influence
- any work or activity where any part of the subject site, or any tools, material, machine, suspended load, or any person, is within the light rail hazard zone
- any work or activity which will force pedestrians to be diverted into the light rail hazard zone

- any work or activity which may obscure light rail vehicle sight lines, for example, signage or structures.

How to get authorisation

Written approval can be obtained by directly contacting the relevant light rail manager. To apply to undertake work on or near the Gold Coast light rail corridor, applicants must submit a G:link Work Request Form. This form is available to be downloaded at www.RideTheG.com.au

Typically, the information required to support an application for authorisation includes:

- location of works
- timeframe for works
- scope of works and equipment to be used
- company name, contact name and contact details including phone number
- work method statement
- other information deemed necessary when undertaking a worksite safety assessment.

In addition, an applicant may be required to provide a construction management plan demonstrating that there will be no disruption to the light rail during the course of the construction. Guidance on preparing a construction management plan is provided in Part D: Supporting information, Appendix 10.

3. Safe work arrangements

The safety of light rail operations and workplace health and safety in the light rail environment are paramount. Light rail managers have safety policies which extend to all works undertaken by third parties in the light rail environment. It is recommended that applicants liaise with the relevant light rail manager to ascertain safety requirements prior to works commencing.

Any application for work within the light rail corridor must demonstrate safety issues in the light rail corridor have been considered. Some of the information that may need to be provided includes:

- a work health and safety management plan
- a safe work method statement
- a site supervision plan as agreed with the light rail manager, including the use of specialist safety personnel, such as protection officers, lookouts and electrical supervisory staff
- copies of appropriate insurances and indemnities.

3.1 Safety liaison representative

Depending on a light rail 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 light rail corridor
- coordinating and programming the contractor's work in the corridor
- receiving directions from the light rail manager's superintendent, the site protection supervisor or protection officers on matters relating to the safety of the operating light rail
- 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 the subject site at all times while works are being undertaken in the light rail corridor. If the safety liaison representative leaves the site at any time while works are being undertaken, a competent relief representative must be appointed.

3.2 Design risk assessment

A design risk assessment (which incorporates a safe design and risk management approach) may need to be undertaken to ensure that works are designed to minimise risks to the health and safety of persons who:

- construct the works
- operate and maintain the works
- use the light rail transport infrastructure including adjoining development
- demolish and dismantle the works.

This is a legislative requirement in accordance with:

- *Work Health and Safety Act 2011*
- *Safe Design of Structures - Code of Practice 2013.*

3.3 Site supervision requirements

Where works or activities are being carried out in a light rail corridor, it may be necessary for the works to be carried out under the direction of the light rail manager to ensure the safety of the operating light rail. The officer assigned by the light rail manager 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.

3.4 Emergency procedures and contacts

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

Where works obstruct the track unexpectedly, if anyone or anything comes into contact with the OHLE, or if light rail transport infrastructure is damaged, the light rail manager's control room must be immediately informed. The control room can be contacted at any time by, for example, using emergency help points at light rail stations, or asking a member of staff or emergency services personnel. The light rail manager will provide control room contact details prior to any works commencing near the light rail corridor.

3.5 Trespassing on light rail

In accordance with section 377 of the Transport Infrastructure Act, a person must not be on light rail land, light rail transport infrastructure or a site where light rail transport infrastructure works are situated unless the person has relevant permission to do so from the light rail manager or a delegated officer from TMR.

4. Interface agreements

Where any works require modification to, or interference with, light rail transport infrastructure or light rail transport infrastructure works, the light rail manager may recommend the applicant enter into an interface agreement. The meaning and scope of transport interface agreements are set out in the Transport Infrastructure Act.

An interface agreement may require the works (including the design) and certification be undertaken by the light rail manager. An interface agreement may also seek to recover the light rail manager's costs associated with modifying or interfering with light rail transport infrastructure or light rail transport infrastructure works. In addition to design and construction costs, these costs may also include:

- additional project specific insurance
- cost of operational impact on the light rail manager/operator caused by the development (e.g. delayed services)
- design and technical assessments
- documentation update costs.

5. Works in the vicinity of overhead line equipment

A light rail manager is an electrical entity under the *Electrical Safety Act 2002* and must be contacted before any work within the light rail hazard zone commences. Any instructions given by the light rail manager on how to perform the work around the overhead line equipment (OHLE) must be complied with in full.

In some circumstances, the light rail manager may undertake all work on the OHLE required to facilitate the development and charge the costs to the proponent.

As none of the components on the OHLE have protective covering, they are potentially dangerous, and people should not encroach into light rail hazard zone (see section A.1.3.1) either directly or indirectly with any item of material or equipment without appropriate approval.

All OHLE must always be regarded as energised with 750V DC of electricity unless an isolation has been carried out and a permit to work has been issued to the trained authorised person.

In some circumstances, light rail managers may not permit lifting/crane operations over operational tracks or live OHLE without isolation or the erection of protective structures in the corridor that will withstand the impact of a failure in lifting operations.

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

5.1 Overhead line equipment isolations

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

An OHLE isolation may be required in the following circumstances:

- there is a risk that any part of the operation (including plant or machinery) will encroach within 3 metres of the OHLE
- there is a risk that light rail continuity or any bonding cables will be broken.

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

As isolations interfere with normal light rail operations, they must be kept to a minimum and may be scheduled at night when light rail vehicles are not running.

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

The applicant is responsible for the costs of isolations and cancellations. There may be additional associated costs, for example for alternative transport arrangements for passengers such as buses.

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

6. Dilapidation survey

An applicant may be required to schedule a dilapidation survey prior to commencement of a development where there is risk of damage to light rail infrastructure. The purpose of the survey is to record and compare the pre and post construction condition of light rail transport infrastructure.

Dilapidation surveys can be undertaken by the light rail manager, at the applicant's expense. Alternatively, subject to the satisfaction of the light rail manager, consultants with the necessary skills and expertise (for example, an appropriately experienced RPEQ certified engineer) can conduct dilapidation surveys.

If any necessary rectification works are identified, these will need to be undertaken at the applicant's expense and within TMR's stipulated timeframe. Guidance on preparing dilapidation surveys is provided in Part D: Supporting information, Appendix 6.

7. Rectification of works

The light rail manager has powers under the Transport Infrastructure Act to issue a written notice requiring rectification works to be undertaken within a stated time period if a person interferes with light rail transport infrastructure or light rail transport works without authorisation.

8. Public utility provider agreements

To ensure regular access and maintenance of existing and future public utility plants, an interface agreement between public utility providers and other relevant parties may be established.

Where an interface agreement exists between a public utility provider and TMR or a light rail manager, the interface agreement will take precedence over the Light Rail Guide.

8.1 Public utility plant in a light rail corridor

Section 366 of the Transport Infrastructure Act provides for a public utility provider to undertake works to their public utility plant on light rail land where written agreement has been received by the light rail manager and a delegated officer of TMR.

In accordance with section 366(4) of the Transport Infrastructure Act, a public utility provider may carry out urgent maintenance of public utility plant on light rail land without written agreement where reasonable steps have been taken to obtain agreement.

8.2 Public utility provider consultation with light rail authority

In the interests of coordination of mutually benefit works arrangements for government agencies and public utility providers, section 368 of the Transport Infrastructure Act provides for public utility providers to consult with light rail managers and TMR when proposing replacement of the whole or a substantial proportion of a public utility plant on light rail land.

8.3 Compliance and remedy actions for public utility providers

In accordance with section 369 of the Transport Infrastructure Act where a public utility provider undertakes works to their public utility plant without seeking the required written agreement, or where works are inconsistent with an existing interface agreement, the light rail manager and TMR may

require the public utility provider, at its cost, to take action to remedy the relevant action within a stated time period.

Should rectification works not be complied with, the light rail manager may arrange to undertake necessary action to remedy the relevant action and request recovery for the cost of these actions from the public utility provider.

8.4 Requirement for public utility providers to alter public utility plants

In accordance with section 370 of the Transport Infrastructure Act, TMR or their delegate may require a public utility provider to alter the position of a public utility plant on light rail land if it is deemed to interfere with the exercise of TMR's powers for the light rail land.

8.5 Liability for damage

Sections 372 to 374 of the Transport Infrastructure Act provide protection for TMR and light rail managers, where damage is caused to a public utility plant on light rail land. In certain circumstances, TMR and the light rail manager are not liable for damage where a public utility provider has not complied with legislative requirements.

As per section 375 of the Transport Infrastructure Act, the public utility provider may be liable to pay TMR and the light rail manager the additional expense incurred in carrying out light rail transport infrastructure works.

Part D. Supporting information

Appendix 1: Geotechnical assessment

An RPEQ certified geotechnical assessment should provide design information on the following to inform the structural engineering design and construction management of the development:

- scaled cross sections and elevations that clearly show the interface with the light rail corridor, including light rail transport infrastructure, as a result of the proposed earthworks
- scaled cross sections and elevations showing the difference between existing site levels and finished/design levels
- details of earthworks including:
 - methods for excavation
 - any excavation and drilling of rock,
 - the stability of open excavations
 - filling/back filling and compaction
- the location and extent of any proposed earthworks within the zone of influence (see figure 5 for further information)
- permanent and temporary basement retention options, design loads and geotechnical design parameters
- suitable options for foundation structures, design loads and geotechnical design parameters
- information on the effects of the development on the existing light rail transport infrastructure and relevant construction issues.

Alternatively, copies of any existing geotechnical investigations previously undertaken for the site may be provided.

Appendix 2: Earthworks drawings

Where an earthworks plan is required it should include scaled cross sections/elevations and any required supporting technical details clearly showing:

- the location/setback and extent of proposed excavation and filling works including likely volumes of cut and fill
- the interface with the light rail corridor boundary as a result of any proposed earthworks
- the difference between existing site levels and finished/design levels
- the maximum depth of any excavation in relation to the existing ground level on the site and the level of light rail transport infrastructure
- the maximum height of any proposed filling and the gradient and height of any proposed batters adjacent to the light rail corridor
- the maximum height and intended form/design of any proposed retaining walls or structures adjacent to the light rail corridor

- the outermost projections of existing light rail transport infrastructure such as soil nails and other retaining and footing structures.
- the interface with the light rail as a result of the proposed earthworks, including the difference between existing site levels and finished/design levels.

Note, where proposed excavations, filling/backfilling or retaining works will be greater than 1m in depth or height abutting the light rail, RPEQ certified drawings should be provided demonstrating that the works will not de-stabilise light rail transport infrastructure or the land supporting this infrastructure

Appendix 3: Structural engineering drawings – retaining structures

RPEQ certified structural engineering drawings for the development should provide design information on the following:

- Cross sections/elevations and any required supporting technical details showing the type, spacing, location and depth of building foundation structures (including any structures such as footings, and bored piles/piers and associated columns).
- Preliminary plans, sections and details showing the temporary and permanent retention system proposed for the development, including design, location, length, depth and angle of insertion of any proposed rock anchors and/or soil nails.
- Technical information demonstrating that any proposed temporary retention will not compromise the light rail both during construction and on-going operation, including any structural or geotechnical impacts.
- Technical information detailing the loading configuration of the proposed development. This information should demonstrate that the lateral and vertical loading implications of the proposed development will not compromise the safety and operational integrity of the light rail.
- Technical information demonstrating that any basement retention system is robust and sufficient to prevent any movements on the light rail infrastructure. This may require finite element and seepage modelling.

Appendix 4: Vibration and movement monitoring plan

Where a vibration and movement monitoring plan is required, a licensed surveyor and RPEQ should be engaged to establish an appropriate monitoring system utilising the relevant instrumentation for the purpose of vibration, surface and subsurface ground movement and structural movement monitoring (including monitoring of light rail infrastructure).

A vibration and movement monitoring plan should be prepared in accordance with the *Transport Noise Management Code of Practice, Volume 2: Construction Noise and Vibration*. A vibration and movement monitoring plan should include the following:

- an impact assessment of any potential vibration, ground movement and structural movement impacts on light rail transport infrastructure or light rail corridor from the demolition, excavation and construction works associated with the development
- the identification of vibration, ground movement and structural movement intervention levels and limits (determined in consultation with the light rail manager)

- mitigation measures to be employed during works to manage the identified risks on the light rail and details of the mitigation measures
- an alert and response plan which provides the alarm and reporting procedures, required actions, responsibilities and stop work requirements.

It is strongly recommended that an applicant consult the light rail manager when developing and implementing monitoring regimes. The light rail manager will need to be engaged (at the applicant's expense) to undertake baseline vibration, ground and structural level readings within the light rail corridor.

Appendix 5: Groundwater monitoring and management plan

Where a groundwater monitoring and management plan is required, a licensed surveyor and RPEQ should be engaged to investigate groundwater seepage, fluctuations and ground water levels adjacent to light rail transport infrastructure. A groundwater monitoring and management plan should include the following:

- controlled monitoring of groundwater (including, but not limited to, groundwater seepage, fluctuations and ground water levels adjacent to light rail infrastructure and field tests [for example, pumping tests] to confirm the water tightness of the retaining system) during construction
- identification of any changes that would adversely affect the integrity of the light rail
- identification mitigation measures to be employed during works to manage the identified risks on the light rail
- field tests to confirm the water tightness of the retaining system
- an alert and response plan which provides the alarm and reporting procedures, required actions, responsibilities and stop work requirements in the event of groundwater issues during excavation and construction works.

Appendix 6: Dilapidation Survey

The RPEQ certified pre-development dilapidation survey should be provided to TMR prior to demolition and construction works commencing. The survey should:

- identify the existing condition of light rail transport infrastructure prior to any demolition or construction works
- identify any defects (including but not limited to cracks, settlement, movement, distortion and other infrastructure defects).

The RPEQ certified post-development dilapidation survey should be conducted by a qualified consultant and provided to TMR within 10 business days of the completion of site works. The survey should:

- identify the condition of light rail transport infrastructure following demolition and construction works
- identify any damage or changes caused by the demolition and construction that is beyond the defects identified in the pre-development dilapidation survey

- identify measures necessary to be undertaken to restore or reinstate state transport infrastructure.

Generally, two dilapidation survey reports will be required; pre-development and post-development. Depending on the duration of the construction period and the manner in which the development is being constructed (for example, a staged approach), there may be a requirement for a series of dilapidation surveys to be undertaken.

Any necessary rectification works will need to be undertaken at the applicant's expense and within the timeframe specified by TMR.

Dilapidation surveys can be undertaken by the light rail manager, at the applicant's expense. Alternatively, subject to the satisfaction of the light rail manager, consultants with the necessary skills and expertise can conduct dilapidation surveys.

Extent of dilapidation survey area

The dilapidation survey area may be either:

- the nominated dilapidation survey area, or
- if detailed design work has been undertaken, an area proposed by the applicant and endorsed by TMR. If an applicant wishes to propose a survey area, the extent of the proposed area needs to be clearly shown via a plan and provided at the time a development application is lodged for assessment.

The nominated dilapidation survey area is determined using the following dilapidation survey area formula (see Figure 6 for a diagrammatical representation of the formula):

$$\text{Dilapidation survey area} = (2 \times \text{impact area } (y)) + \text{width of excavation } (w)$$

where the impact area (y) = 4 x depth of excavation (d).

This calculation considers the empirical relationship between the depth of excavation and the distance from excavation. Excavation work generally means work involving the removal of soil or rock from a site to form an open face, hole or cavity using tools, machinery or explosives.

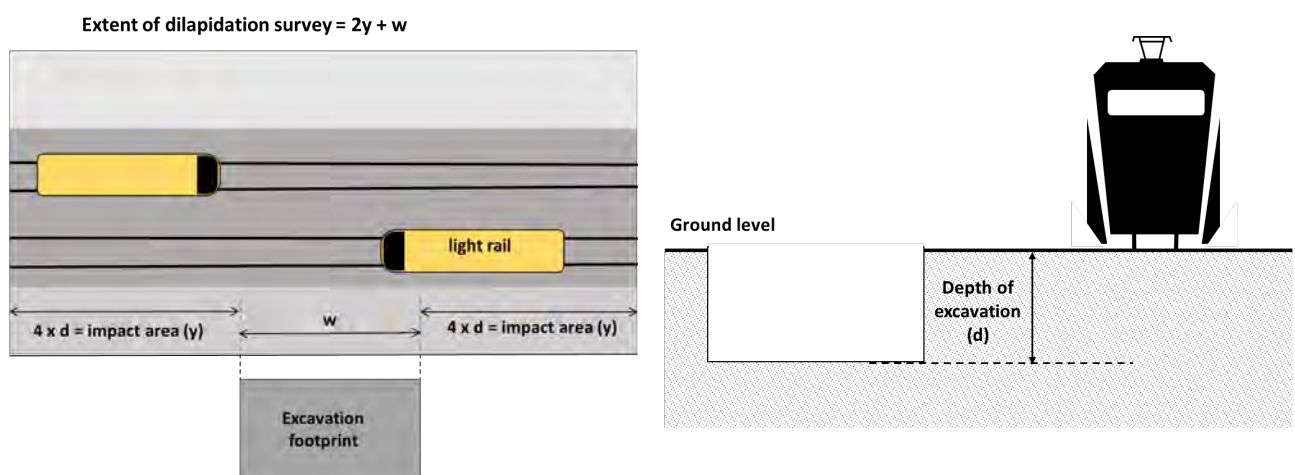


Figure 6: Nominated dilapidation survey area

Appendix 7: Basic stormwater information

Basic stormwater information (including a suitable scaled drawing) should include the following:

- Existing site topography/levels (contour information can be sourced from the relevant local government or prepared by a registered surveyor)
- The proposed finished levels for the proposed development.
- Information verifying whether the subject site is flood prone. Flood searches and mapping can often be obtained from the relevant local government
- Existing drainage infrastructure on the subject site and in the immediate surrounding area, For example, culverts or kerb and channel in surrounding roads, including 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. This information is best provided in the form of a site detail and contour survey plan prepared by a registered surveyor.
- Details of the drainage infrastructure proposed to be used to manage stormwater and connect it to the proposed point of discharge (including any devices such as pipes, downpipes, pits, detention basins, tanks and drains). The location where stormwater is proposed to be discharged should be clearly identified, preferably by a RPEQ certified drawing showing the proposed stormwater drainage design for the development with associated hydraulic calculations.
- Architectural drawings showing the proposed increase in impervious area of the subject site as a result of the development. This will include the location and extent of any proposed hardstand or sealed surfaces.

Appendix 8: Stormwater management plan

A RPEQ certified Stormwater Management Plan (water quantity and quality) should assess the potential stormwater impacts on the light rail corridor, including light rail transport infrastructure, as a result of the proposed development and recommends appropriate mitigation measures.

The Stormwater Management Plan should:

- Be prepared in accordance with the relevant performance outcomes of SDAP and with consideration given to the Queensland Urban Drainage Manual (available at <https://www.dews.qld.gov.au/water-supply-regulations/urban-drainage>).
- Demonstrate that the management of stormwater (quantity and quality) post development can achieve a no worsening impact (on the pre-development condition) for all flood and stormwater events that exist prior to development and up to a 1% Annual Exceedance Probability (AEP) (equivalent to 1/100 year Average Recurrence Interval (ARI)).
- Demonstrate that the stormwater management for the proposed development can ensure no worsening or actionable nuisance to the light rail corridor, including light rail transport infrastructure, caused by peak discharges, flood levels, frequency/duration of flooding, flow velocities, water quality, sedimentation and scour effects.
- Include details of the mitigation measures proposed to address any potential stormwater impacts (including flooding impacts) of the proposed development. The design flood peak discharges should be shown for the mitigated case to demonstrate there is no worsening impact on the light rail.

- Incorporate 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 ARI events)
 - where flood modelling is required to be undertaken, the flood model needs to be extended to encompass the light rail corridor. Mapping should be provided to illustrate the pre-development scenario, and the post development impacts for all relevant flood events.
- ensure the following are addressed where applicable:
 - all relevant legal points of discharge for the subject site are identified; note, no new discharge points for stormwater will be permitted on the existing or future light rail corridor
 - 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 subject site as part of the proposed development
 - flood storage capacity and hydraulic conveyance is maintained on the subject site as part of the proposed development
 - adverse impacts from sheet flow on the light rail corridor 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 light rail transport infrastructure
 - the proposed development does not impede or interfere with any drainage, stormwater or floodwater flows from the light rail corridor
 - stormwater or floodwater flows have been designed to maintain the structural integrity of the light rail corridor
 - existing stormwater drainage infrastructure on the light rail corridor 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 light rail corridor is not reduced through erosion and sedimentation.
- Include details of the mitigation measures proposed to address any potential stormwater impacts (including flooding impacts) of the proposed development. The design flood peak discharges should be shown for the mitigated case to demonstrate there is no worsening impact on the light rail corridor.

The flood model should encompass the existing and future light rail. Mapping should be provided to illustrate the pre-development scenario, and the post development impacts for all relevant flood events.

Appendix 9: Noise assessment

Where development includes a sensitive land use and is likely to be impacted by noise from a light rail, an applicant should provide a Noise Assessment Report demonstrating that:

- relevant noise criteria will not be exceeded and therefore no attenuation measures are required, or
- noise attenuation treatments can be included in a development to ensure that noise levels are reduced to an acceptable level.

A Noise Assessment Report seeks to ensure that any sensitive development achieves acceptable noise levels for residents and visitors by ensuring development mitigates the adverse impacts from noise generated by a light rail.

A Noise Assessment Report should adequately document and present all the data inputs, assumptions and assessment results, and noise attenuation strategies/options considered as part of the assessment. In order to limit the expense of preparing reports, a Noise Assessment Report has been split into two parts:

- Noise Assessment Report – Part A is to present the noise assessment findings. The findings and conclusion of Part A will determine whether noise attenuation measures will be required for the development
- Noise Assessment Report – Part B is to detail the noise attenuation measures required as per the results of Part A and will only need to be provided when measured noise levels exceed the relevant noise criteria for the development in the *State code 4: Development in a light rail environment*.

Where it is obvious that a development will require noise attenuation measures, it is suggested a full Noise Assessment Report (i.e. Part A and Part B) be prepared at the same time. Matters that the Noise Assessment Report should consider are outlined as follows:

Noise Assessment Report Part A – review of noise impacts

Development details

The following information is to be provided:

- description of the subject site including real property description/s and a locality plan
- architectural drawings illustrating the proposed development including building and open space layout plans, noise sensitive areas and uses, the setback distances for building facades (noise sensitive locations), proposed lot numbers (if applicable)
- drawings showing site contours and earthworks (cut and fill) information to clarify the existing topography and proposed finished levels
- confirmation of the extent and height of any existing noise barriers and their location in relation to the proposed development.

Noise measurement

The following information is to be provided:

- a summary of the noise measurement results including a layout plan depicting the site locations and positions of the noise measurements conducted for the assessment, the time of day and weekday the measurements took place
- measurement data sheets and site attendance records/site notes taken by the consultant measuring noise at each measurement site:

- all results of measurements, calculations and predictions are to be presented in a tabular format
- tabulation of calculated noise levels for all noise sensitive receptors (without noise attenuation treatments)
- noise contours or plans showing specific areas where noise criteria are exceeded:
 - the noise level exposures can be produced as noise level contours or presented in a format depicting areas where the specified noise criteria are exceeded or where the noise levels of noise sensitive receptors fall within a certain noise level range. Which format to adopt will depend on the number of factors/options/ criteria considered in the noise assessment and the type of development proposal being assessed
 - when presenting noise contours, the figure should make clear whether the noise levels are facade corrected or free field based on a grid assessment. This assessment will determine the relative accuracy of the contours compared with the facade calculations and the receptor height assumed. The maximum grid spacing shall be a 10 metre by 10 metre square depending on the accuracy required. Reference to grid spacing assessment is to be noted in the title block for each figure.

Acoustic assessment

For acoustic assessment, the following information should be provided:

- description of the investigation process in determining the noise exceedance:
 - careful interrogation of noise level contours needs to be undertaken in conjunction with the tabulated noise levels in order to clearly identify whether any of the criteria levels are exceeded
- documentation of all noise model input data and assessment criteria adopted. The source and date of collection of all data used should be clearly documented. Data more than 12 months old cannot be used in the acoustical assessment
- all acoustical assessments undertaken as part of the Noise Assessment Report must take the following into account:
 - for reconfiguration proposals, the assumed location of residential building facades is to be the minimum setback distance required by the relevant local government planning scheme for detached and duplex housing. For other noise sensitive developments, the assumed facade location is to be as per the relevant planning scheme. In these situations, a 'facade correction' of 2.5dB(A) should be added to the free field measurement of 1 metre from the assumed facade to determine the facade corrected noise level
 - the receptor height used in the acoustical assessment should be 1.5 metres above the finished floor level/s. In the case of multi-level buildings, all floor levels are to be assessed. For residential reconfigurations, where the finished floor level is not known, the receptor heights should be assumed at 1.8 metres and 4.6 metres above an assumed building pad level, for the ground and first floors (first and second storey) respectively. It is essential that both low and high-set residential buildings be considered in the assessment.

Recommendation

The Noise Assessment Report Part A must clearly articulate whether noise generated from the transport corridor exceeds the relevant noise criteria, as outlined in SDAP. If levels are exceeded, the Report must recommend that attenuation measures are to be provided by the development.

Certification

The Noise Assessment Report Part A is to be prepared by a qualified acoustic consultant and certified by a RPEQ.

Attachments

Attachments to include where applicable are:

- all field measurement results
- all input and output data and analysis including modelling data files in electronic format
- supplementary reports and references
- any other explanatory and general notes.

Noise Assessment Report Part B – noise attenuation measures

If the Noise Assessment Report Part A recommends that noise attenuation measures are necessary, these measures should be presented as per the requirements of Part B.

Attenuation

Part B should provide full details of the preferred noise attenuation strategies and clearly demonstrate that the proposed measures will reduce noise to acceptable levels including:

- description of the investigation process in determining the preferred noise attenuation strategies/options
- description and layout plans of all existing and recommended noise attenuation treatment/options, including the length, height and location of proposed noise barriers
- layout plans showing the length, height and location of all existing and recommended noise attenuation treatment options. These should include:
 - the maximum height above proposed finished ground levels in Reduced Levels (RLs) on AHD of any proposed noise attenuation structures, which are required to meet the TMR's noise criteria
 - the maximum height above proposed finished ground levels in RLs on AHD of any proposed noise attenuation structures, which are required to meet the TMR's noise criteria for the ground level (first storey) of any noise sensitive receptor (if different from above)
 - the maximum height above proposed finished ground levels in RLs on AHD of any proposed noise attenuation structures which are required to meet the TMR's noise criteria for the first floor level (second storey) of any noise sensitive receptor
 - if the proposed noise attenuating structure(s) include/s an earth mound/s, the footprint extent of any earth mound/s
 - the layout of the proposed development.
- supporting analysis, calculations and model outputs substantiating the ability of the proposed treatments to attenuate noise to acceptable levels.

Recommendations and conclusions

The Noise Assessment Report Part B must clearly demonstrate and subsequently recommend that the development provide noise attenuation measures to ensure noise generated from the transport corridor meets acceptable noise criteria as outlined in SDAP.

Certification

The Noise Assessment Report Part B is to be prepared by a qualified acoustic consultant and certified by a RPEQ.

Attachments

Attachments to include where applicable:

- all input and output data and analysis including modelling data files in electronic format
- supplementary reports and references
- any other explanatory and general notes.

Appendix 10: Construction management plan

A construction management plan should provide the following:

- a detailed and complete description of the works
- details regarding the estimated duration and timing of construction (including start and finish dates and times)
- identification of the equipment/machinery required to undertake the works and the proximity of the works, equipment and machinery (including crane/s) to a light rail corridor
- identification of the road/s or sections of road/s that will be closed and the closure period/s
- details on any roads that will require a change to traffic conditions (if any) – for example, closure of one lane, and the period of time required for the change to traffic conditions
- a schedule of when material or goods will be removed or delivered to the site in quantities that may disrupt traffic or the light rail (through traffic volumes or oversized vehicles)
- identify any disruptions to the operation of the light rail including any impacts on light rail transport infrastructure or light rail transport infrastructure works or other public transport services or stops
- identification of access and egress locations
- identification of any disruption to pedestrian, cyclist or public passenger transport services or infrastructure
- details of how waste and other materials will be managed to ensure no encroachment, dust or debris within the light rail
- confirmation that an application to undertake works or activities on a light rail corridor is to be submitted to, and authorisation obtained from, the light rail manager if any of the following is proposed:
 - works or activities where any part of the site, tools, material, machinery, suspended load or personnel could come within the light rail hazard zone
 - works or activities which may result in pedestrians or vehicles being diverted into the light rail hazard zone
 - using a crane and/or erecting and dismantling scaffolding or other structures within six metres of the edge of the light rail hazard zone
 - any excavation or piling within the zone of influence
 - any work or activity which may obscure light rail sight lines (including signage or structures)

- any other works with the potential to impact the integrity of the light rail infrastructure or the safe and efficient operation of the light rail system, including overhead line equipment.

Glossary of terms

Term	Definition
Activities	See 'works'.
Developed kinematic envelope (DKE)	The maximum width of a light rail vehicle in motion at a particular point.
Development	Refer to <i>Planning Act 2016</i> . Means— <ul style="list-style-type: none"> • carrying out— <ul style="list-style-type: none"> – building work; or – plumbing or drainage work; or – operational work; or • reconfiguring a lot; or • making a material change of use of premises.
Dilapidation survey	A survey that is usually undertaken immediately before a contractor commences site work and within 10 business days of the completion of site works. The purpose of the survey is to record the pre and post construction condition of the light rail transport infrastructure and determine if any rectifications works are required to be undertaken by the applicant.
Future light rail corridor	Refer to <i>Planning Regulation 2017</i> . Means land identified in a guideline made under the Transport Planning Coordination Act 1994, section 8E for— <ul style="list-style-type: none"> • light rail transport infrastructure; or • light rail transport infrastructure works.
Interfere with light rail transport infrastructure	Refer to <i>Transport Infrastructure Act 1994</i> , schedule 6. For light rail transport infrastructure, for chapter 10, part 4, division 2, see section 361A of the Transport Infrastructure Act.
Light rail	Refer to <i>Transport Infrastructure Act 1994</i> , schedule 6. Means— <ul style="list-style-type: none"> • a route wholly or partly dedicated to the priority movement of light rail vehicles for passenger transport purposes, whether or not the route was designed and constructed for those purposes as well as other purposes • places for the taking on and letting off of light rail vehicle passengers using the route.
Light rail corridor	Refer to <i>Planning Regulation 2017</i> . Means— <ul style="list-style-type: none"> • land on which light rail transport infrastructure is situated; or • land on which light rail transport infrastructure works are carried out; or • land on which services for the maintenance or operation of light rail transport infrastructure are situated.

Term	Definition
Light rail environment	<p>Comprises the following:</p> <ul style="list-style-type: none"> • The light rail corridor. This includes the land on which light rail transport infrastructure or light rail transport infrastructure works are situated, the land below the infrastructure and works • the area adjacent to the light rail corridor, the airspace above, the ground below, including the zone of influence
Light rail hazard zone	<p>Means—</p> <ul style="list-style-type: none"> • the area extending: <ul style="list-style-type: none"> – 1.75 metres horizontally either side of the nearest rail below ground and up to 3 metres above ground, and – 3 metres horizontally either side of the nearest rail at 3 metres or more above ground. <p>Note: the hazard zone extends indefinitely above and below ground.</p>
Light rail land	<p>Refer to <i>Transport Infrastructure Act 1994</i>, schedule 6.</p> <p>Means—</p> <ul style="list-style-type: none"> • Light rail land means land declared to be light rail land under chapter 10 [of Transport Infrastructure Act 1994]. • Additionally, the following apply- <ul style="list-style-type: none"> a) for chapter 10, part 4, division 3, see section 364 of the Transport Infrastructure Act 1994; [s364(1) of the Transport Infrastructure Act 1994 includes land that is state land, or private agreement land, on which light rail transport infrastructure is, or is proposed to be, situated] b) for chapter 10, part 4, division 5, see section 378 of the Transport Infrastructure Act 1994. [s378 of the Transport Infrastructure Act 1994, light rail land means light rail land that, when declared under this chapter to be light rail land, was- <ul style="list-style-type: none"> (a) a road or part of a road; or (b) busway land].
Light rail manager	<p>Refer to <i>Transport Infrastructure Act 1994</i>, schedule 6.</p> <p>Means a person who is an accredited rail infrastructure manager in relation to railway operations, under the <i>Rail Safety Law</i>, for the light rail.</p>
Light rail operator	<p>Refer to <i>Transport Infrastructure Act 1994</i>, schedule 6.</p> <p>Means a person who is accredited, as a rail transport operator in relation to railway operations for light rail, under the <i>Rail Safety Law</i>.</p>
Light rail transport infrastructure	<p>Refer to <i>Transport Infrastructure Act 1994</i>, schedule 6.</p> <p>Means each of the following-</p> <ul style="list-style-type: none"> • the rails on which light rail vehicles run for a light rail and pavement incorporating the rails; • the stations for operating a light rail; • other facilities necessary for managing or operating a light rail, including, for example -

Term	Definition
	<ul style="list-style-type: none"> a) works built for the light rail, including the following- cuttings; drainage works; excavations; land fill; track support earthworks; and b) light rail vehicles that operate on a light rail; and c) the following things if they are associated with the light rail's operation- access or service lanes; bridges, including bridges over water; communication systems; light rail operation control facilities; machinery and other equipment; maintenance depots; marshalling yards; monitoring and security systems; noise barriers; notice boards, notice markers and signs; office buildings; overhead wiring; over-track structures; passenger interchange facilities between light rail and other modes of transport; platforms; positioning systems; power and communication cables; power supply substations and equipment; signalling facilities and equipment; survey stations, pegs and marks; ticketing equipment and systems; timetabling systems; tunnels; under-track structures; workshops; <ul style="list-style-type: none"> • vehicle parking and set down facilities for intending passengers for a light rail • pedestrian facilities, including paving of footpaths, for a light rail • other facilities, of commercial or retail outlets or works, for the convenience of passengers and others who may use a light rail, including, for example, automatic teller machines, lockers or showers for cyclists and others, newsagents and wheelchair hire or exchange centres; • landscaping or associated works for a light rail.
Light rail transport infrastructure works	<p>Refer to <i>Transport Infrastructure Act 1994</i>, schedule 6.</p> <p>Means works done for -</p> <ul style="list-style-type: none"> • constructing light rail transport infrastructure or things associated with light rail transport infrastructure; or • the maintenance of light rail transport infrastructure or of things associated with light rail transport infrastructure; or • facilitating the operation of light rail transport infrastructure or things associated with light rail transport infrastructure; or • establishing, constructing or maintaining transport infrastructure, other than light rail transport infrastructure, if the works are - <ul style="list-style-type: none"> a) directly related to an activity mentioned in paragraph (a), (b), or (c); and b) necessary for the safety, efficiency and operational integrity of transport infrastructure; or • other works declared under a regulation to be light rail transport infrastructure works.
Light rail vehicle	<p>Refer to <i>Transport Infrastructure Act 1994</i>, schedule 6.</p> <p>Means a type of transport that –</p> <ul style="list-style-type: none"> • is intended wholly or mainly for the carriage of passengers or for track maintenance; and

Term	Definition
	<ul style="list-style-type: none"> • travels on flanged wheels on parallel rails; and • is designed to operate in line of sight on road-like areas.
Nominated dilapidation survey area	A standard area used in the undertaking of a dilapidation survey. The extent is identified using the dilapidation survey area calculation (2 x impact area + width of excavation). This calculation considers the empirical relationship between the depth of excavation and the distance from excavation. See Figure 6 in Appendix 6 for further information.
Overhead line equipment (OHLE)	Overhead lines, cabling and associated structures used to provide power to electrical trains or light rail vehicles.
Public passenger transport Infrastructure	<p>Refer to <i>Transport Planning and Coordination Act 1994</i>, section 3.</p> <p>Means -</p> <ul style="list-style-type: none"> • infrastructure for, or associated with, the provision of public passenger transport, including, but not limited to: • a transit terminal for public passengers services (for example, an airport terminal, a coach terminal, a cruise ship terminal) • a ferry terminal, jetty, pontoon or landing for ferry services • a bus stop, bus shelter, bus station or bus lay-by • a busway station • a light rail station • a taxi rank, limousine rank or limousine standing area • a railway station • vehicle parking and set-down facilities • pedestrian and bicycle paths and bicycle facilities • a road on which a public passenger transport service operates.
Registered Professional Engineer of Queensland (RPEQ)	Registered Professional Engineer of Queensland, under the <i>Professional Engineers Act 2002</i> .
Rock anchor	A steel rod or cable placed in a hole drilled in rock, held in position by grout, mechanical means or both.
State transport corridors	<p>Refer to <i>Planning Regulation 2017</i>.</p> <p>Means –</p> <ul style="list-style-type: none"> • a busway corridor; or • a light rail corridor; or • a railway corridor; or • a State-controlled road.
Stormwater management plan	<p>A stormwater management plan demonstrates the likely stormwater and drainage impacts of a proposed development on a public passenger transport corridor, including light rail transport infrastructure.</p> <p>It must be certified by a RPEQ and demonstrate mitigation strategies to achieve no worsening impacts on the pre-development condition.</p>
Works	<p>Refer to <i>Transport Infrastructure Act 1994</i>, schedule 6.</p> <p>Works includes activities.</p>

Term	Definition
Zone of influence	The zone of influence is an area below ground where works and activities pose an increased risk to the safety and integrity of light rail infrastructure and light rail infrastructure works.

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