Department of Transport and Main Roads

Manual

Non-Transport Utility Management and Design Manual

July 2025

Queensland Government

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1.1 Introduction and overview

The *Non-Transport Utility Management and Design Manual* (NTUMDM), sets out a multi-disciplinary approach to management of Non-Transport Utility Infrastructure (NTUI) in transport corridors.

The manual details the technical standards and processes that must be complied with in the planning, design, construction, maintenance and disposal of infrastructure by Non-Transport Utilities (NTU) operating within State-Controlled Road Corridors (SCRC). The manual includes consideration of the relevant aspects of NTUs' design standards and construction processes, in the context of safety, community and environmental impacts, maintenance and corridor management having regard to future provisions and cost implications to both the Department of Transport and Main Roads and NTU.

This manual is a published standard under the *Transport Infrastructure Act 1994* (Qld) that provides a framework for assessment and management of NTUI on SCRC.

This manual replaces TN163 *Third Party Utility Infrastructure Installation in State-Controlled Roads Technical Guidelines.*

This manual prescribes specific design criteria for NTUI within a SCRC. The manual includes processes and considerations for planning, management and engagement of NTUI to facilitate the delivery of Department of Transport and Main Roads infrastructure projects. This work may include the relocation / protection of NTUI during Department of Transport and Main Roads projects.

The manual must also be applied in the installation, maintenance and disposal NTUI within a SCRC.

All NTU technical standards (including codes of practice and guidelines) and Australian Standards as they apply to NTUI must be considered, together with the Department of Transport and Main Roads standards.

This manual harmonises NTUI design guidelines, codes of practice and manuals relevant to SCRC. The Department of Transport and Main Roads acknowledges there may be some inconsistency between all of the relevant requirements resulting in a requirement of a higher, or more specific standard. In this circumstance the NTU must adopt the higher standard having regard to Department of Transport and Main Roads technical publications.

This manual also identifies the legislation, standards, obligations and procedures to mitigate risks and support a good practice approach to the management of NTUI within a SCRC.

The Department of Transport and Main Roads has established agreements which include protocols with NTU that will not change due to release of this manual. The processes within these agreements will continue to apply.

1.2 Why is this manual important

The Gratton Institute, in the 2016 *Cost overruns in transport infrastructure*, reports that:

> *"Over the last 15 years, the costs of transport infrastructure projects over and above what was promised have amounted to $28 billion."*

Roads and Infrastructure Australia, in their 2020 article *Breaking contractual habits* (https://roadsonline.com.au/) states:

> *"changes in project scope that respond to stakeholder / community input and issues such as unknown ground-conditions and utilities are more directly linked to cost variation on projects."*

Spending millions of dollars on utility relocations, or protection of utility assets within Transport and Main Road's SCRC for over 80% of road projects, is not sustainable or good value for money. It is better for the department and utilities to prevent utility assets from impacting road projects in the first place.

As road corridor land becomes increasingly scarce, and local government planning allows properties and building setbacks to front/back or straddle many more road corridors, allocating service corridors in road or easements in private property is becoming more difficult without the need for full property resumptions – particularly in high density urban areas. This in turn pushes utilities into undesirable alignments in road corridors dedicated to future road transport needs. This increases costs to both utilities and road authorities during road project works due to the need to relocate assets outside the road footprint.

Where room does exist within the corridor, aged assets, current service alignments, depth of cover or vibration sensitivity has limited the progression of road projects where the existing service will need to be adjusted to suit the road infrastructure upgrade alignment.

This manual is an attempt to minimise future cost overruns on road projects, and better manage utilities within the department's road corridors, through standards harmonisation and a road environment specific non-transport utilities standard. The purpose of a harmonisation is to develop specific minimum design standards for utility assets to:

- protect new and existing utility assets under the roadway and within the roadside (depth of cover, casings, materials)
- better align road and utility assets
- increase safety through exclusion zones between different assets
- define minimum construction methodologies in roads
- specify conditions associated with service placement within the SCRC
- define risks during road projects, and
- manage data capture and data sharing through improved database management.

To date, utility providers have worked collaboratively with the department in providing benefits to the community. This manual is designed to enhance joint understanding and positive outcomes for all parties.

For example, the requirement for locating underground utilities / assets via MRTS56 *Construction Surveying* for undertaking As Constructed Survey during installation is a key component for mitigating future cost overruns. This Technical Specification requires that the installation of underground utilities meet conformance requirements and most importantly the geospatial high accuracy of As Constructed survey that enables the development of three dimensional (3D) As Constructed Survey object-based models suitable to meet Building Information Modelling (BIM) requirements.

1.3 Definitions

The Department of Transport and Main Roads has agreed to adopt the standards published in Austroads Guides as part of national harmonisation. The department seeks to avoid duplicating information addressed in national guidance, and where possible has developed supplements instead that provide Queensland specific advice while following the structure established in Austroads Guides.

Queensland specific advice includes practices which vary from national practice because of local environmental conditions (such as geography, soil types, climate); different funding practices; local research; local legislation requirements; and to expand instruction on particular issues.

A definition of terms is described in Table 1.3.

Table 1.3 – Definitions

Term	Definition
abandoned assets	An asset that is no longer required, utilised or serviced by a NTU. It should be noted that some Legislative Acts (for example, Telecommunication Act and South-East Queensland Water (Distribution and Retail Restructuring) Act) require Utility Authorities to maintain and provide Transport and Main Roads with records of all abandoned assets as well as live assets. Irrespective, the department requires all NTUs to keep records of such assets. Abandoned assets are also known as redundant assets.
Act	An Act is a statute or law passed by House/s of Parliament that has received Royal Assent. Acts are given a year and number. Once an Act is formally enacted it can generally only be amended or repealed by another Act. When an Act changes, a compilation of the Act is prepared to show the Act as amended. Acts are also known as primary legislation.
alignment / works agreement	NTUIs are permitted within the road corridor however the NTU must obtain a works agreement from the road authority. An alignment agreement confirms the location for the utility asset (generally an offset from the property boundary or kerb). Failure to obtain an alignment/works agreement can result in an objection to the works, or the asset being removed at the NTU's cost.
Approved Supplier / Materials	NTUs have identified particular products (pipe types, valve types, pits, and so on) or manufacturers that can be used on their infrastructure. Generally, the prequalified NTU's contractor or the road construction contractor is responsible for purchasing materials from approved suppliers however the details will be taken from the design drawings.
ARMIS	ARMIS is A Road Management Information System, built internally by Transport and Main Roads which includes road location, road inventory, pavement condition, traffic, crashes and routine maintenance performance contracts and a number of other key data sets.
asset	An item of property owned by a person or company, regarded as having value.
asset owner	Organisation or individual (either public or private) that is the Owner of the utility service, network or infrastructure. This is the term that will be used to refer to both Public and Private Utility Providers.
AWE	Ancillary Work and Encroachment for a road has the meaning of the term in TIA Schedule 6.
betterment	Capacity, quality or size increase of existing utility networks.
BIM	Building Information Modelling.

Term	Definition
BYDA	Before You Dig Australia. Plans and data showing location and type of known utility assets. Data supplied from BYDA is only valid for the specified period found on the plans or information pack received from the registered asset owners and only as accurate as the data provided by the asset owners. The location, is typically highly inaccurate because the asset owners' own information is inaccurate or general.
carrier pipe	The conduit carrying cables and pipes carrying a gas or fluid.
civil works	Separate works which are undertaken by a construction company in order to facilitate work by an NTU. This may be installation of conduits, pits, access roads, excavations etc.
Constrained Road Corridors	Constrained Road Corridors may include but is not limited to border zone widths under the minimum, highly congested border zones, limited footprint to facilitate trenchless construction methods or shallow non rippable rock. Determination of whether a site in constrained or not is at the discretion of Transport and Main Roads, with consideration of information and required work methods as provided by the NTU.
contestable works	Works on NTUI (generally as part of consequential works) that can be undertaken or managed by an organisation/ contractor who is not the utility infrastructure owner. The scope of works must generally meet specific criteria set out by the NTUI owner, and the consultants who undertake design and/or the contractors who undertake the works generally require prequalification (approved supplier status) from the NTUI owner.
consequential works	Works that are required as a consequence of Transport and Main Road's works (including transport projects).
Contractor	A company engaged to undertake the works.
Council assets	Council assets may include land, fences, roads, buildings, toilets, tourist attractions, sewerage pipelines, water pipelines, pumping stations, septic tanks, and so on.
Department of Transport and Main Roads	Means the State of Queensland represented by the Department of Transport and Main Roads. Singular term 'department' in the text has the same meaning.
department asset	Means all of the department's land, Plant, equipment, fixtures, fittings, furnishings and other property of the department in and in connection with the Subject Road.
departmental works	means the relocation and/or removal of Non-Transport Utility Infrastructure (NTUI) as a result of department initiated projects.
decommissioned assets	A decommissioned asset is infrastructure that was being used by the NTU but is no longer required for current needs but may be required for future needs. An example of decommissioned asset would be road crossing conduits that previously contained electrical cables but the connection serviced by the electrical cable is no longer required for current needs but it may be required for future needs. NTUs may elect to recommission a decommissioned asset at any point in time, hence the NTU is required to maintain decommissioned assets. Decommissioned assets are not abandoned assets and are therefore treated as live assets.
design	Design of the NTUI including electrical network, water pipeline, gas pipeline, telecommunications assets, sewerage pipeline and related infrastructure that supports these NTUI.
distribution network	The network of pipes (water, gas) or electrical / communication lines that supply the utility service to the end user. Property service connections are fed from the distribution network.

Term	Definition
District	A Transport and Main Roads geographical area of responsibility – often one or more Districts are in a region.
District Director	District Director is a Transport and Main Roads delegate responsible for approvals. Also applies to Deputy Regional Director or their approved delegates.
EMI	Electromagnetic Interference.
enveloping pipe	A protective pipe through which the carrier pipe placed. Also referred to as an 'encasing pipe'.
fees	Some NTUs charge fees for example design lodgement fee, field audit fee, inspection fee, switching fee, etc.
Functional Specifications	Project document for prequalified consultants depicting the design / work elements required under the contract (refer to *Consultants for Engineering Projects* Manual)
good practice	Means practices, procedures, methods and techniques followed when work is carried out: a) in a sound and workmanlike manner b) with the professional skill, care and diligence which may be expected of Competent professionals suitably qualified and experienced in the performance of work similar to the work to be carried out under this Agreement c) in accordance with all applicable laws, standards, codes of practice, manuals, guidelines and the department's technical publications d) in a manner to satisfy the time, cost, quality and performance requirements of the department under this Agreement e) the work carried out utilises the department's Approved products and suppliers, and f) without defect, deficiency or omission or in a manner resulting in any defects, deficiencies or omissions.
GPR	Ground Penetrating Radar.
High voltage power	Includes 11 kV, 22 kV, 33 kV, 66 kV, 110 kV ,132 kV and 275 kV power (electrical) lines.
IFC	Issued for Construction – design drawings and associated documents.
IFT	Issued for Tender – design drawings and associated documents.
investigation	A detailed investigation of an NTU asset, used to determine the location, depth and extent of the asset. The quality of the information is categorised in accordance with AS 5488.
ITS&E	Intelligent transport systems and electrical.
LGA	Local Government Authority, also referred to as “council”.
LIFD	Low Impact Facilities Determination.
limited access roads	A road or part of a road that has been defined in accordance with Section 54 of the *Transport Infrastructure Act 1994* (Qld). Generally, refers to roads that have been specifically designed and constructed as a high- speed road. This includes but is not limited to freeways, expressways, motorways and some bridge structures where, due to safety concerns, access must be restricted.
Local authority	Includes any approvals from a local authority in relation to the works.

Term	Definition
Local Laws	Local Laws are laws passed by Local government under the powers of the Local Government Act and administered by the Local Council.
Low voltage power	A power (electrical) line conducting electricity in the range from 50 to 1000V.
MIC	Minor Infrastructure Contract.
MIC-CO	Minor Infrastructure Contract – Construct Only.
MoU	Memorandum of Understanding – a non-legally binding agreement between two organisations.
MRS	Transport and Main Roads Specification (Measurement).
MRTS	Transport and Main Roads Technical Specification.
non-contestable works	Works on NTUI that can only be undertaken (or managed) by the NTUI owner.
non-consequential works	Non-consequential works are third party instigated works requiring road access initiated and funded by a NTUI owner and/or developer within the SCRC.
NTU	Non-Transport Utility, a general term for a service and infrastructure owner / provider, (electricity, gas, telecommunications, water, wastewater and so on.), incorporating public and private networks.
Non-transport utility personnel	Means any individual engaged, directed, managed or supervised by the Non-transport utility to perform any works and includes directors, officers, employees, agents, invitees, consultants, contractors and subcontractors of the Non-transport utility.
NTUI	Non-Transport Utility Infrastructure means all infrastructure not owned by the department that is in the State-controlled Road Corridor.
NTUMDM	*Non-Transport Utility Management and Design Manual*.
OH	Overhead.
permits	Local Governments and other government bodies may require contractors to obtain a permission to work in their road corridor or on their land for permissible activities against laws, codes, guidelines and so on.
Plant	Means a conduit or cable, an electrical installation under the *Electricity Act 1994*, an overhead conveyor, a pipeline, a pole, a railway, monorail or tramway, a telecommunications plant, a viaduct or aqueduct, a water channel.
PPV	Peak Particle Velocity, parameter used in vibration monitoring.
Preferred Service Alignment Corridor	Where services are approved to be installed in SCRC, locations shall be as defined on the Transport and Main Roads Preferred Service Alignment drawings for Urban and Rural locations.
Prequalified Supplier	A list of approved companies and individuals that are authorised to undertake, manage and/or coordinate works on their assets for the NTUI owner.
Private Networks	Assets owned privately and approved to be located in the SCRC under section 50 of the TIA via a Road Corridor Permit or deed, licence, infrastructure agreement or other contractual arrangement.

Term	Definition
Public Utility Provider	Means an entity that owns public utility plant. An organisation that has a right, under federal or state legislation, to undertake works in the SCRC. These are entities empowered by legislation to own and operate infrastructure for the purpose of providing essential services to the community only to the extent that each legislation allows. As detailed in the introduction, this covers electricity entities (generation, transmission and distribution), gas suppliers / pipeline licence holders (distribution and transmission), telecommunications carriers (excluding mobile towers and limited other infrastructure which is considered commercial assets), retail-distributors or council water suppliers (water / wastewater / recycled water / sewage delivery but not bulk water). Note: Stormwater is not PUP.
PUP	Public Utility Plant, means plant permitted under another Act or a Commonwealth Act to be within a road corridor. PUP falls under the definition of NTUI.
QTRIP	Queensland Transport and Roads Investment Program.
RCP	Department Road Corridor Permit. A permit granted by the department under the TIA for a structure, activity or works within a State-Controlled Road Corridor.
region	A geographical area of responsibility.
road authority	Organisation responsible for the management of the road corridor / network (i.e Transport and Main Roads or LGA).
RP BDY	Registered Property Boundary.
RPDM	*Road Planning Design Manual* 2nd Edition
RPEQ	Registered Professional Engineer of Queensland.
Safety in Design	Safety in Design allows for the early integration of risk control measures in the design process.
Safe Systems Approach	Adoption of safe system principals and processes in order to increase safety aspects while engaging with a broader set of stakeholders utilising four key pathways of road and roadsides, places and spaces, individuals, communities.
SCR	State-Controlled Road.
SCRC	State-Controlled Road Corridor.
SME	Subject Matter Expert.
SPS	Sewage Pump Stations.
standards	Australian Standard (AS) documents, Transport and Main Roads publications and/or Utility Authority specific standards.
SW	Stormwater is Transport Infrastructure with design and management conducted in accordance with relevant design manuals. Refer to Transport and Main Roads / local government cost sharing arrangement document and/or Chapter 7 regarding access requirements where the SW asset works are conducted by a third party.
Technical Publications	Means departmental approved manuals, guidelines, technical specifications and other technical information relating to road infrastructure and its operation, including reference documents for roads, bridges, traffic devices, signage, pedestrian and bicycle facilities.
TIA	*Transport Infrastructure Act 1994* (Qld).

Term	Definition
TIPDS	*Transport Infrastructure Project Delivery System*
Tag	Identification tag found on optic fibre e.g. 1-2, 29-70, 18-53B.
TCP	Traffic Control Permit
third party	Person or organisation not associated with Transport and Main Roads or its contractors for works.
TIC	Transport Infrastructure Contract.
TIC-CO	Transport Infrastructure Contract – Construct Only.
transmission networks	Mains that go over greater distances supplying distribution networks or substations.
Utility	A general term for a provider of service and infrastructure (electricity, gas, telecommunications, water, wastewater and so on.), incorporating public and private networks. Please note, when used by Transport and Main Roads it often refers to gas, water, sewerage, telecommunications and electricity utilities that operate on departmental land and are not owned by the department. Note: in this context stormwater is not a utility.
Utility Design Team	Team responsible for NTUI conflict mitigation as part of the road project team during consequential works.
Works	A collective term generally describing activities being undertaken, or infrastructure being installed, maintained, decommissioned or removed.

1.4 Rules for interpreting this manual

The following rules apply in using this manual, except where the context makes it clear that a rule is not intended to apply:

a) words in the singular include the plural and vice versa

b) any gender includes the other genders

c) if a word or phrase is defined, its other grammatical forms have corresponding meanings

d) ‘includes’ means includes without limitation

e) a reference to:

   i. any legislation includes subordinate legislation under it and includes that legislation and subordinate legislation as modified or replaced

   ii. writing includes any mode of representing or reproducing words in tangible and permanently visible form, and

   iii. anything is a reference to the whole or any part of it and a reference to a group of things or persons is a reference to any one or more of them.

f) a reference to a document or arrangement (including this manual) is a reference to that document or arrangement as amended, supplemented, varied or replaced, and

g) in the interpretation of this manual, headings are for convenience only and must not be construed as part of this manual.

1.5 Applicability of this manual

This manual incorporates the standards, technical publications, and policies of the department that must be complied with in throughout the works in SCRC.

The manual applies equally to all persons that are engaged in any works or departmental works in SCRC.

This manual facilitates the development and implementation of solutions for NTUI in SCRC and provides guidance on the requirements of sustainable works.

This manual must be utilised for all NTUI in SCRC by suitably qualified personnel or competent personnel supervised by suitably qualified personnel.

This manual includes technical governance requirements to ensure efficient corridor management requirements are met whilst minimising the potential of risk to existing NTUI, department assets and the safety of the general public.

Limitations to the application and use of this manual are outlined in Section 1.5.2.

1.5.1 Structure of this manual

This manual has been designed to be utilised throughout the planning phases and lifecycle of the NTUI, so users can refer to this manual for compliance. This manual aims to provide all information necessary to comply with the requirements of works and departmental works as they relate to NTUI in SCRC.

It should be noted that other chapters and referenced manuals, technical specifications, guides or legislation must still be consulted for completeness.

To facilitate this, references (where possible) have been made to other manuals, guidelines, standards, specifications and policies. The references provided may not be exhaustive, all users of this manual must make their own enquiries to ensure compliance with their obligations.

Additionally, checklists, tables and flow charts are provided throughout this manual to assist users.

Table 1.5.1 outlines the structure of this manual.

Table 1.5.1 – Structure of Non-Transport Utility Management and Design manual

Chapter	Title of Chapter	Purpose of Chapter
1	Framework and strategic planning	Provides reader with overall strategic objectives.
2	Data collection	General guidance on how to source and collect data.
3	General design requirements	Introduce a number of general design requirements within SCRC for consequential and non-consequential works.
4	Utility engagement and time appreciation	General appreciation for resource shortages and procurement timeframes for NTU conducting consequential works.
5	NTUI design requirements in State-Controlled Road Corridors	Provides reader with minimum design standards and supplementary requirements and considerations when installing third party assets within the SCRC for consequential and non-consequential works.

Chapter	Title of Chapter	Purpose of Chapter
6	Design development and workflow	Process for the Utility Design Team during consequential works.
7	Non-consequential works – Third party driven	Used by departmental staff managing corridor access or third parties wanting access.

1.5.2 Limitations of this manual

The following sections outline the limitations placed on personnel that must be complied with in the design of NTUI within SCRCs.

However, this manual does not cover all aspects of NTUI conflict mitigation, materials, grades, design elements or management. There is a myriad of potential solutions to conflicts within the design of NTUI, and engineering judgement should still be applied. This manual has been created to outline the department's requirements for the management of NTUI within SCRCs.

The purpose of this manual is to improve road management outcomes while still enabling appropriate access to the SCRC by an NTU. The operation of this manual is to provide a centralised resource to support works in a SCRC.

The department has design criteria and technical publications that must be adhered to in the management of NTUI within the SCRC. If the standard of an NTU or an Australian Standard has greater requirements than the department's, the NTU must comply with the department's technical publications and the requirements of the higher standard as applicable.

1.6 Other reference documents and manuals

This manual has been designed to be used in conjunction with other departmental documents, technical publications to support the works on an NTUI in SCRC in Queensland. A non-exhaustive list of documents that should be consulted are:

- *Biosecurity Act*
- *Cultural Heritage Acts*
- *Environmental Legislation Register*
- *Environmental Processes Manual*
- *Framework to Incorporate Bushfire Resilience into Road Infrastructure*
- *Guidelines for Strategic Road Network Planning*
- *Road Landscape Manual*
- *Road Planning Design Manual* 2nd Edition (RPDM), and
- *Roadside Advertising Manual*.

All Non-transport utilities access requests within SCRC must comply with the technical publications of the department in addition to the standards enforced through code or authority on the NTU. The NTU must adhere to technical publications, standards, guidelines and codes of practice when carrying out works on NTUI within a SCRC.

Compliance with the department's technical publications is necessary for all personnel involved in any works or departmental works involving NTUI.

Conformance with department's technical publications means designs must:

- space-proof the corridor and limit congestion
- not compromise safety for road users (for example, must not block sight lines at intersections or driveways, or be hazardous, and must not impede movement on footpaths)
- design solutions that consider future road upgrades and rehabilitation works
- submit a request providing reasoning for design exceptions that must be approved
- minimise any potential costs to the department, and
- not undertake works that may prohibit the department from operating and maintaining its assets effectively.

Early involvement and planning are paramount to maintaining a mutually beneficial outcome for the department and the NTU.

1.7 Importance of NTUI management

The management of NTUI is an important consideration in the planning and design of road infrastructure and management of SCRCs.

The effective and efficient management of the available footprint, necessitates that all projects, (irrespective of location, size, cost or complexity) must consider and address:

- safety of all road users, the general public and personnel working in the vicinity of NTUI
- protection of NTUI within SCRC (for example, located in the road pavement, footpath and border zone etc.)
- access to NTUI for maintenance
- future works required to be undertaken by the department or NTU
- financial implications
- availability in the SCRC
- Safety in Design, and
- Safe Systems Approach.

It is acknowledged that there are issues associated with legacy NTUI in SCRC, improvements in the management of NTUI will provide more beneficial outcomes for both the NTUI and the department for future works.

Adoption of this manual will ensure that NTUI is installed in appropriate locations, facilitating effective management throughout the lifecycle (including decommissioning and disposal) of the NTUI.

Good management is particularly critical to minimise risks where it is proposed for the NTUI to remain in the SCRC during department works. The original design intent must be reviewed and understood, and the existing system needs to be assessed against performance, adequacy and continued durability. Design must ensure that the original intent is restored, deficiencies corrected by the NTU and modifications / changes appropriately considered and detailed.

Safety is an underpinning element throughout the lifecycle of the NTUI and is ingrained in our planning, design, installation, operation, maintenance, and decommissioning processes.

The Safety in Design approach allows for the early integration of risk control measures in the design process, which are then followed throughout the lifecycle of the NTUI. This ensures that risks to health and safety are minimised, creating a safer environment for all users in the SCRC.

Lifecycle Considerations:

- Planning - careful evaluation of the NTUI's entire lifecycle is essential, identifying potential health and safety risks at each phase: from construction to operation, maintenance, and eventually, decommissioning. As part of this risk management process, future use and misuse scenarios, the intended environment, and maintenance requirements are among the key factors considered. The planning process ensures appropriate resources are allocated for risk mitigation measures.
- Design – integrate control measures into the design of the NTUI to eliminate or minimise identified risks. Materials and technologies are chosen with a focus on reducing risks during construction, operation, and maintenance. Accessibility, durability, and resilience are factored into the design to reduce health and safety risks during maintenance and operation. Safety features are incorporated into the design, such as safety barriers, warning systems, and emergency procedures, to mitigate the impact of potential hazards.
- Install - safety measures identified during the planning and design stages are implemented. Workers are trained in safety protocols to mitigate risks during construction. The proper use of personal protective equipment is ensured, safe lifting and handling procedures are followed, and materials are stored and handled appropriately to prevent accidents. Installation processes are rigorously monitored to maintain the structural integrity of the NTUI and to avoid the occurrence of new safety risks.
- Operate – the health and safety measures integrated into its design are crucial. The NTUI should be operated in compliance with the safety guidelines formulated during the design and planning stages. Operator training should incorporate these safety measures to minimise risks during operation. Regular inspections and safety audits should be conducted to ensure that all safety measures are implemented successfully.
- Maintain - focus is on maintaining the health and safety control measures integrated into the design. Regular safety inspections and predictive maintenance strategies are implemented to identify and rectify potential issues before they escalate. Maintenance personnel are trained in safety procedures related to the NTUI, and safe disposal protocols for waste or replaced parts are followed.
- Demolition - At the end of the NTUI's lifecycle, removal is carried out with safety at the forefront, adhering to the necessary approvals of the application process. Risks associated with dismantling and disposal of the NTUI must be managed with due diligence. The safe removal, transportation, and disposal of materials are planned in advance, and site remediation procedures are put into place to minimise environmental impact.

This comprehensive and proactive approach to safety not only mitigates risks but ensures the longevity of all NTUI and department assets, as well as protecting all third party users.

1.8 Who should design?

1.8.1 Departmental designers

Departmental designers engaging in utility design must be suitably qualified; that is, have demonstrated capability in road geometry, road safety, road drainage, and utility design and management.

1.8.2 Prequalification of consultant engineers and designers

Project briefs will nominate the minimum prequalification level for engineering consultants based on size and complexity of the project. Where the principal consultant utilises a subconsultant to conduct NTUI design, the sub consultant must also be prequalified with Transport and Main Roads in the prequalification category of highway design (HE1) and hydraulic design (HD1) as a minimum before providing any utility advice or undertaking any utility design or review on behalf of the department.

1.8.3 NTUI works by third parties

Designers and engineers engaging in the design of NTUI on behalf of NTU or developers / contractors should have a demonstrated appreciation of department standards, technical documents, and policies, understanding of the approval processes for Works Agreements and be suitably industry qualified. Hazard assessments and sightline investigations, where required, must be conducted by RPEQ with experience in road environments.

1.9 Legislative powers

The *Transport Infrastructure Act 1994* (TIA) gives the department the legislative powers necessary to effectively manage and regulate access to SCRCs.

A NTU is either a Public Utility Provider or a third party utility, distinguished by the definition of Public Utility Provider in TIA. A Public Utility Provider means '*an entity that owns Public Utility Plant*', TIA provides that Public Utility Plant means '*plant permitted under another Act or Commonwealth Act to be on a road*'. If a NTU does not own plant that is permitted to be on the road under the relevant legislation, the NTU is considered by the department and TIA as a third party utility and must obtain access to the SCR through mechanisms provided in section 50 of TIA.

The legislative distinction means that there is a difference in the regulation and process of NTU's obtaining access to a SCR, depending on its legislative position.

Public Utility Provider

The regulation of Public Utility Providers is dependent on the enabling legislation of the Public Utility Provider and the type of infrastructure. Sections 77 to 83 of TIA includes provisions enabling the department to regulate Public Utility Plant on SCR, however, certain Public Utility Providers are excluded from those provisions. Public Utility Providers that are excluded in section 77 of TIA require management under their enabling legislation and must comply with the regulations of the legislation.

Section 77 of TIA provides that:

This division does not apply to:

a) public utility plant constructed under the *Electricity Act 1994*; or

b) gas infrastructure, or the carrying out of gas infrastructure work, under the *Gas Supply Act 2003*, or

c) water infrastructure, or the carrying out of water infrastructure work, under the *South-East Queensland Water (Distribution and Retail Restructuring) Act 2009*.

Although Public Utility Providers are permitted to carry out works on their plant on a SCR, compliance with the department's technical publications and their enabling legislation is required prior to commencing works. The Public Utility Provider will not be permitted to carry out works in SCR unless there is written agreement with the department or their enabling legislation provides otherwise.

Third party utility

A Non-transport Utility is considered a third party utility by the department in the absence of any legislation that permits their plant to be on a SCR. TIA provides that ancillary works and encroachments, for a road, means "a structure or other thing, other than public utility plant, on, over or under the road". Any works for ancillary works and encroachments by a third party utility on a SCR road may only be permitted by section 50 of TIA. The department must approve a third party utility to carry out works on a SCR. A third party utility is not permitted to access the SCR to carry out works unless approved by the department through an Agreement or Permit, or alternative exemption provided under section 50(2) of TIA.

Section 50(2) TIA provides that a person other than the Chief Executive, must not carry out works on a state-controlled road unless the works:

a) Is approved in writing by the Chief Executive, or

b) Conforms to requirements stated in a notice made by the Chief Executive, or

c) Is done as required by a written arrangement entered into with the Chief Executive, or

d) Is approved under this Act, other than this section, or

e) is permitted under the *Land Act 1994*, the *Transport Operations (Road Use Management) Act 1995*, the *Economic Development Act 2012* or an Act about local government.

General

When interacting with an NTUI, it is necessary that the project or corridor manager check what legislative, regulatory, contractual and/or permit rules apply, as NTU's may have different legislative requirements or processes. **Whether private or public, all NTUI shall adhere to the requirements of this manual.**

Access to the SCRC by any NTU to carry out installation, maintenance, operation and other works on NTUI is managed through written permission (permits) / Work Agreements / infrastructure agreements or another form of Agreement.

However, Telecommunications carriers seeking access to the SCR will issue the Department Notice under Commonwealth law when undertaking activities in the SCRC. If the department does not agree with the proposed activity, then the department can lodge an objection, which is then regulated by a Commonwealth defined process.

The department has obligations under state and federal legislation, as well as state government policies.

The department also provides direction through a number of key corporate documents, including the department’s strategic plan, road network strategy, roads implementation program and sustainability framework and statement.

The following Queensland legislative acts may be pertinent to NTUI design and installation:

- *Aboriginal Cultural Heritage Act 2003*
- *Torres Strait Islander Cultural Heritage Act 2003*
- *Nature Conservation Act 1992*
- *Land Act 1994*
- *Environmental Protection Act 1994*
- *Fisheries Act 1994*
- *Professional Engineers Act 2002*
- *Planning Act 2016*
- *Soil Conservation Act 1986*
- *State Development and Public Works Organisation Act 1971*
- *Transport Infrastructure Act 1994*
- *Water Act 2000*
- *Workplace Health and Safety Act 2011*.

The following Commonwealth legislative act may also be applicable to NTUI design on state-controlled road in Queensland:

- *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

The *Work Health and Safety Act* 2011, the *Work Health and Safety Act Regulation 2011* and the codes of practice set out the safety requirements in workplaces.

Designers of NTUI need to consider each location of installation as a workplace during maintenance operations and incorporate provisions that permit maintenance to be completed in a manner that manages exposure to risk in accordance with all relevant safety requirements for the workplace. This implementation is to minimise the ongoing risks to all third party users and people working within the vicinity of the NTUI whilst Works are being carried out.

It is recommended that project teams include, or have access to, personnel who have sufficient knowledge, understanding and application of the relevant legislation, as well as the functions and responsibilities of local authorities and standards.

1.10 Strategic planning and access control

There are two departmental functions that are important in the pre-planning of a road corridor or link and the ongoing stewardship of a road with respect to non-transport utility management.

The first is concerned with strategic planning and service alignments within the corridor when developing strategies and plans for SCRs. The second is concerned with the possible effects on existing NTUI and department assets in SCRCs due to the development of the SCR and/or NTU and third party users.

The design considerations for the strategic planning for management of NTUI include:

- Service alignment and footprint availability
- Project cost implications.

Delivering on strategic planning goals mean careful lifecycle management of NTUI from planning, design, installation, maintenance stages, to protection or relocation during department projects, and eventual decommission and removal.

1.10.1 Service alignment and available footprint

The allocation / alignment of NTUI in the SCRC is entirely at the discretion of the department. There is no guarantee that there will be space available for NTU's to utilise in the SCRCs. The alignment of NTUI within preferred service corridors in the SCRC will assist the department in managing the impacts of the NTUI until its decommissioning.

The purpose of preferred NTUI service alignments is to manage undesirable service interactions in the SCRC and require consideration of space-proofing in the planning phases. Refer Figure 1.10.1 for typical planning section of a road corridor.

Where a NTUI type is not expected to be installed within the preferred service alignment corridor for the design or serviceability life of the asset, or where footprint is limited, NTUI may be placed on an alternative (agreed) alignment, however this is to be assessed on a case-by-case basis and alignments entirely decided by the department. Where the NTUI is located outside the agreed Service Alignment corridor and prevents another NTU provider's service from installation or maintenance, the NTU provider whose service is in the unapproved location may be responsible for relocating its asset to a favourable alignment at cost to the non-conforming NTU provider.

If there is limited space to accommodate NTU's within the SCRC, the department's order of priority is Electrical and Communications, followed by Transmission Gas (registered license number) and Bulk Water, lastly all other non-transport utility infrastructure. If there has been access and alignments confirmed and approved by the department, future NTUI designs should be located on one side of the corridor where practicable and economical, with adequate service crossings to promote de-cluttering of the road corridor and increase land availability.

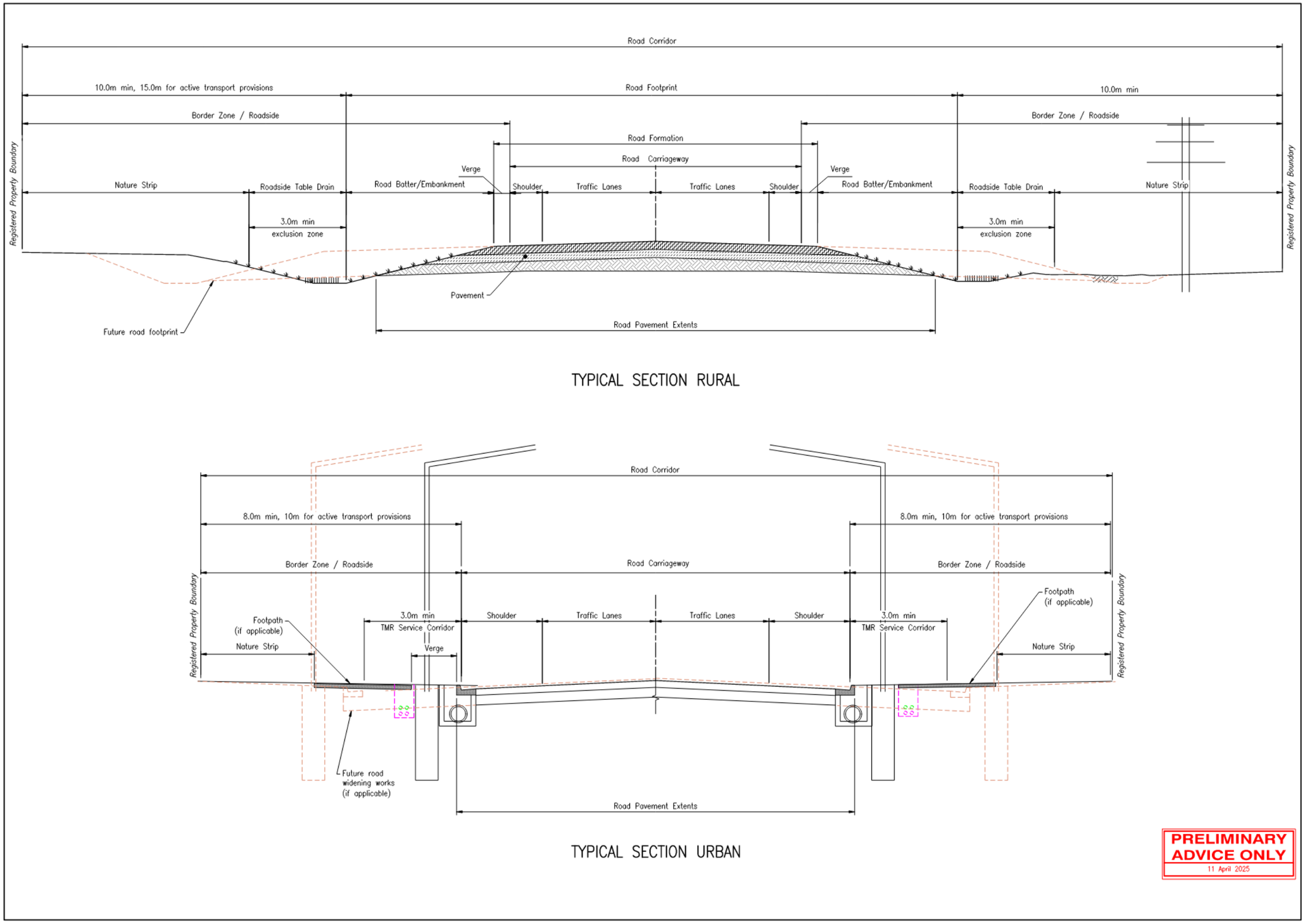
It is not the department’s responsibility to manage, maintain or operate any NTUI. The department takes no responsibility for damage by third party users or management of installations by NTU's.

The NTU must at its own expense maintain any NTUI in the SCRC to ensure department assets and other NTUI is protected, as well as ensuring the safety of all third party users. Any damage caused by the construction, operation, maintenance or decommissioning of an NTUI shall be borne by the NTU.

Installations of NTUI in the SCRC is at the risk of the NTU. Where the asset is proposed to be gifted to the utility provider, the utility provider takes on the responsibility of the asset, for the life of the asset once it meets the legislated requirements of that utility service.

Footnote: What the above alludes to is if an alignment was agreed between parties during the access approval process and the asset is subsequently installed not in accordance with that agreement, it is deemed a non-conformance with cost to rectify the non-conformance being borne by the utility provider should relocation/protection works be required in future.

Figure 1.10.1 – Typical section road corridor planning



1.11 Access to State-Controlled Road Corridor by utilities

Access to the SCRC is regulated by state and federal legislation. The department has a number of methods to condition access to State-Controlled Road Corridors for Non-transport utilities activities.

Some of the planned activities undertaken by Non-transport utilities, are:

- inspections of existing infrastructure
- installation of new infrastructure
- maintenance and operation of existing infrastructure
- upgrades to existing infrastructure, and/or
- asset decommissioning / removal of existing infrastructure.

All of these activities require either an application for activities and location of asset to be approved / agreed or a notice from the NTU to Transport and Main Roads (depending on the type of activity and utility).

All emergency works undertaken require notices of what occurred to be supplied to Transport and Main Roads in accordance with the entry conditions or existing MoUs.

It is the responsibility of all parties to ensure the department's existing infrastructure and assets, either temporary or permanent, surface or sub-surface, are not compromised whilst working in the corridor.

If a NTU damages or interferes with the department's property or other NTUI, unless the NTU has access conditions from the department to the contrary will be responsible for the full cost of rectification to the department's standards which may include ongoing costs (during the warranty / defect period) of increased road inspections of the rectification depending on the agreed scope and impacts of rectification works as deemed necessary by the department.

Depending on the scope of the rectification, the department may engage its construction and maintenance teams to carry out the rectification. This may include things such as reinstatement of road pavements, disturbing or attaching infrastructure to the department's structures or bridges or disturbing the department's Intelligent Technology Systems and Electrical (ITS&E) assets. Unless otherwise agreed in the conditions of access between the department and NTU these activities will incur a fee for service cost and may require applications via utilities for alteration / addition to the service as part of the works.

Information relating to the department's existing road transport infrastructure assets can be obtained by contacting Transport and Main Roads to obtain plans to identify its assets prior to finalising the NTUI detailed design and commencing any ground disturbance activities.

The 'Permits for access to the Road and Corridor' is a customer portal where applications and notices can by submitted by individuals, NTU's, traffic control companies or other organisations seeking to undertake activities in the SCRC including traffic management.

The department uses this tool to manage, process and issue responses, including permits, applications and notices for SCRC. Assessments can only be undertaken if applications and notices have all the required information. The most common cause of processing delays are submissions which have insufficient information and documentation from NTU owners and/or developers. NTU owners and/or developers should refer to Chapter 7 of this manual for further requirements.

1.12 Road Infrastructure Delivery

Transport and Main Road's delivery process for road infrastructure is described in the *Transport Infrastructure Project Delivery System* (TIPDS), Volume 1.

NTUI requirements should be established during the identification of the project solution, options and selection process and included in *Consultants for Engineering Projects* manual, C7521 to C7524 Addendums to Functional specifications templates.

Actual information and data inputs for utility design within projects are usually enhanced as investigations are progressively completed and the solutions developed through an iterative process. This can occur over several years and may involve various studies that are commissioned during the project solution identification process. The outputs from these studies usually identify a range of issues to be addressed by the designer. The issues are included in a design report with the designer, including statements on how these issues were considered and incorporated into the design.

All risks must be recorded in a register and treated appropriately to mitigate or remove the risk as the design evolves. Remaining risks at the end of the design development process are to be costed and the total cost included in the project estimate contingency amount.

1.12.1 Consequential works and non-consequential works

When a NTU is required to perform works as a consequence of the department, the works are termed as consequential works. The various legislative instruments prescribe the cost obligations in these circumstances. Notwithstanding cost obligations, the department has a responsibility to:

- locate all affected NTUI
- notify any potentially impacted NTU
- consult and collaborate with the NTU in relation to the scope and timing requirements of the department in relation to the consequential works
- request in writing that the NTU consequential works that are required to be completed by the NTU, or a third party acceptable to the NTU, where the works are contestable, and
- meet any requirements, reasonably required by the NTU, to facilitate the consequential works.

If NTUI is required to be relocated because of a conflict, no betterment will occur. However, should the impacted NTUI be designed to a superseded specification or standard, the new NTUI (relocated to a new alignment) is to conform to the current utility and road design standards, as well as the department's current technical publications.

Non-consequential works are works instigated by the NTU / third parties that require access to the SCRC. The works are initiated and funded by the NTU or contractors. This may include works by developers where an asset is gifted to the NTU post construction.

It is necessary to have a uniform NTUI design standard that is applicable to everyone who carries out works, to reduce the risk of negative service and budgets impacts in the future.

A detailed and thorough design and investigation process is required by designers of NTUI when it comes to risk mitigation for utility services.

1.12.2 Betterment and cost sharing

Betterment is when the NTU wants to upgrade or better their network whilst the department is undertaking a project that may not have impacts on existing NTUI. This can include the installation of larger assets, an increased number of assets, more complex assets and so on. Betterment is not a bad thing, in fact it can be cost effective to bring forward NTUI capital works while road construction is taking place preventing potential damage to newly installed infrastructure
10-15 years down the track. Early notification and consultation is key to allow NTU to forecast budget for any works. If a NTU seeks betterment, the project manager shall arrange a betterment agreement to be drafted and reviewed by legal services and signed / executed by the appropriate NTU delegate so that it is legally binding. Provision for future NTUI will be at the cost of the NTU.

Any cost difference due to betterment must be paid by the NTU in full, and include materials, labour, and provision for potential delay costs due to the NTUI betterment. Refer to Appendix 1 for possible scenarios.

Clarification Notes:

- Unless stipulated in an infrastructure agreement or any other form of contractual agreement, should a road project cause an impact to existing utilities that require relocation, installation to the latest published standard is not deemed betterment. As this is the standard of the day. Caveat to this scenario is if the utility at time of installation did not meet Transport and Main Roads conditions of entry or the utility design standard when installed, this is deemed a non-conformance and contribution by the asset owner to upgrade/ relocate the asset is deemed fair and reasonable.
- Where, due to a relocation and design requirement for cover to Transport and Main Roads assets, a gravity service requires to be at a flatter grade than the existing, upsizing the pipe to achieve the same capacity is not betterment, as like for like means efficiency / capacity and functionality of the existing system needs to be maintained.

Appendix 1

Betterment Scenarios

The scenarios are provided for explanatory purposes; they are not prescriptive and are intended to highlight possible outcomes based upon real-world examples. The scenarios presented in this manual are not exhaustive and should not be relied upon as individual circumstances may alter the outcome.

Scenario 1

The department is conducting a road rehabilitation project with an upgraded intersection (widening) within the State-controlled road. There is an existing Asbestos Concrete (AC) sewer rising main (SRM) that crosses under the current and the new footprint of the intersection. Upon design assessment it is determined that the SRM can be protected in place with an appropriate treatment method whether that be physical controls or construction procedures. The Sewer owner's preference is to replace the SRM asset with a different material. This change is considered betterment as it is not the minimum requirement to manage the asset as part of the upgrade project, so the utility provider shall contribute to the difference in cost between the cost of physical controls and pipeline replacement.

NOTE: if the asset is at the end of its service life and not fit for purpose, it is the responsibility of the asset owner to replace the asset completely at the asset owner's cost. The department will not be relocating utility assets except as a last resort and utilities should plan its network maintenance and upgrades with that consideration in mind. When there is no other choice, organising betterment during road projects can save utilities significantly over its forward program.

Scenario 2

Transport and Main Roads are conducting a road upgrade project consisting of an additional lane (formation widening) within the SCRC. There is a 40 year old existing water main pipeline running parallel with the roadway. Due to lack of asset information in the Public Utility Provider's database, it has been allocated a 2 mm/s PPV. The road widening footprint finishes 3.0 m adjacent to the main, however construction or maintenance plant and equipment vibration would surpass 2 mm/s PPV during construction or during standard maintenance activities. The road designer during the road upgrade project requires conducting a vibration assessment and dilapidation survey to determine allowable vibration and asset residual design / service life. Where insitu protection of the asset can withstand the works and/or provides an increased design life, the treatment option should be progressed. Where the risk of damage cannot be offset to a reasonable level of certainty with in-situ treatment measures, the asset which should have a 100 year design life, is deemed not fit for purpose for continued operation in the road corridor. Liaison with the water authority should be conducted and notice given that the water authority should upgrade the asset as it is a requirement that third parties have NTUI that is fit for purpose in good working order, within design life and will not be impacted by normal road operations and maintenance. Whether the water authority takes action prior or during the road project, costs of rectification or replacement will be borne by the water authority.

Scenario 3

Transport and Main Roads are conducting a road project consisting of an additional lane (formation widening) within the SCRC. There is a recently installed, existing direct buried fibre on an alignment and depth not consistent with the conditions required for all utilities entering the road, its notice to the department and the telecommunications industry standards at the time of installation. The service cannot remain in place due to the depth of the future pavement. The service requires relocating to Transport and Main Roads' Preferred Service Alignment Corridor at an adequate depth and in conduits.

The telecommunications provider has not appropriately complied with its obligations to comply with good engineering practice under Commonwealth law. The department would pursue the telecommunications carrier to contribute to the asset relocation as the asset owner is required to ensure its Assets are in compliance with legislation and is responsible for the original non-conforming works.

2 Data collection

2.1 Introduction

In this chapter, general guidance is provided on how to source and collect data and how to scope site surveys / assessments to assist in the planning, design and review of utility infrastructure within the SCRC.

Similar to the department's road drainage design process, various forms of data used in the planning, design and review of utility infrastructure are broadly categorised as either 'strategic data' or 'project data'. Strategic data is further sub divided into 'utility' and 'road corridor' depending on the purpose.

Designers and managers should ensure that collected data is appropriately stored for easy retrieval, not only during the preconstruction activities of the project, but also in the future.

2.2 Types of data

Data is progressively collected, analysed and used throughout all preconstruction activities at a level of detail that is appropriate for the purpose being considered. For Consequential Works the data that is to be collected (if available) is from the service providers to determine any forecasted new installations or planned upgrades of their respective networks. This information is pertinent to the road project mitigation strategy for utility design and confirms potential resumption requirements in order to provide an adequate service corridor that can be efficiently managed by Transport and Main Roads. Data collected for these purposes is defined as 'utility strategic data'.

For Non-Consequential Works, data that is generally to be reviewed includes Transport and Main Roads planning category A, B, C and D plans and any planned upgrades / road rehabilitation works. The purpose of this data is to confirm that the proposed utility line and level does not:

- impede future road works
- encroach on other service alignments, and
- limit the requirement of utility protection and relocation in future.

This data is defined as 'road corridor strategic data' and is generally used by departmental staff as part of the corridor access permit process. It can also be used by designers in order to space-proof the preferred utility alignment corridors where there is a staged road upgrade proposed.

In the development of specific project proposals, the strategic data needs to be reviewed and expanded with the introduction of more detailed, project-specific data. As a project proposal progresses through various preconstruction activities, refinement of data occurs through various investigations and studies and as new design specific data is obtained.

Data collected during preconstruction, construction and operational/maintenance activities is defined as 'project data'.

2.2.1 Quality level of data

Where utility assets are likely to be impacted by departmental works, Transport and Main Roads must notify the Utility owner, and in the case of most public utilities, protect and/or relocate the asset at the department's cost.

Where works are to be constructed, the transport infrastructure designer must identify any utility asset conflicts and conflict locations. Information pertaining to the location of utility assets is gathered in accordance with the four quality levels identified in *TMR Survey Standards* Part 2 – Underground asset investigation:

a) Quality Level D – The lowest of the four levels. Provides an indicative location of the subsurface features. Before You Dig Australia (BYDA) is considered Quality Level D.

b) Quality Level C – provides the location of subsurface features with a maximum horizontal tolerance of ± 300 mm (no vertical measurement).

c) Quality Level B – provides the location of subsurface features with a maximum horizontal tolerance of ± 300 mm and maximum vertical tolerance of ± 500 mm.

d) Quality Level A - provides the location of subsurface features with a maximum horizontal and vertical tolerance of ± 25 mm. Potholing to expose the asset and survey pick up of the assets actual location is required for Quality Level A information.

The Quality Level required is dependent on the design stage (concept, preliminary, detailed) and the type of PUP asset impacted, (high value, high risk PUP assets would require information far earlier during design development than low risk assets.

It must be noted that while the quality levels above will identify a location for the asset they will not confirm if the asset is '*live*', '*abandoned*', '*decommissioned*', or '*redundant*'. Only the NTU owner of the asset can provide this information.

2.2.2 Utility project data

As the department generally approves the location of service infrastructure within the road corridor, documentation associated with these approvals provides an initial source of data for new road projects. This data needs to be verified with the agency involved and any information supplied should be confirmed with site measurements and ground survey. Utility project data includes:

- As Constructed Plans / models
- Ground investigation and feature surveys (GPR, EMI, Potholing)
- BYDA Plans
- Geospatial data (ArcGIS, mapinfo etc, from government bodies or NTU)
- Lidar or aerial survey.

2.2.3 Road corridor project data

Utility design within the road corridor is holistic in nature and interactions with other disciplines requires appreciation for the road environment as a whole. Road corridor project data is relevant especially in the design phase and largely relates to the physical characteristics of a site. It may be collected or measured at varying times in the different phases of the planning process and at different levels of detail. Project data includes but is not limited to:

- land-use
- topographic information
- latest flooding information
- waterway characteristics and stability

- soils data
- erosion history
- vegetation constraints
- fauna habitats
- underground assets
- structures.

2.2.4 Sources of data

Different phases and steps during the preconstruction process may use the same data. This data may be obtained from field investigations, studies and recorded information in various forms such as:

- ground survey
- existing field inspection records
- topographic maps
- documentation obtained during the environmental assessment process
- existing / proposed design drawings
- geotechnical investigations
- survey records
- aerial photographs
- published references
- previously published reports and investigations (being feasibility studies)
- various electronic data sources (such as geospatial data, mapinfo, Queensland Globe). The department's Geospatial Technologies Unit (enquire to TMR_Spatial_Enquiry@tmr.qld.gov.au) can assist with this service provider's database, and/or
- local knowledge and historical information from persons living or working in the area.

2.2.5 Site investigations

During the planning and concept phases of projects, there may not be detailed site data (Quality Level A, B or C) available due to limited site investigations conducted, however Quality Level (QL) D is considered adequate for a high-level utility design and conflict mitigation strategy.

As the project progresses into the later part of the Concept Phase (Business Case Stage), where refined mitigation strategies are required to price and confirm with the NTU, a higher survey quality level is required. The designer or manager shall conduct a data validation and gap analysis of the compiled project data in the planning phase and generate a survey and potholing scope early in the concept phase to refine the utility design and treatment strategy.

3 General design requirements

3.1 Introduction

The purpose of this chapter is to introduce and discuss a number of general design requirements for installation of NTUI within the SCRC for consequential and non-consequential works. The requirements presented cover a range of topics.

Where these requirements cannot be achieved, a fit for purpose solution will need to assess issues, functional requirements, expectations, demands, constraints, risk elements and costings on a case-by-case basis via the design exception process presented in Section 5.8.

3.1.1 NTUI non-contestable and contestable works

'Non-contestable' and 'contestable' are terms that refer to who can undertake and/or manage the design, relocation, protection, or commission of utility assets. Contestability is determined by utility legislation, and also NTU have their own procurement requirements and compliance checks.

Non-contestable means that only the NTU provider can undertake and/ or manage works on its assets. This will require the department or the Utility Design team to engage the NTU provider to conduct the works.

Contestable means that the NTU provider can permit others to undertake and/or manage components of the design, relocation, protection, or commissioning works. Note however, designs still require review and approval (endorsement) by the NTU provider.

All relocation or protection works on utility assets include an element (or elements) of non-contestable work that must be considered when negotiating with utilities (such as 'live' connections or water testing). While there are legislative powers permitting the department to undertake protection / relocation works on gas, sewer and water assets, this power is conditional. It is subject to:

- adherence to the legislative notification periods
- the NTU provider not undertaking the works themselves within in an acceptable time period, or
- the NTU provider authorising Transport and Main Roads to undertake / manage the design, relocation, protection, or commissioning works on behalf of the utility authority.

Works associated with the design, relocation, protection, or commissioning of high voltage electricity and telecommunications assets can only be undertaken / managed by the owners of those assets. Consequently, they are referred to as non-contestable works. In practice, there are very limited circumstances where the department can apply non-contestability without the active consent of the utility.

Note: Connections to the utility networks typically remain non-contestable, although this is changing with some utilities authorising third parties to do this work.

3.1.2 Utility alignment and orientation

General

The SCRC's primary use is for transport assets that benefit the community. It is Transport and Main Road's obligation to ensure the land use continues to be fit-for-purpose for this primary transport function. This takes priority over any other third party uses.

Utilisation of the road corridor by third parties should keep this primary purpose in mind when considering the available space to install and maintain Non-transport utility assets. If NTUI is not installed in alignments agreed by the department, and managed appropriately, this causes significant expense to taxpayers during road upgrades.

To prevent future impacts on NTUI, NTU providers and third parties during strategic and planning phases should first seek to install utility assets outside the SCRC, as SCRs are more likely to be widened or upgraded than local roads or adjacent land. Transport and Main Roads may, at its own discretion, ask the third party for evidence and/or reports and/or documentation showing option(s) to seek installation of NTUI outside but immediately adjacent to road corridors to assess potential future impacts.

Utility alignments vary considerably within local and state road corridors dependent on historical and current guidance. To better manage preferred NTU alignment corridors within the SCRC, alignment plans have been developed in line with industry documentation but adjusted specifically to SCRCs. Refer to Figures 3.1.2(a) to (d) for further guidance.

Low speed urban roads or high-speed arterials within dense population areas tend to have a substantial volume of NTUI within the SCRC, while due to fewer homes and businesses with direct access onto the highway, freeway and rural roads, there are fewer NTUI on these roads. For consistency, alignments have been synchronised between different road hierarchy groups to have a singular design outcome. This presents as two preferred alignment models (Rural and Urban) to minimise confusion between road type transitions. Limited Access Corridors are not included as NTUI longitudinally is prohibited.

Where a NTUI type is not expected to be installed within the preferred service alignment corridor for the design or serviceability life of the asset, or where footprint is limited, NTUI may be placed on an alternative (agreed) alignment, however this is to be assessed on a case-by-case basis and alignments entirely decided by the department. Where the NTUI is located outside the agreed Service Alignment corridor and prevents another NTU provider's service from installation, the NTU provider whose service is in the unapproved location may be responsible for relocating its asset to a favourable alignment at cost to the non-conforming NTU provider.

Note for localised small encroachments outside preferred alignment corridors (example pit larger than allocated width or avoidance of a conflict) is acceptable subject to review of conflicts and where another service exists, receipt of third party no objection for the localised departure. Documentation required for this scenario is depicted in Section 5.8.

Legacy situations

The exception to this requirement is legacy or existing alignments where there may be limitations to adhering to alignment service corridors in the SCRC. When relocations or new installations are proposed during consequential works, the road project utility designer shall look to adjust services as necessary to optimise and declutter the service alignment. This may add to the capital cost of the project (CAPEX) depending on amount of services conflicts to be resolved but will reduce costs into the future. This likely additional cost to apply this realignment of services shall be assessed and provided to the department to make an informed decision regarding funding and practicality. Where relocations or new installations are proposed during non-consequential works, line and level will need to be reviewed and confirmed with the department on a case-by-case basis and may be subject to strict conditions and a requirement for an infrastructure agreement depending on risk and detriment to Transport and Main Roads assets in future.

The alignment of the utility assets in the SCRC is entirely at the discretion of the department.

Refer to Figures 3.1.2(a) to (d) for preferred service alignments within SCRC.

Alignment

For consequential works, where the NTU provider is responsible for the design documentation of non-contestable works, the road project utility designer shall provide a space-proofed horizontal and vertical service alignment within the Transport and Main Roads Preferred Service Alignment corridor. This approach is detailed further in later chapters of this manual.

For non-consequential works, the NTU provider (or third party) is responsible for the design documentation and shall provide a space-proofed horizontal and vertical service alignment and conflict resolution strategy as part of the access permit requirements.

Installation of a new NTUI (unless otherwise depicted on the preferred service alignment drawings) will not be permitted longitudinally within the road carriageway (pavement area) except in extremely exceptional circumstances entirely at the department’s District Director’s (or their delegate’s) discretion, on a case-by-case basis, subject to strict conditions and where no other reasonable alternative routes are available.

If permitted within the road carriageway, then the NTUI will not be able to be dug up for maintenance (excluding emergency works) or have valves or pits that disrupt traffic operations or make resurfacing works difficult and will be required to have a remaining life in excess of the road asset. The design needs to be robust enough so disturbance to the pavement areas is not required for the life of the asset, as far as practicable which may then lead to an infrastructure agreement due to the high-risk location.

Installation of a new NTUI or upgrades to existing NTUI will not be permitted longitudinally in a limited access road corridor unless it is required for road infrastructure purposes or in extremely exceptional circumstances entirely at the department’s District Director’s (or their delegate’s) discretion, subject to strict conditions and where no other reasonable alternative routes are available.

If permitted, the NTUI installation must not adversely affect the design, safety or operation of the limited access road (which includes the Shared User Path) and must be maintained and serviced without access from the carriageway (which may include the Shared User Path, depending on location) of the limited access road, or any associated ramps.

The installation must be constructed in a manner so that all future access and maintenance to such utility services will be carried out from outside the limited access road.

This requirement for installation within limited access roads is primarily to maintain road safety at the high degree to which these roads have been specifically designed and constructed.

Longitudinal services maybe permitted in SCRCs other than limited access road corridors, if:

- the proposed service does not have a negative impact to the travelling public or the operations of the SCR
- there is sufficient space available to accommodate the proposed service without interfering with departmental assets and other services already occupying the road border zones
- the road designer and / or the NTUI owner provides adequate justification that other areas outside the SCRC is unavailable
- the proposed NTUI does not have a negative impact on the department's future planning, or expose the department to unnecessary relocations costs and/or time delays during future road upgrades or maintenance activities, and
- the NTU provider acknowledges if any of the above dot points for new installations are not achieved, this location may be temporary and agrees in writing, that if room becomes available due to future road upgrades, the NTU provider will contribute financially to the relocation of this asset outside of the proposed road footprint.

Figure 3.1.2(a) – Preferred service alignment plan urban

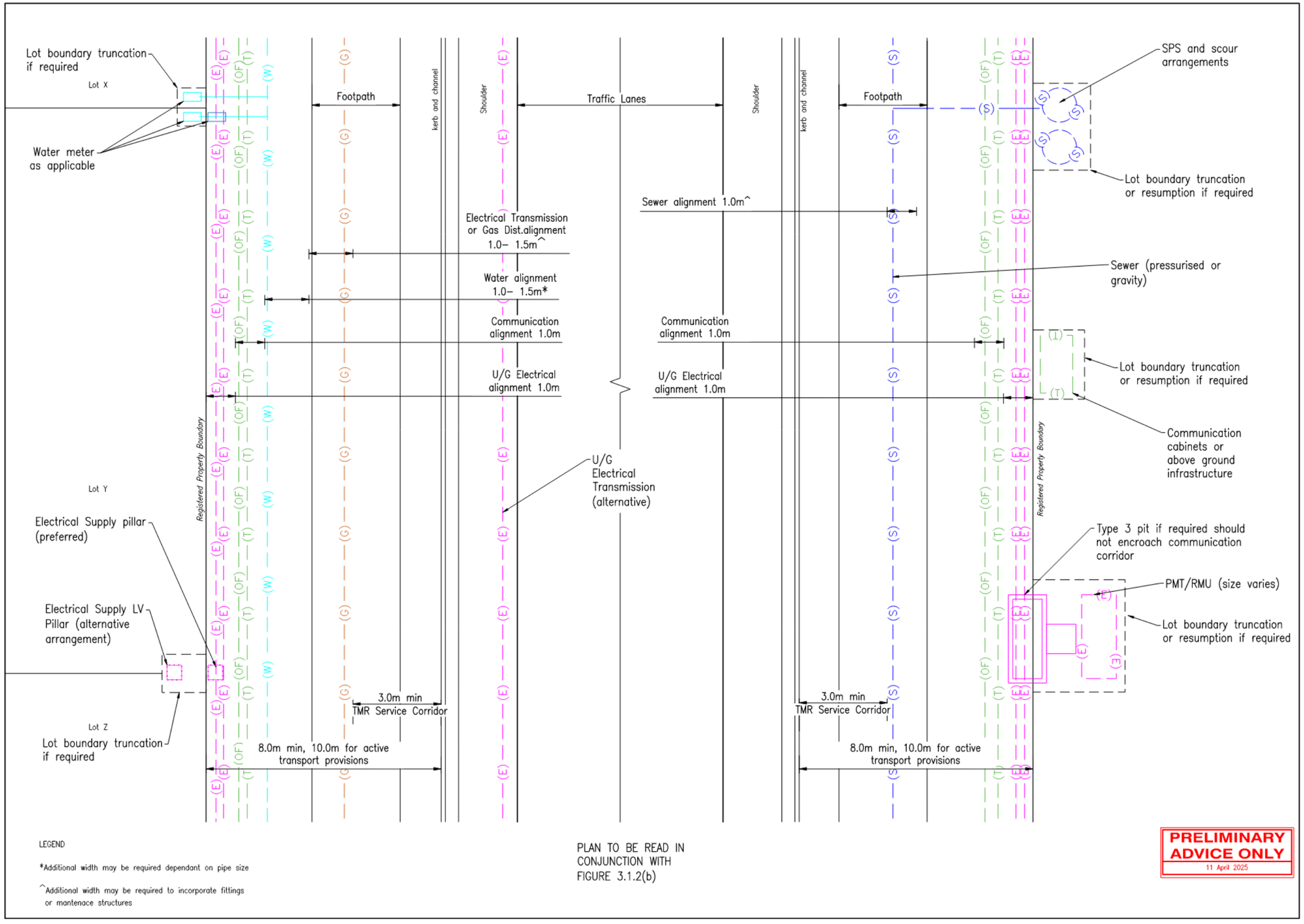
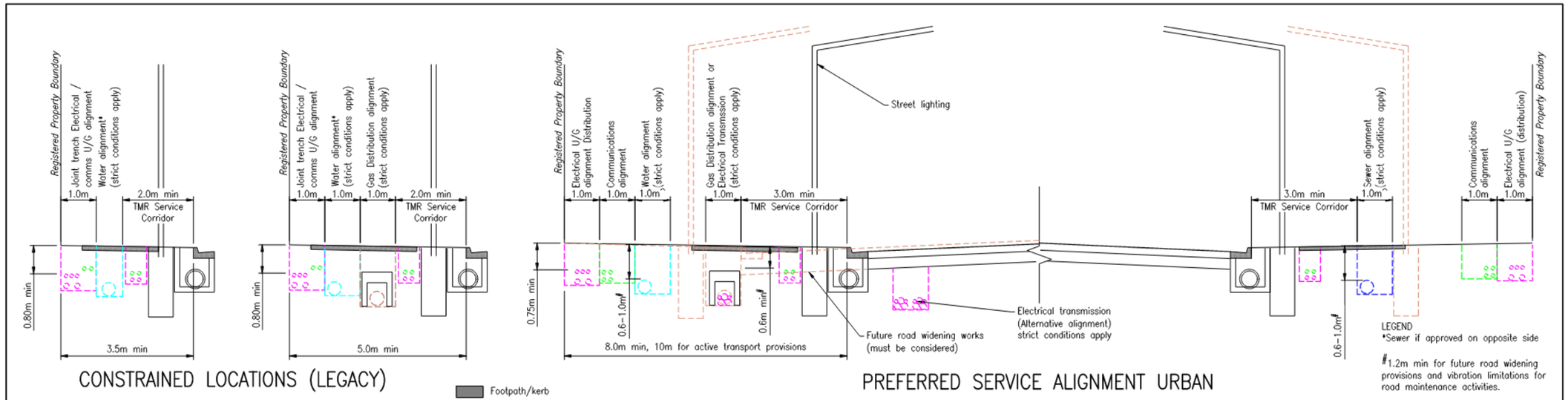


Figure 3.1.2(b) – Preferred service alignment urban



GENERAL NOTES

1. The State Controlled Road Corridor's (SCRC) primary use is for transport assets that benefit the community. It TMR's obligation to ensure the land use continues to be fit-for-purpose for this primary transport function. This takes priority over any other third-party asset uses.
2. Utilisation of the road corridor by third-parties should keep this primary purpose in mind when considering the available space to install and maintain utility assets. If utility asset location is not installed in alignments agreed by the Department, and managed appropriately, this causes significant expense to taxpayers during road upgrades.
3. To prevent future impacts on utility services, utility providers should first seek to install utility assets outside the SCRC, as State-controlled Roads are more likely to be widened or upgraded than local roads or adjacent land.
4. Longitudinal services are prohibited on limited access roads. Limited Access Roads are generally high speed roads (80Km/hr and above) with access limited to entry and exit ramps. This includes but is not limited to motorways, freeways, expressways and arterials.
5. Longitudinal services maybe permitted in State Controlled Roads other than limited access roads, if
   - the proposed service does not have a negative impact to the travelling public or the operations of the State Controlled Road.
   - there is sufficient space available to accommodate the proposed service without interfering with departmental assets and other services already occupying the road Border Zone,
   - the designer and / or the NTUI owner provides adequate justification that other areas outside the SCRC is unavailable,
   - the proposed NTUI does not have a negative impact on the department's future planning and expose the department to unnecessary relocations costs and time delays during future road upgrades or maintenance activities,
   - the NTU provider acknowledges if any of the above dot points are not achieved, this location may be temporary and agrees in writing, that if room becomes available due to future road upgrades, the NTU provider will contribute financially to the relocation of this asset outside of the proposed road footprint.
6. The alignment of the utility assets in the SCRC is entirely at the discretion of the Department. There is no guarantee that land will be available in SCR corridors for future use by utilities. Purpose of this drawing is to manage cluttering of the road corridor and consider space proofing in the planning phases.
7. Where a NTUI type is not expected to be installed within the preferred service alignment corridor for the design or serviceability life of the asset, or where footprint is limited, NTUI may be placed on an alternative alignment, however this is to be assessed on a case-by-case basis and alignments entirely decided by the department. Where the NTUI is located outside the agreed Service Alignment corridor and prevents another NTU Provider service from installation, the NTU provider whose service is in the unapproved location may be responsible for relocating its asset to a favourable alignment at cost to the non-conforming NTU provider.

   Refer to Chapter 3 of the Non Transport Utility Management and Design Manual (NTUMDM) for further guidance.
8. If there is limited space to accommodate NTU's within the SCRC, the department's order of priority is Electrical and Communications, followed by Transmission Gas (registered license number) and Bulk Water, lastly all other non-transport utility infrastructure. If there has been access and alignments confirmed and approved by the department, future NTUI designs should be located on one side of the corridor where practicable and economical, with adequate service crossings to promote de-cluttering of the road corridor and increase land availability.
9. It is not the department's responsibility to manage, maintain or operate any NTUI. The department takes no responsibility for damage by third party users or management of installations by NTU's
10. Refer to TMR NTUMDM for other requirements.

ELECTRICAL NOTES

1. For new installations powerpole installations should be avoided with underground (U/G) installations preferred.
2. Powerpoles if installed shall be no closer than 2.0m from back of kerb.
3. Hazard risk assessment shall be conducted in accordance with TMR standards and requirements to determine mitigation treatments necessary to maintain safety of the road users. Assessment shall also consider future widening and available footprint.
4. Refer to TMR Non Transport Utility Management and Design Manual for other requirements.

COMMUNICATIONS NOTES

1. Telecommunications corridor is to be shared by all carriers.
2. Conduit installation shall be to one side of the alignment corridor trench to facilitate future installation of additional conduits.
3. It is noted communication requirements are based on client demand, however consideration should be given to providing redundancy (spare conduits) at time of installation to prevent disturbance to ground in future. Review of local mapping and land categorization can present a reasonable expectation of potential population growth.
4. The service alignment corridor shall be measured from the surveyed RP Boundary and not the existing fence line.
5. Shared electrical and communication service trenches (separate utility authorities) are not approved within a SCRC. where room permits, each service type shall have its own alignment corridor, unless approved otherwise. Refer to note 6.
6. At locations where verge width is constrained shared trenches are accepted subject to risk and responsibility agreement between utility authorities.
7. Where Communication networks cross the SCR, a splice / junction pit (extra coil) shall be considered either side to allow connection of a new crossing should the existing require replacement to a maximum spacing between pits being 250m. Splice (fibre joint) pits shall not be placed within 30m of an intersection.
8. Refer to TMR Non Transport Utility Management and Design Manual for other requirements.

WATER NOTES

1. Where longitudinal alignments are agreed to be installed, they shall be to one side of the alignment corridor trench to facilitate upgrades or repairs.
2. Dual water supply systems not accepted as this network should fall within local government boundaries.
3. Duplicate mains (each side of corridor) is not preferred. Watermain alignment shall be on one side with water service road crossings at appropriate locations if feasible.
4. Where pressurised NTUI cannot be shut down (restricted mains) for a reasonable time period to allow for cut overs or tie-ins associated with relocation works, road crossings may require a purpose-built junction either side of the road crossing, as close to the road cadastral boundary as practical, in the form of a pit and / or fittings / valves that facilitate online connection of the new crossing without requiring shutting down of the main
5. Where these restricted mains run parallel with the SCR, junctions shall be considered generally no further than 400 m apart in low density urban areas or 200 m in high density areas subject to existing intersection spacing and footprint availability. This junction shall be within the service alignment corridor to allow replacement next to the existing main or for sewer and water, potentially on the main for a temporary above ground bypass, to facilitate a remove and replace on the same alignment
6. Meters servicing adjacent properties for commercial, industrial, strata managed properties or above ground, are not to be installed in the SCRC. Single residential meters are situationally dependent, subject to fence types and accessibility. The meter box may be placed inside the property, or inside a truncation of the fence, or within the SCRC as close as possible to RP boundary. Meters are below-ground and pit lids are 'on surface' with no protrusions above surface level to interfere with pedestrians nor vegetation management.
7. Refer to TMR Non Transport Utility Management and Design Manual for other requirements.

SEWER NOTES

1. Sewer gravity and reticulation systems are restricted on SCRC, It is up to the utility provider to plan / design a system that does not rely solely on SCRCs to reticulate the sewerage to its respective treatment plants. This expectation puts onus on TMR to purchase more land to accommodate its service should it need to be relocated. Where land is required to be purchased to accommodate a third-party utility relocation, cost sharing arrangements need to be considered.
2. Where access is granted, installation shall be to one side of the alignment corridor trench to facilitate upgrades or repairs.
3. Dual mains (same side of corridor) is prohibited unless otherwise approved by TMR. During road upgrade projects, where this scenario exists, designers shall look to augment the system to have 1x larger pipe opposed to 2x smaller ones.
4. Duplicate mains (one each side of corridor) is prohibited unless otherwise approved by TMR. Sewer alignment shall be on one side of the corridor.
5. Where pressurised NTUI cannot be shut down (restricted mains) for a reasonable time period to allow for cut overs or tie-ins associated with relocation works, road crossings may require a purpose-built junction either side of the road crossing, as close to the road cadastral boundary as practical, in the form of a pit and / or fittings / valves that facilitate online connection of the new crossing without requiring shutting down of the main
6. Where these restricted mains run parallel with the SCR, junctions shall be considered generally no further than 400 m apart in low density urban areas or 200 m in high density areas subject to existing intersection spacing and footprint availability. This junction shall be within the service alignment corridor to allow replacement next to the existing main or for sewer and water, potentially on the main for a temporary above ground bypass, to facilitate a remove and replace on the same alignment
7. Refer to TMR Non Transport Utility Management and Design Manual for other requirements.

GAS NOTES

1. Designers are to note the vibration restrictions imposed by some gas authorities when assessing the proposed alignment. Example, 'Guidelines for working near gas assets' can have restrictions such as limitation for vibration equipment within 15 m of the gas asset. This needs to be considered when allowing gas assets from varying authorities to be installed within road corridors. Where gas alignments are within this potential restriction of 15 m from the existing road footprint or future footprint, pipe material, depth and physical controls may need to be considered to offset vibration risk due to road maintenance activities.
2. Due to constraints in achieving horizontal offsets to transmission gas mains, installation within an urban road corridor is not achievable and should be avoided. Where installed will come with strict conditions stipulated in an Infrastructure Agreement.
3. Conduit installation shall be to one side of the alignment corridor trench to facilitate upgrades or repairs.
4. Duplicate mains (each side of corridor) is prohibited unless otherwise approved by TMR. Gas alignment shall be on one side of the corridor.
5. Where pressurised services cannot be shut down (restricted mains) for a reasonable time period to allow for cut overs or tie-ins associated with relocation works, road crossings shall look to have a purpose-built junction, as close to the outside of the road cadastral boundary as practicable in the form of a pit and / or fittings / valves that facilitate online connection of the new crossing without requiring shutting down of the main.
6. Refer to TMR NTUMDM for other requirements.

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Figure 3.1.2(c) – Preferred service alignment plan rural

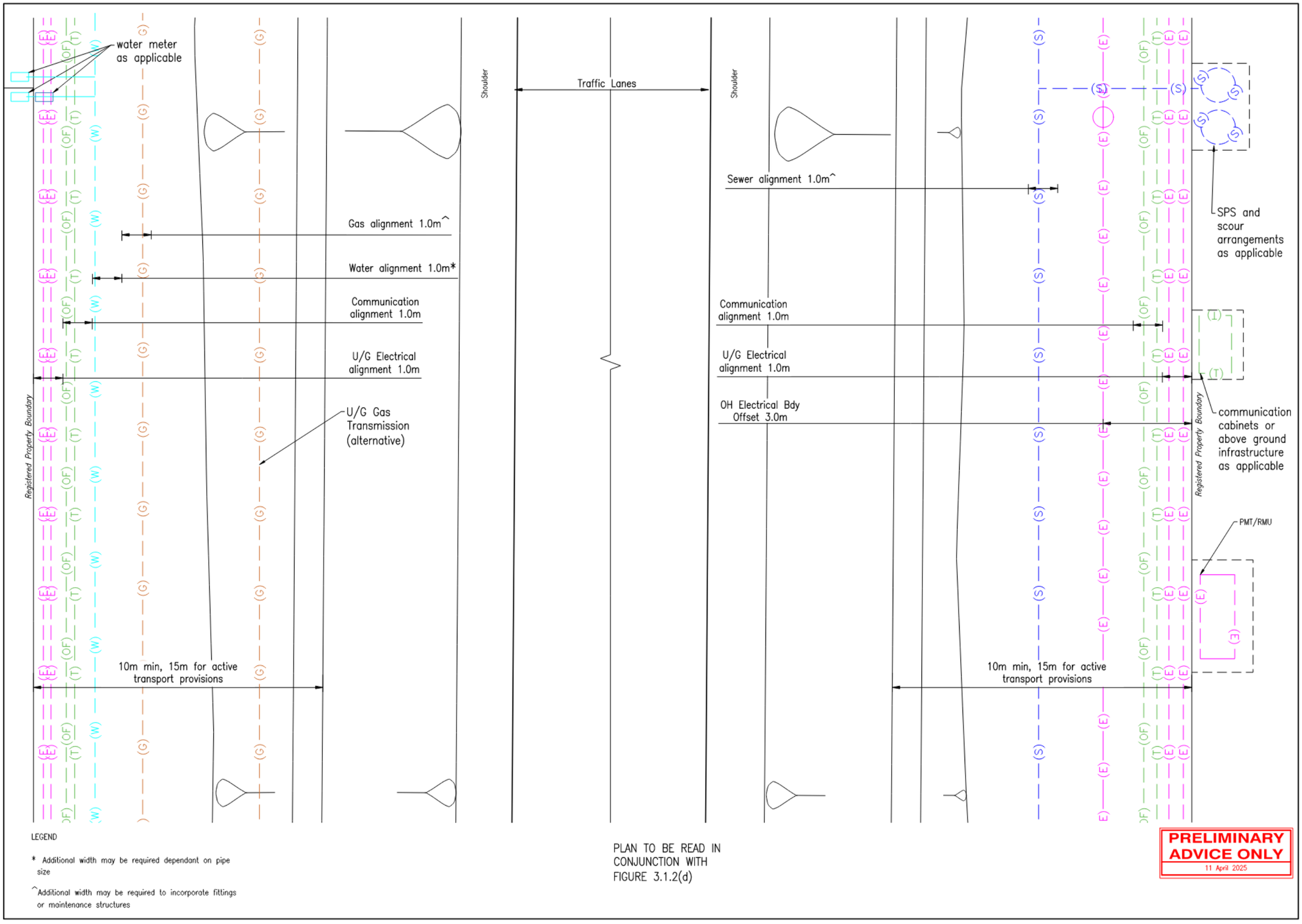
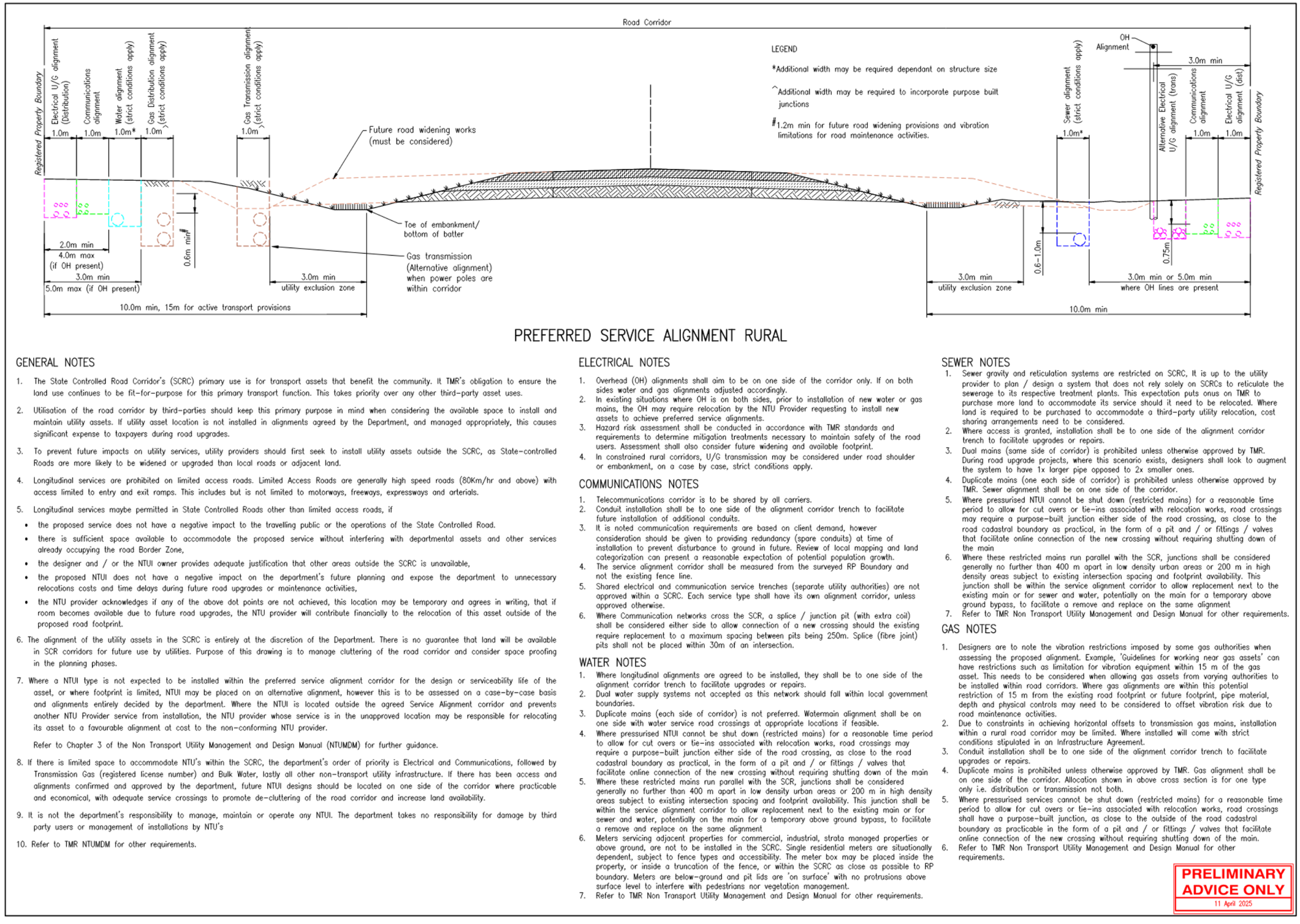


Figure 3.1.2(d) – Preferred service alignment section rural



PREFERRED SERVICE ALIGNMENT RURAL

GENERAL NOTES

1. The State Controlled Road Corridor's (SCRC) primary use is for transport assets that benefit the community. It TMR's obligation to ensure the land use continues to be fit-for-purpose for this primary transport function. This takes priority over any other third-party asset uses.
2. Utilisation of the road corridor by third-parties should keep this primary purpose in mind when considering the available space to install and maintain utility assets. If utility asset location is not installed in alignments agreed by the Department, and managed appropriately, this causes significant expense to taxpayers during road upgrades.
3. To prevent future impacts on utility services, utility providers should first seek to install utility assets outside the SCRC, as State-controlled Roads are more likely to be widened or upgraded than local roads or adjacent land.
4. Longitudinal services are prohibited on limited access roads. Limited Access Roads are generally high speed roads (80Km/hr and above) with access limited to entry and exit ramps. This includes but is not limited to motorways, freeways, expressways and arterials.
5. Longitudinal services maybe permitted in State Controlled Roads other than limited access roads, if
   - the proposed service does not have a negative impact to the travelling public or the operations of the State Controlled Road.
   - there is sufficient space available to accommodate the proposed service without interfering with departmental assets and other services already occupying the road Border Zone,
   - the designer and / or the NTUI owner provides adequate justification that other areas outside the SCRC is unavailable,
   - the proposed NTUI does not have a negative impact on the department's future planning and expose the department to unnecessary relocations costs and time delays during future road upgrades or maintenance activities,
   - the NTU provider acknowledges if any of the above dot points are not achieved, this location may be temporary and agrees in writing, that if room becomes available due to future road upgrades, the NTU provider will contribute financially to the relocation of this asset outside of the proposed road footprint.
6. The alignment of the utility assets in the SCRC is entirely at the discretion of the Department. There is no guarantee that land will be available in SCR corridors for future use by utilities. Purpose of this drawing is to manage cluttering of the road corridor and consider space proofing in the planning phases.
7. Where a NTUI type is not expected to be installed within the preferred service alignment corridor for the design or serviceability life of the asset, or where footprint is limited, NTUI may be placed on an alternative alignment, however this is to be assessed on a case-by-case basis and alignments entirely decided by the department. Where the NTUI is located outside the agreed Service Alignment corridor and prevents another NTU Provider service from installation, the NTU provider whose service is in the unapproved location may be responsible for relocating its asset to a favourable alignment at cost to the non-conforming NTU provider.

   Refer to Chapter 3 of the Non Transport Utility Management and Design Manual (NTUMDM) for further guidance.
8. If there is limited space to accommodate NTU's within the SCRC, the department's order of priority is Electrical and Communications, followed by Transmission Gas (registered license number) and Bulk Water, lastly all other non-transport utility infrastructure. If there has been access and alignments confirmed and approved by the department, future NTUI designs should be located on one side of the corridor where practicable and economical, with adequate service crossings to promote de-cluttering of the road corridor and increase land availability.
9. It is not the department's responsibility to manage, maintain or operate any NTUI. The department takes no responsibility for damage by third party users or management of installations by NTU's
10. Refer to TMR NTUMDM for other requirements.

ELECTRICAL NOTES

1. Overhead (OH) alignments shall aim to be on one side of the corridor only. If on both sides water and gas alignments adjusted accordingly.
2. In existing situations where OH is on both sides, prior to installation of new water or gas mains, the OH may require relocation by the NTU Provider requesting to install new assets to achieve preferred service alignments.
3. Hazard risk assessment shall be conducted in accordance with TMR standards and requirements to determine mitigation treatments necessary to maintain safety of the road users. Assessment shall also consider future widening and available footprint.
4. In constrained rural corridors, U/G transmission may be considered under road shoulder or embankment, on a case by case, strict conditions apply.

COMMUNICATIONS NOTES

1. Telecommunications corridor is to be shared by all carriers.
2. Conduit installation shall be to one side of the alignment corridor trench to facilitate future installation of additional conduits.
3. It is noted communication requirements are based on client demand, however consideration should be given to providing redundancy (spare conduits) at time of installation to prevent disturbance to ground in future. Review of local mapping and land categorization can present a reasonable expectation of potential population growth.
4. The service alignment corridor shall be measured from the surveyed RP Boundary and not the existing fence line.
5. Shared electrical and communication service trenches (separate utility authorities) are not approved within a SCRC. Each service type shall have its own alignment corridor, unless approved otherwise.
6. Where Communication networks cross the SCR, a splice / junction pit (with extra coil) shall be considered either side to allow connection of a new crossing should the existing require replacement to a maximum spacing between pits being 250m. Splice (fibre joint) pits shall not be placed within 30m of an intersection.

WATER NOTES

1. Where longitudinal alignments are agreed to be installed, they shall be to one side of the alignment corridor trench to facilitate upgrades or repairs.
2. Dual water supply systems not accepted as this network should fall within local government boundaries.
3. Duplicate mains (each side of corridor) is not preferred. Watermain alignment shall be on one side with water service road crossings at appropriate locations if feasible.
4. Where pressurised NTUI cannot be shut down (restricted mains) for a reasonable time period to allow for cut overs or tie-ins associated with relocation works, road crossings may require a purpose-built junction either side of the road crossing, as close to the road cadastral boundary as practical, in the form of a pit and / or fittings / valves that facilitate online connection of the new crossing without requiring shutting down of the main
5. Where these restricted mains run parallel with the SCR, junctions shall be considered generally no further than 400 m apart in low density urban areas or 200 m in high density areas subject to existing intersection spacing and footprint availability. This junction shall be within the service alignment corridor to allow replacement next to the existing main or for sewer and water, potentially on the main for a temporary above ground bypass, to facilitate a remove and replace on the same alignment
6. Meters servicing adjacent properties for commercial, industrial, strata managed properties or above ground, are not to be installed in the SCRC. Single residential meters are situationally dependent, subject to fence types and accessibility. The meter box may be placed inside the property, or inside a truncation of the fence, or within the SCRC as close as possible to RP boundary. Meters are below-ground and pit lids are 'on surface' with no protrusions above surface level to interfere with pedestrians nor vegetation management.
7. Refer to TMR Non Transport Utility Management and Design Manual for other requirements.

SEWER NOTES

1. Sewer gravity and reticulation systems are restricted on SCRC, It is up to the utility provider to plan / design a system that does not rely solely on SCRCs to reticulate the sewerage to its respective treatment plants. This expectation puts onus on TMR to purchase more land to accommodate its service should it need to be relocated. Where land is required to be purchased to accommodate a third-party utility relocation, cost sharing arrangements need to be considered.
2. Where access is granted, installation shall be to one side of the alignment corridor trench to facilitate upgrades or repairs.
3. Dual mains (same side of corridor) is prohibited unless otherwise approved by TMR. During road upgrade projects, where this scenario exists, designers shall look to augment the system to have 1x larger pipe opposed to 2x smaller ones.
4. Duplicate mains (one each side of corridor) is prohibited unless otherwise approved by TMR. Sewer alignment shall be on one side of the corridor.
5. Where pressurised NTUI cannot be shut down (restricted mains) for a reasonable time period to allow for cut overs or tie-ins associated with relocation works, road crossings may require a purpose-built junction either side of the road crossing, as close to the road cadastral boundary as practical, in the form of a pit and / or fittings / valves that facilitate online connection of the new crossing without requiring shutting down of the main
6. Where these restricted mains run parallel with the SCR, junctions shall be considered generally no further than 400 m apart in low density urban areas or 200 m in high density areas subject to existing intersection spacing and footprint availability. This junction shall be within the service alignment corridor to allow replacement next to the existing main or for sewer and water, potentially on the main for a temporary above ground bypass, to facilitate a remove and replace on the same alignment
7. Refer to TMR Non Transport Utility Management and Design Manual for other requirements.

GAS NOTES

1. Designers are to note the vibration restrictions imposed by some gas authorities when assessing the proposed alignment. Example, 'Guidelines for working near gas assets' can have restrictions such as limitation for vibration equipment within 15 m of the gas asset. This needs to be considered when allowing gas assets from varying authorities to be installed within road corridors. Where gas alignments are within this potential restriction of 15 m from the existing road footprint or future footprint, pipe material, depth and physical controls may need to be considered to offset vibration risk due to road maintenance activities.
2. Due to constraints in achieving horizontal offsets to transmission gas mains, installation within a rural road corridor may be limited. Where installed will come with strict conditions stipulated in an Infrastructure Agreement.
3. Conduit installation shall be to one side of the alignment corridor trench to facilitate upgrades or repairs.
4. Duplicate mains is prohibited unless otherwise approved by TMR. Gas alignment shall be on one side of the corridor. Allocation shown in above cross section is for one type only i.e. distribution or transmission not both.
5. Where pressurised services cannot be shut down (restricted mains) for a reasonable time period to allow for cut overs or tie-ins associated with relocation works, road crossings shall have a purpose-built junction, as close to the outside of the road cadastral boundary as practicable in the form of a pit and / or fittings / valves that facilitate online connection of the new crossing without requiring shutting down of the main.
6. Refer to TMR Non Transport Utility Management and Design Manual for other requirements.

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3.1.3 Service crossings and tie-ins / cutovers

Unless otherwise agreed in writing by the department's District Director (or their delegate), all NTUI crossing under SCR pavements shall be installed using trenchless methods with no disturbance to the pavement or shoulders and have at least the minimum cover as stated in Chapter 5 of this manual.

In SCRC with no existing pavement assets, trench or trenchless methods are acceptable.

All underground NTUI crossing a SCRC must where practicable not be within 20 m of the lowest point of the road (road sag), cross connections / branches no closer than 20-30 m from an intersection (excluding through runs) and be located so as to cross as close as 90°, however a greater oblique angle shall be used to prevent bends being located below the pavement area.

Overhead electrical and overhead telecommunication assets may cross a road corridor at an angle up to 45º to the road subject to departmental requirements for:

1. all horizontal and vertical clearance requirements being addressed for current and proposed transport infrastructure (that is street lighting, traffic signals, road signs and fences etc)
2. consideration of all constraints that would be placed on workers installing and maintaining overhead assets including departmental assets throughout the life of the service
3. consideration of any impact that the crossing during its life cycle may have on the safety of the travelling public and other users of the road corridor
4. any overhead clearance zones required by Transport and Main Roads and/or NTUs, and
5. cross connections no closer than 30 m from an intersection.

Overhead electrical / telecommunication assets crossing less than 45° to the road may be approved on a case-by-case basis subject to the department's District Director (or their delegate) discretion.

Overhead electrical / telecommunication diagonal crossing at intersections should be avoided, all crossing at intersections MUST be 90° to the road, unless approved by the department's District Director (or their delegate).

Refer to Figure 3.1.3.1(a) below for typical service configuration at intersections.

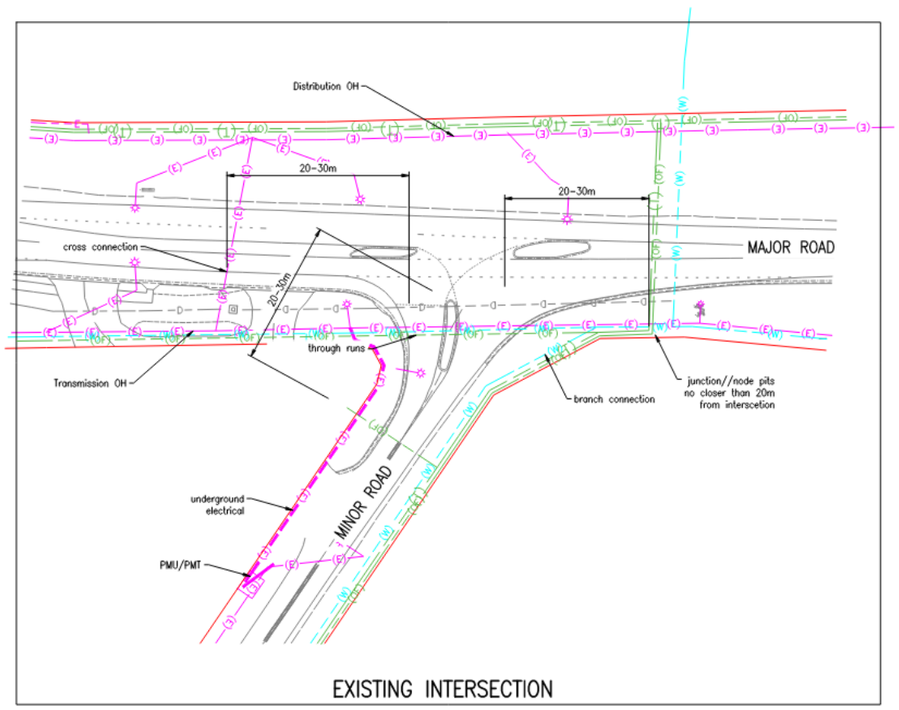
More information is in Chapter 7 of this manual about the notice and permit requirements for utilities.

3.1.3.1 Offsets between services

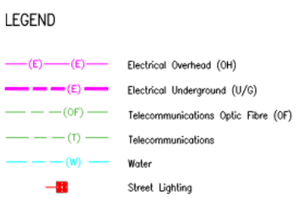
Where multiple NTUI cross a SCR (excluding intersections), offsets between services are required to cater for future installation of NTUI via trenchless technology. If practicable, spacing between different NTUI types should be no less than 6.0 m outer wall to outer wall. Offset between electrical and communications crossings may be reduced subject to supporting evidence such as design redundancy where there would be no requirement to install a replacement line in future as conduits in initial crossings can be utilised.

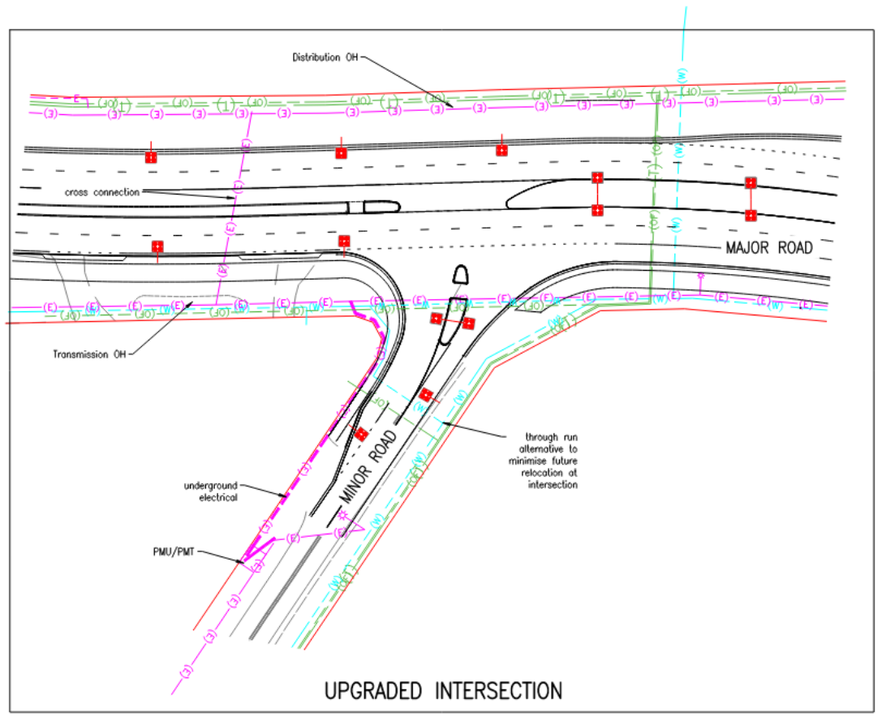
Refer to Figure 3.1.3.1(b) below for typical service crossing offsets.

Figure 3.1.3.1(a) – Typical service crossing offsets plan



EXISTING INTERSECTION





UPGRADED INTERSECTION

GENERAL NOTES

1. NTUI shown is an example only with appreciation for upgrades to intersections.
2. Plans show crossings, connections and pits as far as practicable from an intersection to cater for operation and maintenance of the intersection infrastructure as well as minimising impacts to NTUI during upgrade works.
3. Intersection configuration and NTUI requirements vary considerably and alignments to be discussed with the department prior to installation
4. Traffic signals and design road infrastructure (drainage, electrical and ITS) omitted for clarity

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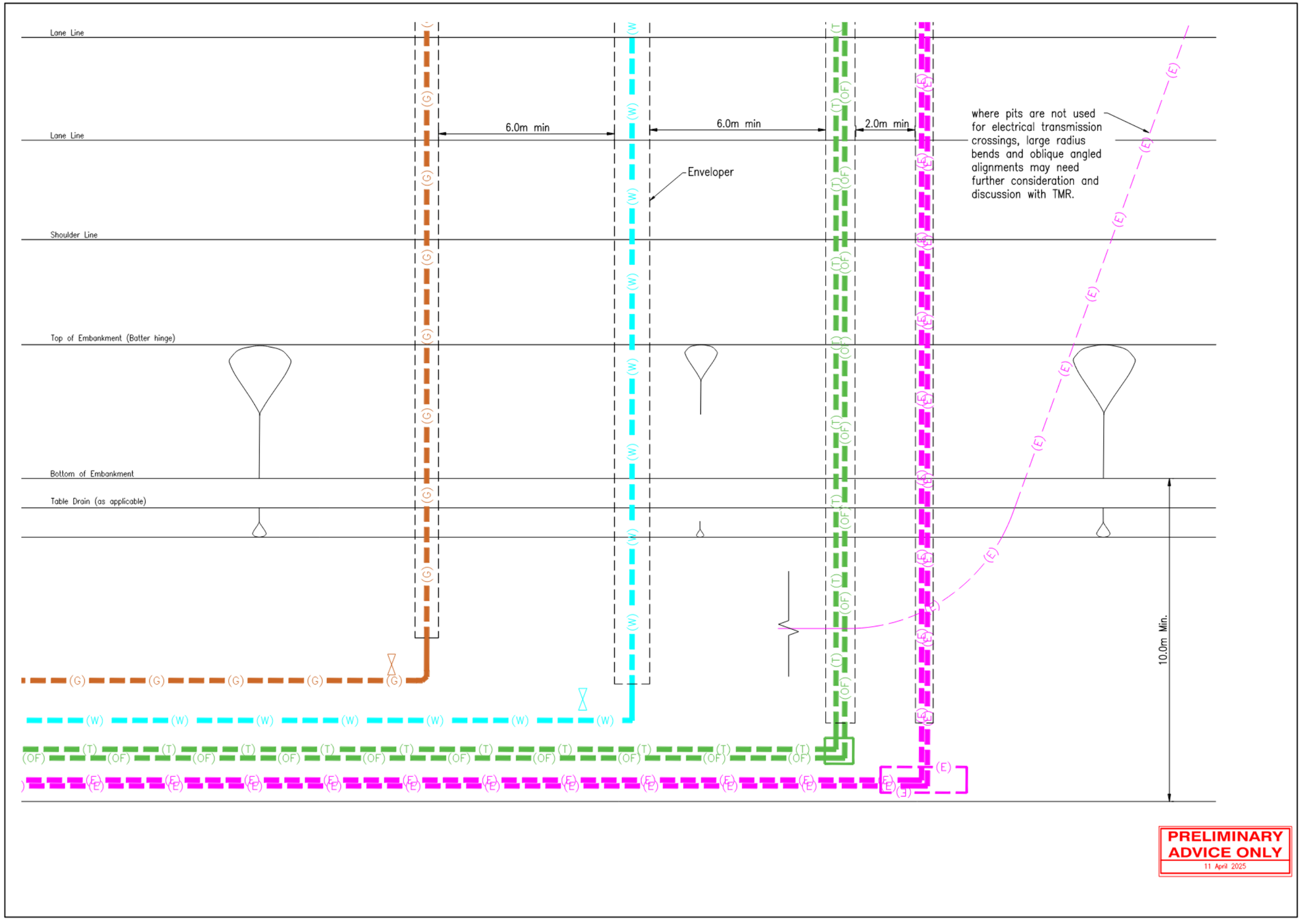
Figure 3.1.3.1(b) – Typical service crossing offsets plan



3.1.3.2 Building NTUI to facilitate future maintenance and road operations

Where pressurised NTUI cannot be shut down (restricted mains) for a reasonable time period to allow for cut overs or tie-ins associated with relocation works, road crossings may require a purpose-built junction either side of the road crossing, as close to the road cadastral boundary as practical, in the form of a pit and / or fittings / valves that facilitate online connection of the new crossing without requiring shutting down of the main.

Where these restricted mains run parallel with the SCR, junctions shall be considered generally no further than 400 m apart in low density urban areas or 200 m in high density areas subject to existing intersection spacing, existing junctions and footprint availability. This junction shall be within the service alignment corridor to allow replacement next to the existing main or for sewer and water, potentially on the main for a temporary above ground bypass, to facilitate a remove and replace on the same alignment.

Purpose of this requirement is to prevent costly unnecessary relocations of unaffected mains in excess of 500 m until the next available tie-in point.

Where Communication networks cross the SCR, a splice / junction pit shall be considered either side (where vertical / horizontal bends are not practicable) to allow connection of a new crossing should the existing require replacement to a maximum spacing between pits being 250 m.

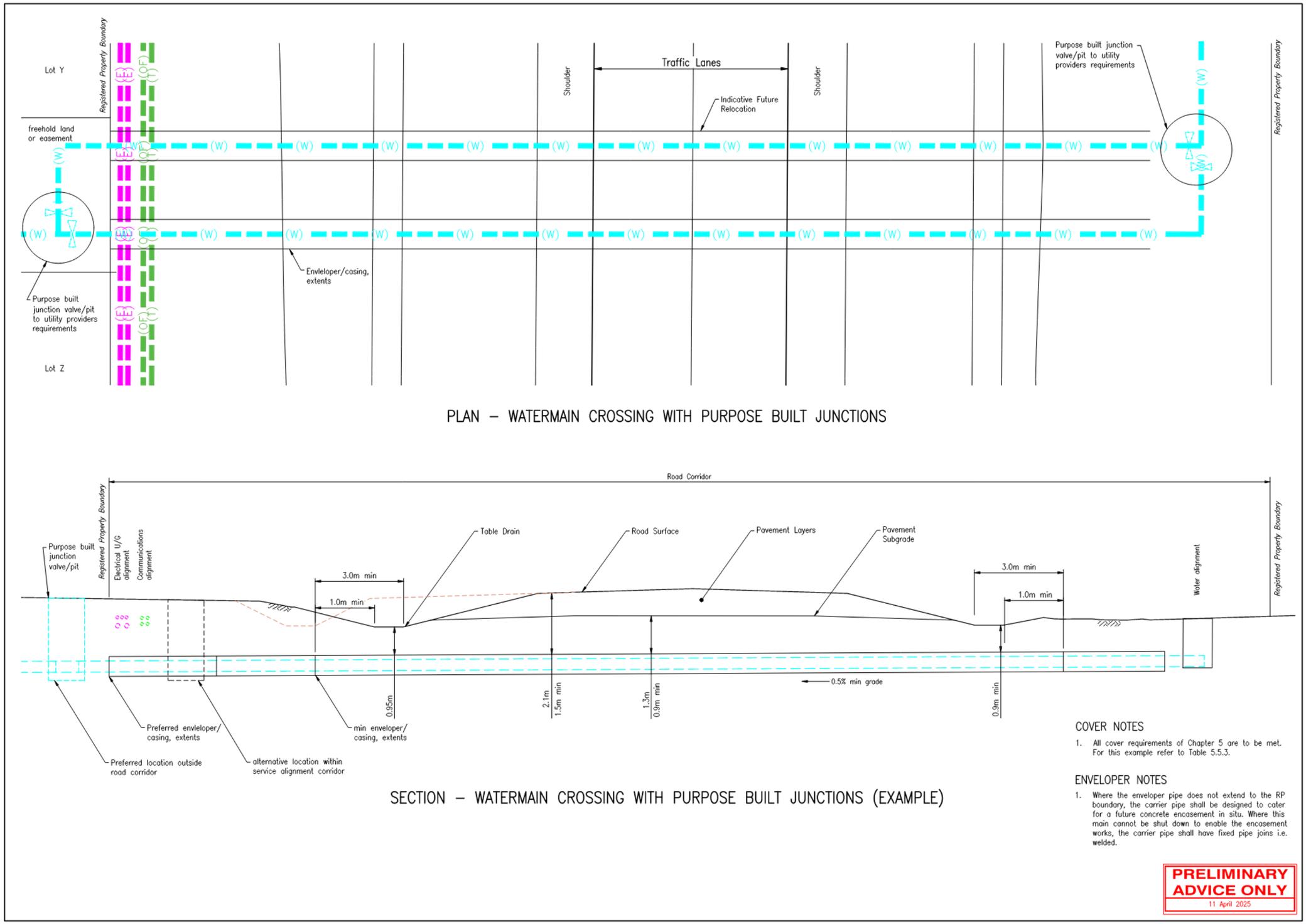
Where these networks run parallel with the SCR, junctions (pits with extra coil) shall be spaced no further than 500 m apart in low density urban areas or 250 m in high density areas and no closer than 30 m from an intersection, subject to existing intersection spacing, existing junctions and footprint availability.

Where NTUI is installed across a gazetted corridor with future road construction, these junctions shall be either outside the corridor as close as practicable to the outside of the SCRC boundary or within the service alignment corridor either side of the SCRC.

Refer to Figure 3.1.3.2 below for example of indicative purpose- built junction locations.

Where pressurised NTUI can be shut down for a reasonable time period, depending on location of existing valves and dewatering pits, consideration for additional isolation valves to reduce time for dewatering should also be determined by the NTU provider in consultation with the department.

Figure 3.1.3.2 – Example purpose-built junction



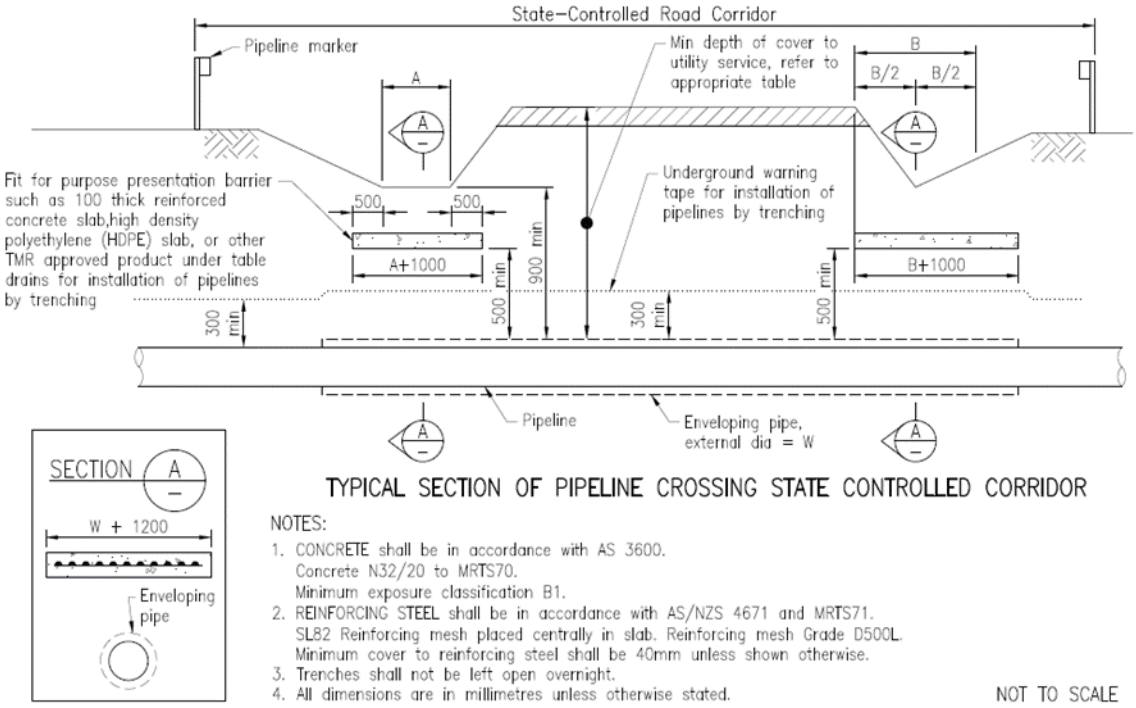
3.1.4 Clearances and depth of cover

The department acknowledges that various Australian Standards and NTU's own standards stipulate many different minimum depth requirements and clearances for underground assets.

The department has set minimum cover requirement that each type of utility service must adhere to within the SCRC. Should a NTU's own standard or an Australian Standard require a greater depth of cover, then the higher value of cover must be used.

It must be noted that this minimum cover may be reviewed on a case-by-case basis by the department. Deeper cover may be required depending on the material and class of the pipe proposed and the type of service being installed. Refer to figure below for typical road crossing detail and Chapter 5 of this manual for further details.

Figure 3.1.4 – Typical section – Road crossing



Overhead clearance to any existing or planned road infrastructure or furniture must comply with the distances / heights shown in the:

- *Electrical Safety Regulation 2013* (Qld),
- *NTU Provider's Overhead Design Manual* (as applicable), and
- Standard Drawing 1333 *Traffic Signals/Road Lighting/ITS – Minimum Clearance of Overhead Electric Lines from Ground and Structures* as a minimum.

Consultation with departmental offices needs to be undertaken to identify oversized vehicle routes, future planning requirements and any other matters that will influence vertical clearance requirements.

The clearances given (in particular horizontal and vertical clearances) are relevant to the maximum swing of the electricity conductor predicted maximum operating conditions, with confirmation obtained from the electricity asset owner.

Clearances for plant and personnel should also be considered during maintenance activities of Transport and Main Roads road furniture and infrastructure in line with the relevant electrical code of practise.

In addition to electrical safety requirements, assets crossing over any part of the carriageway shall also address the minimum vertical clearances identified for bridge structures over roads.

Overhead clearances to any existing or planned road infrastructure, or furniture for telecommunication lines located within SCRCs, must comply with the distances / heights shown in the:

- *Electrical Safety Regulation* and/or adhere to
- *Industry Code C524: External Telecommunication Cable Networks* Table 1 for services not situated over any part of the road carriageway.

Consultation with departmental offices needs to be undertaken to identify over dimensional vehicle routes, and future planning requirements, that will influence vertical clearance and arcing requirements.

For NTUI situated over any part of the carriageway, the clearances shall also address the minimum vertical clearances identified for bridge structures over roads.

NTUI road crossings shall not be within 30 m horizontal of a bridge structure, unless explicitly agreed with Transport and Main Roads.

3.1.5 Design life

The department acknowledges that various Australian Standards and NTU's own standards stipulate many different design / service life for utility assets. Typically for steel and concrete elements it is 100 years. For other elements such as valves, connections, fittings and plastic elements, design life will vary dependant on the inline opposed forces the element withstands over its service life and the ground conditions. Access and maintenance limitations need to be considered when selecting a material type.

3.1.6 Proximity to structures (including bridges and culverts)

Any NTUI that is proposed to be laid longitudinally within a 5 m horizontal distance from a departmental structure (i.e. bridge abutment, culvert, gantry, noisewall, etc.) will be assessed on a case-by-case basis to ensure the installation method and/or the type of NTUI does not present an unacceptable risk to the departmental structure, other infrastructure or people.

Vertical clearance (outside structure to outside structure) to Transport and Main Roads structures shall be no less than 600 mm for stormwater drainage pipes and 600 mm for all other structures. This value may be increased subject to design calculations and safety assessments. Pipelines shall have additional physical controls in the form of concrete slabs, concrete encasement or casing/enveloper as it passes under / over a Transport and Main Roads structure. Pipelines less than 600 mm vertical and 5.0 m horizontal from a departmental structure will be assessed on a case-by-case basis and approval sought.

The installation of NTUI longitudinally under or above an existing drain must be avoided due to maintenance issues and flood impacts that may result in the future. Where, due to an alternative routing being impractical, if NTUI must be located longitudinally within an existing drain, consideration must be given to how the NTUI will be accessed and maintained throughout its operational life and how the drain is to be maintained. Additional protection or depth of cover may be required to minimise the risk of the NTUI being damaged during drainage maintenance works.

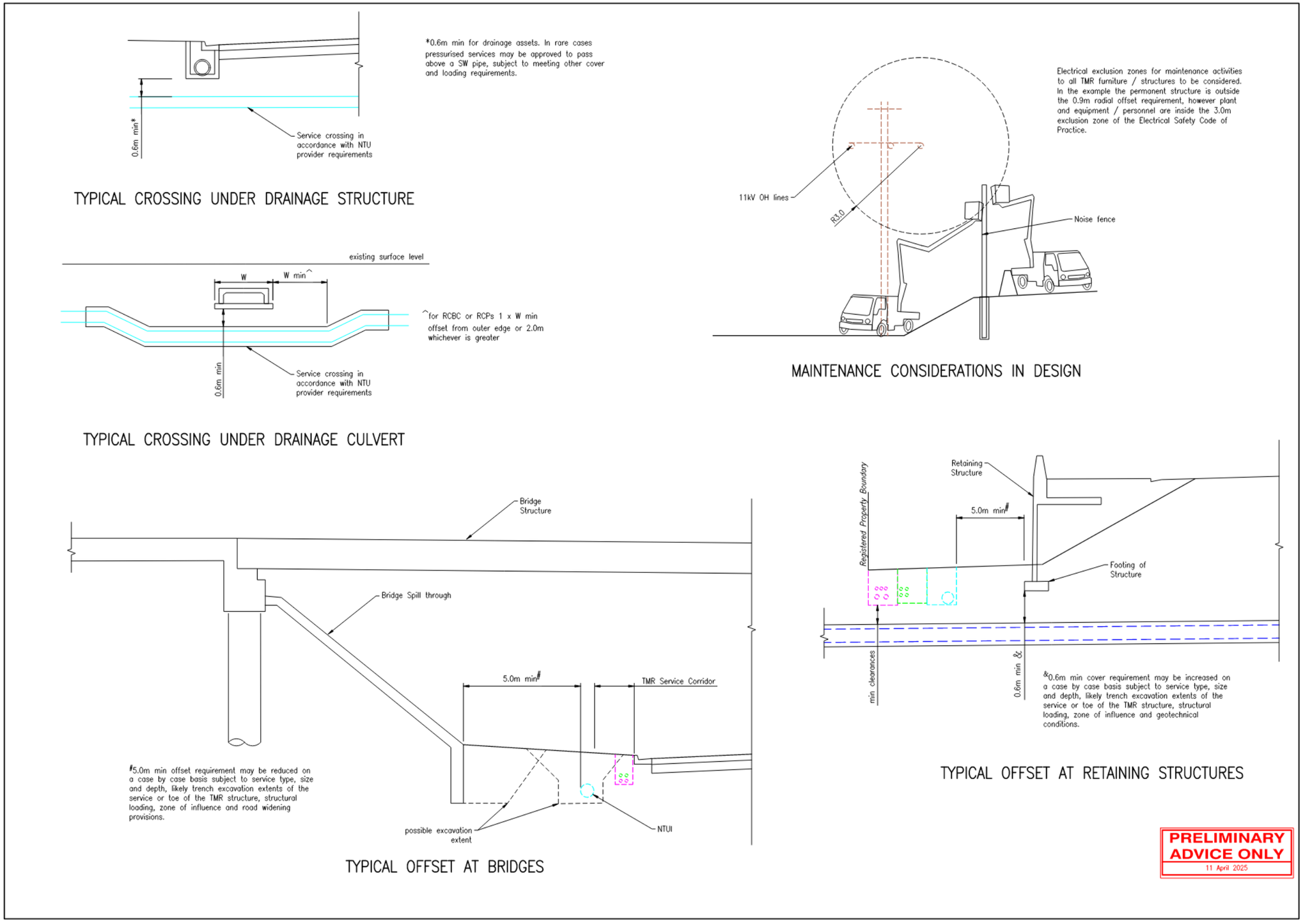
Any assets being replaced or upgraded must be removed from Transport and Main Roads drains.

The installation of NTUI longitudinally within an existing culvert must be avoided due to maintenance issues and flood impacts that may result in the future. Any assets being replaced or upgraded must be removed from Transport and Main Roads culverts.

Installations on or through Transport and Main Roads structures / culverts shall be avoided. If unavoidable, strict conditions apply, refer Section 7.5.5 and 7.5.6 for further details.

Refer to Figure 3.1.6 below for typical scenarios.

Figure 3.1.6 – Proximity to structures plan (example scenarios)



3.1.7 Computer modelling

Computer modelling with accurate NTUI vertical and horizontal survey locations can assist the planning and design process with the detailed NTUI alignments, clash detection and conflict resolutions and is recommended to be conducted as early as the Concept Phase.

3.1.8 Conflict mitigation

When NTUI owners have differing interests with regards to the use of the SCRC there is the potential for conflict. Relocation of NTUI has historically presented issues for departmental projects (with regards to scope, time and cost). Consequently, the hierarchy for treating conflicts either between NTUs assets, or NTUs and Transport and Main Roads assets, in the SCRC should be adopted as follows:

1. **Avoid the conflict**. Adopting options that avoid conflicts should always be investigated as the first step. This may involve alignment refinement. Of course, this should only be adopted if the risk and costs associated with avoiding the asset are lower than the risk and costs associated with protecting or relocated the asset.
2. **Retain the asset in existing alignment**. Subject to the depth and type of NTUI it may be possible to construct over the top of an existing asset that runs longitudinally within the road (i.e. under pavement). This should be limited to telecommunication and electrical assets that are located within conduits.

   Existing utility assets can remain in their current alignment for the construction of small bus shelters, due to the low risk posed on the existing utility assets (subject to the district / region and NTU provider accepting the risk). However, bus bays may require utility asset relocations if the depth of the utility asset is insufficient to support the superimposed live loading both during construction and/or operation. In addition, access pits cannot be located within the bus bay or bus stop area where it may cause disruption during routine maintenance.

   Constructing the new transport asset over the utility asset may be a viable option over short lengths, but consideration should be made regarding the impacts (both during construction and future operation of the road) that this could have, including:

   a. constructing over an existing utility asset may impact on the construction methodology that can be used (vibration rollers may not be permitted) or pavement type (rigid / flexible)
   b. risk of road failure may increase should the utility asset be damaged or breaks
   c. the limitations or impossibility of asset maintenance. If works are ever required on the utility asset; the road may require closing, significant excavation undertaken, reconstruction of the impacted section of the road, and
   d. NTU providers usually mandate that existing network assets be exposed when new infrastructure is installed above, below or near their assets, leaving NTUI under the pavement or hardstand areas will require the road to be closed and significant excavation in the pavement to view / inspect new installations.

   These issues must therefore be carefully considered before proposing to construct over an existing asset. Of course, access pits, and so on cannot be constructed over.

   It is recommended that advice be sought from the district / region subject matter expert in such circumstances or a relevant Engineering and Technology branch specialist.

3. **Protect the asset**. Protection can be short term (during construction only) or can be long term, for instance:

   a. permanent protection during operation (may include safety barriers)

   b. construction plates (temporary protection), and/or

   c. concrete relieving / protection slabs and concrete encasement (permanent protection).

   These are employed when there is reduced cover over an asset. Permanent protection slabs and concrete encasement may limit the NTU's ability to access their asset in the future. Consequently, future access and maintenance requirements need to be investigated and considered in the design or implementation of protection treatments.

   Installation of protection slabs above existing NTUI MUST be agreed in writing with the NTUI owner and the slab specifications included in the appropriate design documentation.

4. **Relocate the asset**. If a conflict cannot be avoided or treated with a protection measure that is acceptable to both Transport and Main Roads and the NTUI owner, then a relocation will be required. It is important that relocations consider:

   a. Re-connection requirements for joining the relocated asset to the existing live network (physical space required to undertake the reconnection works i.e. high-pressure gas main connections can require pits up to 6 m long and 1.5 m wide for stopple fittings to be installed).

   b. Space required for items associated with a relocation, not just the pipe/ conduit, for example, thrust blocks, manholes, service pits, valves, and so on.

   c. Maintenance access to the relocated asset, (there is little value in relocating an asset to a location that requires the road to be closed when maintenance on the NTUI is being undertaken); and the department cannot unnecessarily restrict maintenance access for NTU provider assets.

   d. Impacts on future road works, as there is little point in relocating an asset to a location that will impact known future road works. Transport and Main Roads and NTU Project Managers must check all information from Transport and Main Roads and local government planning sources such as QTRIP.

   e. Available space within the road corridor. If there is limited space available within the existing road border zone then consideration should be made during the resumption phase to ensure land resumptions allow for the relocation of NTUI and where possible future upgrades are pending forecasted population growth – this cannot be done later as the department does not have the power to resume purely for NTUI relocation.

f. Resourcing limitations of the NTU provider undertaking the relocation. It is incredibly unlikely that a NTU will have the available resources to mobilise and relocate an asset within weeks just because it is on the critical path of a road construction project. In some cases, such as electricity transmission lines and major optical fibre cables, there are legislated and operational restrictions on what time of year relocations can occur. Relocations need to be planned and programmed with consideration of such restrictions and resources available to undertake the works.

g. Removal of redundant assets (refer to Sections 5.6 and 7.6.4 for further details).

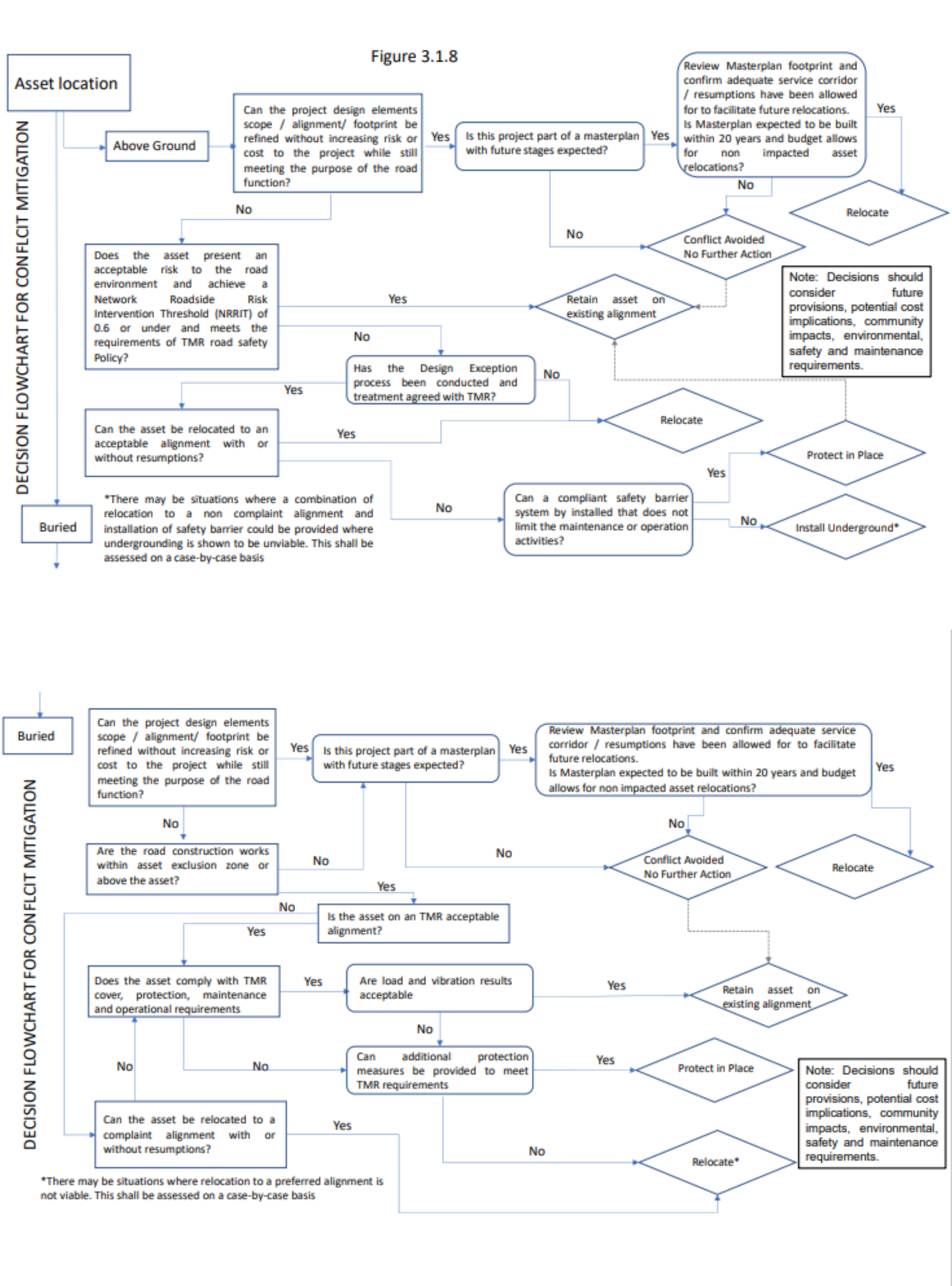
Please note: relocation designs are negotiated based on the needs of the NTU provider and the road authority. It is recommended the project team negotiate with NTUs to review the design drawings and MRTS170 *Public Utilities in Road Projects Site Works* and MRTS171 *Public Utilities in Road Projects Principal Contractor Responsibilities* at 30%, 50%, 90% and 100% so the IFT/ IFC drawings and specifications and have the NTUI owners' endorsement.

The mitigation strategy adopted will differ from utility type, project, and conflict to conflict. Assumptions should never be made that a treatment used in one location will be suitable for the next. The accepted mitigation strategy adopted will be influenced by numerous factors such as:

- lead time for obtaining the materials (can be 12 or more months for some asset types)
- type of utility asset (i.e transmission or distribution service)
- size of utility asset (i.e DN400 or DN100)
- network criticality of that particular asset
- future access for maintenance purposes
- speed environment and traffic volume of road
- road type – motorway and distraction (rubberneckers are an issue)
- available space within road corridor
- physical location of the asset
- reconnection requirements, and
- time period available for reconnection (e.g. electricity demand may require the reconnection to be undertaken in stages).

Refer to Figure 3.1.8 decision flow chart for guidance.

Figure 3.1.8 – Conflict decision flowchart



3.1.9 Roadside hazard risk assessment and safety in design

As part of the design for utilities, roadside hazards shall be assessed in accordance with *Road Planning and Design Manual* 2nd Edition (RPDM), Volume 3, Part 6 or alternative method noted in relevant MoU.

NTU should particularly note that any aboveground asset in the road corridor requires assessment of risk by the NTU if it is being installed, replaced or upgraded, that includes sightlines from/to the assets and subsequent access facilities (driveways).

When developing solutions, safety considerations are required for design, construction, operation and maintenance components in accordance with WHS act and regulations.

3.1.10 Geotechnical considerations

Ground conditions shall be assessed to determine requirements for bedding treatments and special thrust block designs which can have an effect on the design solution and overall project costs.

Soft soils or areas subject to excessive movements are important factors in the design phase for materials, ground improvements and viability of relocation or in-situ protection of utility assets.

Geotechnical investigations shall be considered and scoped specific to utility design that may include testing along the proposed service alignment and in vicinity of proposed thrust restraints.

3.1.11 Maintenance and construction considerations

The provision for maintenance is an integral component of the planning and design phases of NTUI. Preference is not to close traffic lanes to conduct NTUI maintenance activities where it can be avoided.

To enable maintenance to be properly and safely undertaken during road construction and operation, consideration must be given at the design stage to the requirement of the *Workplace Health and Safety Act* 1995 (Qld) to make a safe maintenance workplace.

Designers / Planners / Managers need to consider how NTUI is to be built and provide for the future cross-section and ultimate road configuration in order to future proof the installation, and limit impacts to future road maintenance and construction works.

Refer to Figures 3.1.2(a) and 3.1.2(d) that demonstrates considerations for future proofing for urban and rural road upgrades.

All utility Designers / Planners need to consider how the utilities will be constructed with an appreciation for construction methodology, plant and equipment and sequencing as part of the design and documentation for relocations. Simply assuming the contractor will manage the installation in accordance with its management process is not good design practise and does not adequately show risk has been minimised as much as practicable in accordance with the Queensland *Workplace Health and Safety Act* and Regulations.

Understanding constructability and having a full appreciation of likely risks will feed into the design solution. Example, how a pressurised service cut over is designed, the fittings chosen, the location of thrust restraints, staging and sequencing of the cutovers all need to consider the design objective, the construction risk, maintainability and operational requirements.

When dealing with a constrained utilities corridor, the design process can be more complex due to the limited space and increased potential for conflicts between different utilities. Some additional considerations during design are as follows:

1. Utility Conflict Minimisation: Use 3D modelling techniques to minimise conflicts between utilities and optimise the use of available space through visualisation.
2. Minimum Clearances: Australian Standards and regulations dictate minimum clearances between utilities, however these minima may require increasing to cater for plant and personnel to actually conduct the works.
3. Protection Measures: Additional protective measures may be needed to prevent damage to utilities from adjacent construction work or utilities.
4. Access for Maintenance: Limited space might make access for maintenance or repair works challenging. Ensure there is adequate access to all utilities for future maintenance or repair, which might require specialised equipment or a low maintenance solution.
5. Flexibility: As far as possible, design for future expansion or modification. This can include space for additional utilities, redundancy (extra conduits), flexibility for upsizing of existing utilities or materials chosen.
6. Sequential Installation: Plan the sequence of installation carefully. Document the sequencing as it supports the design decisions and reduces the likelihood of potential design changes during construction.

3.1.12 Environmental considerations

The temporary and permanent impact of utility works on the environment must be identified and managed during the planning, design and installation phases of NTUI. Impacts to the environment often trigger regulation, which can have repercussions for project delivery, in particular time and resources. Specific permits may be required in order to undertake works, if there are no applicable exemptions or activities are not self-assessable.

The department's *Environmental Processes Manual* outlines the environmental process for delivery of transport infrastructure projects, including environmental assessments. Consequential NTUI works must be considered as part of this process to fully understand the risk to project delivery.

For example, where relocation of utilities is required as a consequence of a road infrastructure project, and the road infrastructure project will have significant impact on a federally listed flora species, no works will be able to commence until an approval under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth) has been obtained. This can have a critical impact on delivery where NTUI works are scheduled as early works. Where utilities cross under waterways, permits from Department of Agriculture and Fisheries may be required if there will be impacts to fish passage during installation or operation.

3.1.13 Future-Proof considerations

Assessing the potential changes to the road corridor environment (border zone / roadside) is an important factor during initial installation of NTUI. A border zone with no paths or bus stops may be subject to active transport provisions in future. Assessing pipe cover and material for future provisions is an important factor to preventing future impact should the utility require mitigation against damage or limiting inspection / maintenance activities. An example of some restrictions to consider during design risk assessment are as follows:

- Lowering an insitu pressure main in future may not be viable as it adds sag points to the network.
- Adding concrete paths may also limit inspection capabilities of assets for leak detection which may require an insitu treatment or material change that may be difficult to conduct on critical mains.
- Road maintenance and operation activities in relation to vibration should also be considered as the road will likely be rehabilitated / repaired down to subgrade at least twice during the life span of the NTUI that will have an impact on the material and cover chosen as part of the initial installation.

Value engineering should be considered over value for money and be in the forefront during design risk assessments. Value engineering considers cost and risk to the asset for the life span of the asset factoring in known or likely future impacts. Applying value engineering principals during the initial installation can offset the need for potential future treatments saving millions.

4 Utility engagement and time appreciation

4.1 Introduction

The purpose of this chapter is to give designers conducting consequential works (instigated by Transport and Main Roads) appreciation of the required engagement process.

Timeframes indicated in this chapter are indicative only and are to be verified by project managers, designers, and contractors at earliest time within the planning and design development process.

Each NTU provider has a specific process for obtaining quotes. This may include registering the project on utility portals during initial consultation to discuss likely impacts in the early design phases.

The accuracy of the quotation is dependent on the level of information you provide to the NTU Owners. Relocation of utility assets may not just involve the section of pipe, or cable directly impacted by the road project. You should allow for the possibility that the asset relocation may need to extend to an existing connection point, to maintain network capability (i.e. installing additional joints may reduce the efficiency of the utility network).

The project remains responsible for the full extent of the utility works required as a consequence of the project, which can extend for several kilometres in some instances to reach telecommunications joints. Consideration should be given to additional joint locations to allow Transport and Main Road's future works.

When relocating a utility asset, the existing asset must remain operational until the new asset has been commissioned. This means that two identical assets will likely be operating for a short period of time or require a switch-over timeframe. This is an important consideration that is often overlooked when obtaining quotes. Limited room in a services corridor may result in the length of a proposed relocation being extended to provide enough room for the new asset to be connected back to the live network and additional civil works (e.g. Installation of new conduit banks) may also be required if the existing conduit banks are full.

Confirming the connection point with the NTU asset owner and survey of the location to Quality Level 'A' data is very important as incorrect designs to complete the connection can delay projects and be very costly.

Project managers / designers need an appreciation for the time it takes NTU asset owners to allocate a resource to review project initially (minimum of 3 months), develop a quote, conduct the design, then quote the construction phase.

Some authorities' resources or materials have long lead times. This should be understood in the planning phases when making decisions to fast-track projects or seek funding.

4.1.1 Energex engagement process example

- A Transport and Main Roads project gets registered into the ENERGEX Portal. A fee is required to allocate a Project Officer to do an initial assessment and conduct initial discussions. This may take up to 3 months or much longer depending on resource availability within ENERGEX.
- Upon finalisation of discussions a quote for design needs to be developed, depending on complexity and size can take up to 4-6 weeks or much longer and subject to adequate road design data being provided.

- Upon agreement between the department and ENERGEX, non-contestable design phase begins, again depending on size and complexity can take a minimum of 8-12 weeks for small distribution mains and much longer for large works or transmission mains.
- Upon completion of design and interface with the department to confirm space-proofing and no further issues to resolve, a construction quote is developed (minimum of 2-4 weeks)
- Depending on whether the relocation requires LV or HV procurement of materials and construction time may be in the order of 9-18 months minimum from the countersigned construction quote.
- Other considerations include availability of pre-qualified ENERGEX sub-contractors to be on site to conduct the works to interface with the principal road contractor.

4.1.2 Gas engagement example

- After initial discussions, an RWA is provided to Transport and Main Roads for counter signature in order to conduct assessments and design requirements. Whether or not there are relocations or protections only, the gas authority must go through the same process of integrity and safety assessments as well as either a protection design or relocation design, interface with road design teams and approvals between both parties (department and Gas Authority).
- Time required for design assessment will depend on size, locations and complexity of the project and can vary considerably.
- For protection only designs can generally take up to 3 months, for relocation designs process can take up to 6-9 months or much longer.
- Upon approval of IFC drawings a construction quote is then developed (1-3 months minimum).
- Procurement of materials and construction time may be in the order of 9-18 months minimum from the countersigned construction quote.
- Other considerations include availability of pre-qualified sub-contractors to be on site to conduct the works to interface with the principal road contractor.
- Project managers and designers need to keep abreast of the times when developing project timeframes or considerations for fast-tracking projects or early works contracts.

4.1.3 Telecommunications

Telecommunication requirements for relocations vary considerably but is in the range of a minimum of 3-5 months design and 9 months construction and procurement. Some communication authorities have portals others do not.

Depending on complexity of project, available third party resource pool and likelihood for scope change between projects phases, the indicative non-contestable design timings above would generally start toward the conclusion of the Road Project Preliminary Design Phase, where the design and scope are locked in and not subject to change, or ideally, where there is little risk of the utility relocation being impacted by minor design optimisations, at the completion of the Business Case Stage (Concept Phase).

5 NTUI design requirements in State-Controlled Road Corridors

5.1 Introduction

The purpose of this chapter is to clarify design and supplementary requirements for installation of NTUI within the SCRC for consequential and non-consequential works. This means that all parties, Transport and Main Roads and third parties, adhere to these design requirements.

NTU providers (including developers and consultants) adhere to standards, guidelines and codes of practice when designing and operating NTUI. Such standards need to be considered within the context of the department's SCRCs and requirements for providing transport services. The purpose of this manual is not to limit the NTU provider in the design, operation, maintenance or demolition of its asset, but to provide specific design criteria that meets the department's requirements to facilitate a safer, more efficient and cost-effective management strategy of the SCRC to then provide more robust NTUI design solutions.

5.2 Installation methods for services crossing a State-Controlled Road

5.2.1 Trenchless installation

Construction of services by means of trenchless installation shall comply with departmental Technical Specifications:

- MRTS140 *Horizontal Directional Drilling (HDD)*
- MRTS141 *Microtunnelling and Pipe Jacking*, and
- MRTS142 *Thrust Boring and Auger Boring*.

Enveloping pipes and/or other physical controls shall be used for all pressurised services, or services carrying fluids, such as high-pressure gas, combustible fluids, water mains, rising sewer mains etc. and gravity sewers in accordance with relevant industry standards and this manual.

For non-pressurised dry services, where a bank of conduits is required for the road crossing (that is, two or more conduits) an enveloper shall also be considered. Determination for enveloper requirements likely includes soil type being bored, the void space remaining between conduits and depth of cover.

The requirements in this document for enveloping pipes shall take precedence over the NTUI owner's requirements and industry standards for installations in the SCRC.

Where installations are approved to be installed without an enveloper, the outer annulus shall be grout filled with cementitious material in accordance with MRTS140 *Horizontal Directional Drilling (HDD)* and where carrier pipe material is non metallic a trace wire shall be installed with carrier pipe / pipes prior to grouting.

Enveloping pipes are to extend beyond elements of the road formation as follows for a minimum of:

- To the SCRC Boundary (preferred) or 3.0 m beyond the batter (constrained), and/or
- 1.0 m beyond the table drain or back of kerb alignment.

This minimum requirement may be extended to accommodate future road enhancement works where known, or local conditions. Refer to Figure 3.1.3.2 for further guidance.

Minimum horizontal and vertical clearances to other utility services must also be maintained as specified by Australian Standards, Service Authority Standards and legislation.

Exit / entry pits shall be located away from existing table drain / channel inverts.

5.2.2 Trench installation during road projects

Trenching is prohibited across departmental road pavement assets not under construction with few exceptions.

For departmental road pavement assets under construction or pavement rehabilitation projects, trenchless installation is preferred unless trenched installation is proven viable during the design development phases for projects where traffic control, construction staging, and worker safety can be achieved. Exceptions are rare.

Situations where trenching may be acceptable is during road widening works with full pavement rehabilitation works where the road infrastructure will not be negatively affected. This may be where new utility services are being installed or where the existing services are being extended and does not require relocation first.

Trench works may also be required to treat/protect existing utility assets in place prior to proposed pavement works. Viability of installation or protection methods shall be confirmed during the design and constructability reviews / approvals for each project.

Minimum pipe embedment for rigid pipes shall be in accordance with the departmental Standard Drawing 1359 *Culverts – Installation, Bedding and Filling/Backfilling Against/Over Culverts*, MRTS04 *General Earthworks* Clause 19.2 or higher standard nominated by utility provider.

5.2.3 Trench installation not during road projects

This scenario generally falls under non-consequential works. Refer to Chapter 7 of this manual for more details.

Exceptions to using trenching works may only be acceptable in emergency works where the road is being damaged by insitu utility assets, or legacy NTUI affecting mains electricity or water that cannot be repaired or replaced any other way.

5.3 Design of enveloping / casing pipes crossing a State-Controlled Road

This section outlines the requirements for the design of enveloping pipes to facilitate installation and also for protecting underground utility services crossing SCRCs from external interference threats. Examples of the potential sources of external interference are construction or maintenance of roads and excessive external loads from traffic.

The improvements in trenchless installation methodologies have enabled natural gas and liquid petroleum pipelines to be installed under roads, rivers, levees, and railroads utilizing engineered designs that do not require open cutting of ground surfaces. Historically, casings have been installed routinely at sites requiring additional structural support and mechanical protection in locations such as highway and railroad crossings. While offering structural support and mechanical protection, the casings themselves, dependant on material type, may be susceptible to pipeline integrity threats that are unique to cased crossings.

5.3.1 Enveloping / casing pipes

The NTUI owner is responsible for maintenance of enveloper pipes.

5.3.2 Grouting, venting and corrosion protection

The outer annulus of the enveloper pipe (between the enveloper pipe and surrounding ground) shall be grouted as per MRTS140 *Horizontal Directional Drilling (HDD)* if the enveloper pipe is installed by pipe jacking, directional drilling, thrust or auger boring. The department does not prescribe or mandate filling the inner annulus between the carrier pipe, or conduit and the enveloper, with grout or other material.

Likewise, the department does not prescribe or mandate venting or corrosion protection requirements of the carrier pipe or conduit within the enveloper pipe. It is the responsibility of the asset owner (or its third-party design and construction representatives) to design and install the carrier pipe or conduit installation within the enveloper to ensure the long-term durability and safety of the installation that ensures safety to the road network and public. We acknowledge safety and regulatory aspects for some pipes will require regular testing for asset integrity assurance. As such, it is up to the pipe asset owner to provide adequate venting and cathodic protection for the pipe to achieve these requirements. Digging up a road with high traffic volumes for maintenance activities will not be accepted, therefore, designs need to consider this restriction prior to installation or replacement.

In all cases the enveloper pipe shall be designed to resist the required loading imposed by the ground conditions, height of fill over the enveloper pipe, vibration from pavement reconstruction works and traffic loading without any support from internal grout or other material that is used to fill the enveloper pipe. It needs to be sufficient to ensure that it remains in good repair for the asset lifespan of the road (generally 100 years) so as not to disrupt road operations later in its lifecycle.

5.3.3 Material types

The following material types shall be used for enveloping pipes:

a) Mild steel

b) Reinforced concrete

c) Glass Filament Reinforced Plastic (GRP)

d) High Density Polyethylene (HDPE) with compound classification of PE 100, or

e) modified Poly Vinyl Chloride (mPVC) and unplasticised Poly Vinyl Chloride (uPVC) with material class of 500.

A summary of the allowable material types for enveloping pipes are shown in Table 5.3.3.

Alternate material types including full technical details shall be submitted by the department’s District Officer to the Engineering and Technology Branch's Structures Director (Planning and Delivery) (or succeeding role) for review and acceptance.

Table 5.3.3 – Material types for enveloping pipes

Type of Pipeline/Service	Material Type for Enveloping Pipes (✓ - Allowed) (✗ - not Allowed)				
	Reinforced Concrete, Class 4 or higher load class	**Steel**	**Glass Filament Reinforced Plastics (GRP), jacking pipe, SN 40000 or higher stiffness class**	**Butt welded High Density Polyethylene (HDPE), PE100 compound classification, PN20 or higher pressure rating**	**Modified Poly Vinyl Chloride (mPVC) or Unplasticised Poly Vinyl Chloride (uPVC), material class of 500, PN20 or higher-pressure class with solvent weld joints**
High pressure gas and liquid petroleum transmission pipelines complying with AS 2885	✓	✓	✓#	✓	✗
Gas distribution networks complying with AS/NZS 4645	✓	✓	✓#	✓*	✗
Pressure water mains	✓	✓	✓#	✓	✗
Pressure water service pipelines	✓	✓	✓	✓	✓^ Allowable for pipelines of DN32 or smaller only
Pressure sewers	✓	✓	✓#	✗&	✗
Gravity Sewer	✓	✓	✓#	✗	✗

Notes:

* PE100 PN16's permitted

subject to asset owner's requirements for use.

^ may be considered for trench installation only outside road footprint

& may be considered subject to installation method, soil properties, depth, obstacle being avoided and asset owner's consent

5.3.4 Design life of enveloper pipe

The design life of enveloping pipes shall be equal to, or longer, than the design life of the carrier pipe.

The exception to the above requirement, being, in accordance with Clause 4.7 of AS 2832.1, steel casings shall not be coated or lined, and shall not be connected to a cathodic protection system. In this situation it may be impractical to stipulate a design life.

5.3.5 Structural design

5.3.5.1 Mild Steel (MS)

Mild Steel design shall be in accordance with the relevant Australian Standards and utility provider design standards.

In relation to liquid and petroleum gas, stress levels conforming to the requirements of AS 2885 *Gas and Liquid Petroleum*. The asset owner shall protect the steel carrier pipe against corrosion in accordance with AS 2885.1 or AS 4645.2 *Gas Distribution and Networks Standards*, as applicable.

Where a steel carrier pipe is designed and installed without an enveloping pipe it shall have a an appropriate corrosion protection system and where installed via open trench, physical penetration barrier and marker tape. The designer shall use an appropriate penetration barrier, set out in Clause 5.4.5(b)(ii) of AS 2885.1. Other protective methods that should be considered to prevent third party interference are:

- Extra depth
- Heavy wall pipe, and
- Higher grade steel.

The mandatory AS 2885.6 *Pipeline Safety Management* evaluates the threats and the controls for this application in the relevant location.

5.3.5.2 Reinforced concrete pipe

Reinforced precast concrete enveloping pipes shall be designed in accordance with AS/NZS 3725 with the load distribution through fill in accordance with AS 5100.

Reinforced concrete enveloping pipes shall be Class 4 or higher load class, be supplied in accordance with MRTS25 *Steel Reinforced Precast Concrete Pipes* and have flush joints. Where enveloper is installed via trench methods, Rubber Ring Joint (RRJ) is acceptable.

5.3.5.3 Glass Reinforced Pipe (GRP)

GRP enveloping pipes shall be designed in accordance with AS/NZS 2566.1 *Buried Flexible Pipelines, Part 1: Structural Design*.

GRP enveloping pipes shall have a stiffness class of SN 40000 or higher and be sufficient to resist installation forces.

5.3.5.4 High Density Polyethylene (HDPE)

HDPE enveloping pipes shall be designed in accordance with AS/NZS 2566.1 *Buried Flexible Pipelines, Part 1: Structural Design*.

HDPE enveloping pipes shall have a pressure rating of PN20 PE100 (SDR9) or higher unless used for gas carrier pipelines, which require a pressure rating of PN16 PE100 (SDR11) or higher as a minimum requirement.

5.3.5.5 Modified / Unplasticised Poly Vinyl Chloride (mPVC and uPVC)

mPVC and uPVC enveloping pipes shall be designed in accordance with AS/NZS 2566.1 *Buried Flexible Pipelines, Part 1: Structural Design*.

mPVC and uPVC enveloping pipes shall have a pressure class of PN20 or higher.

5.3.6 Design loads

The design of the enveloping pipes shall account for the types of design load addressed in the utility design references specified. Superimposed live loads shall consider the following construction and road vehicles loads.

a) Construction loads:

   i. Truck and dog trailer with a minimum height of compacted fill of 0.5 m over the top of the enveloping pipe. The load configuration is defined in Figure 5.3.6(a).

   ii. 25.9 tonne excavator with a minimum height of compacted fill of 1.0 m over the top of the enveloping pipe. Load configuration is defined in Figure 5.3.6(b).

   iii. 580 mm wide compaction wheel with a minimum height of compacted fill of 1.0 m over the top of the pipe. Load configuration is defined in Figure 5.3.6(c).

   iv. Allow a dynamic load allowance of 0.4 for zero fill height, 0.1 for 2 m and greater fill height and linear interpolation between 0.4 and 0.1 for depths between zero and 2 m respectively.

   v. Where additional load cases other than those listed above are required as part of the construction sequence, these additional cases shall be considered in the design, and

   vi. If the actual construction sequence results in lower fill heights, and/or heavier equipment / vehicles(s) is used than those specified, then the capacity of the enveloping pipe shall be reassessed. Adopt a higher load class of pipe if the specified load class is structurally inadequate.

b) Road vehicle loads:

   i. W80

   ii. A160

   iii. SM1600, and

   iv. iHLP400.

Note these loads and their dynamic load allowance are defined in AS 5100.2 *Bridge Design – Design Loads*. Distribution of road vehicle loads through fill shall be determined in accordance with Table 5.7.2 of MRTS25 *Manufacture of Precast Concrete Pipes*.

Figure 5.3.6(a) – Load configuration: Truck and dog trailer

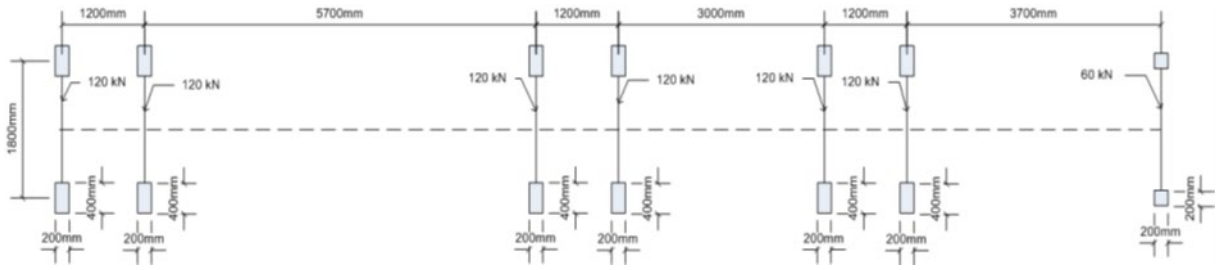


Figure 5.3.6(b) – Load configuration, 25.9 tonne Excavator

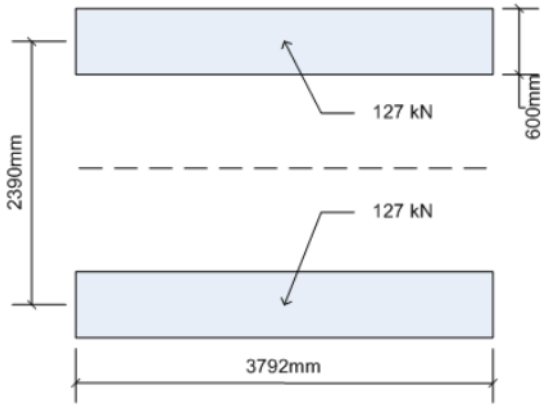
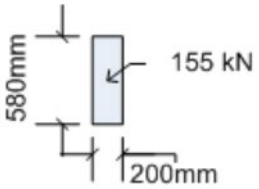


Figure 5.3.6(c) – Load configuration: 580 mm - Wide compact wheel



5.4 Vibration assessment - Consequential works

The road project utility design team / road project manager is responsible for liaising with the relevant NTU provider during the design phases as presented in Chapter 6 of this manual. The construction contractor is responsible to liaise with the relevant NTU provider based on its work methods to seek approval during construction to manage potential impacts in accordance with MRTS170 *Public Utilities in Road Projects Site Works* and MRTS171 *Public Utilities in Road Projects Principal Contractor Responsibilities* and NTU provider requirements.

There has been significant research in vibration assessments on pipes and concrete structures conducted over many years. Each NTU provider has limitations on allowable vibration over their NTUI, which has implications for road projects, often forcing relocations to be conducted instead of keeping the asset in place.

The purpose of providing updated standards is to determine a minimum requirement for depth and cover for the majority of cases, based on limitations provided by NTU providers, in order to offset current and future loads and vibration effects on existing assets. This cannot possibly cover all design scenarios so a process to manage exceptions has been included in this manual.

Notwithstanding this, each design is likely to have additional assessments required if the position of the asset is outside the minimum standards suggested. Any exceptions are considered on a case-by-case basis and must be approved by a District Director or Deputy Regional Director or higher. Without conducting multiple scenarios in a Finite Element Analysis model, considerations for increased minimum depths shall be based on a risk assessment approach presented in the sections below.

For non-consequential works, refer to Chapter 7 of this manual.

5.4.1 Concept phase (Options Analysis and Business Case Stages)

Each NTUI owner may have specific vibration limits, permits and/or processes for working above or near its assets. In the absence of values, use of British Standard BS 5228-2:2009 and or German Standard DIN 4150-3:1999 should be considered and confirmed via liaison with the relevant NTU provider. A screening assessment should be conducted using the below example in the concept stage to determine level of risk to each NTUI as this assessment may contribute or justify the preferred treatment option. Refer to *Consultants for Engineering Projects*, C7523/C7524 Addendums to Functional specifications templates for more details.

5.4.1.1 Risk assessment

A suitable risk assessment using appropriate industry standards or documentation can be used for an initial screening assessment. An example of this is below.

An extract from *Australia geomechanics* Vol 49 No3 September 2014 on "*Assessment of ground vibration from ground treatment techniques*" by Richard Moyle and David Airey presents particle peak velocity (mm/s) values from various equipment at various distances. Two figures of note from this extract are Figure 1: *'Construction Vibrations, adapted from Wiss (1981)*' and Figure 12: *'Comparison of Ground Improvement techniques*'.

Pipework would need to be able to withstand these vibration effects if they are to remain within the zone of impacts. Where pipes cannot withstand these values, additional protection controls such as encasement, casings(envelopers), protection slabs or increased depth would be required when installing new utility assets or working near existing utility assets.

While various procedural controls can be implemented on site, such as installation of pipes after significant compaction works are conducted, or, limiting the size of vibration equipment over the asset until cover is achieved, constructability should be considered when determining a treatment option.

Where the pipe / conduit is an existing asset, the construction impacts may not be able to be eliminated or reduced to allowable limits by change in plant or equipment alone and would therefore require a different treatment method of either protect or relocate in the concept phase so it can be considered in the costing estimates.

5.4.1.2 Case study

Below is an example of a Site Vibration assessment against values of the British Standards.

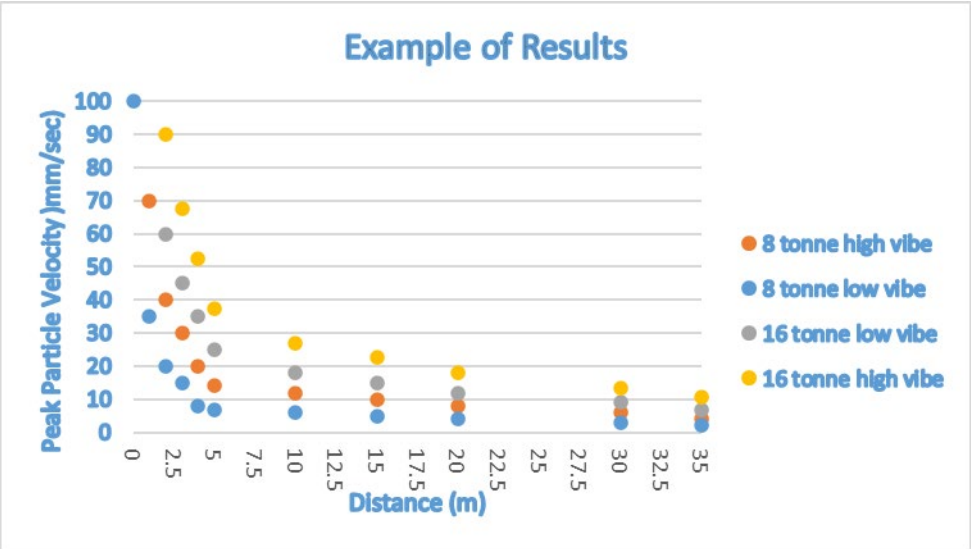
BS 5228-2:2009 provides some information on services and structures, stating that because of the variability in use, condition and vibration characteristics, structures must be assessed on a case-by-case basis, unless determined otherwise by the department. Notwithstanding this, it does provide guidance for some scenarios.

Underground services: BS 5228-2:2009 proposes levels in the absence of asset owner guidelines:

- A maximum Peak Particle Velocity (PPV) for intermittent or transient vibration of 30 mm/s
- A maximum PPV for continuous vibration of 15 mm/s.

Figure 5.4.3 below presents a graph of results for a single drum vibratory roller (excluding startup / rundown) for pavement compaction works over a steel main. The site results for an 8 tonne roller (considered to be the average plant used on most small road construction projects) on high amplitude setting is comparable with the *'Construction Vibrations, adapted from Wiss (1981)*' referenced in Section 5.4.1.1 above.

Figure 5.4.1.2 – Example of vibration results for plant near a steel main



Based on the above, for a high-level assessment (screening), use of industry graphs coupled with applicable industry standards and asset owner's requirements, should give an adequate risk rating (low, medium, high) to determine a feasible concept treatment option, whether that be increased cover to reduce PPV, protection with physical controls or relocation outside the impact area. Note, distance in the graph is from roller to monitoring station at surface level.

5.4.2 Design phase

As the design progresses and confirmation of permissible vibration exposure values has been determined / confirmed with the utility providers, the vibration assessment shall be conducted using computer-based modelling. Refer to *Consultants for Engineering Projects*, C7523/C7524 Addendums to Functional specifications templates for more details.

5.5 Design criteria and considerations

5.5.1 Electrical

For electricity utility providers, the following standards and guides where reviewed as part of the harmonisation process and development of this manual includes but is not limited to:

- *Underground Distribution Construction Manual*
- *Overhead Design Manual*
- *Overhead Construction Manual*
- *Public Lighting Design Manual*
- *Codes of practice*.

Non-transport electricity assets are non-contestable. Network designs are conducted by the asset owner (or its acceptable suppliers) in accordance with its relevant design guides and codes. Where electricity assets are to be installed in SCRC, the following supplementary criteria are also required.

Consequential works (instigated by Transport and Main Roads): the project designer / manager shall provide a horizontal and vertical utility alignment corridor to the asset owner's designer in accordance with the requirements of this manual.

Non-consequential works (instigated by the utility provider): the detailed design proposal shall be provided to the department and considered in accordance with the requirements of this manual.

Cover

Unless otherwise approved, the minimum depth of cover for utility services installed within a SCRC (either parallel with, or crossing, the road footprint) are as specified in Table 5.5.1 below.

Table 5.5.1 – Minimum depth of cover for Electrical utility services

Location	Nominal Cover
Road Surface (from top of pipe / conduit to surface level at the lowest point of the pavement surface cross section)	1200 mm
Footpath / border zone / roadside (below lowest point in footpath allocation)	600 mm (2) / 750 mm (1,3)
Table drains (below invert level of table drains)	900 mm
Between pavement subgrade and utility service / service conduits	800 mm / 400 mm (4)
Bored, jacked, or micro tunnelled installations	1500 mm

Notes:

(1) Services under vehicle crossing driveways or private property access are to be reviewed on a case-by-case basis.

(2) 600 mm measured from the surface level of an existing or proposed path.

(3) 750 mm where no path is present i.e from natural surface.

(4) Cover may be reduced to 400 mm with the incorporation of a protection slab. Top of slab to be no higher than the pavement subgrade level unless otherwise agreed with Transport and Main Roads and utility provider.

Note values may increase with the presence of road assets such as drainage or Intelligent Transport Systems and Electrical (ITS&E).

Pits and access chambers

Pits and access chambers shall not be installed within the road footprint area and must be within its service alignment corridor. Where the utility is in a shared trench (joint use trench) a pit shall be installed as close as practicable to the Registered Property (RP) boundary of the trench to allow room for communication pits to be installed on the roadside of the shared trench.

Where the distribution service crosses under a SCR, pits shall be installed on either side of the crossing prior to direction change where vertical or horizontal large radius bends are not practicable.

Transmission mains generally do not have pits and designs should consider and assess space required for vertical / horizontal large radius bends.

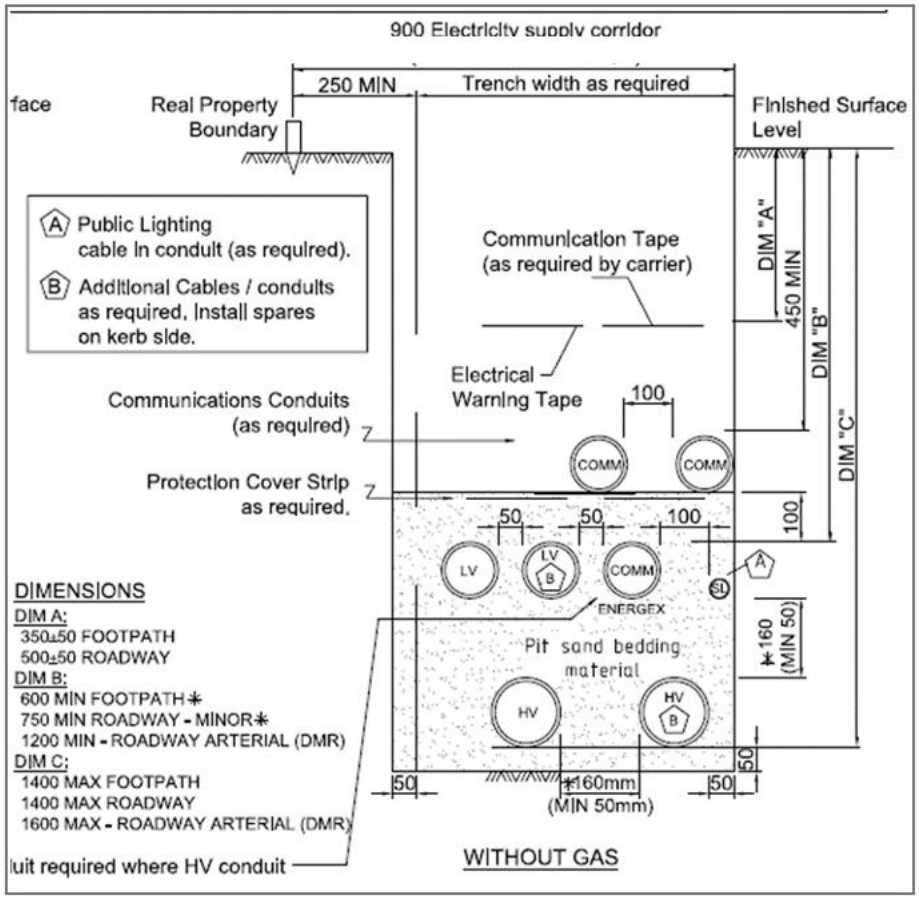
Locations to consider pedestrian movements (where applicable) and maintenance access that limits impact to traffic movements.

5.5.1.1 Supplements to the Underground Distribution Construction Manual and OH Manuals

Joint use trenches

Gas reticulation shall not be installed in the electricity service alignment corridor (supply corridor) in SCRCs. Refer to Figure 5.5.1.1(a) below as an example.

Figure 5.5.1.1(a) – Example joint use trenches



Footpaths generally will not be within 1.0 m of an RP boundary (excluding legacy situations or commercial frontages). If a joint use trench is to be applied, the minimum cover to the highest conduit in border zone / under footpath shall be 600 mm, therefore Dimension B (DIM B) under footpath / border zone in above figure to be 800 mm minimum to top of Low Voltage conduits.

Where conduits pass under road, if installed via trench methods, the minimum cover to the highest conduit shall be as per values in Table 5.5.1.

The above joint use trench example applies against RP boundary or when overhead (OH) and poles are converted to an underground (UG) system and there is no room available in the border zone to allocate a separate communications trench. All other situations, communication infrastructure to be in its own service alignment corridor.

Overhead (OH) pole alignment

For new installations, OH poles shall be no closer than 3.0 m to the RP boundary and no closer than 8.0 m to the road edge (batter hinge or back of kerb) for 80 km/h posted speed and below. Outside these limits undergrounding shall be the primary treatment for distribution mains unless approved by Transport and Main Roads. For transmission mains or existing situations, where poles fall outside these limits, options shall be assessed for roadside hazard and treatments determined from *Road Planning and Design Manual* 2nd Edition (RPDM), Volume 3 Part 6 to achieve a Network Roadside Risk Intervention Threshold (NRRIT) of 0.6 or alternative agreed method. Do nothing or maintain status quo for risk scores above 0.6 is not in accordance with the department's *Road Safety Policy* and will generally not be accepted.

Trench treatments crossing SCRs

Where minimum depth of cover is not achieved, trench treatments with protection slab shall be in accordance with departmental requirements. Refer to Figure 5.5.1.1(b) for potential solutions.

Installations under a roadway shall be a low maintenance solution, therefore removable slabs are not permitted. Locator strips shall also be placed at base of trench either side and adjacent to lowest conduit bank or cut-off wall.

On ground Plant

On ground plant, such as pad transformers and Ring Main Units (RMU) if approved within SCRC, shall be assessed for roadside hazards, sightlines, impacts to other road users (pedestrians / cyclists) and treatments. Where OH is converted to UG, there may be a requirement to truncate adjacent property (partial resumption) in order to have the transformer installed outside road corridor. This needs to be considered in the early planning phase when resumptions and land availability is assessed.

Overhead clearances

The designer shall assess OH clearances to road infrastructure (road level, barriers, noise walls, fences, direction signage, light poles, traffic signals, gantries and so on) meets the utility providers preferred values and the department's Standard Drawing 1333 *Traffic Signals/Road Lighting/ITS – Minimum Clearance of Overhead Electric Lines from Ground and Structures*. Assessment shall also consider the required exclusion zones for personnel, plant and equipment for maintenance activities as documented in the *Electrical Safety Code of Practice* – Working near overhead and underground electric lines (Appendix B).

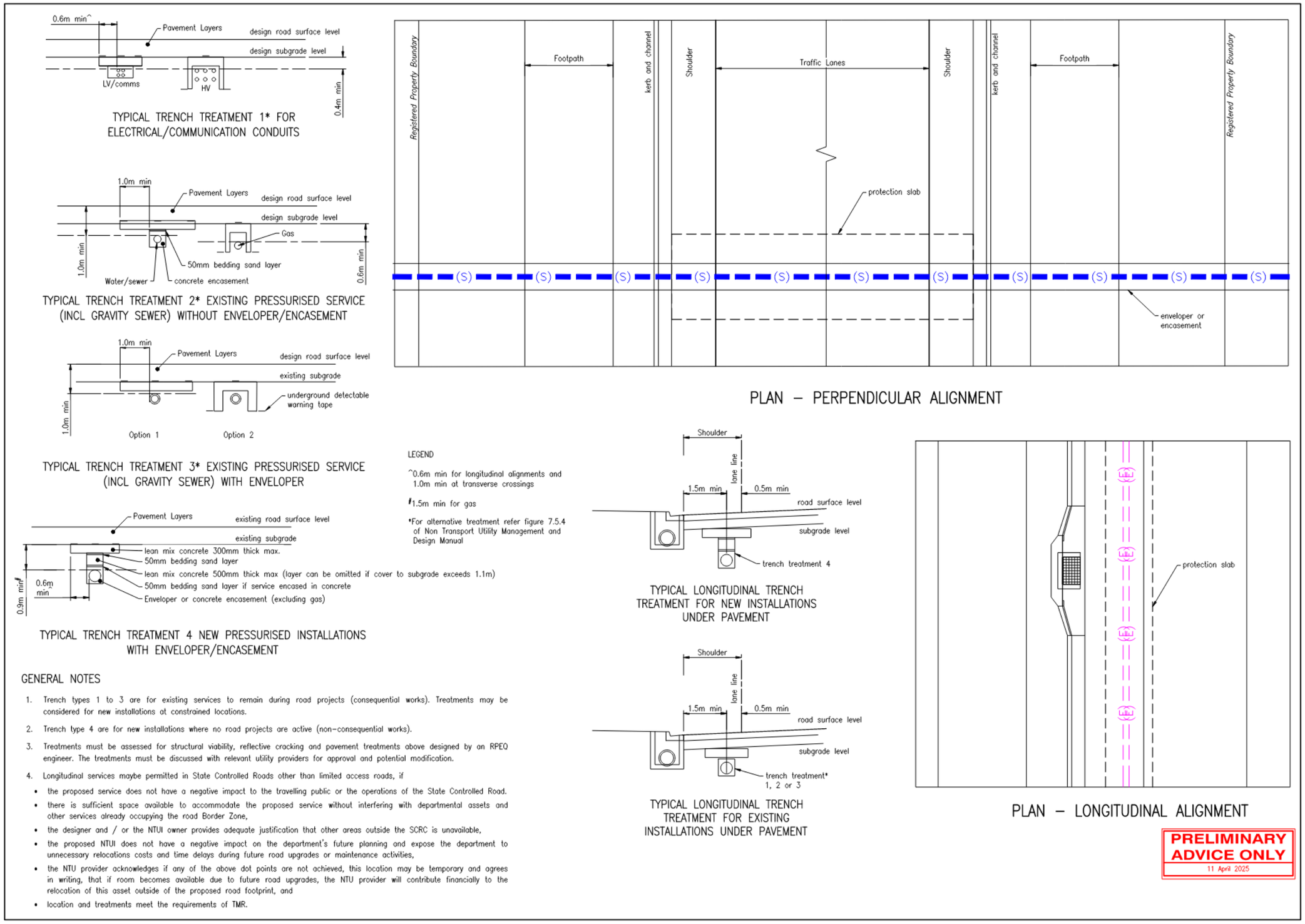
Refer Figure 3.1.6 of this manual for an example of exclusion zone.

Underground clearances

The designer shall review relevant utility providers guidelines for vertical and horizontal clearances between other underground services in order to mitigate potential clashes as part of the conflict resolution process and development of a space-proofed utility corridor.

Example:
An existing shallow buried pressure sewer main, not being relocated as part of the project works, crosses perpendicular through the service alignment corridor in the road border zone. Top of the proposed LV conduits within trench is 800 below the surface level, invert of the sewer main is 850 mm below the surface level. Review of the appropriate *Water Services Association of Australia Pressure Sewer Code* indicates vertical clearance is not achieved and a solution is required.

Figure 5.5.1.1(b) – Suggested treatments to existing assets or constrained locations



5.5.1.2 Trench treatments for existing assets to remain or constrained situations

Where the treatment option is to protect an existing utility in place and the incorporation of physical controls can meet the minimum requirement of Table 5.5.1 above, the potential treatments presented in Figure 5.5.1.1(b) may be applied subject to the department's and utility provider's approval.

For new installations, where trenchless installations are not practicable (example high density urban areas with no room for receiver or thrust pits) or the required trench depth cannot be achieved (example rock is encountered at shallow depth or construction under high volumes of traffic limits how long trench can be open without shoring), treatments depicted in Figure 5.5.1.1(b) may also be applied, subject to department's and utility provider's approval.

Refer to Figure 5.5.1.1(b) above for potential solutions.

5.5.2 Telecommunications / communications

For telecommunication utility providers, the following standards and guides were reviewed as part of the harmonisation process and development of this manual includes but is not limited to:

- AS/NZS 2566.2: *Buried flexible pipelines*
- *Industry Code C524 External Telecommunication Cable Networks*
- *Telecommunications in Road Reserves – Operational Guidelines for Installations Industry Guideline G591*.

Telecommunication carrier assets (communications assets) are non-contestable and the design is conducted by the utility provider (or its approved suppliers) in accordance with its relevant design guides and codes. The following supplementary criteria are required where telecommunications assets are to be installed in SCRC. Where the works are consequential (instigated by Transport and Main Roads) the project designer / manager shall provide a horizontal and vertical utility corridor to the utility provider's designer in accordance with the requirements of this manual.

Where the works are non-consequential (instigated by the utility provider) the design proposal shall be reviewed in accordance with the requirements of this manual.

Cover

Unless otherwise approved, the minimum depth of cover for utility services installed within a SCRC (either parallel with, or crossing, the road footprint) are as specified in Table 5.5.2 below.

Table 5.5.2 – Minimum depth of cover for telecommunication utility services

Location	Nominal Cover
Road Surface (from top of pipe / conduit to surface level at the lowest point of the pavement surface cross section)	1200 mm
Footpath / border zone / roadside (below lowest point in footpath allocation)	600 mm [2] / 750 mm [1,3]
Table drains (below invert level of table drains)	900 mm
Between pavement subgrade and utility service / service conduits	800 mm / 400 mm [4]
Bored, jacked, or micro tunnelled installations	1500 mm

Notes:

[1] Services under vehicle crossing driveways or private property access are to be reviewed on a case-by-case basis.

[2] 600 mm measured from the surface level of an existing or proposed path.

[3] 750mm where no path is present i.e from natural surface.

[4] Cover may be reduced to 400 mm with the incorporation of a protection slab. Top of slab to be no higher than the pavement subgrade level unless otherwise agreed with Transport and Main Roads.

Note values may increase with the presence of road assets such as drainage or Intelligent Transport Systems and Electrical (ITS&E).

The depth of cover in Table 5.5.2 is the minimum cover for various situations. 450 mm cover is not accepted in any situation under the road pavement surface area and only accepted in the border zone if there is a concrete footpath above, being cover to the underside of the footpath therefore achieving 600 mm to the surface. Preference is to have cables in a conduit within Transport and Main Roads' road corridors.

Pits and access chambers

Pits and access chambers shall not be installed within the road footprint area and must be within its service alignment corridor. Refer to Chapter 3 of this manual for preferred pit spacing requirements. Pits shall be installed to one side of the allocated service corridor to allow for future installations of other carriers or network upgrades.

Locations to consider pedestrian movements (where applicable) and maintenance access that limits impact to traffic movements.

Direct buried cables

Direct buried cables are prohibited in SCRC unless explicitly agreed. Direct buried cables cannot be readily relocated or repaired, there is often no way to undertake service locations as they do not have trace wires and coiled sections take up border zone capacity.

5.5.2.1 Supplements to the telecommunications industry code and guideline

Underground installation and alignment

Conduit bank shall be positioned to one side (not central) of the service alignment corridor with redundancy (extra conduits) to cater for potential future growth and additional conduit installations by other carriers. As most communication networks are customer driven, appreciation for future population growth should be considered during the first installation, preventing potential disturbance to ground and limiting impacts to existing services in future. Redundancy shall also be considered at road crossings and active transport locations. Service alignment corridor is to be measured from the RP boundary not the fence line.

Separation from other carrier and utility services

The designer shall review relevant utility providers guidelines for vertical and horizontal clearances between other underground services in order to mitigate potential clashes as part of the conflict resolution process and development of a space-proofed utility corridor.

Example:

An existing shallow buried pressure sewer main, not being relocated as part of the project works, crosses perpendicular through the service alignment corridor in the road border zone. Top of the proposed communication conduits within the trench is 750 below the surface level, obvert of the sewer main is 700 mm below the surface level. Review of the appropriate *Water Services Association of Australia Pressure Sewer Code* indicates vertical clearance is not achieved and a solution is required.

Overhead clearances

The designer shall assess OH clearances to road infrastructure (road level, barriers, noise walls, fences, direction signage, light poles, traffic signals, gantries and so on) meets the utility providers preferred values. Considerations for future pavement overlays and over dimension routes should also be assessed.

On ground Plant

On ground plant, such as cabinets if approved within SCRC, shall be assessed for roadside hazards, sightlines and treatments. There may be a requirement to truncate adjacent property (partial resumption) in order to have the above ground infrastructure installed outside road corridor. This needs to be considered in the early planning phase when resumptions and land availability is assessed.

Trench treatments crossing SCR

Where minimum depth of cover is not achieved, trench treatments with protection slab, if approved, shall be in accordance with departmental requirements. Installations under a roadway shall be a low maintenance solution, therefore removable slabs are not permitted. Locator strips shall also be placed at base of trench either side and adjacent to lowest conduit bank or cut-off wall.

5.5.2.2 Trench treatments for existing assets to remain or constrained situations

Where the treatment option is to protect an existing utility in place and the incorporation of physical controls can meet the minimum requirement of Table 5.5.2 above, the potential treatments presented in Figure 5.5.1.1(b) may be applied subject to the department's and utility provider's approval.

For new installations, where trenchless installations are not practicable (example high density urban areas with no room for receiver or thrust pits) or the required trench depth cannot be achieved (example rock is encountered at shallow depth or construction under high volumes of traffic limits how long trench can be open without shoring), treatments depicted in Figure 5.5.1.1(b) may also be applied, subject to the department's and utility provider's approval.

Refer to Figure 5.5.1.1(b) for potential solutions.

5.5.3 Water

For water utility providers, the following standards and guides that were reviewed as part of the harmonisation process and development of this manual includes but is not limited to:

- AS 2832.1-2015 *Cathodic Protection of Metals*
- *Water Supply Code of Australia* (and relevant geographical amendments)
- *Urban Utilities - Trunk Water Main Design and Construction Code Addendum to SEQ Service Providers Edition of the WSAA Water Supply Code* V1.3
- Seqwater D-GDE-STD-001 *Seqwater Network Consent Guidelines*
- Seqwater *Engineering Standard D-SPE-STD-001 Water Supply Network Planning, Design and Construction*
- *CoGC - Schedules Schedule 6 City Plan* policies SC6.11 City Plan policy – Land development guidelines, 6. Water supply and sewerage reticulation standards
- *SEQ Service Providers - Water Supply Standard Drawings*
- *CTM Water Alliance Design and Construction Code*

Note, the Water Supply Code is the National Standard and some service regions have supplements or addendums to clauses within this code. The designer must refer to each geographical location and apply the supplementary clauses appropriate to the region. Should a NTU's own standard, or an Australian Standard, require an increased minima than shown in this manual, then the higher value must be used.

Non-transport water utility assets are contestable. Network designs are conducted either by approved consultants or by the asset owner in accordance with its relevant design guides and codes. Where water assets are to be installed in the SCRC, the supplementary criteria listed in Section 5.5.3.1 are also required.

Where the works are consequential (instigated by Transport and Main Roads) the project designer / manager shall provide a design in accordance with the requirements of this manual.

Where the works are non-consequential (instigated by the utility provider or other third parties (developers / private) the design proposal shall be reviewed in accordance with the requirements of this manual.

Cover

Unless otherwise approved, the minimum depth of cover for utility services installed within a SCRC (either parallel with, or crossing, the road footprint) are as specified in Table 5.5.3 below.

Table 5.5.3 – Minimum depth of cover for water utility services

Location	Nominal Cover (≤200NB)	Nominal Cover (>200NB)
Road Surface (from top of enveloper pipe / conduit to surface level at the lowest point of the pavement surface cross section	1500 mm	1500 mm
Footpath / border zone / roadside (below lowest point in footpath allocation)	600 mm (1)	1000 mm (3)
Table drains (below invert level of table drains)	900 mm	900 mm
Between pavement subgrade and utility service / service conduits	900 mm	900 mm
Bored, jacked, or micro tunnelled installations	1500 mm	1500 mm
Road Surface (existing installations / constrained sites)	750 mm (2)	1000 mm (2)

Notes:

(1) New services under vehicle crossing driveways or private property access are to be reviewed on a case-by-case basis. Roadside locations with no footpaths minimum cover shall be 750 mm.

(2) In situations where existing assets are to remain and don't meet minimum depth requirement, or site constraints prevent increased depth, service may have reduced cover subject to physical protection measures such as concrete encasement and / or protection slab with detailed calculations and approval from Transport and Main Roads and NTU provider on a case-by-case basis.

(3) May vary subject to the requirement of valves, pits and pipe material.

5.5.3.1 Supplements to the water industry codes and guidelines

Location of water mains

Installation of longitudinal services under pavement areas is prohibited on departmental road pavement assets unless explicitly agreed in writing by the department's District Director after other locations have been assessed as impractical. Reasons why other installation methods have been ruled out must be documented and supplied to Transport and Main Roads prior to design progression. Regardless of pipe size, alignments shall be outside the road footprint whether that be border zone or nature strip. Where room does not exist, the need for land resumptions or easements outside the road corridor needs to be considered or replacing existing asset on same alignment. Refer to service alignment corridor in Chapter 3 of this manual.

Location of water mains in roundabouts and bus bays

Transport corridors are primarily used for transport purposes though provides ancillary functions to other public services like active transport or utility services where they can be reasonably accommodated. For the purpose of new or existing installations under ancillaries or proposed ancillaries (footpaths, off-road bikeways and so on), a low maintenance installation needs to be considered either as an enveloper treatment or physical protection or a combination of the two. For the purpose of existing services to remain in place, physical protection may be provided, to prevent relocations, subject to all other design assessments being conducted and review by the water authority.

Replacing AC watermains

Where an existing main has been assessed to remain in place with or without additional physical controls, (that is, agreed protection measure), replacing this main for the purpose of material type is deemed betterment and utility provider should contribute under a cost sharing arrangement.

Dual water supply systems

New installations for dual mains will not be accepted as this network should fall within the local government road corridors or adjacent land / properties. Utilising the SCRCs, where alternatives exist on land the system is servicing adjacent to the SCR, and because it is more convenient for installation and maintenance by the service authority, is not acceptable. Space in SCRCs is limited. Such installations take space from Transport and Main Roads Preferred Service Alignment corridors for other services. Alignment for drinking water if approved shall be within preferred service alignment corridor and consistent with utility alignment and orientation within Chapter 3 of this manual.

Crossings

The enveloper pipe shall continue the full width of the SCRC, that being RP boundary to RP boundary, where however, the crossing links to an existing parallel (longitudinal) run or service changes direction to run parallel, then the enveloper shall extend a minimum of 3.0 m beyond the road formation, that being toe of embankment and 1.0 m beyond back of kerb, or, if known future embankment / back of kerb (refer Figure 3.1.3.2). Where this cannot be achieved, approval must be sought from Transport and Main Roads to relax this requirement based on constrained site conditions and available corridor widths – such approval must be sought from the Manager (Program Planning and Corridor Management) or equivalent.

Installations not at 90 degrees (± 5 degrees) to the road are subject to departmental approval. For the purpose of existing assets on a skew, dependant on availability to shut the main down, depth, size, residual design life and cost of relocation, can be protected (concrete encased etc) in place at Transport and Main Road's discretion and subject to the NTUI owner consent.

For the purpose of new installations, if trenching installation is approved by the department, the pipe shall be installed with an enveloper, or concrete encased, and trench backfill treatment assessed in regard to pavement interface. Refer to the Section 7.5.4 for further details. For an existing service to remain, physical controls are required within the trench backfill and potentially a concrete slab at road subgrade level in accordance with departmental requirements. Liaison with and approval from the department on final pavement treatments and configuration is required.

Crossings of creeks or drainage reserves

Further to additional protection requirements at creek crossings, for the purpose of new installations under waterways (mapped as Green, Amber, Red and Purple – Mapping | Planning) within the department's road corridor, alignment needs to consider current and future climate changes associated with erosion risk, buoyancy and potential for additional bed armour requirements due to limited access. Access pits shall be no closer than 5.0 m from top of bank with trench installations or 10 m for trenchless installations, subject to riparian buffers, land availability, accessibility, soil conditions and depth of installation. Approvals via Department of Agriculture and Fisheries (DAF) is also required.

Trenchless technology

For trenchless installation under departmental assets, the design shall also comply with the provisions of the below, as applicable:

- MRTS170 *Public Utilities in Road Projects in Site Works*
- MRTS171 *Public Utilities in Road Projects Principal Contractor Responsibilities*
- MRTS140 *Horizontal Directional Drilling (HDD)*
- MRTS141 *Microtunnelling and Pipe Jacking*
- MRTS142 *Thrust Boring and Auger Boring*
- MRTS24 *Manufacture of Precast Concrete Culverts*
- MRTS25 *Steel Reinforced Precast Concrete Pipes* and
- MRTS26 *Manufacture of Fibre Reinforced Concrete Drainage Pipes*.

Duplicate mains

Further to this clause, for purpose of new installations, where no local roads or service roads exist, and the SCR is the only access point to the properties on both sides, duplicate mains may be considered (one each side of corridor), where service crossings have shown to be unviable. Duplicate mains on the same side of the corridor should be combined and augmented to have one larger main and not 2x smaller mains in order to manage the corridor with other service providers. Where NTU provider justifies where augmentation is not practicable, the duplicated main must be within the allocated preferred alignment corridor.

Service meters

Meters servicing adjacent properties for commercial, industrial, strata managed properties or above ground, are not to be installed in the SCRC. Single residential meters are situationally dependent, subject to fence types and accessibility. The meter box may be placed inside the property, or inside a truncation of the fence, or within the SCRC as close as possible to RP boundary. Meters are below-ground and pit lids are “on surface” with no protrusions above surface level to interfere with pedestrians nor vegetation management. The service connection pipe material is recommended to be PE and not copper, as it sits within the electrical alignment corridor and the lids shall be trafficable in rural areas.

In-line pressure booster pumping stations

Location of pumping stations, if proposed to be within SCRC is subject to the department’s approval.

Pipe cover, structural considerations and external forces

For the purpose of new installations under current roadways or future roadways, increased depth and/or casing / enveloper should be standardised in order to prevent costly relocations in future. For purpose of existing installations under current or future roadways, pavement maintenance works, full rehabilitation and widening of existing formations provide the highest risk of damage to assets due to plant and equipment loads during construction, including vibration. Where minimum depth to subgrade cannot be achieved and vibration levels are outside the allowable range, additional physical controls are required. Physical controls to be either concrete encasement or concrete protection slab or a combination of the two. Where risks are still not able to be mitigated with the allowable treatment options, relocation may be required. Refer to Table 5.5.3 above for cover requirements.

Physical Protection Treatments

Concrete encasement, bridging slabs, protection slabs and so on are feasible physical protection treatments within a SCRC and shall also be in accordance with the NTU provider requirements and subject to the department's approval.

Pipeline anchorage

Locations of anchorage shall be outside the road pavement extents no closer than 3.0 m from the toe of embankment or 1.0 m from back of kerb and within the service alignment corridor as applicable unless otherwise agreed with Transport and Main Roads. Vertical and horizontal bends under the road pavement extent shall be avoided. Where approved by the department to be within pavement extents, thrust restraints shall be limited to inline thrust blocks with trench drainage and restrained pipe joins.

Bulkheads, trench stops and trench drainage

Upon the department's approval of use, height of concrete bulk heads shall not extent beyond pavement subgrade level or underside of concrete slab as depicted on drawing SEQ-WAT-1204-1. Bulkheads shall not be used at road crossings. Where pipe has been approved to be installed longitudinally within the pavement area, and where trench drains are required, discharge system for trenches, will require additional assessment.

Appurtenances, pits and valves

Locations of appurtenances shall be outside the road pavement extents and within the service alignment corridor unless agreed in writing by the department.

Refer to Chapter 3 of this manual regarding cut / overs and tie-ins.

5.5.3.2 Trench treatments for existing assets to remain or constrained situations

Where the treatment option is to protect an existing utility in place and the incorporation of physical controls can meet the minimum requirement of Table 5.5.3 above, the potential treatments presented in Figure 5.5.1.1(b) may be applied subject to the department's and utility provider's approval.

For new installations, where trenchless installations are not practicable (example high density urban areas with no room for receiver or thrust pits) or the required trench depth cannot be achieved (example rock is encountered at shallow depth or construction under high volumes of traffic limits how long trench can be open without shoring), treatments depicted in Figure 5.5.1.1(b) may also be applied, subject to the department's and utility provider's approval.

Refer to Figure 5.5.1.1(b) for potential solutions.

5.5.4 Sewerage

For sewerage utility providers, the following standards and guides that wase reviewed as part of the harmonisation process and development of this manual includes but is not limited to:

- AS 2832.1-2015 *Cathodic Protection of Metals*
- *Gravity Sewerage Code of Australia* (and relevant geographical amendments)
- *Water Services Association of Australia - Pressure Sewer Code of Australia*
- *Water Services Association of Australia - Sewage Pumping Station Code of Australia*
- *SEQ Service Providers - Sewerage Standard Drawings*
- *SEQ Service Providers – Pressure Sewerage Standard Drawings*
- *CTM Water Alliance Design and Construction Code.*

Note, the Water Services Association Code is the National Standard with many regions having supplements or addendums to clauses within this code. The designer must refer to each geographical location and apply the supplementary clauses appropriate to the region. Should a NTU's own standard, or an Australian Standard require an increased minima than shown in this manual, then the higher value must be used.

Non-Transport utility sewer assets are contestable and the design if not conducted by the utility authority can be undertaken by appropriately skilled engineers and designers. In SCRC however, the following supplementary criteria are required.

Where the works are consequential (instigated by Transport and Main Roads) the project designer / manager shall provide a design in accordance with the requirements of this manual.

Where the works are non-consequential (instigated by the utility provider or other third parties (developers/private) the design proposal shall be reviewed in accordance with the requirements of this manual.

Cover

Unless otherwise approved, the minimum depth of cover for utility services installed within a SCRC (either parallel with, or crossing, the road footprint) are as specified in Table 5.5.4 below.

Table 5.5.4 – Minimum depth of cover for sewer utility services

Location	Nominal Cover (≤200NB)	Nominal Cover (>200NB)
Road Surface (from top of enveloper pipe / conduit to surface level at the lowest point of the pavement surface cross section	1500 mm	1800 mm
Footpath / border zones / roadside (below lowest point in footpath allocation)	600 mm (1,3)	1000 mm (1,2,3)
Table drains (below invert level of table drains)	900 mm	900 mm
Between pavement subgrade and utility service / service conduits	900 mm (4)	1200 mm (4)
Bored, jacked, or micro tunnelled installations	1500 mm	1800 mm
Road Surface (existing installations / constrained sites)	750 mm (5)	1000 mm (5)

Notes:

(1) Services under vehicle crossing driveways or private property access are to be reviewed on a case-by-case basis. Roadside locations with no footpaths minimum cover shall be 750 mm.

(2) Refer to NTU providers design code to confirm minimum depths. The highest of the two standards shall govern.

(3) Gravity sewer minimum cover in the border zone shall be 900 mm. Refer to relevant sewer provider standards for depths of services when parallel to other services.

(4) Gravity sewer minimum cover can be reduced to match water criteria, that is, 1500 mm from surface and 900 mm from subgrade, where fixed inverts at tie-ins outside the SCRC restrict available depth.

(5) In situations where existing assets are to remain and don't meet minimum depth requirement to the road surface, or site constraints prevent depth, service may have reduced cover subject to additional protection measures, such as concrete encasement and/or protection slab, subject to detailed calculations and approval from Transport and Main Roads on a case-by-case basis.

Crossings

The enveloper pipe shall continue the full width of the SCRC, that being RP boundary to RP boundary, where the crossing links to an existing parallel (longitudinal run) or service changes direction to run parallel, then the enveloper shall extend a minimum of 3.0 m beyond the road formation, that being toe of embankment and 1.0 m beyond back of kerb, or, future embankment / back of kerb (refer to Figure 3.1.3.2). Where this cannot be achieved approval must be sort from Transport and Main Roads to relax this requirement based on constrained site conditions and available corridor widths.

Installations not at 90 degrees (± 5 degrees) is subject to departmental approval. For the purpose of existing assets on a skew, dependant on availability to shut main down, depth, size, residual design life and cost of relocations, can be protected (concrete encased etc) in place as a cost saving exercise subject to NTUI owner consent.

For purpose of new installations, if trenching installation is approved by the department, the pipe shall be installed with an enveloper or concrete encased and trench backfill with concrete slab at subgrade level in accordance with the department's requirements. For an existing service to remain, physical controls are required within the trench backfill and potentially a concrete slab at road subgrade level in accordance with departmental requirements. Liaison with the department on final pavement treatments and configuration is required.

5.5.4.1 Supplements to the sewer industry codes and guidelines

Horizontal alignment of sewers

New installations for sewer mains (gravity) may not be accepted within constrained SCRCs as this network should fall within the local government road corridors or adjacent land / properties. Utilising the SCRCs, where alternatives exist on land the service is servicing adjacent to the SCR, but because it is more convenient for installation and maintenance by the service authority, is not acceptable. Space in SCRCs is limited. Such installations take space from Transport and Main Roads Preferred Service Alignment corridors for other services.

Where approved to be installed in the corridor, installation of longitudinal services under current or future pavement areas is prohibited unless explicitly agreed in writing by the department's District Director after other locations have been assessed as impractical. Reasons why other installation methods have been ruled out must be documented and supplied to Transport and Main Roads prior to design progression. Regardless of pipe size, alignments shall be outside the road pavement extents whether that be border zone or nature strip. Where room does not exist, the need for land resumptions or easements outside the road corridor needs to be considered or replacing existing asset on same alignment.

If trench installation is approved by Transport and Main Roads, the pipe shall be installed with an enveloper or concrete encased and trench backfill with concrete slab in accordance with the department's requirements. For an existing service to remain, physical controls are required within the trench backfill and potentially a concrete slab at road subgrade level in accordance with departmental requirements. Liaison with the department on final pavement treatments and configuration is required.

Horizontal alignment of sewers – dual pipelines

For purpose of new installations, where approved by the department to be installed in the corridor and where no local roads or service roads exist, and the SCR is the only access point to the properties on both sides, or a split carriageway exists, dual mains may be considered, only where service crossings have shown to be unviable by the department on consideration of the documentation provided by NTU or their representatives. Dual mains on the same side of the corridor should be combined and augmented to have one larger main and not 2x smaller mains in order to manage the corridor with other service providers. Where NTU provider justifies where augmentation is not practicable, the duplicated main must be within the allocated preferred alignment corridor. Where redundancy is required, consideration for stacking the assets in same trench should be assessed.

Minimum cover over sewers

For the purpose of new installations under current roadways or future roadways, increased depth and/or casing / enveloper should be standardised in order to prevent costly relocations in future.

For purpose of existing installations under current or future roadways, pavement maintenance works, full rehabilitation and widening of existing formations provide the highest risk of damage to assets due to plant and equipment loads during construction, including vibration. Where minimum depth to subgrade cannot be achieved and vibration levels are outside the allowable range, additional physical controls are required. Physical controls to be either concrete encasement or concrete protection slab or a combination of the two. Where risks are still not able to be mitigated with the allowable treatment options, relocation will be required. It should be noted, that, damage to the road or other road assets, if not part of departmental project, would not be permitted to accomplish such installations. Refer to Table 5.5.4 above for cover requirements.

Special considerations for location of maintenance structures

Further to the provision of the sewerage code, where the main crosses the SCRC and continues beyond the SCRC boundaries, maintenance structures shall be located outside of the SCRC boundaries. Where the main crosses, then runs parallel with the road, buried structures shall be located within its service alignment corridor, as far as practicable.

Structures general

Above ground infrastructure is prohibited within SCRC. All small underground infrastructure must fit within the preferred service alignment corridor as far as practicable. Small structures include but is not limited to booster pits (< 1200 mm diameter), air valves, discharge pits (< 1200 mm internal diameter) and vents. Larger structures, such as scour arrangements, dosing stations and flow meter boxes are to be installed outside the SCRC.

Pipeline anchorage

Locations of anchorage shall be outside the road pavement extents no closer than 3.0 m from the toe of embankment or 1.0 m from back of kerb and within the service alignment corridor as applicable unless otherwise agreed with Transport and Main Roads. Vertical and horizontal bends under the road pavement extent shall be avoided. Where approved to be within pavement extents, thrust restraints shall be limited to inline thrust blocks with trench drainage and restrained pipe joins.

Bulkheads and trench stops

Upon Transport and Main Roads approval of use, height of concrete bulk heads shall not extent beyond pavement subgrade level or underside of concrete slab as depicted on drawing SEW-1206. Bulkheads shall not be used at road crossings. Where pipe has been approved to be installed longitudinally within the pavement area, and where trench drains are required, discharge system for trenches, will require assessment.

Obstructions and clearances

Installations not at 90 degrees (± 5 degrees) is subject to departmental approval. For the purpose of existing assets on a skew, dependant on availability to shut main down, depth, size, residual design life and cost of relocations, can be protected (concrete encased etc) in place as a cost saving exercise subject to agreement between parties.

Trenchless techniques

For trenchless installation under departmental assets, the design shall also comply with the provisions of the below, as applicable:

- MRTS170 *Public Utilities in Road Projects in Site Works*
- MRTS171 *Public Utilities in Road Projects Principal Contractor Responsibilities*
- MRTS140 *Horizontal Directional Drilling (HDD)*
- MRTS141 *Microtunnelling and Pipe Jacking*
- MRTS142 *Thrust Boring and Auger Boring*
- MRTS24 *Manufacture of Precast Concrete Culverts*
- MRTS25 *Steel Reinforced Precast Concrete Pipes* and
- MRTS26 *Manufacture of Fibre Reinforced Concrete Drainage Pipes*.

Pressure sewers in road reserves

New installations for pressure sewer mains may not be accepted within constrained SCRCs as this network should fall within the local government road boundaries or adjacent land in the first instance. Utilising the SCRCs, where alternatives exist on land the service is servicing adjacent to the SCR, and because it is more convenient for installation and maintenance by the service authority, is not acceptable. Space in SCRCs is limited. Where approved to be installed in the corridor, installation of longitudinal services under current or future pavement areas is prohibited unless explicitly agreed in writing by the department's District Director after other locations have been assessed as impractical. Reasons why other installation methods have been ruled out must be documented and supplied to Transport and Main Roads prior to design progression. Regardless of pipe size, alignments shall be outside the road footprint whether that be border zone or nature strip. Where room does not exist, the need for land resumptions or easements outside the road corridor needs to be considered or replacing existing asset on same alignment.

Valves general

Locations of appurtenances [structures] shall be outside the road pavement extents and within the service alignment corridor unless agreed in writing by Transport and Main Roads.

Refer to Chapter 3 of this manual regarding cut / overs and tie-ins.

Trench design

Trenching is prohibited on Transport and Main Roads road pavement assets unless explicitly agreed in writing by the department's District Director after other methods have been assessed as impractical. Reasons why other installation methods have been ruled out must be documented and supplied to Transport and Main Roads prior to design progression. In remote locations subject to low traffic volumes, where side-tracks can be safely provided and after departmental approval, trenching may be considered for practicality and cost reduction.

Sewerage Pumping Stations (SPS)

Installation of SPS within the SCRC is prohibited. Exceptions can only be granted if explicitly agreed in writing and approved by the department's District Director / Deputy Regional Director. Any exception will be subject to specific conditions that may include agreement that future relocation costs of such assets would be at the NTUI owner's expense. Exceptions will only be granted after all other locations have been assessed as impractical. Reasons why other locations are ruled out must be documented and supplied to Transport and Main Roads prior to design progression. Location of SPS, if approved, shall ideally be accessed from and adjacent to a service road. Emergency storage tanks, chambers and devices are also prohibited within SCRCs.

Where a road project impacts access to an existing SPS, provision for new safe access needs to be considered.

5.5.4.2 Trench treatments for existing assets to remain or constrained situations

Where the treatment option is to protect an existing utility in place and the incorporation of physical controls can meet the minimum requirement of Table 5.5.4 above, the potential treatments presented in Figure 5.5.1.1(b) may be applied subject to the department’s and utility provider's approval.

For new installations, where trenchless installations are not practicable (example high density urban areas with no room for receiver or thrust pits) or the required trench depth cannot be achieved (example rock is encountered at shallow depth or construction under high volumes of traffic limits how long trench can be open without shoring), treatments depicted in Figure 5.5.1.1(b) may also be applied, subject to the department's and utility provider's approval.

Refer to Figure 5.5.1.1(b) for potential solutions.

5.5.5 Gas

For gas utility providers, the following standards and guides where reviewed as part of the harmonisation process and development of this manual:

- AS 2832.1 *Cathodic Protection of Metals*
- AS 2885.0 *Pipelines-Gas and liquid petroleum Part 0 General Requirements*
- AS/NZS 2885.1*Pipelines-Gas and liquid petroleum Part 1-Design and Construction*
- AS/NZS 2885.2 *Pipelines-Gas and liquid petroleum Part 2- Welding*
- AS 2885.3 *Pipelines-Gas and liquid petroleum Part 3-Operation and maintenance*
- AS/NZS 2885.6 *Pipelines-Gas and liquid petroleum Part 6-Pipeleine safety management*
- AS/NZS 4645.1 *Gas distribution networks Part 1-Network management*
- AS/NZS 4645.2 *Gas distribution networks Part 2-Steel pipe systems*
- AS/NZS 4645.3 *Gas distribution networks Part 3-Plastics pipe systems*
- *Guidelines to work near Existing Gas Assets 400-STD-AM-0001*, and
- GAS-960-GL-PL-001 *Designing, Constructing and Operating Assets Near Jemena Pipelines.*

Distribution and transmission gas is non-contestable. The design is conducted by the utility asset owner in accordance with its relevant design guides and codes. Where the assets are to be installed in SCRC, the following supplementary criteria must also be met.

Where the works are consequential (instigated by Transport and Main Roads) the department's project designer / manager shall provide a horizontal and vertical utility corridor asset location, and road design, to the utility provider's designer in accordance with the requirements of this manual.

Where the works are non-consequential (instigated by the utility provider) the design proposal shall be reviewed by Transport and Main Roads in accordance with the requirements of this manual.

Cover

Unless otherwise approved, the minimum depth of cover for utility services installed within a SCRC (either parallel with, or crossing, the road footprint) are as specified in Table 5.5.5 below.

Table 5.5.5 – Minimum depth of cover for gas utility services

Location	Nominal Cover Transmission	Nominal Cover Distribution
Road Surface (only existing installations / constrained sites)	1200 mm (1)	1200 mm (1)
Footpath / border zone / roadside (below lowest point in footpath allocation)	600 mm (2) / 1200 mm, (3)	600 mm (2) / 1200 mm (3)
Table drains (below invert level of table drains)	900 mm	900 mm
Between pavement subgrade and utility service / service conduits	1500 mm	1500 mm
Bored, jacked, or micro tunnelled installations	1500 mm (1)	1500 mm (1)

Notes:

(1) If an enveloping pipe is impractical or not feasible for use, the minimum cover to a high-pressure gas or liquid petroleum transmission line shall be increased to:

(a) 2100 mm for steel pipelines when crossing low speed (< 70 km/hr) roads in high density constrained urban areas or low volume roads (under 4000 AADT) in constrained rural areas, and 3000 mm for pipelines for all other locations including limited access roads. Additionally, the design must comply with Chapter 5.3 and 5.4 of this manual

(b) 3000 mm for all other pipe materials, and

(c) in highly constrained locations where, trenchless methods are not viable, pipe shall be 600 mm below pavement subgrade or 1200 mm below the surface level (whichever is greater) and shall have additional physical controls in the form of casings, concrete bridging slabs and/or concrete encasement or a combination of the these as a minimum. Depths outside the above table values shall be reviewed on a case-by-case basis with final solution agreed with Transport and Main Roads.

(2) Services under vehicle crossing driveways or private property access are to be reviewed on a case-by-case basis but not less than 900 mm.

(3) Depth of cover in border zones, where existing pressurised utilities greater than NB200 mm is adjacent to the gas service alignment corridor, depth of new installations shall be increased in accordance with AS 2885.1 Clause 10.12.1. Where the gas alignment is within the Transport and Main Roads service corridor, depth shall increase to 1200 mm minimum as shown in Figures 3.1.2 (b) and 3.1.2 (d).

Pits and access chambers

Pits and access chambers shall not be installed within the road pavement extents area or Transport and Main Roads service corridor and must be within its service alignment corridor. Refer to Chapter 3 of this manual for pit spacing requirements. Pits shall be installed to one side of the service alignment trench to allow network upgrades and limit impacts to other services.

Locations to consider pedestrian movements (where applicable) and maintenance access that limits impact to traffic movements.

Treatment of existing assets

Designers and project managers are to note, while use of the criteria in this manual and review against Gas authority's guides, potential treatment options of in situ assets may be considered a feasible solution in the early design phases, however, the gas authority must conduct their own feasibility assessment to determine and confirm the final treatment option based on their safety management assessment and considerations for maintenance and repair. This is generally conducted after engagement under a Recoverable Works Agreement (contract). Due to long lead times, these assessments and confirmation of treatment options need to be confirmed as early as possible in the design phase, ideally during the end of the Business Case so not to delay projects due to funding or time implications in later stages. New installations require consideration for future road works so to minimise the requirement for relocation and support additional physical controls should they be required in future.

5.5.5.1 Supplements to the gas industry codes and guidelines

Pipeline corridor

There are other services existing or future, including departmental infrastructure, that share the roadside locations and requesting a 3.0 m corridor is not feasible especially on land that the gas authority does not own or manage. Each service that is to be installed within the Transport and Main Roads Preferred Service Alignment corridor should be able to accommodate construction of a new asset next to the redundant one still within the same relevant service alignment corridor. Alignment within the trench needs to consider this potential future option. i.e. gas alignment as close to outer trench (not central). Accessibility is a main factor in decision to leave in place or relocate.

Casings, culverts, tunnels, slabs

For the purpose of new installations under current roadways or future roadways, pipelines installed 1500 mm or less below the pavement subgrade shall be installed with physical controls such as a casing / enveloper pipe. For existing pipelines under existing road assets less than 1200 mm from the subgrade, where the asset is chosen to remain in place, physical controls in the form of concrete encasement or concrete slabs (such as side slabbing or bridging slab) shall be used as a minimum. A combination of both physical treatments may be required subject to design and safety assessment.

Vibration in the vicinity of a PIPELINE SYSTEM

For the purpose of new installations, road asset construction plant and equipment for vibration impacts for future widening or rehabilitation works needs to be assessed as far as practicable. This assessment may determine either placing the asset further away from the current / future road footprint, or, incorporate additional physical controls, such as increase in depth, increase wall thickness, concrete slab or concrete encasing or a combination of the above during installation, to offset the need for future treatments. Designers are to note the vibration restrictions imposed by some gas authorities when assessing the proposed alignment. For example installed gas assets can have restrictions such as limitation for vibration equipment within 15 m of the gas asset. This needs to be considered when allowing gas assets from varying authorities to be installed within road corridors in the first instance. Where gas alignments proposed to be installed are within this potential restriction of 15 m from the existing road footprint or future footprint, pipe material, depth and physical controls may need to be considered during the initial installation to offset vibration risk due to road operation and maintenance activities.

Risk treatment during operation and maintenance

For the purpose of existing installations under current roadways or future roadways, pavement maintenance works, full rehabilitation and widening of existing formations provide the highest risk of damage to gas assets due to plant and equipment loads during construction, including vibration. Where minimum depth to subgrade cannot be achieved and vibration levels are outside the allowable range, additional physical controls are required. Physical controls to be either concrete encasement or concrete protection / bridging slab or a combination of the two. Where risks are still not able to be mitigated with the allowable treatment options, relocation will be required. Refer to Section 5.4 regarding vibration assessments.

5.5.5.2 Trench treatments for existing assets to remain or constrained situations

Where the treatment option is to protect an existing utility in place and the incorporation of physical controls can meet the minimum requirement of Table 5.5.5 above, the potential treatments presented in Figure 5.5.1.1(b) may be applied subject to the department's and utility provider's approval.

For new installations, where trenchless installations are not practicable (example high density urban areas with no room for receiver or thrust pits) or the required trench depth cannot be achieved (example rock is encountered at shallow depth or construction under high volumes of traffic limits how long trench can be open without shoring), treatments depicted in Figure 5.5.1.1(b) may also be applied, subject to the department's and utility provider's approval.

Refer to Figure 5.5.1.1(b) for potential solutions.

5.6 Redundant / Abandoned assets

Unless the assets are under the department's road pavement areas not subject to reconstruction, and the department determines it is safe to do so, all redundant / abandoned infrastructure must be removed from SCRC. In special and extreme circumstances, the department has sole and absolute discretion to review the removal requirement of redundant infrastructure. Mains crossing under existing road pavement that cannot provide for a staged removal as part of the road reconstruction works, shall be trimmed back as much as practicable, based on traffic safety and constructability, capped and core filled. Plans showing method, extents and removal staging to be provided to the department for approval. In remote locations subject to low traffic volumes, where detour of traffic can be safely provided and after departmental approval, trenching may be considered for removal of redundant assets under pavement areas. Care must be taken to ensure that all proposed abandonments or treatments are formally approved in writing by the NTUI owner's Nominee or Delegate in every situation, typically during the detailed design phase or as indicated in the accepted design. This protocol aims to prevent the unauthorised removal of assets and ensures that no assets are removed without proper consent.

Note: the asset owner does not relinquish responsibility of decommissioned / redundant / abandoned assets that remain within the SCRC. Refer to Section 7.6.4 for further guidance.

Redundant assets that remain must be recorded as prescribed under Clause 13 of MRTS56 *Construction Surveying* to identify the entire length of the redundant network and provided to the asset owner in a format that can be integrated in the NTU database.

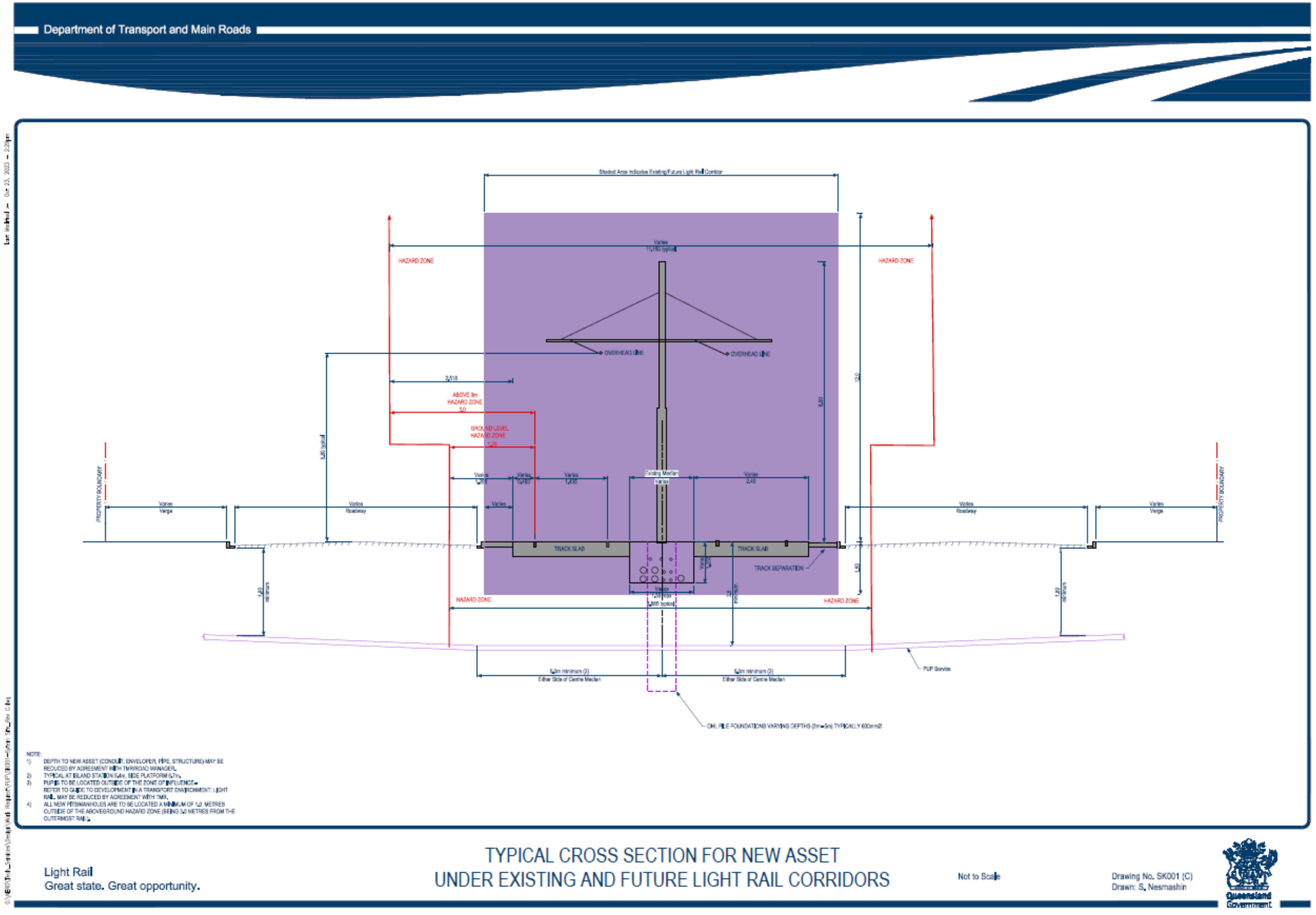
5.7 Light rail considerations

Designers and managers are to note the specific requirements for utilities within an existing and/or gazetted light rail corridor such as AS 4799 for example reference material can be sourced on Transport and Main Roads Technical Publications website:

https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications

Refer to Figure 5.7 for typical considerations.

Figure 5.7 – Typical considerations for light rail



5.8 Utility Design Exception process

Where a design requirement needs to be relaxed due to constraints, approval / agreement is required for the relaxation / departure in order to assess the risk and how the risk relates to other design elements. Utility providers use terms such as design relaxations, design departures or derogation where a design element cannot be achieved but through the design process offset the relaxation to an acceptable outcome.

Transport and Main Roads has a similar process with road geometric elements known as design departures through three main criteria:

- Normal Design Domain (NDD), which is adherence to the standard or design requirement
- Extended Design Domain (EDD), where it is a relaxation to a specific parameter or element of the design (relaxation), and
- Design Exception (DE) where an element is not tabulated within the design manual as a NDD or EDD requiring detailed justification for the departure.

A utility design proposal may not have any utility departures, however, still may not meet the requirements of this manual. Therefore, so not to confuse the above two separate processes of documentation and approval, a third and separate process for utility design non-conformances for Transport and Main Roads' design criteria is required.

Transport and Main Roads does not approve utility design relaxations or departures on behalf of the Utility Authorities and therefore the departure documentation should not be combined.

This information can be presented to Transport and Main Roads be via several methods, whether that be a combination of technical memos, reports, workshops or other project type documentation. Key to the documentation provided should align with the design exception process depicted in the *Road Planning and Design Manual 2nd Edition (RPDM)*, Volume 3, Part 1: Objectives of Road Design.

With the above in mind, designs that propose to have a non-conformance to the department's utility criteria should document these as dot points or tabulated in the PUP report in the concept and preliminary stage and as design develops and is advanced in a Utility Design Exception report to be sent to the department for review where exceptions to Transport and Main Road's criteria is being sought. This applies to any utility design element that does not meet the department's NTU criteria, for instance:

- when a utility proposes to install assets on an alignment other than specified by Transport and Main Roads
- has underground structures larger (wider) than the service alignment corridor (valve pits, anchor blocks etc)
- any sewer infrastructure (pumping stations, scour arrangements, odour stations and so on) is proposed to be installed in the SCRC, and/or
- where replacement or upgrade to a utility on a non-preferred alignment is required.

Before any Utility Design Exception (DE) is adopted, it is necessary to demonstrate the non-conformance provides for a reasonable level of safety, that adequate risk assessments have been conducted and there is a clear articulation of ownership for risk and responsibility (including costs and liability). This shall be fully documented in a Utility DE report and provided to the department for consideration and approval.

To defend a decision to adopt a utility design exception / departure, the utility's design RPEQ will be required to demonstrate that in the process of adopting it, an evaluation of the impacts of providing the chosen design parameter value/s has been undertaken. Alternatives, including one that meets the department's NTUI standards will need to be developed and evaluated to a level that is reasonable and practical for the particular design.

Similar to the DE process for road geometry, non-conforming utility criteria shall be presented clearly on the project drawings.

For design exception process utility designers are to refer to Appendix A.2 of the *Road Planning and Design Manual* 2nd Edition (RPDM), Volume 3, Part 1: Objectives of Road Design.

For the purpose of utility design exception process the following clarifications are provided:

- Where road geometric elements are impacted by the installation of the proposed utility or road elements are modified to avoid a conflict with utilities (for example, reduced shoulder width, steepened batter) the full process of the RPDM Volume 3, Part 1 shall be applied.
- For purpose of reporting and justifications, any alignments outside Transport and Main Roads Preferred Service Alignment corridor for longitudinal alignments within the SCRC are deemed an DE for utility design.
- Installation of sewer infrastructure (excluding compliant perpendicular road crossings) are deemed a DE in all cases.
- All other elements that do not meet departmental requirements are considered a DE and requires to be documented.
- Above ground infrastructure must also include a Hazard Assessment defined in the *Road Planning and Design Manual* 2nd Edition (RPDM), Volume 3, Part 6: Road Design, Safety and Barriers and sightline assessments.
- In reference to Appendix 5 Utility DE report template, where the works are consequential (instigated by Transport and Main Roads) the utility designer shall include Design class, projected AADT and accident history in the report. For non-consequential works (instigated by utility authority or third party) the aforementioned items may be omitted with the exception to accident history, where proposed above ground infrastructure or non-complaint access driveways form part of the assessment.

Intent of the aforementioned process is to:

- document the decision to depart from the planning including justification for the departure
- seek approval from relevant delegate, and
- proceed in documenting the relevant acceptance and approval.

Appendix 5 provides an example of how to document departures, similar to road design.

Note examples in the Appendix are DE elements for Transport and Main Roads design requirements. Design relaxations / departures for service provider's design standards / codes / guidelines shall be documented separately and approval sort separately.

When the design exception is accepted, the design is compliant (subject to conditions) and documentation can proceed to completion. Where not agreed, design requires refinement.

All non-conformances are required to be confirmed and agreed prior to certification of Issue for Construction documentation.

Appendix 5 – Utility Design Exception Report

The template provided in this Appendix is an **example only**. It should be modified to ensure the project specific design adopted is justified.

CNxxxx-REP-UDER-0001-REVx

Utility Design Exception Report (UDER)

Basic Information

Job Number	Road	Report No.

Location

Locality Map	Chainages

Posted Speed	V85 Speed	____ AADT	_____ Projected AADT	% HV

Design Class	
	Justification
☐ A	
☐ B	
☐ C	
☐ D	

Work Description

Example non-consequential

[intro] new development requires a new connection and road crossing to sewer and water reticulation systems on other side of main road …….

[body] describe works further ……

Example consequential

[intro] Existing 2 lane 2 way arterial road upgrade works to provide additional lanes both sides. The widening works extend over existing services that require treatment strategy …….

[body] describe PUP works further ……..

Site Considerations

Limitations and controls

Property boundaries, other utilities, environmental constraints and so on

Identify Known Minima or criteria

Example

Existing watermain not in preferred service alignment corridor

Existing telecommunications not in preferred service alignment corridor

Existing Power poles within 8.0 m of the road edge line

Current vertical clearances, cover and grades

Accident History
Input as required

Criteria Analysis

Category #	Potential Considerations #	Classification	
Horizontal Alignment	**Service alignment within corridor, offset to carriageway (above ground infrastructure) / offset from departmental structures**		**Design Exception**
Element 1	*Watermain between ch x ch y not in Transport and Main Roads service alignment corridor*		☒
Element 2	*Proposed WM horiz clearance < 500 mm to Transport and Main Roads utilities*		☒
Element 3	*Longitudinal gravity Sewer alignment within road corridor*		☒
Element 4	*Alignment 3.0 m from Transport and Main Roads structure*		☒
Element 5	*Existing alignment under embankment or pavement*		☒
Total			
Vertical Alignment	**Cover / clearances**		**Design Exception**
Element 6	*Min cover not achieved between ch xx to ch yy*		☒
Element 7	*Clearance to Transport and Main Roads structure*		☒
Total			
Cross section	**Lane / shoulder / medians / batters / formation widths (consequential works only)**		**Design Exception**
Element 8	*Batter steepened to provide offset to optic fibre infrastructure*		☒
Total			
Other	**Ancillary structures / thrust restraints outside service alignment corridor / material type / access / guardrail / envelopers / installation**		**Design Exception**
Element 9	*WM valve outside preferred alignment corridor*		☒
Element 10	*Scour arrangement within SCRC*		☒
Element 11	*Extent of enveloper*		☒
Element 12	*Trench installation under Transport and Main Roads pavement*		☒
Element 13	*Redundant NTUI to remain grout filled in SCRC*		☒
Total			
# Populate as required for each element and show detailed analysis for each element if below NDD			

Note above examples are DE elements for Transport and Main Roads utility design requirements. Design relaxations or non-compliances specific to service provider's design standards / codes / guidelines shall be documented separately and approval sort separately.

Design Considerations

Alternatives			
• Review capability • Specify extents			
Elements 1, 2 and 4 – WM between ch x to ch y			
Location and description	**Adopt Preferred Criteria**		**Adopt Design Exception ***
Option 1.1	*Relocated WM*		
Option 1.2			*Leave WM in current alignment, relocate Transport and Main Roads ITS&E assets*
Element 3 – Longitudinal gravity Sewer alignment within road corridor			
Location and description	**Adopt Preferred Criteria**		**Adopt Design Exception ***
Option 1.1	*Install sewer infrastructure outside road corridor*		
Option 1.2			*Install within service alignment corridor*
Element xxx			

Impacts Assessment
• Cost and time • Social, environmental, safety and traffic • Maintenance
Elements 1, 2 & 4 – Horizontal Alignment – WM between ch x to ch y
Option 1.1 Option 1.1 proposed to provide a **Preferred Criteria** solution ……. [input] Option 1.1 would cost approximately ……. [input] Option 1.2 Option 1.2 proposes to provide a DE ……. [input] Option 1.2 would cost approximately ……. [input] • **Social, environmental, safety and traffic** Option 1.1 ……. and so on • **Maintenance** Option 1.1 ……. and so on

Design Proposal

Recommendation
When considering all options above, it is recommended that ……. • Can design exception be retained? • Is redesign required? • Strategy report for compliance to **Preferred Criteria** in future (non-consequential only)
Mitigating Treatments
• Infrastructure Agreement or Master Agreement (contract / Deed)

Post Implementation Management

Proposals
• Monitoring Regime • Maintenance

Supporting Information

Technical Resources
The following supporting documents should be read in conjunction with this report: • [list documentation]

RPEQ Certification

I consider the technical mitigating treatments appropriate and the decision to adopt this design exception proposal as acceptable.

RPEQ Name and Signature		**Reg no.**	**Date**

Department Manager "Recommend to Use" (with endorsement from departmental SME)

☐ I approve the use of the mitigating treatments for this design exceptions proposal in this project as detailed. ☐ I reject the use of the mitigating treatments and submit the following alternative for RPEQ consideration:

Department Manager Name and Signature		**Date**

District Director "Delivery Approval to Use"

☐ I approve the use of the mitigating treatments for this design exceptions proposal in this project as detailed. ☐ I reject the use of the mitigating treatments and submit the following alternative for RPEQ consideration:

District Director Name and Signature		**Date**

Attachments

☒ Attachment A
☒ Attachment B
☒ Attachment C
☒ Attachment D
☒ Attachment E
☒ Attachment F
☒ Attachment G

6 Design development and workflow

6.1 Introduction

The purpose of this chapter is to inform road project designers of design phases, deliverables and workflows for design and installation of NTUI within the SCRC for consequential works.

Project managers, engineers and road project utility designers (utility design team) should ensure that NTUI requirements associated with transport infrastructure projects are adequately assessed and the necessary measures, consultation processes, timeframes and costs are fully considered at each part of the project phase to minimise the department's exposure to risk and cost escalation.

The key objective within each design phase is information gathering and consultation. As times between project phases can vary significantly, the information and strategies developed in earlier stages may become obsolete, not fit for purpose, outdated or need revision to suit new constraints, updates to design standards or NTU provider requirements. Common changes between phases includes, but is not limited to:

- New services installed within the corridor that has not been assessed.
- Upgrades to existing NTUI within the corridor that requires to be reassessed.
- Changes to design standards and NTUI operational requirements.
- Internal movements and changes to personnel within NTU provider's teams causing difference in opinion or preferential solutions to what was previously agreed in principle.
- Land use and environmental considerations.
- Project funding implications that may add to or remove items within the scope of works.

Closing information gaps as much as practicable and early as possible, especially for critical infrastructure, allows for early engagement for non-contestable works, buffering potential cost and time delays to projects.

The design development and workflow presented in this chapter can be used for all project contract types where NTUI is present. Each contract type may come with additional provisions; therefore the utility design team is to pay particular attention to the requirements of each contract.

6.2 Preliminary Evaluation and Options analysis stage (Concept design phase)

The principal stages of NTUI planning and investigation are:

- high-level investigation of the transport corridor which involves generally non-intrusive and largely desktop investigations
- preparation of risks and constraints as input to the design development report (planning), and
- development of a plan for carrying out more detailed utility investigation as part of the concept phase.

The desktop studies are relatively inexpensive but may reveal some important information for guiding the high-level options of the planning study. Examples of sources of readily available information are presented in Chapter 2 of this manual.

There are multiple types of projects that require different approaches to management of NTUI. Customising the design development process and workflow to suit the style of project is critical to ensure that all legislative, technical and project requirements are met. For instance, where the Options Analysis and Business Case stages are rolled together, all design checklist items should be reviewed and new lists relevant to the combined stage should be drafted.

Alterations to existing NTUI must comply (where possible) to the design criteria and intent of this manual. Any deviation from these requirements must be clearly documented.

The utility design team shall ensure that administrative data, and any early site investigations of existing NTUI conform to specified quality level documented in Transport and Main Roads standards and manuals.

6.2.1 Workflow and checklists

To assist the utility design team with gathering of information, mitigation strategies and design development related to NTUI, checklists and workflows have been developed for each project stage.

The utility design team is required to utilise these checklists and workflows as the framework to assist with considering NTUI in the Options Analysis stage. The utility design team is required to adapt these to fit the circumstances of the individual project and provide a short rationale to justify any adaptation. Changes to the checklist must be approved by the Transport and Main Roads Project Manager or delegate. A copy of the workflow and checklist templates are included in C7521 *Addendum to Public Utility Plant (PUP) Options Analysis*. A list of the minimum outputs and required tasks is provided below:

- Requested Before You Dig Australia (BYDA), GIS, Decommissioned data, As Constructed and other NTUI records.
- As Constructed Survey information that includes underground assets can be requested from TMR_Spatial_Enquiry@tmr.qld.gov.au
- Established a list of NTUI provider contact details.
- Reviewed quality of base data (BYDA, As Constructed etc) in accordance with *TMR Surveying Standards*.
- Coordinated and conducted meetings with NTU providers to share information, scope requirements and timeframes.
- Liaised with maintenance contractor and/or local government to determine if past land use, past actions or natural features may affect design, construction or operations.
- Produced draft NTUI concept drawings, with conflict tags, showing existing active and redundant / decommissioned NTUI.
- Initial consultation with NTU providers completed.
- Developed the Conflicts Matrix.
- Developed the Risk Matrix.
- Reviewed and identified NTUI conflicts to remain (Preferred Option), to protect (Acceptable Option) or to relocate (Least Preferred Option).

- Reviewed if overhead powerlines and poles can be relocated underground to avoid poles within the area of interest, subject to Site specific risk assessment (e.g. if assessed as in the clear zone).
- Developed Early Works recommendations.
- Reviewed if land resumption will be required to enable the NTUI relocations.
- Identified Site conditions required to achieve NTUI alterations including but not limited to, suitable alignments, clearing, environmental and cultural heritage impacts, unsuitable materials (i.e. rock, slopes, batters, water causes, acid sulphate soils and so on).
- Assessed NTUI conflicts and potential relocations with other constraining factors, such as safe access to NTU assets for future maintenance and access for utilities etc.
- Discussed opportunities to upgrade existing NTUI networks with NTU providers.
- Developed a budget estimate for each option.
- Produced final Options Analysis NTUI concept drawings showing existing and proposed NTUI.
- Completed NTUI Options Analysis report inclusive of final concept drawings for each option and any design exceptions.
- Provided a NTUI summary section in the Options Analysis report including estimated funding requirements for recommended options.

6.2.2 Consultation

Existing assets

Information to identify existing NTUI may need to be sourced from various agencies including BYDA, local government and water authorities, previous designs, As Constructed data, the department's GIS, District / Region Corridor Management team and As Constructed Survey information from TMR_Spatial_Enquiry@tmr.qld.gov.au. The utility design team shall be responsible for liaising with all relevant agencies and teams.

Land use

The utility design team shall liaise with Transport and Main Roads Project Manager, to source information from the current road maintenance contractor, local government and adjacent property owners to assist in determining any areas where past actions, land uses, natural features, etc. may affect the design, construction, and operation of the proposed works (e.g. previous land use [factory, abattoir, waste disposal, mining, fire stations including rural fire, railway] acid sulphate soils, sodic soils, bogs, springs, landslides, and the like).

Survey review

The utility design team shall review the project ground survey (if provided) and conduct gap analysis together with existing asset information gathered and develop a survey brief of the project area to close the gaps in information to a minimum of Quality Level C for underground assets and Quality Level B for critical assets (gas, large diameter pressure mains, 33 kv ≥ underground cables) conforming to *TMR Surveying Standards* and MRTS56 *Construction Surveying* Technical Specification. Refer to *Consultants for Engineering Projects*, C7521 to C7524 Addendums to Functional specifications templates for more details.

Consultation with service authorities

The utility design team shall liaise with the responsible NTU providers with regard to the potential impact to the existing NTUI, high risk assets, programmed works and discuss future network requirements to minimise damage to new road surface as a result of the options being analysed.

The utility design team shall use the letter templates in C7521 *Addendum to Public Utility Plant (PUP) Options Analysis* to communicate the information requests and potential conflicts created by the Transport and Main Roads project.

The list of service providers that require consultation will be listed in the *Consultants for Engineering Projects*, C7521 to C7524 Addendums to Functional specifications templates.

The utility design team shall establish a list of NTUI authority contact details and provide these in the NTUI report.

6.2.3 Decision making

The utility design team must consider network conflicts, technical, cost, constructability, future road planning, efficiency, safety, future planned upgrades, land availability and a range of other factors when considering the action to take to manage a NTUI impact on the Transport and Main Roads project, as these factors will influence the decision to design out conflicts with NTUI networks, protect in place or relocate NTUI. The rationale for the approach must be documented for each utility network to demonstrate sufficient research, information gathering, and evidence has informed the approach.

The utility design team is required to utilise the *Road Safety Policy* and *Safe Systems Approach* (both available on the department's website) to form the foundation of decision-making. Where practicable and economical, relocation or alterations to NTUI shall be avoided. However, where the design increases the risks associated with utility assets, especially above ground assets, relocation will be required to maintain or increase road safety.

NTUI investigation

The utility design team shall:

- Investigate treatment options meet the requirements of:
  - Chapter 3 of this manual
  - Chapter 5 of this manual
  - relevant departmental Transport Specifications and NTU providers design standard
  - available data, and
  - seek additional data where the data is insufficient to form an adequate decision

  to confirm an option for conflict resolution.
- Develop a conflict matrix and place it on the drawing set for completeness and presentation purposes.
- Assess early works recommendations and land resumption requirements and present the assessment in the appropriate documentation,

- Include a budget estimate for each mitigation option. The estimate shall be indicative and based on the estimates provided by each NTU provider or sourced from recent projects validated by the project estimator. Detailed quotes will be obtained from asset owners during subsequent stages of the project.

6.2.4 Deliverables

Drawings (digital)

The utility design team shall produce draft drawings identifying existing utility assets (active and redundant) for each option. These drawings shall superimpose all existing services information on to the NTUI base plans for consultation with all affected NTU providers (that is, PUP layout drawings with conflict tags, proposed service alignment corridors and conflict matrix table).

In finalising the design analysis, the utility design team shall review the information obtained via investigations and discussions with asset owners and update drawings for completeness. These drawings shall contain all existing services information superimposed on to the NTUI base plans and identify the potential conflict locations and possible solutions.

Report

The utility design team shall provide a final NTUI report inclusive of design drawings for each option. The report shall include all of the deliverables as required in Section 6.2.1 above, provide a recommended option for each NTU network and associated costs, benefits and likely impact on the project and additional requirement of the *Consultants for Engineering Projects*, C7521 to C7524 Addendums to Functional specifications templates.

Formal and email correspondence with NTU providers shall also be included in the report appendix as well as a completed design checklist.

6.3 Business case stage (Concept design phase)

The utility design team is to undertake NTUI investigations as part of the concept phase development where applicable. NTUI risks, if not properly articulated, can undermine the viability of any project by increasing risk of cost overruns and project delays.

A preliminary NTUI investigation of the project site should be carried out to locate and characterise the materials and conditions which may be encountered during the construction and operation of the project, their nature, variability, extent, and any special requirements to be observed.

The aim of the investigation is to:

- summarise finding of NTUI and conflicts from the previous stage and field inspection
- review information where existing utilities interface with the planning / proposed design
- undertake initial risk assessment and conflict review, and identify high-potential clashes
- provide recommendations for NTUI utility adjustment, modification of the project option and/or NTUI relocation – the order of precedence for dealing with service location is:
  - avoidance through design
  - adjust to suit design
  - protection measures, and
  - relocation works

- prepare a project plan for future design stages, including recommended approach for additional survey, site investigation and potholing, and
- undertake consultation and approvals required with the relevant NTU providers.

The project manager is to investigate utilities that could potentially cause complications due to their close proximity to the preferred project options. All services that lie within the extents of works should be considered a hazard and a detailed assessment of NTUI relocation / protection requirements must be undertaken by the business case stage, including identification of NTUI of adjoining corridors (local government, Queensland Rail) which could potentially be affected by this project.

6.3.1 Workflow and checklists

To assist the utility design team with gathering of information, mitigation strategies and design development related to NTUI, checklists and workflows have been developed for each project stage.

The utility design team is required to utilise these checklists and workflows as the framework to assist with NTUI in the Business Case stage. The utility design team is required to adapt these to fit the circumstances of the individual project and provide a short rationale to justify any adaptation. Changes to the checklist must be approved by the Transport and Main Roads Project Manager or delegate. A copy of the workflow and checklist templates are included in *C7522 Addendum to Public Utility Plant (PUP) Business Case*. If required, relevant outputs that were not completed in the Options Analysis stage, should be added to the Business Case outputs.

A list of the minimum outputs and required tasks is provided below:

- Obtained current information to identify existing and abandoned NTUI from owners of all assets located within the limits of works of the recommended option to the quality level nominated by the Project Manager.
- Requested and received in writing from NTU providers of any upcoming works or future planning in the works area.
- Ensured all NTU providers have been consulted; including, identifying all utility standards required for working near their assets, particularly specific requirements in relation to vibration exposure.
- Establish a list of NTU providers contact details.
- Reviewed the information provided by the NTUI owners and Site survey.
- Checked with Corridor Management team of any new utility installations or currently processed applications at the works area.
- Coordinated meetings with NTU providers to share information, scope, timeframe etc.
- Updated the drawings / models prepared during the Options Analysis.
- Updated the conflict matrix for the Approved Recommended Option.
- Discussed and agreed with NTU providers on standards to be adopted (e.g. cover and clearances, protection treatment and construction methods etc.).
- Prepared a Site validation / pothole plan for additional investigation to verify existing NTUI.
- If survey and potholing works have been undertaken, checked utility line types are updated to reflect the change in quality level and indicative information has been removed.

- Reviewed if the relocated NTUI can be on a standard alignment and space-proof the alignment.
- Reviewed and confirmed that sufficient land is available in the Approved Recommended Option project Site to cater for NTUI relocations.
- Considered other factors such as environment, width of border zone, drainage and approval timeframes.
- Identified risks associated with proposed NTUI works including vibration and updated risk matrix from Options Analysis stage.
- Requested from NTU providers for relocation cost estimates or in some instances engage the NTU providers to undertake an impact assessment to provide better idea of costs.
- Identified NTUI which require a long lead time to procure, approve and/or construct, and completed the 'Suitability of Early Works for NTUI' checklist.
- Summarised NTUI findings, decisions and agreements in the Business Case report.

6.3.2 Consultation

Existing assets

Information to identify existing NTUI may need to be sourced from various agencies including BYDA, local government and other authorities, previous designs, As Constructed data, the department's Geospatial Information System (GIS), District / Region Corridor Management team and As Constructed Survey information from TMR_Spatial_Enquiry@tmr.qld.gov.au. The utility design team shall be responsible for liaising with all relevant agencies.

Survey review

The utility design team shall review the project survey data and a site validation plan and matrix where potholing and/or cable location works are to be undertaken to close the gaps in information to a minimum of Quality Level B for underground assets and Quality Level A for critical assets (gas, large diameter pressure mains, 33 kv ≥ underground cables) conforming to *TMR Surveying Standards* and MRTS56 *Construction Surveying* Technical Specification. Refer to *Consultants for Engineering Projects*, C7521 to C7524 Addendums to Functional specifications templates for more details.

Consultation with service authorities

The utility design team shall liaise with the responsible NTU providers with regard to the potential impact to the existing assets, high risk assets, programmed works and discuss future network requirements to minimise damage to new road surface as a result of the options being analysed.

Relocation / protect in place designs are negotiated based on the need of the NTU providers and the road authority. The utility design team should negotiate with the NTU providers to review the design drawings and obtain asset owners' endorsement or 'In Principle Agreement' at each project stage.

Betterment is when the NTU provider wants to upgrade or better their network while Transport and Main Road's project is affecting the NTUI. This can include larger assets, an increased number of assets, more complex assets and so on to be installed (refer to Section 1.12.2 for further guidance). The utility design team with support of the department shall arrange a betterment agreement to be reviewed by legal services and signed / executed by the appropriate NTU provider's delegate so that it is legally binding. Provision for future NTUI will be at the responsible authorities' cost. Any betterment must be paid by the NTU provider in full, and include materials, labour, and provision for potential delay costs due to the utility betterment if the works cause issues. A letter template to use with NTU providers to document expectations is available in C7522 *Addendum to Public Utility Plant (PUP) Business Case*.

The utility design team is to consult with relevant NTU providers with formal letters and copies of draft drawings. Where letters and liaison was conducted in the previous stage, the consultation for this stage is a progress status update and discussions of refinements and additional considerations not covered in previous correspondence.

The utility design team shall use the letter templates (as required) in C7522 *Addendum to Public Utility Plant (PUP) Business Case* to prepare communication of the potential conflicts and agree to design standards, specifications and endorsement that is to be sent by the Transport and Main Roads for the project.

The list of service providers that require consultation will be listed in the *Consultants for Engineering Projects*, C7521 to C7524 Addendums to Functional specifications templates.

The utility design team shall establish a list of NTU authority contact details and provide these in the NTUI report.

The utility design team shall coordinate and conduct all formal meetings with the respective NTU providers and local government regarding the appropriate treatment required over services identified as being in conflict with the roadworks. The utility design team shall ensure that a departmental representative must be present at all decision-making negotiations with NTU providers and local government.

6.3.3 Decision making

The utility design team must consider network conflicts, technical, cost, constructability (including exclusion zones, vibration limits and removal of redundant services), future road planning, efficiency, safety, future planned upgrades, land availability and a range of other factors when considering the action to take to manage a NTUI impact on the Transport and Main Roads project, as these factors will influence the decision to design out conflicts with NTU networks, protect in place or relocate NTUI. The rationale for the approach must be documented for each NTU network to demonstrate sufficient research, information gathering, and evidence has informed the approach.

The utility design team is required to utilise the *Road Safety Policy* and *Safe Systems Approach* to form the foundation of decision-making. Where practicable and economical, relocation or alterations to NTUI shall be avoided. However, where the design increases the risks associated with NTUI, relocation will be required to maintain or increase road safety and maintenance activities.

NTUI investigation

The utility design team shall:

- Investigate treatment options meet the requirements of Chapter 3 and Chapter 5 of this manual, relevant departmental Technical Specifications and NTU provider design standards, based on available data to confirm treatments for conflict resolution.

Each NTU provider may have specific vibration limits and permits / processes for working above or near its assets. The utility design team through liaison with each NTU providers shall confirm these limitations / restrictions in order to confirm the business case NTUI treatment strategy.

Construction vibration impacts may restrict piling method/roller selection (i.e. static rolling) or preferred NTUI treatments due to the proximity of construction activities near critical NTUI (gas, aged water/sewer mains). Whilst a detailed assessment of vibration (using computer modelling) is not required in the business case, a screening assessment shall be conducted to determine risk. The findings of the screening assessment shall be considered at a high level in the costings for business case (e.g. limitation of piling methods and/or additional time required for compaction, further mitigation strategies).

The utility design team shall update the drawings and Conflict Matrix prepared during the Options Analysis stage to verify all NTUI impacted by the Approved Recommended Option. These drawings shall contain all existing services information superimposed onto the NTUI base plans to determine possible conflict locations that require Site validation (further field investigation).

If there were no available drawings and/or Conflict Matrix prepared during the Options Analysis stage, then these must be prepared in accordance with the requirements specified in the Options Analysis section of this manual.

Where a designer's high level vibration assessment and asset exclusion zones are not detailed in the NTUI report, the conflict matrix table shall show utility specific vibration limits, exclusion zones and asset cover to design / existing subgrade items in order to assess risks and determine if site specific monitoring is required to supplement the vibration assessment during the preliminary design phase.

If the Approved Recommended Option for managing utility conflicts needs to be changed, rather than refined, discussion with Contract Manager regarding the potential impact on estimated costs must be undertaken.

The conflict matrix shall be developed and placed on the drawing set for completeness and presentation purposes.

The utility design team shall establish a potential timeline for the treatment required to manage conflicts with NTUI, including contingency for likely, high impact risks. In consulting with the various NTU providers, the utility design team shall enquire and confirm where possible, any scheduling or procurement constraints on the proposed solution for each NTU provider (for example, lead time for procuring a designer, sourcing materials, service moratoriums over holiday periods.

Early works recommendations and land resumption requirements shall also be assessed and presented in the appropriate documentation.

The utility design team is required to confirm that sufficient land is available in the Approved Recommended Option project Site to cater for NTUI relocations.

Note that land can only be resumed for these as part of the original road upgrade request. If NTUI is inadequately scoped at this stage, further resumptions are not permitted solely to accommodate NTUI in the future, so attention to this is critical.

The utility design team shall confirm site conditions for the proposed alignments are suitable to achieve NTUI alterations including but not limited to, clearing, environmental and cultural heritage impacts, unsuitable materials (i.e. rock, slopes, batters, water causes, acid sulphate soils etc.) and maintenance provisions.

Space-proofed service corridors with vertical / horizontal asset alignments are to be delivered to the NTU provider as part of non-contestable works. Due to long lead times in design and procurement of communications, electrical and gas utilities, this information will allow NTU providers to begin preliminary assessments (impact statements) to develop a cost estimate / quotes for the next design phase.

Recommendations for NTUI that can be relocated prior to main construction contract should be confirmed, based on the early Works checklist and updated Risk Matrix.

The utility design team shall prepare an estimate of indicative costs for the identified protection and relocation works, whether that be provided by each NTU provider or sourced from recent projects validated by the project estimator.

The utility design team is required to be clear when communicating with NTU providers that the department is only in the Concept Stage and that no design or works are being required as part of the process and additionally that any estimates or quotes requested are to be indicative only not detailed.

In finalising the design analysis the utility design team shall review the information obtained via investigations and discussions with NTU providers and update drawings for completeness. These drawings shall contain all existing services information superimposed on to the NTUI base plans and identify the potential conflict locations, possible solutions.

6.3.4 Business case deliverables

Drawings (digital)

The utility design team as a minimum shall prepare drawings clearly identifying:

1. All existing NTUI that will not be impacted.
2. All existing NTUI that will potentially remain in its existing location but that may require protection.
3. All existing NTUI that will potentially require replacement, switch over and decommission/removal (known as relocation), and
4. Different line styles shall be used in the above drawings to identify, unimpacted assets, assets requiring protection and assets being relocated. Proposed protection treatments, relocations and alignments must have in principle agreement from the relevant authority (NTU providers and/or road authority).

Clash detection model

As part of the design development and space-proofing of the service corridor, 3D model (12DA or IFC) of all utilities and underground services for the purpose of clash detection and coordination shall be developed. The model shall include all existing and proposed utilities and underground services including electrical and ITS&E, power poles, light poles and traffic poles (as applicable), Stormwater (SW) drainage network, culverts, surface levels and subgrade levels.

Note: This is where As Constructed Survey information (requests made to TMR_Spatial_Enquiry@tmr.qld.gov.au) can be hugely beneficial.

Report

The utility design team shall provide a final NTUI report inclusive of design drawings. The report shall include all of the deliverables as required in Section 6.3.1 above, provide a recommended option for each NTU network and associated costs, benefits and likely impact on the project and additional requirement of the *Consultants for Engineering Projects*, C7521 to C7524 Addendums to Functional specifications templates.

Formal and email correspondence with NTU providers shall also be included in the report appendix as well as a completed design checklist.

6.4 Development phase (preliminary and detailed designs)

At this stage of the development phase, on the proviso that previous stages were conducted adequately, utility alignments and treatments are expected to be agreed and confirmed with minimal optimisation required to produce adequate details for construction or facilitate non-contestable designs to commence in the background while contestable designs can be progressed.

There are situations where the road design or project scope, through a value engineering exercise or budget modifications may develop additional conflicts or require an update to the mitigation strategy.

In most cases the road design changes are not expected to impact the whole project conflict mitigation strategy, only affect localised areas, therefore limiting the amount of rework or consultation needed to advance the utility design further minimising potential project delays.

Exceptions to this may be when significant scope change happens between the business case and preliminary design, or, during design and construct contracts where design optimisation for cost savings or value for money is a main driver.

Where this is likely to occur, the project design team together with the utility design team are required to assess the risk accordingly and provide a management strategy to offset potential time delays and cost implications to the project.

There are multiple types of projects that require different approaches to management of NTUI. Customising the design development process and workflow to suit the style of project is critical to ensure that all legislative, technical and project requirements are met. For instance, where the design stages are rolled together, all design checklist items should be reviewed and new lists relevant to the combined stage should be drafted.

Alterations to existing NTUI must comply (where possible) to the design criteria and intent of this manual. Any deviation from these requirements must be clearly documented.

The utility design team shall ensure that administrative data, and any early site investigations of existing NTUI conform to specified quality level documented in Transport and Main Road's standards and manuals.

6.4.1 Workflow and checklists

To assist the utility design team with gathering of information, mitigation strategies and design development related to NTUI, checklists and workflows have been developed for each project stage.

The utility design team is required to utilise the department's checklist and workflow as the framework to assist with considering NTUI in the Detailed Design stage. The utility design team is required to adapt these documents to fit the circumstances of the individual project and provide a short rationale to justify any adaptation. Changes to the checklist must be approved by the department's Project Manager or delegate.

A copy of the workflow and checklist templates are included in C7523/C7524 *Addendum to Public Utility Plant (PUP) Design Requirements*.

A list of the minimum outputs and required tasks is provided below:

- Consulted with the department's ITS&E and Corridor Management teams for their input to the Preliminary Design stage.
- Coordinated meetings with NTU providers to share Early Design information, scope, requirements, timeframe, standards (particularly in relation to vibration exposure), review previous upgrade and/or betterment agreements.
- Requested condition survey or asset validation from NTU providers, if this was not completed in the Business Case stage (or is more than 12 months old). [Note, it is the obligation of the designer to validate and ensure that data on asset condition and location is accurate.].
- Confirm and obtain agreement from the NTU providers and Project Manager on any design review process, for assets where the department or its Contractor will undertake relocation designs.
- Reviewed or generated Site validation / pothole plans and engaged subcontractors to undertake survey and potholing works in accordance with *TMR Surveying Standards* (if it was not already undertaken in the Business Case as Early Works).
- Undertook reviews of the data provided.
- Cross-referenced the survey data into the NTUI model and updated the NTUI to reflect the change in quality level and the indicative information (QL-D) is removed / trimmed.
- Confirmed all NTUI features / layers in the model have been turned on.
- Developed preliminary alignments (3d vertical and horizontal) of proposed NTUI relocations and confirmed if standard alignments to Transport and Main Roads satisfaction are achievable.
- Assessed and confirmed the line and level of existing NTUI to the extent necessary to enable potential conflicts (including any height clearances to wires) to be identified and discussed in detail with the responsible authorities.
- Provided updated NTUI drawings with alignments to NTU providers for review and agreement.

- Engaged NTU providers or design consultants (where the NTU providers do not want to undertake the design) to undertake preliminary and Detailed Design of NTUI relocations.
- Confirmed and obtained formal engagement offers and any initial upfront payments. Ensure these have sufficient detail about the scope of works, payment and variation so that there is confidence in what is being delivered by the NTU providers. If there are not agreed contract templates, the contracts should have legal review.
- Reviewed the terms of engagement, timeframe, costs, deliverables etc. and signed off by Transport and Main Roads.
- Once the preliminary NTUI relocation designs are developed, they must be cross referenced with all the designs into the NTUI model and a 'space-proofing' review (to ensure the design fits in all networks) undertaken.
- Checked all new NTUI designs were not in conflict with existing or new infrastructures.
- Met with NTU providers and agreed on all protection and relocation works (this can be in person or via video conference).
- Assessed and confirmed any impacts to the environments, cultural heritage, future maintenance and access for utilities and so on.
- Developed the NTUI BIM model for existing and proposed NTUI, inclusive of mains, conduits, pits, manholes and so on.
- Assessed and confirmed all new and existing NTUI for constructability and risk.
- Assess and confirmed NTUI construction staging and temporary works, if applicable.
- Discussed and agreed with utility authorities if Transport and Main Roads can undertake any civil works on behalf of the utility authority.
- Requested and received updated NTU estimates and bill of quantities.
- Assessed NTUI for Early Works and planned for Early Works where practical.
- Drafted a NTUI report documenting all the draft design plans, decisions, agreements and findings on NTUI.
- Consulted with the department's ITS&E and Corridor Management teams for their input to the Detailed Design stage.
- Coordinated meetings with NTU providers to share Detailed Design information, scope, requirements, timeframe etc.
- Assessed and confirmed if any additional survey and potholing works are required, especially at tie-in locations to existing NTUI.
- Assessed and confirmed proposed NTUI designs complies with this manual.
- Assessed and confirmed proposed NTUI trenchless design complies with the Transport and Main Roads technical specifications.
- Cross referenced all final NTUI designs into the NTUI model and undertook a final ‘space-proofing’ review.

- Assessed and confirmed proposed NTUI designs meets future maintenance and safe access to utilities.
- Assessed and confirmed minimum clearance to aboveground powerlines / cables are achieved with the new finished surface levels including exclusion zones for maintenance staff.
- Assessed and confirmed if any power pole relocations can be relocated outside of the area of interest, subject to Site specific risk assessment (e.g. clear zone). If not, are safety barriers warranted?
- Assessed and confirmed clearances to cut batter slopes, subgrade excavation level, invert of table drains etc.
- Assessed and confirmed clearances to existing and new structures, as well as new guardrail, fence line etc.
- Assessed and confirmed if any property connections are impacted and if so, specified the mitigation measures.
- Assessed and confirmed which existing NTUI are required to be grout filled and capped and/or removed.
- Finalised the certified RPEQ and endorsed NTUI relocation design drawings and obtained confirmation through the Project Manager or that all alignments are accepted by the utilities and department.
- Finalised the NTUI BIM model.
- Finalised constructability and risk reviews for electrical NTUI.
- Finalised constructability and risk reviews for water / sewer NTUI.
- Finalised constructability and risk reviews for telecommunication NTUI.
- Finalised constructability and risk reviews for gas NTUI.
- Finalised estimate in 3PCM and bill of quantities.
- Finalised contractual arrangements with NTU providers including utilities' payment of NTUI upgrades / betterment, and identification of their management strategy regarding disruption of essential services (such as medical, emergency services, police, defence forces).
- Finalised NTUI Supplementary Specifications.
- Finalised Early Works package and early procurement, if applicable.
- Finalised the Detailed Design NTUI Report (including DE report as applicable).

6.4.2 Consultation

Existing assets

Information to identify existing PUP may need to be sourced from various agencies including BYDA, local government and other authorities, previous designs, As Constructed data, the department’s Geospatial Information System (GIS), District / Region Corridor Management team and As Constructed Survey information from TMR_Spatial_Enquiry@tmr.qld.gov.au. The utility design team shall be responsible for liaising with all relevant agencies.

Survey review

The utility design team shall review the project survey data and a site validation plan and matrix where potholing and/or cable location works are to be undertaken to close the gaps in information to a minimum of Quality Level B for underground assets and Quality Level A for all assets and proposed tie-in / connection points conforming to *TMR Surveying Standards* and MRTS56 *Construction Surveying* Technical Specification. Refer to *Consultants for Engineering Projects*, C7521 to C7524 Addendums to Functional specifications templates for more details.

Consultation with service authorities

The utility design team is to consult with relevant NTU providers with copies of preliminary drawings for each treatment option. The utility design team shall coordinate and conduct all formal meetings with the respective NTU providers and local government regarding the appropriate treatment required over services identified as being in conflict with the roadworks. The utility design team shall ensure that a departmental representative must be present at all decision-making negotiations with NTU providers and local government.

If proposed treatments or service corridor alignments have been revised since the business case or there has been more than 12 months since the Concept (business case) delivery phase and the NTU provider has closed the works request of project in their system, the utility design team may need to use the letter templates in *Consultants for Engineering Projects*, C7521 to C7524 Addendums to Functional specifications templates to prepare communication of the revised conflicts and confirm / agree to design standards, design review process, specifications, cost sharing arrangements and design endorsement that is to be sent by Transport and Main Roads for the project.

Where betterment discussions were not conducted in the Business Case, the utility design team may consider sending this letter early in the preliminary design phase or combine relevant parts to the network conflict letter template.

The list of service providers that require consultation will be listed in the *Consultants for Engineering Projects*, C7521 to C7524 Addendums to Functional specifications templates.

The utility design team shall update and confirm NTU provider contact list and develop, through liaison, contacts for the construction phase.

Relocation / protect in place designs are negotiated based on the need of the NTU provider and the road authority. Designs do not have to be completely agreeable to the NTU providers for it to be an acceptable solution; however, the utility design team should negotiate with the utilities to review the design drawings and obtain NTU providers endorsement or 'In Principle Agreement' at each project stage in writing.

Due to resource shortage for non-contestable designs and the time it takes for NTU providers to develop a quote and conduct the design works, finalising the space-proofed service corridor early in the design phase is imperative. The NTU providers designs still require to be incorporated into the overall clash model to confirm no conflicts with other services prior to finalising the non-contestable works packages. Works that potentially may be conducted by the principal contractor to expediate construction, such as clearing and grubbing, trench excavation, survey set out and trenchless installations must also be agreed and confirmed. At the time of writing this manual, design lead times for NTU providers to generate a quote and conduct the IFC designs are as follows:

- Electrical (distribution) - 5 to 9 months.

- Communications – 3 to 6 months.
- Gas – 6 to 9 months.

Timings are dependent on resource availability, project complexity, volume and length of relocations, however, timings need to be considered and checked with all relevant NTU providers when developing the design project timelines.

The utility design team together with the project design teams shall assess the risk of road design development to determine the likely changes or impacts that may occur between the preliminary and detailed design phases, in conjunction with Transport and Main Roads, in order to decide when to engage the non-contestable NTU providers to commence designs. For departmental projects this is generally subject to the type of contract (TIC-CO, TIC-DC) and timings between the Preliminary Design and the Detailed Design stages.

Where utility design works are not on the critical path, engagement for non-contestable works is likely to commence either at the end of the Preliminary design stage (where all design disciplines are complete and scope change is highly unlikely) or at the early parts of the detailed design stage (at design freeze, but prior to DRAFT submissions).

Development of contestable works packages generally occur at the same time as other disciplines (ideally earlier) where the packages are first approved by Transport and Main Roads prior to submission to the relevant NTU providers. Several iterations may be required between the utility design team and the NTU provider's reviewers until endorsement / ‘in principle agreements' are obtained from the NTU. This review time and interface should be factored into any project design timelines.

6.4.3 Decision making

When considering the action to take to manage network conflicts, technical, cost, constructability, efficiency, safety, land availability and a range of other factors will impact on the decision to design out conflicts, protect in place or relocate NTUI. The rationale for the approach must be documented for each utility network to demonstrate sufficient research, information gathering and evidence has informed the approach. Some of this work may have already been undertaken in the Business Case stage.

NTUI investigation and preliminary design

The utility design team shall investigate treatment options meet the requirements of Chapter 3 and Chapter 5 of this manual, relevant departmental Technical Specifications and utility provider design standards, based on available data to confirm treatments for conflict resolution.

The utility design team shall confirm site conditions for the proposed alignments are suitable to achieve NTUI alterations including but not limited to, clearing, environmental and cultural heritage impacts and maintenance provisions.

Ground conditions needs to be considered with potential for scoping additional ground investigation works to determine if ground improvement treatments are required under the proposed relocation service alignment (example high settlement areas).

Each NTU providers may have specific vibration limits and permits / processes for working above or near its assets. The utility design team through liaison with each NTU provider shall confirm these limitations / restrictions in order to confirm the business case NTUI treatment strategy. Refer to project functional specification for more details.

The utility design team shall update the drawings and Conflict Matrix prepared during the Business Case stage to verify all NTU assets impacted by the preliminary design. These drawings shall contain all existing services information superimposed onto the NTUI base plans to determine possible conflict locations that may require Site validation (further field investigation).

The conflict matrix shall be placed on the drawing set for completeness and presentation purposes.

When requesting non-contestable works costs for relocation or protection of existing NTUI, the utility design team shall provide the NTU providers all the required data necessary to make an informed decision and shall include relevant specifications to meet the road construction requirements. These may include but is not limited to:

- Relevant Design documentation and electronic files
- Space-proof service corridor for the NTU provider's designer
- Design departures (relaxations)
- Conflicts with or positions of other services the NTU provider's designer may need to design out
- Australian, state and local government forms and specifications (underground services)
- lateral clearance (for poles)
- environmental requirements
- clearing requirements
- traffic control requirements
- backfill requirements, and
- list of works that could be conducted by principal contractor to expediate construction and maintain quality assurance and post construction data capture.

To finalise and specify NTUI relocation / protection contestable works, the utility design team shall liaise closely with the various responsible NTU providers to determine a cost-effective treatment acceptable to both the provider and the Principal, on such issues as:

- allowance for possible future NTUI
- relocation / protection works to be carried out by the NTU providers including specialised works and any civil works that the authority may wish to carry out
- relocation / protection works to be included in the relevant construction Contract (for example, TIC-CO) and confirmation of the standard that any such relocations / protection must adhere to
- access and alignment requirements
- management of the environment, and

- timing of both the specialised and civil works, with regard to the overall construction Contract, including necessary lead time for the purchase and supply of equipment.

While the majority of this work may be close to completion, confirming timelines, constraints and hold points for the utility works, including contingency for likely, high impact risks, is important to avoid considerable time and delay costs during construction.

The utility design team shall check all scheduling or procurement constraints on the proposed works for each NTUI owner (for example, lead time for procuring a designer, sourcing materials, service moratoriums over holiday periods).

The utility design team must be clear when communicating with NTU providers that the department is progressing the Detailed Design stage. After review of the proposed treatments and negotiations finalised, an 'in principle' agreement or no objection is required in order to progress the design.

The utility design team shall prepare an estimate of preliminary costs for the identified protection and relocation works, whether that be provided by each service provider or sourced from recent projects validated by the project estimator.

Early works recommendations shall also be assessed and presented in the appropriate documentation (Refer to early works checklist in *C7523/C7524 Addendum to Public Utility Plant (PUP) Design Requirements*).

In finalising the design analysis the utility design team shall review the information obtained via investigations and discussions with NTU providers and update drawings for completeness. These drawings shall contain all existing services information superimposed on to the NTUI base plans and identify the potential conflict locations, possible solutions.

The utility design team, as part of the constructability assessment shall also provide input into the construction staging plans or develop sketch plans showing full or partial removal of all redundant services. The purpose of this assessment is to document feasible solutions for removal of redundant assets as much as practicable during staged construction works so the principal contractor can assess, confirm feasibility and price accordingly.

A lack of information or consideration during design leads to solutions that do not have the best long-term outcomes for roads or utilities. Solutions born out of convenience (leave in place), when constructability assessments have not properly been undertaken, do not comply with departmental requirements for redundant services within the SCRC. As approval is required to grout fill and leave redundant services in place, including negotiations with NTU providers to take the risk of the abandoned or redundant service, this information is required prior to construction to minimise potential time delays and cost variations during construction.

NTUI detailed design

It is expected that the utility design team will have scoped and accommodated the majority of design considerations for NTUI in the NTUI Preliminary Design Package. Refinement of design should attempt to minimise changes unless absolutely necessary to minimise major re-work of the total project design.

To finalise and specify NTUI relocation / protection works, the utility design team shall liaise closely with the various responsible NTU providers to determine any final amendments or additions to the design and documentation. Note, this may require several submissions and revisions to achieve a mutually beneficial outcome for approval.

By this stage the NTU providers should have been engaged to conduct the non-contestable works design and be near complete in order to incorporate the utility design into the overall Project designs for space-proofing and service conflict checks.

Upon review and no further amendments, detailed quote for construction works should be received from the NTU providers.

The utility design team shall check all scheduling or procurement constraints on the proposed works for each NTUI (for example, lead time for procuring a designer, sourcing materials, service moratoriums over holiday periods).

The utility design team shall update all preliminary documentation for construction.

This documentation can be a composite of the various Authority Plans but shall include complete details of civil works to be carried out by the Contractor including; potholing; clearing, trenching, backfilling, protection works, installation of conduits, manholes, pits and so on in accordance with the Transport and Main Roads *Drafting and Design Presentation Standards Manual*.

These plans shall clearly identify the works to be carried out by others (under the control of the relevant service authorities).

6.4.4 Preliminary design deliverables

Drawings (digital)

The utility design team as a minimum shall prepare drawings clearly identifying:

1. All existing NTUI that will not be impacted.
2. All existing NTUI that will potentially remain in its existing location but that may require protection.
3. All existing NTUI that will require replacement, switch over and decommission/removal (known as relocation).
4. Different line styles shall be used in the above drawings to identify, unimpacted assets, assets requiring protection and assets being relocated. Proposed protection treatments, relocations and alignments must have in principle agreement from the relevant authority (NTU providers and/or road authority).
5. Conflict matrix.
6. Detailed construction notes, typical trench details, online and offline connection details (as applicable), item schedules (as applicable) bends and thrust block designs (as applicable). Long sections (with existing and proposed services that cross perpendicular), HDD alignments (as applicable), cross sections (as applicable) and fitting, chambers and valve details (as applicable).

Clash detection model

As part of the design development and space-proofing of the service corridor, 3D model (12DA or IFC) of all utilities and underground services for the purpose of clash detection and coordination shall be developed. The model shall include all existing and proposed utilities and underground services including electrical and ITS, power poles, light poles and traffic poles (as applicable), SW drainage network, culverts, surface levels and subgrade levels. This model with the preliminary documentation shall be submitted to a departmental Subject Matter Expert (SME) or representative for review.

Report and documentation

The utility design team shall provide a preliminary NTUI report inclusive of design drawings for each utility type. The report and documentation shall include all of the deliverables as required in Section 6.4.1 above, provide a recommended treatments for each NTUI network and associated costs, benefits and likely impact on the project and additional requirement of the *Consultants for Engineering Projects*, C7521 to C7524 Addendums to Functional specifications templates.

Formal and email correspondence with utility providers shall also be included in the report appendix as well as a completed design checklist.

Compiled specifications for all civil works included in the construction Contract (including backfill requirements, manhole requirements, enveloping pipe structural requirements and so on).

This may include annexure of supplementary specifications detailing the NTU providers permit and approval processes during construction, point of contact during construction, preferred sub-contractors list to conduct asset relocation works and any policy or process required by the construction principal contractor to facilitate approval of relocation works.

Itemised estimates shall include:

- the relocation and protection works shall be scheduled as Principal's Materials in the estimate for the road construction contract
- separate itemised estimates shall be provided for the NTUI relocation Works Contracts, and
- provision for future NTUI shall be at the cost of the responsible authority.

6.4.5 Detailed design deliverables

Drawings (digital)

The utility design team as a minimum shall prepare drawings clearly identifying:

1. All existing NTUI that will not be impacted.
2. All existing NTUI that will potentially remain in its existing location but that may require protection.
3. All existing NTUI that will require replacement, switch over and decommission / removal (known as relocation).
4. Conflict matrix.

5. Detailed construction notes, typical trench details, online and offline connection details (as applicable), item schedules (as applicable) bends and thrust block designs (as applicable). Long sections (with existing and proposed services that cross perpendicular), HDD alignments (as applicable), cross sections (as applicable) and fitting, chambers and valve details (as applicable)

Clash detection model

Final 3D model (12DA or IFC) of all utilities and underground services for the purpose of clash detection and coordination shall be developed. The model shall include all existing and proposed utilities and underground services including electrical and ITS, power poles, light poles and traffic poles (as applicable), SW drainage network, culverts, surface levels and subgrade levels. This model with the preliminary documentation shall be submitted to a departmental SME or representative for review. This information will be incorporated into the project BIM model, if required, as part of the main contract.

Report and documentation

The utility design team shall provide a detailed NTUI report inclusive of design drawings for each utility type. The report and documentation shall include all of the deliverables as required Section 6.4.1 above, provide final approved treatments for each public utility network and associated costs, benefits and likely impact on the project and additional requirement of the *Consultants for Engineering Projects*, C7521 to C7524 Addendums to Functional specifications templates.

Formal and email correspondence with utility providers shall also be included in the report appendix, including letters of no objection for contestable works, as well as a completed design checklist.

Compiled specifications for all civil works included in the construction Contract (including backfill requirements, manhole requirements, enveloping pipe structural requirements and so on.).

This may include annexure of supplementary specifications detailing the NTU providers permit and approval processes during construction, point of contact during construction, preferred sub-contractors list to conduct asset relocation works and any policy or process required by the construction principal contractor to facilitate approval of relocation works.

Itemised estimates shall include:

- The non-contestable relocation and protection works shall be scheduled as Principal's Item in the estimate for the road construction contract.
- Separate itemised estimates shall be provided for the NTUI relocation Works Contracts.
- Provision for future NTUI shall be at the cost of the responsible NTU provider.

6.5 Post construction actions

At completion of the relocation works, the Principal Contractor is to supply As Constructed Survey in accordance with the requirements of MRTS171 *Public Utilities in Road Projects Principal Contractor Responsibilities*, MRTS56 *Construction Surveying*, including exporting to NTU provider's format (e.g. Asset Design and As Constructed (ADAC)) and other relevant contract documents within two months of practical completion (UNO in contract).

The Utility Design team is to utilise this data to generate as constructed drawings / models for the contestable works for delivery to Transport and Main Roads for acceptance.

Departmental staff will send relevant survey, drawing files, electronic files and correspondence to each relevant NTU provider. Departmental staff are to refer to EP174 *Utility Infrastructure Relocation and Protection Management Policy and Procedure*, Table 8.1 (internal resource) for further guidance.

7 Non-consequential works – Third party driven

7.1 Introduction

The purpose of this chapter is to inform third parties wanting access to the SCRC of the technical requirements for approvals, design and installation of NTUI within the SCRC for non-consequential works.

The department manages the entirety of the SCRC on behalf of the State of Queensland. The departments' broader objective is to deliver an integrated, safe, efficient and reliable transport system that is accessible to all. One of the department's core values, to provide fair and equitable access to the SCRC whilst ensuring the safety of the travelling public and third party users, is at the forefront of all decisions.

SCRCs are becoming increasingly congested due to population growth, increase in demand by the general public for community and recreational activities, and demands from NTU providers to expand their service network. It is the responsibility of all parties to ensure the corridor is managed in an efficient manner and that the best outcome is delivered for all stakeholders.

7.2 Document application

The purpose of this chapter is to support the permitting application process for non-transport utility infrastructure providers / owners to access the SCRC and provide technical requirements governing the installation of its services.

This process applies to the installation of NTUI by NTU provider or its representative within the boundaries of a SCR corridor declared under the *Transport Infrastructure Act 1994* (Qld)[1].

All works must be conducted in accordance with the conditions identified in this manual and other relevant departmental standards, the approval conditions detailed in the permit, with the Objection to Notice, or part of a Deed or Agreement issued by the department, and the design requirements identified in Chapter 3, Chapter 5 and Chapter 7 of this manual.

7.3 Access to the State-Controlled Road Corridor

7.3.1 Approvals

Access to the SCRC is regulated by state and federal legislation. A number of mechanisms such as works agreements, contracts and permits (such as RCPs and/or TCPs) are used to condition the terms under which access is managed for third parties. Proposed NTUI works and design plans (refer Section 7.7.2) are to be submitted for a written agreement by the department in accordance with the regulated timeframes. Important to note, third parties conducting works (that are not a PUP) are required to apply for an RCP or execute an agreement with the department to access the corridor. The NTU also needs to apply for PUP approval (or for low-impact telecommunications assets undertake the process under Schedule 3 of *Telecommunications Act 1997* (Cth)) prior to third parties gaining access to the corridor. Refer to Section 7.7 for more details.

[1] Specifically, ss77-83 of the Act and Part 4 of the *Transport Infrastructure (State-Controlled Roads) Regulation 2006*

7.3.2 Protecting departmental assets

It is the responsibility of all parties to ensure the department's existing infrastructure and assets, either temporary or permanent, surface or sub-surface, are not compromised whilst working in the corridor. The department does not allow third parties to interfere with or disturb departmental assets without prior approval.

Depending on the works being undertaken, the department reserves the right to engage its construction and maintenance teams to carry out certain activities. Examples of this are reinstatement of road pavements, disturbing or attaching infrastructure to departmental structures or bridges or disturbing departmental ITS&E assets. These activities may incur a fee for service cost.

Information relating to the department's existing road transport infrastructure assets can be obtained by contacting the department to obtain plans to identify departmental assets prior to commencing any ground disturbance activities.

7.4 Preparing the worksite

7.4.1 Clearing

The third party conducting the works must ensure compliance with relevant legislative obligations during clearing (e.g. cultural heritage and environmental obligations). Any proposed clearing or trimming of trees or shrubs is to be indicated specifically or by way of a general note on the plans submitted to the department for approval.

Clearing must be kept to an absolute minimum required for the works and any landscaped areas, revegetated areas, and/or fauna management areas impacted by clearing works must be reinstated on a like-for-like basis or as otherwise advised in the access authorising document.

Cleared vegetation, which is weed free, shall be milled or chipped and returned to site. Alternatively, cleared vegetation shall be removed from site and disposed of legally. Any disturbed ground surfaces must be reinstated with turf, seed or mulch as directed by the department.

7.4.2 Identifying Non-Transport Utility Infrastructure

It is the responsibility of all parties to ensure existing above and below ground infrastructure is not compromised whilst working in the corridor, including the department's assets.

Note, not all underground asset owners (including the department) are members of Before You Dig Australia (BYDA). It is the responsibility of the NTU to contact all Plant or NTUI owners, and the local departmental Project Manager to obtain the relevant plans.

Location of third party or departmental underground assets within the road pavement must be undertaken using non-invasive methods, such as GPR and EMI in vicinity of the works.

Transport and Main Roads will not approve any disturbance to the road pavement for the purposes of exposing existing subsurface infrastructure. Exemptions may be approved by the District Director / Regional Deputy Director after the NTU provides satisfactory evidence that subsurface infrastructure cannot be identified using non-invasive methods, is a safety risk, and warrants the integrity of the disturbed area including associated costs for a period of not less than two years in writing.

7.4.3 Notifying the public

The third party managing the works must provide adequate notice to the public regarding its proposed works. In general:

a) the third party must arrange suitable public communications and media notices to ensure that affected motorists and the local community are advised of any disruptions the project may cause

b) notices must be provided to affected residents and local businesses located adjacent to the proposed works, and

c) the third party (or its nominated contractor) must install signage identifying the works being undertaken and contact numbers for community enquiries.

On request, details pertaining to the content of any advertising, relating to public notices, must be provided to Transport and Main Roads at no cost.

7.4.4 Working hours

The third party must comply with any Working Hours restrictions, including traffic control and lane closure requirements imposed by the department. Details of any requirements which apply will be provided with the departmental permit or Traffic Control Permit. Extended Working Hours must be negotiated as part of the permit application; refer *Queensland Manual for Uniform Traffic Control Devices* (Queensland MUTCD), *Queensland Guide to Temporary Traffic Management* (QGTTM) and local government restrictions for further details:

a) It should be noted that additional time periods and information may be required by the department's Traffic Engineering team or District Director / Deputy Regional Director for applications applying for extended Working Hours, and

b) Every attempt should be made to maintain capacity on roads which normally run close to its capacity particularly during peak hours in built-up areas. In addition to maintaining the required number of lanes in accordance with MRTS02 *Provision for Traffic*, note should be taken of the effect on capacity of traffic lanes less than 3 metres in width and unsealed or rough surfaces. Either condition could lead to lane capacity being reduced.

Works may need to be scheduled so that peak hour capacities are maintained.

7.4.5 Traffic safety and control

The work involved in installing NTUI shall proceed with minimum interruption to the travelling public, including vehicles, cyclists and pedestrians. All steps necessary shall be taken for the protection of the public during construction. Road traffic shall not be diverted to side tracks or detours without the written agreement of the department and the agreement of the police and local government, as may be necessary.

All works that will impede the flow of vehicles, cyclists and pedestrians on a State-Controlled Road, including but not limited to reductions in speed, lane closures, footpath closures, and so on, will require a Traffic Control Permit. Traffic Control Permits will only be issued to departmental Registered Traffic Control Companies. For guidance on preparation and requirements of traffic control, refer to the *Queensland Manual of Uniform Traffic Control Devices* (Queensland MUTCD).

For more information refer to the following link:

http://www.tmr.qld.gov.au/business-industry/technical-standards-publications/traffic-control-permit.aspx

7.4.6 Environment and Cultural Heritage controls

General requirements

Prior to the commencement of works, the third party is responsible for:

a) ensuring that all cultural heritage, native title and environmental risks are identified, and

b) ensuring the proposed works are carried out and managed in accordance with all relevant legislation relating to environmental, cultural heritage and native title.

The third party will abide by all legal requirements and will exercise relevant duty of care to ensure that there is minimal impact on areas of conservation value, or cultural heritage significance.

Specific conditions

Where a development or activity is likely to deleteriously impact on state infrastructure or State-owned property or process, the department will condition proposed works to minimise any negative impacts. Examples of this in relation to environmental values includes:

a) Preservation or if necessary, restoration of nature conservation values or departmental significant environmental areas.

b) Landscaping / revegetation (requirements for the return of the works areas to pre-existing condition. This also would apply where the department or a departmental approved community group has completed previous landscaping / revegetation work in the project area).

c) Pest management.

d) Areas of cultural heritage significance.

e) Where works would degrade the site conditions, and

f) The third party must remove any litter generated as part of the works.

Notification requirements

The department requires that the third party conducting the works to advise the department (as the land manager) of notification of any environmental or cultural heritage incidents to any regulatory authorities or Aboriginal Parties completed under any other legislation (for example *Environmental Protection Act 1994* (Qld), duty to notify requirements) as a result of the project. This is to be completed within 24 hours in writing.

The department requires the third party to notify of any meetings with, inspections, audits, or visits from representatives of other state or federal government departments (for example, the Department of Environment and the Great Barrier Reef, Science and Multicultural Affairs, Department of Resources, and Department of Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts).

Should any unexpected sites or artefacts of potential cultural heritage significance be located during the course of ground disturbance works, the third party or its contractor must:

a) cease the activities immediately in the vicinity of the find

b) leave any found items undisturbed and erect a temporary barrier with suitable buffer to deter access, and

c) notify the department's Cultural Heritage Officer on (07) 3066 4264 or TMR.Heritage@tmr.qld.gov.au to arrange management strategies.

Other requirements

The department makes no warrant as to the existence or non-existence of native title rights and interests over any of the land or waters within the boundaries of the SCRC, proposed to be used for the installation and/or maintenance of utility services. The third party is responsible for ensuring compliance with the *Native Title Act 1993* (Cth) when constructing or maintaining utility infrastructure under relevant legislation.[2]

7.4.7 Drainage

The third party must not carry out any work which has the potential to detrimentally effect the flow of water on or around a road or carry out any work which will interfere with existing drainage systems, (for example, underground stormwater systems, culverts, table drains and so on), or waterways without prior approval from departmental or local government authorities where required.

All works are to be adequately drained during construction so as not to cause damage to existing road facilities or create road safety hazards to travelling motorists or pedestrians.

Any work that proposes alteration to existing drainage arrangements must be specifically detailed on the plans submitted to the department for approval prior to commencement of works. Complex drainage treatments need to be designed by an appropriately qualified designer and certified by an RPEQ prior to submission. Such works will be treated on a case-by-case basis and may require additional approval from the department's Director of Hydraulics and Flooding.

[2] Federal legislation regarding cultural heritage, native title and environmental protection apply. The applicant is required to comply with all legal requirements. A list of some legislation that may apply includes:

- The *Environment Protection and Biodiversity Conservation Act 1999* protects World Heritage properties and defines Commonwealth and National heritage-listed places as matters of national environmental significance.
- The Commonwealth and National Heritage Lists which commenced on the 1 January 2004.
- The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* protects traditional areas and objects from threats in exceptional circumstances.
- *Protection of Moveable Cultural Heritage Act 1986* restricts the export of traditionally important Cultural Heritage objects.
- The Australian International Council on Monuments and Sites (ICOMOS) Burra Charter 1999 which is used as a guideline for making decisions under the *Queensland Heritage Act 1992* and provides a consistent approach to significance assessment, development proposals and Queensland registered place management. The philosophy behind, and the operation of the *Queensland Heritage Act 1992* reflects the principles, processes and practices set out in the charter.

It should be noted that additional time periods may be required for the review of applications that impact on existing drainage systems.

7.5 Working in the State Controlled Road Corridor

7.5.1 Hazard assessments for above ground utility assets

All above ground fixed object installations erected in the SCRC by the third party must be assessed as potential hazards by the asset owner in accordance with the agreed process as defined within documentation agreed directly with Transport and Main Roads, or in its absence, as outlined in the *Road Planning and Design Manual* 2nd Edition (RPDM) Volume 3, Part 6: Roadside Design, Safety and Barriers which can be found at the following internet address:

http://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Road-planning-and-design-manual-2nd-edition.aspx

Assessment reports certified by an RPEQ shall be provided to the department to demonstrate compliance with this requirement.

Installations within the high hazard areas near road carriageways will be subject to special conditions which the third party must comply with to ensure the safety of the travelling public.

Clearance assessments and sightlines shall also be conducted including for pedestrians, driveways and cycle envelopes, and provided in the assessment report.

7.5.2 Design criteria

While it is acknowledged the third parties adheres to relevant standards, guidelines and codes of practice when designing and operating NTUI, the third parties must also comply with criteria mentioned Chapter 3, Chapter 5 and Chapter 7 of this manual.

Where third parties' authority's design falls outside the supplementary requirements of Transport and Main Roads, a design exception report will be required. Refer to Section 5.8 of this manual for further guidance. The third parties must also account for risk and hazard assessments for road asset maintenance activities in its design. A statement on the third parties' submission specifying how the design caters for road asset maintenance, heavy routes, subgrade treatments is required.

7.5.3 Trenchless installation

Construction of services by means of trenchless installation shall comply with departmental Technical Specifications, including but not limited to:

- MRTS140 *Horizontal Directional Drilling (HDD)*
- MRTS141 *Microtunnelling and Pipe Jacking*, and
- MRTS142 *Thrust Boring and Auger Boring*.

Enveloping pipes shall be used for all services, such as high-pressure gas, combustible fluids, water mains, rising sewer mains, gravity sewers and any other like service in accordance with relevant industry standards and this manual.

The requirements in this manual for enveloping pipes shall take precedence over the NTUI owner's requirements and industry standards for installations in the SCRC.

Enveloping pipes are to extend beyond elements of the road formation as follows for a minimum of:

- To the SCRC Boundary/ies (preferred) or 3.0 m beyond the batter (constrained), or
- 1.0 m beyond the table drain or back of kerb alignment.

This minimum requirement may be extended by the department to accommodate future road enhancement works where known, or local conditions.

Minimum horizontal and vertical clearances to other utility services must also be maintained as specified by Australian Standards, Service Authority Standards and legislation.

The third party is to provide details of which installation method will be conducted for its respective service.

All setting out, Conformance and As Constructed Survey requirements are to be adhered to as per MRTS56 *Construction Surveying*.

7.5.4 Trench installation

Where boring, jacking or micro tunnelling has been shown to be technically impractical, (such as constrained road corridor) approval may be given for NTUI to be installed under a road via trenching methods. Such approval will be at the discretion of the District Director / Regional Deputy Director and any conditions pertaining to an approved trenching installation will be provided in the written authorisation to the third party.

Trenching is generally considered as the installation method that will be employed for installations within areas of the road corridor that are not developed for traffic or are not currently under traffic. Any damage caused to existing infrastructure, as a result of trenching works, must be repaired by the utility third party whose works have caused the damage, at no cost to the department. Such repairs must address relevant Australian Standards, industry practices and any relevant departmental asset owner or organisational specifications. Any repair work must be completed in a time frame agreed with the owner of the damaged service and/or infrastructure. For clarity the reinstatement of subsoil drainage is included in the above requirements.

Should the installation crossing under a road via trenching be approved, the pavement reinstatement must comply with Figure 7.5.4. Details of typical trench under existing road. Unless otherwise agreed, the actual reinstatement must also be witnessed and certified by a RPEQ engineer for compliance with the details provided in Figure 7.5.4. Such certification shall be provided to the department on completion of works, at no cost to the department.

While minimum depths of cover have been identified in Chapter 5 of this manual, it is the parties' obligation to ensure that load bearing requirements are addressed for any road crossing. RPEQ endorsed drawings must therefore be provided, at no cost to the department, confirming that all drainage, border zone reinstatement works, load bearing requirements and relevant departmental Technical Specifications have been addressed. It should be noted that additional time periods and information may be required for the review of applications identifying the installation of a service through a road via trenching.

The depth of cover in Chapter 5 of this manual is the minimum cover for various situations.

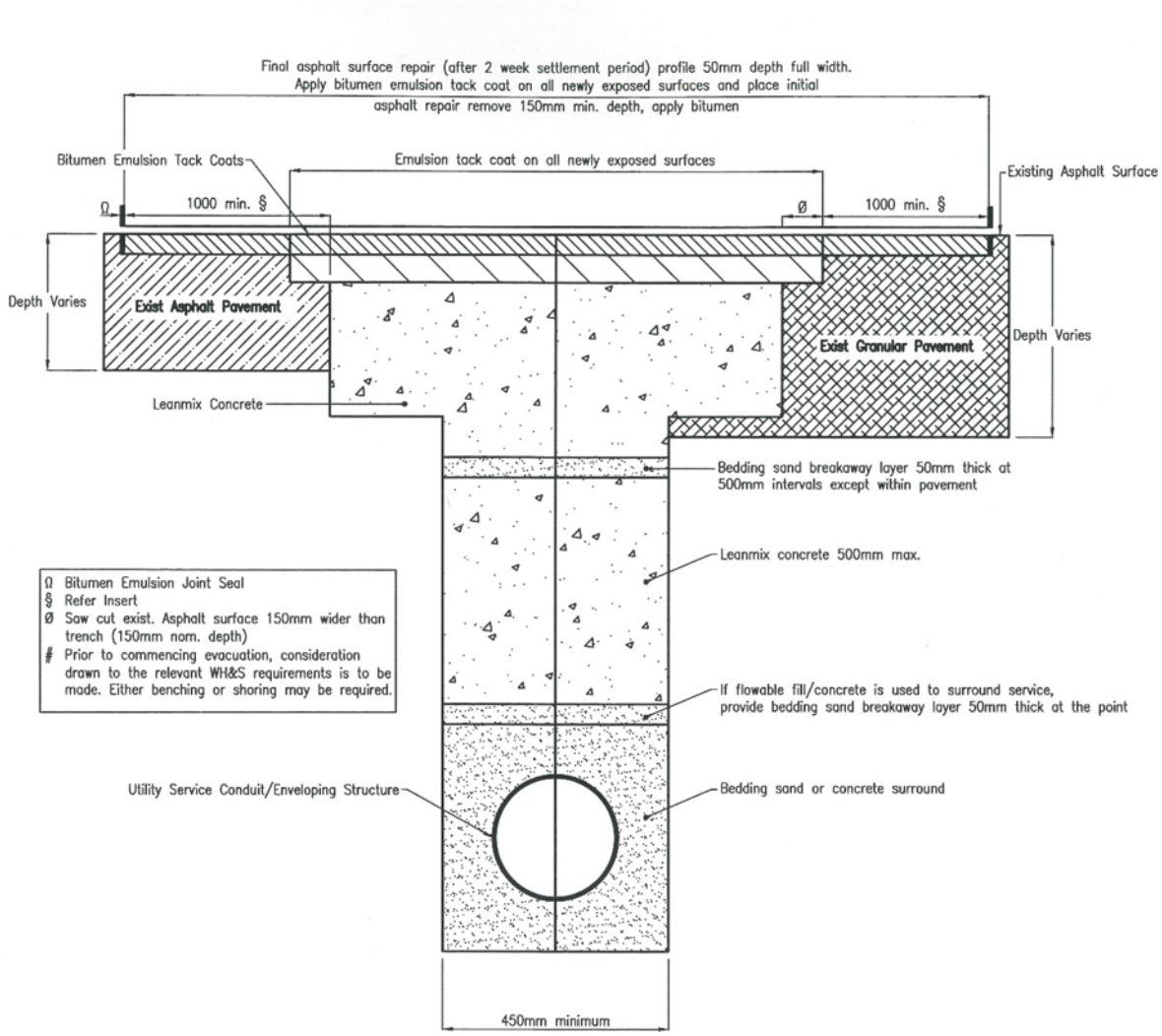
Any depth that does not achieve minimum requirement of the road authority must seek approval prior to installation. Installing conduits at a depth and alignment that is convenient to the contractor but prohibits the purpose of the corridor usage i.e. relocations cost the tax payers excessive amounts during road upgrades and carriers should contribute to these costs in future under conditions of entry. Transport and Main Roads shall seek redress if carrier assets are found non-compliant with the standard minimum depths or approved alignments.

Trenches must not be left open overnight. Trenches are to be back filled, covered with a steel plate lid or be protected by a barrier perimeter approved by the department. Details of the proposed barrier systems must be provided with the application and approval will be confirmed by the department in the written access authorisation document.

Conduits must be bedded in accordance with the relevant Australian Standard or Service Authority Standard and maintain minimum horizontal and vertical clearances to other utility services as specified by Australian Standards, Service Authority Standards, legislation or as detailed in the conditions contained within the department’s written access authorisation document.

All setting out, Conformance and As Constructed survey as per MRTS56 *Construction Surveying* is to be adhered to. No backfilling of trenches is to occur until all surveying requirements have been met in accordance with Clause 7.5.11 of MRTS56 *Construction Surveying*.

Figure 7.5.4 – Backfill of trenches – Typical treatment*



Note: *The department has the right to alter this detail.

Trench reinstatement cross section depicted in Institute of Public Works Engineering Australasia standard drawing RS-170 may be used as an alternative subject to load calculations, cover to subgrade and RPEQ pavement design / treatments. Where the road asset is maintained by the local government authority, liaison with the local authority is also required to confirm treatment.

Installation of longitudinal services under pavement areas is prohibited on the department's road pavement assets unless explicitly agreed in writing by the department's District Director after other locations have been assessed as impractical. Reasons why other installation locations and methods have been ruled out must be documented and supplied to Transport and Main Roads prior to design progression. Regardless of pipe size, alignments shall be outside the road formation whether that be border zone or nature strip. Where room does not exist, the need for land resumptions or easements outside the road corridor needs to be considered or replacing existing asset on same alignment.

Where installations of longitudinal services under pavement areas have been approved, typical trench backfill treatment depicted in Figures 7.5.4 or 5.5.1.1(b) may also need to incorporate relevant utility type trench treatments contained in Chapter 5 of this manual.

Backfill in trenches for sealed pavement and shoulder locations

a) Reinstatement of road pavement is to be carried out in accordance with the cross section detailed in Figure 7.5.4 under the supervision of the third party RPEQ, prequalified Transport and Main Roads road contractor or, if specified, the department's Inspector.

b) The bedding, and the backfill above the bedding, shall conform to MRTS04 *General Earthworks*, AS 3725 and Standard Drawing 1359 *Culverts – Installation, Bedding and Filling / Backfilling against / over Culverts* or as otherwise agreed by the District Director[3]. Backfill must be compacted in layers of a minimum depth of 125 mm and a maximum of 150 mm. Where gravel backfill is used testing in accordance with MRTS05 *Unbound Pavements* may be required. Such testing will be at the District Director's, or their delegate's, discretion and, if required, will be specified in the permit. Compaction testing results shall be provided to the department on request at no cost.

c) Bedding sand 'breakaway' layers 50 mm thick are to be installed at 500 mm intervals except within pavement for lean mix installations.

d) The finished surface of the lean mix concrete is to be a minimum of 150 mm below the existing road surface.

e) Where an alternative trench is proposed, certified RPEQ pavement design shall be provided to the department for approval.

Backfill in trenches for unsealed pavement and shoulder locations

a) Detailed in MRTS05 *Unbound Pavements*[4]. The backfill material shall be placed in uniform layers of not more than 150 mm to subgrade level.

b) The finished surface of the backfill is to be a minimum of 150 mm below the existing surface or the bottom of the existing pavement, whichever is the greater.

c) Compaction of layers shall be as follows:

   i. Below a plane 400 mm below the subgrade (i.e. the trimmed or prepared surface of the formation on which the pavement and shoulders are constructed) - minimum relative compaction of 95% (Test Methods Q140A *Relative compaction of soils and crushed rock* and Q142A *Dry density-moisture relationship of soils and crushed rock – standard*), and

   ii. Above a plane 400 mm below the subgrade - minimum relative compaction of 97% (Test Methods Q140A *Relative compaction of soils and crushed rock* and Q142A *Dry density moisture relationship of soils and crushed rock – standard*).

d) Compaction testing results shall be provided to the department on request at no cost.

e) Final layering shall match the existing materials in accordance with either MRTS04 *General Earthworks* or MRTS05 *Unbound Pavements*.

[3] Flowable fill or stabilised sand maybe provided as part of the backfill at the Deputy Regional Director / District Director discretion.
[4] To view MRTS05 *Unbound Pavements* visit: https://www.tmr.qld.gov.au/business-industry/technical-standards-publications/specifications/5-pavements-subgrade-and-surfacing

Backfill in trenches for unpaved areas in road corridor (border zones and so on)

a) Backfill above the bedding may be sand or earth compacted in uniform layers of not more than 150 mm to a level 100 mm below natural surface. Compaction of the layers to a minimum relative compaction of 90% (Test Methods Q140A *Relative compaction of soils and crushed rock* and Q142A *Dry density moisture relationship of soils and crushed rock – standard*) shall be achieved. Compaction testing results shall be supplied to the department on request at no cost.

b) The top 100 mm of the trench shall be filled with an approved topsoil, unless otherwise agreed by the department.

c) Ground disturbance or exposed bare earth shall be treated as detailed in Section 7.4.1.

d) The reinstatement of an existing concrete footpath shall be for the full width. The full width must match the existing footpath. Concrete type, depth, cover to reinforcement, and so on must be like for like and extend to the next panel either side of trench width that is, contraction joint or expansion joint.

e) Gas pipelines may have a lesser standard of compaction as agreed to by the department on a case-by-case basis. This would be agreed to, provided that a process is in place regarding the monitoring of trench subsidence with suitable soil infill placement in a timely manner.

Reinstatement of pavement surfacing for sealed pavement and shoulder locations

a) Reinstatement of road pavement is to be carried out in accordance with the cross section detailed in Figure 7.5.4 including pavement drains and any conditions contained in the permit issued by the department.

b) Pavement reinstatement works shall be carried out under the supervision of the asset owner or its nominated contractor. The department may stipulate a RPEQ or departmental Inspector must be present when pavement reinstatement works are being performed at no cost to the department.

c) The surface of the final lean mix concrete layer or granular layer (refer backfill in trenches) and the remaining sides of the trench shall be dry and given a thorough brooming before being uniformly covered with a bitumen emulsion tack coat applied at a nominal spray rate of 1 litre/m².

d) The bitumen emulsion shall comply with the requirements of MRTS21 *Bituminous Emulsion*.

e) The 150 mm (minimum) asphalt pavement surface layer shall comply with the requirements of MRTS30 *Asphalt Pavements* and shall be placed between the initial saw cuts original profile level.

f) In areas where it is uneconomical or impractical to source asphalt the method of pavement reinstatement shall be at the District Director’s discretion and will be specified in the permit. This may include the temporary use of cold mix.

Reinstatement of pavement surfacing for unsealed pavement and shoulder locations

a) Unsealed pavement and shoulder material shall be an approved soil aggregate material conforming to the requirements for base material, Type 2.3, Grading B or C, contained in MRTS05 *Unbound Pavements*.

b) In addition, the material shall have a maximum particle size of 25 mm. It shall be compacted to a minimum relative compaction of 95% (Test Methods Q140A *Relative compaction of soils and crushed rock* and Q142A *Dry density moisture relationship of soils and crushed rock standard*).

7.5.5 Attachment to existing bridge structures and culverts

It is the department's position not to have utilities installed on structures for ongoing maintenance reasons. Where alternative routing of NTUI has been shown to be impractical (example, non-rippable rock next to bridge preventing under boring), NTUI (dependant on type and size) may be attached to bridges or culverts at the discretion of, and with the conditions stipulated, by the department's District Director, or their delegate, in the permit. A DE report detailing alternative routes that have been deemed to be impractical MUST be provided to the department as part of the application/notice to undertake works at no cost to the department.

The method and conditions pertaining to the installation of a NTUI on or within a bridge will be treated on a case-by-case basis and will require additional approval from Director (Operations and Management). Engineering and Technology. It should be noted that additional time periods and information will be required for the review of applications identifying the installation of a service on or within a bridge structure. Any additional information requested must be provided at no cost to the department.

If approval is granted, the NTUI must be designed to allow shutdown or isolation to allow Transport and Main Roads to undertake regular maintenance inspection and repairs. This includes future provisions where at time of installation the service is not critical but becomes critical in future limiting shut down provisions. This resilience in the utility network needs consideration during the initial approval process.

All As Constructed Survey requirements are to be fulfilled as per MRTS56 *Construction Surveying*.

No works are to commence without a signed Deed or Agreement.

No works that will impede the flow of vehicles, cyclists and pedestrians on or under the bridge or culvert will be permitted, without the approval District Director and Director of Structures (Manage and Operate). Safe access to the NTUI on a structure remains the responsibility of the NTU.

Under no circumstances are NTUI to be directly encased in concrete within the superstructure due to potential future maintenance issues. Envelopers may be accepted on a case-by-case basis and the location of such enveloper pipes will be determined at the District Director's, or their delegate's, discretion.

Where the installation of a NTUI is approved on a bridge structure or culvert the third party must install jointing pits (for fibre optic and electrical installations) or shutoff valves allowing a minimum of 30 m separation on each approach to the bridge and make provisions for the service to be isolated during the department's maintenance works and economically relocated should the bridge be altered for maintenance operations or replaced.

Should the design life of the proposed NTUI exceed the remaining design life of the bridge structure / culvert the NTU must agree to remove its NTUI at its expense should the bridge structure / culvert be demolished and replaced. It should be noted, that if the staging of demolition / construction works require part or all the existing bridge structure / culvert to be removed before construction can commence, the NTU owner will be required to remove its NTUI within six months of written notification and arrange for any temporary bypass required, at no cost to the department. The department will endeavour to make provisions to cater for existing NTUI during the upgrade of the transport corridor however will not fund any relocation.

In an event of a traffic incident or natural disaster, where the NTUI is damaged, all rectification works shall be conducted at cost to the NTU.

The NTUI owner shall maintain at its own cost, the conduit, cabling, pipe, enveloper and any associated infrastructure in good order and condition to the satisfaction of the department.

Unless specifically approved otherwise, closure of any part of the roadway or footpath, or the parking of service vehicles on the bridge or culvert during installation or maintenance, will not be permitted.

7.5.6 Conduits through drainage culverts

Where alternative routing of NTUI has been shown to be impractical, NTUI (dependant on type and size) may pass through a drainage culvert at the discretion of, and with the conditions stipulated by, the District Director / Regional Deputy Director, or their delegate, in the written access authorisation document.

A DE report detailing alternative routes that have been deemed to be impractical MUST be provided to the department including a RPEQ certified hydraulic report detailing all impacts to the current system as part of your permit application at no cost to the department.

Where this method of installation has the written agreement from the District Director / Regional Deputy Director, or their delegate, the conduit is to be attached to the soffit, with no appreciable sag and along the wings of the specified culvert and then underground to a depth such that the cover specified in Chapter 5 of this manual.

No works are to commence without a signed Deed or Agreement.

Except as provided above, the conduit is not to interfere with the existing drainage system in any way. Where the installation of a NTUI through drainage culverts is approved, the third party must install jointing pits or valves allowing a minimum of 30 m on each approach to the drainage culvert and make provisions for the service to be isolated during the department's maintenance and upgrade works.

Should the design life of the proposed NTUI exceed the remaining design life of the culvert the NTU owner must agree to remove its NTUI at its expense should the culvert be demolished and replaced. It should be noted, that if the staging of demolition / construction works require part or all of the existing culvert to be removed before construction can commence, the NTU owner will be required to remove its asset with six months of written notice and arrange for any temporary bypass required at no cost to the department. The department will endeavour to make provisions to cater for existing NTUI during the upgrade to the transport corridor however will not fund any relocation.

In an event of a traffic incident or natural disaster, where the NTUI is damaged, all rectification works shall be conducted at cost to the NTU.

7.5.7 Installation within the department's underground asset

Where alternative routing of non-pressurised utility services has been shown to be impractical, NTUI (dependant on type and size) may occupy the department's underground assets at the discretion of, and with the conditions stipulated, by the District Director / Deputy Regional Director, or their delegate, in the written access authorisation document. Such approval will be treated on a case-by-case basis and will also require the NTU owner to enter into a commercial agreement with the department prior to any approvals.

A DE report detailing alternative routes that have been deemed to be impractical MUST be provided to the department as part of application / notice at no cost to the department.

Irrespective of the above, the department's conduits for intelligent systems and electricity cannot be accessed or used by third parties under any circumstances.

It should be noted that additional time periods and information may be required for the review of applications proposing to use departmental underground assets. Any additional information requested must be provided at no cost to the department.

Where the installation of a NTUI is approved in the department's underground infrastructure, the third party must ensure jointing pits are installed prior to any point of connection. Such jointing pits shall be no greater than 30 m from the entry and exit points. Additionally, all cables must be labelled using permanent labels, before and after each point of connect, and within any departmental access pit or chamber.

Should any departmental underground infrastructure be damaged as a result of the NTUI installation, the third party agrees to fund all repair costs.

7.5.8 Conduits carrying combustible liquids or flammable liquids

Details of the design regarding an installation that is to carry combustible liquids / gases or flammable liquids / gases shall be negotiated on a case-by-case basis with the District Director / Deputy Regional Director, or their delegate. The requirements for the installation of such NTUI will be dependent on the pressure and volume of liquid / gas that is to be carried. It should be noted that additional time periods and information may be required for the review of applications identifying the installation of a service proposed to carry combustible liquids / gases or flammable liquids / gases. Conduits carrying combustible or flammable liquids are not permitted on departmental bridges or structures.

7.5.9 Vibration assessment for third party instigated works

The third party shall conduct a vibration assessment for the proposed works for potential impacts to all assets within the SCRC in proximity to the works including other NTU services, and Transport and Main Road's below and above ground infrastructure, as applicable.

For any assets that are not the department's, the third parties shall undertake a Construction Vibration Assessment and shall meet the requirements specified in applicable industry standards, other asset owner's requirements, British Standard BS 5228-2:2009 and or German Standard DIN 4150-3:1999 as nominated by the impacted NTU provider.

For departmental assets (and notwithstanding out of scope items in the Code), the third party shall undertake a Construction Vibration Assessment using methodologies and reporting in accordance with the department's current *Transport Noise Management Code of Practice*[5] *– Volume 2: Construction noise and vibration*. The third party shall also meet the requirements specified in applicable industry standards.

The third party is also to conduct an assessment of the existing NTUI no less than 50 m either side of the tie-in works to determine the residual service / design life of the NTUI and provide a predicted allowable PPV value for potential future works for Transport and Main Roads records.

The assessments shall be conducted and/or supervised by a RPEQ with relevant experience in vibration assessment for infrastructure projects. The report shall be signed by the RPEQ and submitted with the application or notice relating to the works for the department's review and approval.

7.5.10 Structural lining of existing assets

Notwithstanding the NTU owner's requirements for determination of which asset can be structurally lined to increase service life or repair damaged assets, the following restrictions apply within SCRC:

- Structural lining of pressurised or non-pressurised carrier pipe assets under pavement areas is restricted and subject to approval and review by the department on a case-by-case basis of the original failure mechanism and location of asset.
- The use of ad hoc or experimental treatments on failing assets will not be acceptable. These assets must be replaced.
- Where an enveloper / encasing does not exist under the road pavement, the asset, subject to depth, may need to be replaced with new.
- Assets outside the current or future pavement footprint are generally accepted but may require further assessment to confirm the asset will be situated outside future roadworks.

Clarification Notes:

- Ad hoc means modification to an industry approved method which may not meet design requirements.
- Innovative solutions have been means tested and come with scientific proof.

7.5.11 Surveying requirements

Other than the NTU owner's own requirement for asset capture (example ADAC), the third party must carry out and meet all the setting out, conformance, As Constructed and delivery requirements as prescribed under Clauses 11 and 11.11 of MRTS56 *Construction Surveying*.

[5] https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Transport-noise-management-code-of-practice.aspx

7.6 Maintaining the SCRC and third party assets

7.6.1 Responsibilities and warranties

The third party will maintain the area affected by the works for a minimum period of one year (or for the period stipulated in a contract, deed or agreement) from the date of notification of completion of works or acceptance by the department.

The department reserves the right to charge the NTU owner for any ongoing maintenance works required in a SCRC as a result of any failure attributed to a service installation.

7.6.2 Restoration of work site

On completion of the activity, the site will be returned to a condition as or near practical to what was in place prior to works commencing, particularly for street scaping works. Restoration includes, but is not limited to, removal of any litter or materials, and revegetation.

For works not contained within pavement and/or gravel shoulder areas, any ground disturbance or exposure of bare earth (by either clearing or machinery), in urban areas, shall be replaced / reinstated in a ‘like for like’ basis unless otherwise agreed or directed by the department.

Exposed bare earth in rural areas is to be covered by mulch or similar, or reseeded, immediately after the activity is completed (unless otherwise agreed by the department). Soil on embankments and cuttings along the road are not to be exposed or damaged. Stumps must be retained for the short-term stability of slopes.

7.6.3 Recording, maintaining and providing records

The third party will be responsible to ensure any new installations are captured to *TMR Survey Standards* and registered with a suitable organisation such as BYDA to enable future site location.

Additionally, provision should be made for all installations to be clearly marked using marker posts or location marker discs (as specified by NTU standard) for all road crossings and identifiable by electronic means to Quality Level B of AS 5488 where suitable to do so.

Electronic 'As Constructed' plans, electronic survey models, or suitable reports that clearly outline the location, depth and levels of the NTUI must be produced and provided to the department after installation, at no cost to the department, in a format specified by the department.

The third party must carry out and meet all the conformance, As Constructed and delivery requirements as prescribed under Clauses 11 and 11.11 of MRTS56 *Construction Surveying*.

7.6.4 Managing and recording redundant / abandoned networks

Existing NTUI, being replaced by proposed departmental works or upgraded by third parties, that will become redundant or be abandoned will only be permitted to remain within a SCRC at a District Director / Regional Deputy Director’s, or their delegate’s, discretion. It is the responsibility of the NTUI owner to manage its assets.

Unless the NTUI is under departmental road pavement areas, and safe to do so, all redundant / abandoned infrastructure to be removed from the SCRC. NTUI under existing road pavement that cannot provide for a staged removal as part of the road reconstruction works, shall be trimmed back as much as practicable based on traffic safety and constructability, capped and core filled. Plans showing method, extents and removal staging to be provided to the department for approval. In remote locations subject to low traffic volumes, where side-tracks can be safely provided and after departmental approval, trenching may be considered for removal of redundant assets under pavement areas.

Abandoned / redundant NTUI that is left in situ will require a formal agreement and remain the responsibility of the NTU owner to maintain. Should these abandoned / redundant assets impact on the operation of, or upgrade to, the road in the future responsibility for any rectification or removal works will be as stipulated in the formal agreement.

If approved, it is the third parties' responsibility to grout fill any redundant networks left in situ and provide information as prescribed under Clause 13 of MRTS56 *Construction Surveying* to identify the entire length of the redundant network.

7.6.5 Asbestos

The department does not require existing underground AC pipes, ducts, conduits or service pits still in operation to be removed because they contain asbestos, provided the asset is in good repair and presents no hazard to the operation of the road corridor. However, any product / asset removed that contain asbestos must be handled and disposed of as required by current legislation.

Where existing underground services are located in Asbestos Concrete (AC) pipes, ducts or conduits, or service pits / access chambers contain asbestos, the third party shall ensure all works meet:

a) legislative requirements (including maintaining an asbestos register for live and abandoned asbestos assets, which on request shall be provided to the department)

b) current best practice standards for workplace health and safety, and

c) the current standards used by the NTU.

Producing, supplying and adhering to the above requirements helps minimise risk for all parties that utilise the SCRC.

7.7 Application and approval process

7.7.1 Purpose

Access to the SCR is regulated through legislation. The customer portal is the key location for utilities to manage access authorisation and notices. There are minimum technical documentation requirements that must be met for Transport and Main Roads to properly assess proposed works.

In follow on from Section 7.3.1, where third parties' (e.g developers / contractors) require access to construct NTUI that becomes a gifted asset to the Public Utility Provider, two works agreements are required.

Firstly, the Public Utility Provider is required to submit a PUP application to obtain a Public Utility Plant works agreement issued by the department prior to the developer applying for a Road Corridor Permit (RCP). This order of approvals is more likely to lead to a suitable location for the infrastructure in a SCRC and the developer receiving an RCP for the infrastructure.

Once the Public Utility Provider has received a works agreement and reference number from the department, the public utility should provide the department's reference number to the developer. The developer can then apply for a RCP, making sure to include the reference number with the application.

The department requires the supplementary information and the department's reference number for the works agreement with the Public Utility Provider to effectively assess the RCP application by a developer. A complete application is beneficial to both the applicant and the department to ensure the assessment of an application can be undertaken in a timely manner.

Alternatively, the developer may submit the RPEQ 'certified for construction' drawings previously approved by the department for the public utility works agreement, where these drawings meet the below Technical Information Requirements, and no changes have been made to the planned construction.

7.7.2 Works proposals

The following technical requirements (unless otherwise stipulated in MoUs or other agreement) must be met for all utilities, contractors, developers, or other organisations seeking to install, maintain, operate and remove assets in the SCR.

Plans must be readable on A3 and should meet the department's *Drafting and Design Presentation Standards Manual* (DDPSM):

1. The name of the road and the proposed location (proximity to a notable feature/ town/ nearest intersection) where works are proposed to be conducted.
2. Asset owner's project number as detailed on drawings.
3. Proposed construction start date and finish date.
4. Address.
5. Detailed description of proposed works, including:
    a. category/type of work, i.e. overhead or underground installation
    b. type of asset (e.g. underground conduit, poles)
    c. number of conduits/poles
    d. material (e.g. uPVC, DICL)
    e. enveloper size (proposed to enclose the utility within the SCRC)
    f. enveloper material, and
    g. any previous departmental reference numbers or correspondence relating to this activity.
6. Preliminary Design drawings and documentation from asset owners detailing:
    a. The type of service to be installed (including, but not limited to; size; material proposed to be used; enveloper size; enveloper material; pressure / kV, cable type and size) and any associated infrastructure (e.g. valves, pits, poles, manholes, thrust blocks), coordinates.
    b. Locality plan including local streets, nearest crossroads, adjoining property ID, etc.

c. Scaled plan view digital drawings identifying not only the service installation that is being proposed but also all existing assets owned by the asset owner, with reference to surveyed (property) boundaries, footpaths and kerb lines and/or road edge lines so the suggested alignment is clearly described. This information is required to assist with identifying and confirming proposed alignments.

d. All road crossing details including orientation, proposed installation method, load bearing capacity calculations, vibration assessment and dilapidation survey, location of chambers or valve and so on.

e. Typical sections identifying all trench reinstatement details including pavement reinstatement.

f. All bore details including location of entry and exit points, depths, diameter, proposed pressurised grout/ flowable material, enveloper size, enveloper type, etc.

g. Service conflicts and mitigation strategy.

PLEASE NOTE: Digital plans must be readable on A3 and should meet the department's *Drafting and Design Presentation Standards Manual* (DDPSM).

h. Detailed list of where the design drawings do not comply with this manual.

7. Details of any non-standard alignment proposal identifying offsets from cadastral boundary, including details of rejected options and other Design Exceptions (refer Section 5.8 of this manual for details).

8. Details of any additional requirements that may be required for the installation works, i.e. proposed locations of compounds/site huts, additional land requirements for bore strings, exclusion zones, clearing requirements etc.

9. Hazard and sightline assessments.

10. Review comments from Transport and Main Roads having been incorporated, final submission (IFC) shall also have a signed letter by RPEQ indicating the design complies with departmental standards, specifications and supplementary requirements of this manual and a text box on the drawings indicating the same.

PLEASE NOTE: Failure to provide site specific detail and correct information may result in the application being rejected.

Refer to supporting document *NTUMDM Worked examples* for example of project packages.