PROJECT FINDINGS REPORT: LATROBE CITY COUNCIL DDO1 MAJOR PIPELINE INFRASTRUCTURE REVIEW

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EXECUTIVE SUMMARY

Latrobe City Council (LCC) is seeking to review the existing Design and Development Overlay, Schedule 1 (DDO1) that applies to high pressure oil and gas pipelines that traverse the municipality. Energy Safe Victoria (ESV) is assisting with the review by working with relevant stakeholders and experts to develop a useful and robust planning tool that could be considered by LCC to replace the DDO1.

The review of the DDO1 provides an opportunity for industry, ESV and local government to work together to develop a methodology and draft a control that is useful, robust and reasonable. The outputs of the project may be a useful tool in rolling out a planning control for licensed pipelines across Victoria more broadly.

A number of key stakeholders have been involved in the development of this report, including Energy Safe Victoria (ESV), Latrobe City Council, APA Group / Australian Gas Infrastructure Group, and ExxonMobil (Esso).

The project has:

1. Developed the principles and a methodology to determine a “notification zone” that is specific to the characteristics of each pipeline and specified the “notification zone” for each pipeline.
2. Developed the principles that determine whether a development is a “notifiable development” that takes into account the Pipeline Licensee’s obligations under AS(/NZS) 2885 *Pipelines-gas and liquids petroleum* and identified “notifiable developments” within the context of land use terms in the Latrobe Planning Scheme (the Scheme).
3. Recommended an appropriate overlay to replace the DDO1.

REQUIREMENT FOR PIPELINE NOTIFICATION ZONES

High pressure oil and gas pipelines in Australia are required to comply with AS(/NZS) *2885 Pipelines - gas and liquid petroleum*, which establishes the requirements that are necessary for the protection of the general public and operating personnel, security of supply, and protection of the environment, as well as protection of the pipelines against accidental damage.

In combination with a robust legislative framework, AS(/NZS) 2885 provides the foundation for the Australian and New Zealand transmission pipeline industry's safety performance.

A key component of the AS(/NZS) 2885 is the safety management process which requires that multiple independent defensive layers are applied to control all threats that could cause product to escape from the pipeline. This provides "defence in depth" against potential safety incidents.

The pipeline safety management study is a live document that is subject to ongoing and regular reviews over the life of the pipeline so that its currency is maintained. In particular, a review is required if land use changes in the vicinity of the pipeline. This is because land use change may alter the consequence of a product escape from the pipeline, or the threats that could cause product to escape.

An effective review of the potential impacts of a proposed land use change requires the pipeline licence holder to obtain and assess detailed information of the changes early in the life of the project. Defensive layers by which pipeline licence holders obtain “early warning” of such projects include a monitoring and engagement regime with key stakeholders, and notification processes initiated by local government decision makers. However, there is long standing recognition that there is a gap in the process to alert Pipeline Licensees of developments that result in land use change around the pipeline.

It is proposed that a planning control be implemented to fill this critical gap in risk management.

The administration of notifications requires the determination of a suitable "notification distance" either side of the pipeline that is efficient and effective for all concerned parties. If the distance is too large it runs the risk of generating a high volume of notifications that require no action, thus negating its effectiveness (like the Boy Who Cried Wolf). If the distance is too small, real safety concerns may be overlooked. (Just like Goldilocks, we need to find a notification distance that is "just right").

Experience in Australia and overseas is that the predominant type of damage that results in product escape is a hole rather than a rupture (which is where the escape is from the full-bore diameter of the pipe). The worst-case holes are generally produced as a result of contact with the pipeline by mechanical equipment (such as excavators or augers). For this reason, it is proposed that the "notification distance" is based on the safety impacts associated with product escape from holes produced by such equipment.

The damage that can be inflicted on any given pipeline depends on the type of equipment that operates in the local area, and also the particular physical features of the pipeline itself (for example, the thickness of the pipeline steel). The safety impacts associated with a product escape are then dependent on the properties of the product in the pipeline and the pressure in the pipeline. For this reason, the “notification distance” for a particular pipeline is unique to that pipeline and is determined by AS(/NZS) 2885 pipeline safety management process.

Adopting this approach to determining the “notification distance” provides a sound basis for notifications that strike a balance that is efficient and effective for all concerned parties.

The principles and methodologies for pipeline notifications zones are summarized in Section 4.1.

NOTIFIABLE DEVELOPMENTS

“Notifiable developments” are typically those that are permitted by the current zone of the land, but result in a change from the current prevailing land use of the site (for example, a residential dwelling being developed for a child care centre). This in turn may change the obligations of the Pipeline Licensee under the requirements of AS(/NZS) 2885, particularly with respect to the provisions for “high consequence areas”. This depends on AS(/NZS) 2885 “location classification” of the particular pipeline at the location of the proposed development[1]. This is discussed in detail in Section 3.7, and the identified “notifiable developments” within the context of the Victorian Planning Scheme Nesting Diagrams are included in Appendix 4C.

REVISED PLANNING CONTROL

‘A Practitioner’s Guide to Victorian Planning Schemes’ sets out the ‘rules’ that should be applied to the preparation of all new planning scheme provisions. Whilst there is an existing overlay in place in LCC, the methodology set out in this report has been established to support a control in all locations across Victoria. It is therefore important that the purpose of such a control is understood and justified.

Any new provision must, amongst other things:

- be within the scope of the objectives and power of the *Planning and Environment Act 1987*;
- not conflict with or duplicate other legislation, instruments or planning scheme provisions; and,
- be necessary and proportional to the intended planning outcome.

The Design and Development Overlay, which is the overlay currently in place in LCC, is effectively a tool to influence built form outcomes. It is commonly used in locations where there is a need to control building heights, setbacks, etc., such as activity centres. The DDO is not considered to be the most appropriate

[1] Terminology used in AS(/NZS) 2885 including high consequence areas and location classification is explained in Appendix 5

tool to manage potential risk and safety issues associated with land use in proximity to pipelines.

The Environmental Significance Overlay: 'seeks to address areas where the development of land may be affected by environmental constraints such as effects from noise or industrial buffer areas, as well as issues related to the natural environment, and is applied if vegetation protection is part of a wider objective to protect the environmental significance of the area'.

The ESO is already widely used in Victoria to not only protect environmental assets, flora and fauna, but to also protect areas surrounding treatment plants, landfills and other industrial facilities from the offsite amenity and safety issues presented by those activities.

It is recommended that the existing Design and Development Overlay, Schedule 1 be deleted and replaced with a new schedule 4 to the Environmental Significance Overlay.

Application triggers

The primary concern for Pipeline Licensees is the siting of developments that potentially result in a significant increase in the consequence of a product release in proximity to pipelines. In the terminology of AS(/NZS) 2885, these are typically developments which result in either "Sensitive Use (S)", "Crowd (C)" or "Heavy Industrial (HI)" location classification. It is noted that the terms applied for location classification in AS(/NZS) 2885 do not correspond directly with terminology used in the Victorian Planning Scheme. The 12 uses/use groups of interest have been identified as 'notifiable developments' are:

Accommodation Group:

- Residential aged care facility
- Retirement village
- Corrective institution

Education Centre Group:

- Child care centre
- Primary school
- Secondary school

Earth and Energy Resources Industry

Leisure and Recreation Group:

- Major sports and recreation facility
- Motor racing track

Place of Assembly Group

Warehouse Group:

- Fuel depot

Other uses not nested:

- Hospital

The ESO should be drafted to trigger a planning permit for buildings and works associated with these uses.

Referral Authority Status

The *Planning and Environment Act 1987* (the Act) confers a special status on referral authorities in the planning regime. It creates two types of referral authorities: recommending and determining referral authorities. As their titles suggest, a recommending referral authority assumes an advisory role only in respect of a planning application while a determining referral authority may direct the outcome of an application. It is considered that a recommending referral authority status is appropriate for applications triggered by a control for licensed pipelines.

It would be inappropriate to include a decision guideline in a planning control requiring a responsible authority to consider the impact of a proposed use or development on a licensed pipeline and vice-versa absent any referral or notice requirements to ESV or a Pipeline Licensee. Primarily, this is because a responsible authority is unlikely to be appropriately skilled or resourced to properly consider public safety risks from licensed pipeline operations.

ESV, as the technical regulator for pipeline safety in Victoria, has the requisite specialist expertise and knowledge in the area to assist in this regard. Notifying or referring such applications to ESV would also ensure ESV can appropriately coordinate referrals to relevant Pipeline Licensees and ensure a consistent standard of responses in line with the relevant planning control.

It is recommended that ESV be identified as a recommending referral authority associated with the introduction of a new planning control to licensed pipelines in LCC.

Planning Scheme Amendment

To implement the recommendations of this report, the following amendments to the Latrobe Planning Scheme will be required:

- The existing DDO1 be deleted and replaced with a new schedule 4 to the ESO (ESO4).
- The ESO4 should trigger a planning permit for buildings and works associated with a notifiable development.
- Clause 66.04 be amended to require all planning applications triggered by the ESO4 to be referred to Energy Safe Victoria (ESV). Identify ESV as a recommending referral authority.

CONTENTS

1 INTRODUCTION

1.1 BACKGROUND

Latrobe City Council is a local government area in the Gippsland region in eastern Victoria, located approximately 150 kms east of Melbourne. It covers an area of 1,426 square kilometres. The region is made up of four central towns: Churchill, Moe-Newborough, Morwell, Traralgon, and smaller rural townships of Boolarra, Glengarry, Toongabbie, Tyers, Traralgon South, Yallourn North and Yinnar.

The municipality is traversed by a number of high pressure oil and gas pipelines (Appendix 2). These pipelines are required to be operated and maintained in accordance with the requirements of AS(/NZS) 2885 *Pipelines-gas and liquids petroleum* and the *Pipelines Act 2005.*

The Latrobe City Council currently has a Design and Development Overlay, (Schedule 1) (DDO1) that applies to most of the pipelines in the municipality. The DDO1 was introduced into the Latrobe Planning Scheme when the New Format Planning Schemes were introduced in Victoria in 1996.

The DDO1 currently applies to 100 m on either side of the majority of licensed pipelines within the municipality. The DDO1 effectively provides a high level of pipeline awareness in the areas in which it applies. There are, however, numerous issues in the drafting of the DDO1. There is opportunity to refine and improve the control so it is considered a useful planning control for licensed pipelines. DDO1 is included in Appendix 3.

Latrobe City Council has embarked on a review of the DDO1 and plans to progress a Planning Scheme Amendment to introduce changes in the 2019/20 financial year. The advice and assistance of Energy Safe Victoria (ESV) was requested as a key input into the review. ESV has engaged GPA Engineering and Auld Planning & Projects to coordinate the review.

The review of the DDO1 provides an opportunity for industry, ESV and local government to work together to develop a methodology and draft a control that is robust and reasonable. The outputs of the project may be a useful tool in rolling out a planning control for licensed pipelines across Victoria more broadly.

1.2 PURPOSE OF PAPER

The purpose of this paper is to set out:

- a methodology for the identification of an appropriate geographical area that any planning control should apply in the vicinity of a pipeline; and
- a summary of the matters that should be considered in a revised planning control.

1.3 SUMMARY OF ISSUES

Latrobe City Council is the Responsible Authority for deciding planning permit applications triggered under the DDO1. Council has raised concerns that the DDO1 is not the most appropriate tool for pipeline protection, is poorly worded, has unclear decision guidelines and is too expansive. The effect of the DDO1 on signage in the overlay has also been raised as anomalous, as the DDO1 applies the most restrictive signage categories that prohibit many types of signs regardless of impact to the pipeline.

Pipeline Licensees are responsible for operating licensed pipelines in accordance with the *Pipelines Act 2005*, the relevant pipeline license and AS/NZS 2885: *Pipelines – Gas and liquid petroleum*. Pipeline Licensees note that the DDO1 does not apply to all licensed pipelines in Latrobe and does not provide for an effective mechanism for the Licensees to be consulted and provide input to the processes for development approvals, which in turn impacts on their ability to minimise potential public safety risks

associated with new development.

In recent years, ESV and Pipeline Licensees have made submissions to various forums about how pipelines can be better identified and protected by the planning system. The most comprehensive response to ways in which the Victorian planning system could respond to pipelines to date has been the recommendations of the Major Hazards Facility Advisory Committee, which recommended investigating the application of an Environmental Significance Overlay (ESO) over licensed pipelines.

2 PROCESS

2.1 PRELIMINARY MEETINGS

Preliminary meetings with representatives of both APA Group and ExxonMobil (Esso)[2] were held in Melbourne on Thursday 18 April 2019. The primary purpose of the meetings was to discuss the assets they have in Latrobe, their views on what the planning process is intended to achieve, and how it could be implemented. These were incorporated into a Draft Position Paper that formed the basis of a subsequent workshop.

2.2 DRAFT POSITION PAPER

The draft position paper was prepared and circulated prior to the stakeholder workshop. Key themes covered by the position paper were:

1) Perspectives and objectives of the Pipeline Licensees / Operators, including:
    a. Factors to be considered when determining the extent of a notification zone;
    b. The Licensees response when they are notified;
    c. Notification requirements for different location classes;
    d. Issues related to fluids other than sales gas (e.g. LPG and crude oil);
    e. Issues related to above ground facilities;
    f. Consideration for operations and maintenance of pipelines; and
    g. Special considerations for above ground facilities.
2) General discussion of the objectives of a planning regime for pipelines.

2.3 WORKSHOP

The stakeholder workshop held at APA's Melbourne Southbank Office on Tuesday 21st May 2019. The agenda for the workshop was structured around the draft position paper. The workshop agenda is included in Appendix 4. Representatives of the following stakeholders were invited to the workshop:

- APA Group (representing both APA and AGIG assets)
- Department of Environment, Land, Water and Planning (DELWP)
- Energy Safe Victoria (ESV)
- ExxonMobil (Esso)
- Latrobe City Council (LCC)
- Loy Yang B
- GPA Engineering
- Auld Planning & Projects

[2] Meetings were held with APA Group and ExxonMobil. APA Group personnel also represented Australian Gas Infrastructure Group (AGIG). Loy Yang B was invited to meet but was not available.

The following people attended the workshop:

NAME	POSITION	COMPANY
Zubair Cheema	Senior Technical Engineer	ESV
Chris Liew (*)	Asset Integrity Manager	APA Networks
Daniel Tucci	Asset Manager	APA Transmission
David Levy	Pipeline Engineer	ESSO Australia
Farrah Tan-Savva	Pipelines Supervisor	ESSO Australia
Glenn Ogilvie	Senior Risk Engineer	APA Transmission
Ian Stewart	Technical & Regulatory Compliance	APA Networks
Jarrod Dunn	Manager Planning and Integrity	APA Networks
Karen Egan	Coordinator Statutory Planning	LCC
Lorrae Dukes	Coordinator Strategic Planning	LCC
Michael Mielczarek	Senior Urban Planner	APA Transmission
Nick Kastelein	Technical Secretary	GPA
Richard McDonough	Workshop Facilitator (Principal Risk Engineer)	GPA
Sarah Auld	Director	Auld Planning & Projects
(*) teleconference		

The attendance sheet is included in Appendix 4B.

2.4 POST-WORKSHOP ACTIONS AND DISCUSSIONS

Draft minutes were circulated after the workshop. The minutes included a number of actions on the Pipeline Licensees in particular, with respect to nominating notifications zones around the individual pipelines, and clarifying a number of issues identified during the workshop. This resulted in further discussions with the individual Pipeline Licensees / Operators. The conclusions of these discussions are incorporated in this report.

3 DISCUSSION

3.1 OBJECTIVES OF PLANNING REGIME FOR PIPELINES

The following objectives for a future planning regime that respond to licensed pipelines were discussed at the workshop and in post-workshop discussions.

1) Identify the presence of a licensed pipeline.
2) Avoid restricting use and development that do not pose a threat or increase the consequence of a pipeline failure.
3) Ensure the Pipeline Licensee is notified of use or development that could change the AS(/NZS) 2885 location classification or increase or alter risks to the pipeline.
4) Provide clear decision guidelines to Council and development proponents that identify how decisions should be made.
5) Encourage development proponents to liaise with the Pipeline Licensee at the pre-application stage of a proposal so that risks to the pipeline can be clearly understood early in the project lifecycle.
6) Establish a regime that enables a Pipeline Licensee to consider a "Planning Notification Zone" procedural control as an applicable layer of protection for the pipeline in AS(/NZS) 2885 Safety Management Studies.

3.2 CONTEXT OF LICENSED PIPELINES IN LATROBE CITY COUNCIL

The locations of the licensed pipelines within the LCC local government area are shown in Appendix 2. Most pipelines traverse open farmland primarily used for cropping and grazing. Some pipelines traverse a Special Use Zone, which apply to coal mining leases. There are also a number of growth areas in proximity to licensed pipelines (refer "Latrobe Growth Areas and DDO1" presentation, Appendix 4C1).

The Tyers to Morwell gas pipeline (and associated laterals) traverses an industrial zone southeast of Morwell. Much of this land is still to be developed. In addition, this pipeline also traverses land earmarked for future industrial and commercial developments in the Employment Corridor in the vicinity of the Latrobe Regional Airport (between Traralgon and Morwell). An expansion of the Moe Water Treatment Plant south of Moe is in the planning phase.

3.3 EXISTING DESIGN AND DEVELOPMENT OVERLAY (SCHEDULE 1)

Planning Schemes in Victoria are structured such that **zones** generally zone land for particular uses, and **overlays** generally identify that the land has a feature that requires particular consideration, such as heritage, vegetation or flooding.

The Design and Development Overlay, Schedule 1 (DDO1), that applies to pipeline infrastructure in the Latrobe Planning Scheme is triggered for **development** activity within 100m of a pipeline. This is distinct from **use**, which means that a change in use does not fall under the provisions of the DDO1.

Use of land refers to using land for a particular purpose (such as a shop or child care centre).

Development includes the construction, alteration or demolition of a building or works and the subdivision or consolidation of land.

The Design and Development Overlay (the parent clause to the schedule) sets out the planning permit triggers for development. The DDO states:

A permit is required to:

- *Construct a building or construct or carry out works. This does not apply:*
  - *If a schedule to this overlay specifically states that a permit is not required.*
  - *To the construction of an outdoor swimming pool associated with a dwelling unless a specific requirement for this matter is specified in a schedule to this overlay.*
- *Construct a fence if specified in a schedule to this overlay.*

Schedule 1 to the DDO specifically details that a permit is required to construct a pool and construct a fence. Therefore, in its current form, DDO1:

- Applies to land 100m either side of a pipeline;
- Requires a planning permit for all buildings and works,
- Requires a planning permit to construct a swimming pool associated with a dwelling;
- Requires a planning permit to construct a fence within 3m of the pipeline;
- Places restrictions on advertising signs, locating all land subject to the DDO1 as category 4 at Clause 52.05;
- Requires the LCC to consider the appropriateness of buildings or fences within 3m of a pipeline;
- Requires the LCC to consider the appropriateness of constructing dwellings or buildings designed to accommodate 20 or more people within 200m of a "Type C Pipeline";
- Requires the LCC to consider the views of the Secretary of the Department administering the *Pipelines Act 1967*.

There are a number of issues with the content of the existing DDO1, including:

- Whilst the DDO1 is expansive in its scope (all buildings and works are subject to a planning permit), the decision guidelines only reflect particular types of buildings;
- The rationale for expansive triggers is not clear;
- There is no real guidance to the LCC with regard to determining "appropriateness" of applications, other than considering the views of the Secretary of the Department administering the Pipelines Act 1967 (now the *Pipelines Act 2005*). There is no related referral mechanism to the Secretary pursuant to Clause 66.04 of the Latrobe Planning Scheme;
- There is no known definition of a "Type C Pipeline";
- The requirement to consider the appropriateness of constructing dwellings or buildings designed to accommodate 20 or more people within 200 m of a "Type C Pipeline" is inconsistent with the extent of the overlay, which is a corridor 100m either side of the pipeline;
- DDO1 provides no mechanism to require LCC to notify or refer applications to ESV or the Pipeline Licensee.

In addition, the following are noted:

- There are other mechanisms and administrative processes in place to notify and engage the Pipeline Licensee for activities, such as:
  - activities within 3 m of the pipeline (i.e. s118 and s120 of the *Pipelines Act 2005*);

- works on the easement (via the easement agreement);
- subdivision of land crossed by a gas transmission pipeline or a gas transmission pipeline easement must be referred to the relevant gas supply authority pursuant to Clause 66.01 of the Victoria Planning Provisions; and
- any changes to the zoning of land via a Planning Scheme Amendment must be notified to the Minister Administering the Pipelines Act pursuant to the *Planning and Environment Act 1987*[3].

It is not intended that a revised overlay overlap or duplicate these processes.

- LCC is required to consider every planning permit application triggered by the DDO1 in accordance with the decision guidelines. In considering a revised and improved control, the scope of the control, its purpose, corresponding application requirements and decision guidelines need to be defined so that the administrative overhead that is incurred by all stakeholders (landowners, developers, LCC, Pipeline Licensees, ESV etc.) is restricted to activities where notification is "necessary" (i.e. real input and recommendations from ESV or Pipeline Licensees is required, and not "for information only"; other mechanisms and administrative process currently in place).
- Where items for information only are useful to Pipeline Licensees, an alternative process can be employed (for example, reviewing the public planning application register).

3.4 AS/NZS 2885 SAFETY MANAGEMENT PROCESS AND REQUIREMENTS

Pipeline Licensees are responsible for operating their pipelines in accordance with *AS(/NZS) 2885: Pipelines – Gas and liquid petroleum*. AS(/NZS) 2885 provides requirements that "are necessary for the protection of the general public and operating personnel, security of supply, and protection of the environment as well as protection of the pipeline system against accidental damage."[4] It requires that a pipeline is designed (and operated and maintained) to "safely withstand all reasonably predicted influences to which it may be exposed during the whole of its design life."[5] In other words, the primary objective is to keep the pipeline products (e.g. sales gas, LPG or liquid petroleum) contained in the pipe.

AS(/NZS) 2885 provides the foundation for the Australian and New Zealand transmission pipeline industry's strong safety record. Incident rates in Australia and Zealand are significantly lower than for Europe and North America. To date, there has not been a fatality associated with a pipeline release incident for pipelines operating under AS(/NZS) 2885.[6]

A key component of the AS(/NZS) 2885 requirements is the safety management process which is the process by which threats to the safety and integrity to of the pipeline system are identified and controls are applied so that risks are reduced to a level that is As Low As Reasonably Practicable (ALARP).

AS(/NZS) 2885 requires that, where a change of land use adjacent to a pipeline occurs, a Safety Management Study (SMS) be undertaken to review whether or not additional protection measures are required.

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[3] Major land use changes (when changing from one zone to another, for example farming zone to residential zone) are required to go through a Planning Scheme Amendment process (as opposed to the planning permit application process). There is already a trigger in the *Planning and Environment Act* 1987 for all Planning Scheme Amendments to be notified to the Minister administering the *Pipelines Act 2005*. The majority of Planning Scheme Amendments are advertised to the public.

[4] Introduction to AS 2885.0:2018, Part 0: General Requirements.

[5] Clause 4.1, AS/NZS 2885.1:2018, Part 1: Design and Construction.

[6] Tuft, P. & Cunha, S. "Comparing International Pipeline Failure Rates", The Australian Pipeliner, April 2014, pg 124 – 134; McDonough, R. "Frequency Estimating Guidelines, presentation to the APGA AS 2885 Parts 1 & 6 Launch Seminar, 19-20 July 2017.

AS 2885.0 Clause 1.5.34 defines land use change as “any change outside the pipeline corridor but within the measurement length, such that there is either a change of location class, or an increase in the likelihood of the consequences of failure event without change in location class”[7].

Therefore, when developments are proposed within the pipeline measurement length, the Pipeline Licensee needs to determine: 1) whether the location class has changed; and 2) whether the development materially increases the risk (the likelihood or frequency of a defined consequence) of a hydrocarbon release.

Similar provisions apply for encroachment, which is defined by AS 2885.0 Clause 1.5.16 as “work by third parties within the pipeline corridor or activities in close proximity that could affect the pipeline system (e.g. blasting or earthworks)”.

3.5 OVERVIEW OF LICENSED PIPELINES

A table of the licensed high pressure oil and gas pipelines that traverse the Latrobe City Council local government area and location maps are included in Appendix 2.

3.5.1 Sales Gas Pipelines

The sales gas pipelines are owned by either: APA Group, the Australian Gas Infrastructure Group (AGIG), or Alinta. Day-to-day operation of the pipelines is by APA Group. The majority of the sales gas is delivered to domestic, commercial and industrial customers in metropolitan Melbourne, primarily via the Longford to Dandenong Pipeline (which typically supplies ~65% to ~75% of Victoria’s gas demand[8]). A number of lateral pipelines deliver sales gas to local domestic, commercial and industrial customers:

- The Morwell to Dandenong (T1) Pipeline (DN450, MAOP = 2,780 kPa) was constructed in 1959 to deliver “town gas” (manufactured from coal using the Lurgi Process) to Melbourne. Following the construction of the Longford to Dandenong Pipeline and Tyers to Morwell (T63) Pipeline, this pipeline has delivered “natural gas”.
- Longford to Dandenong (T60) Pipeline (DN700, MAOP = 6,890 kPa) was constructed in 1969 to deliver “natural gas” from Bass Strait to Melbourne.
- Longford to Rosedale to Tyers (T60) Pipeline (DN750, MAOP = 7,070 kPa) is a loop of the original Longford to Dandenong (T60) pipeline (i.e. is installed in the same easement) and provides additional capacity to the Melbourne market.
- Tyers to Morwell (T63) connects the Longford to Dandenong (T60) to the Morwell to Dandenong (T1) Pipeline.
- The remaining APA pipelines provide gas to local markets.

The sales gas pipelines vary in terms of their diameter, maximum allowable operating pressure (MAOP) and wall thickness. The largest pipeline is the Longford to Rosedale to Tyers Pipeline (T60) which has a nominal diameter of 750 mm, an MAOP of 7,070 kPag, and a standard wall thickness of 10.31 mm. At the other end of the scale, the Morwell to Tramway Road Pipeline (T005) has a nominal diameter of 100 mm, an MAOP of 2,760 kPag, and a standard wall thickness of 5.5 mm. The measurement length is primarily determined by the diameter and MAOP of the pipeline. The measurement length for the T60 and T005 pipeline is 708 m and 74 m respectively. The fact that there is such large variation in these parameters indicates that the existing “one-size-fits-all” approach to planning notifications for these

[7] Terminology used in AS(/NZS) 2885 including pipeline corridor, measurement length, location class and failure event is explained in Appendix 5.
[8] Based on AEMO 2019 Victorian Gas Planning Report data.

pipelines is problematic.

The sales gas transported by a gas pipeline is lighter than air, so if it is released through a hole in the pipeline, it will vent to atmosphere at the leak site. In general, the release can only impact people or property if it finds and ignition source and ignites. In this case the result is a jet fire, from which the radiant heat has the potential to cause property damage, injury or fatality[9].

3.5.2 LPG and Crude Oil Pipelines

Esso Australia own and operate the LPG and crude oil pipelines that deliver these products from the Longford Gas Plant near Sale to the Long Island Point Fractionation Plant near Hastings. The Long Island Point Plant carries out the final stage in the processing of the gas liquids (ethane, propane and butane) and stores crude oil prior to distribution to refineries in Australia and overseas.

While there are four pipelines in total, two of these have been taken out of service. The remaining pipelines are the Longford DN250 to Long Island Point LPG Pipeline (DN250 mm, MAOP 8,275 kPag, standard wall thickness = 5.56 mm, measurement length = 920 m) which was installed in 1969, and the Longford DN350 to Long Island Point Oil Pipeline (DN350 mm, MAOP 9,530 kPag, standard wall thickness = 9.53 mm, measurement length = 500 m) which was commissioned in 2017.

Both LPG and crude oil have different properties to sales gas that determine how they behave if released from the pipeline, and the energy released if ignited:

- Crude oil is a liquid which spills to the ground and will either pool at the release site or flow to a low point, depending on the local topography. If the oil does flow, it may find its way into a watercourse, resulting in environmental impacts. In either case, if the oil finds an ignition source and ignites, the radiant heat from the fire has the potential to cause property damage, injury or fatality.
- LPG is in liquid form in the pipeline, but when released to atmosphere it vaporizes, expands in volume by 270 times and forms a heavier-than-air gas (sales gas is lighter than air so vents directly to atmosphere). The energy contained in the released gas is over twice that of sales gas for the equivalent volume, so the heat radiation contours from an ignited LPG release are greater than from a sales gas release. If the gas does not ignite immediately, this gas cloud can drift, following local topography, until it finds an ignition source remote from the release site. For this reason, an LPG release presents greater potential risk than a natural gas release.
- For these reasons, the consequences of a release from either the crude oil pipeline or the LPG pipeline are more difficult to predict than a sales gas release, and are highly dependent on the topography at the location site, and, in the case of LPG, the prevailing weather conditions at the time of the release.
- The fact that the LPG pipeline has a relatively thin wall (5.56 mm) means that it is more susceptible to penetration by excavators and other equipment (when compared to majority of the APA gas pipelines, and the Longford 350 to Long Island Point Oil Pipeline).

It should also be noted that in November 2000 an incident occurred on the LPG pipeline near Tyers, which resulted in Leak / Loss of containment. The incident was caused by an excavator performing trenching operations. The excavator was installing telecoms cabling when there was a sudden eruption of gas. Fortunately, the operator turned off the excavator and escaped without serious injury. The pipeline leak detection system registered the event and triggered an automatic shutdown of nearby mainline isolation

[9] A method for calculating heat radiation contours for ignited gas releases is provided in AS/NZS 2885.6, Appendix B3.

valves, limiting the total volume of gas released. Fortunately, there was no ignition event. However, the event resulted in a 5 km exclusion zone and evacuation of nearby townspeople. Energy production from Bass Strait was disrupted for an extended period.

3.6 CONSIDERATIONS FOR NOTIFICATION REQUIREMENTS

The objective of notifying the Pipeline Licensee of any planned activity near the pipeline, by any mechanism, is to provide the Pipeline Licensee with information regarding the activity as early in the process as possible, so that the Pipeline Licensee can take appropriate actions to manage risks to public safety, security of supply and the environment in accordance with the requirements of AS(/NZS) 2885.

For the purposes of this discussion a 'planned activity' is termed a 'development'. 'Development' may include a change in use of the land or buildings and works.

The factors that determine whether a Pipeline Licensee should be notified of a development by any mechanism are:

Factor 1. Does the development change the location classification?

Factor 2. Does the development significantly increase the risk (the frequency of a defined consequence) of a pipeline release?

Factor 3. Does the development affect the ability of the Pipeline Licensee to safely operate and maintain the pipeline or facilities?

Factor 4. Does the development affect the pipeline corridor (easement or equivalent)?

One of these mechanisms is notification pursuant to an overlay. The benefits of notification vs referral is discussed at 3.8.6. The Factors that are best addressed by an overlay is discussed below.

3.6.1 Factor 1 – Change of Location Classification?

Use of an overlay as the mechanism to advise Pipeline Licensees of a potential change in location classification is problematic for the following reasons:

1) For the overlay to be effective, the overlay corridor needs to be the measurement length, which is based on full bore rupture of the pipeline and may be many hundreds of metres. However, this will result in notification of a large number of activities that will result in a "no action" or "no objection" response simply because in practice they are too far away from the pipeline to significantly increase the risk associated of a pipeline release (Factor 2). Firstly, in general, people and property located closest to an ignited release are more likely to be impacted, as the heat radiation is greatest at the release site. Secondly, based on Australian and overseas experience, releases from holes are far more likely that ruptures. There are a number of reasons that contribute to this:

    - In many cases it is not physically possible to rupture the pipe (i.e. rupture is a not credible failure mode); or
    - Where rupture is a credible failure mode, the actual damage caused is not sufficient to result in rupture (i.e. even in the worst case the damage does not exceed the critical defect length); or
    - Even if, in the worst case, the damage can exceed the critical defect length, in most cases the actual geometry and orientation of the damage is likely to be such that damage in the axial direction does not exceed the critical defect length and therefore rupture does not occur (this is discussed further in Appendix 7).

(i) There are other processes in place (or that can be put in place) for licensees to monitor development activity that triggers a change in location class but are too far away to significantly increase the risk associated with a pipeline release (Factor 2). These include: 1) 5-yearly operational SMS review under AS/NZS 2885.6; 2) review of the Planning Permit Register maintained by Latrobe City Council.

Where the Pipeline Licensee is aware of proposed developments that trigger a change in location class but are too far away to significantly increase the consequence of a pipeline release, the Licensee will review the details of the proposal to assess whether there are any actions that need to be implemented by the Licensee before the development is completed (e.g. increased signage to comply with AS/NZS 2885, review patrolling regime, review pipeline awareness activities, review compliance with requirements for High Consequence Areas).

3.6.2 Factor 2 – Increase the Consequence of a Pipeline Release?

An overlay is an appropriate mechanism to advise Pipeline Licensees of developments that may significantly increase the risk (the frequency of a defined consequence) of a pipeline release:

(i) Developments that significantly increase the consequence of a pipeline release include those that significantly increase the number of people in the vicinity of the pipeline (refer item (iv) below). They may also include industrial developments that could create “knock-on / escalation effects” if exposed to heat radiation (e.g. chemical storage facility).

(ii) In general, the closer the development is to the pipeline, the more likely that the consequence of a pipeline release will significantly increase.

(iii) Developments within the distance affected by the maximum credible hole size (but assuming that rupture is not the failure mode), need to be reviewed. As discussed in Appendix 7, even if rupture is credible, it is generally a lower frequency event than a hole, and also it is more likely that those closer to the pipeline will be affected than those further away.

(iv) In most cases, developments permitted by the current Zone will not constitute “notifiable developments” because the pipeline has been designed and/or assessed (via the 5-yearly operational SMS) for such developments and they do not significantly increase the consequence of a pipeline release. However, specific types of developments that may be “permit required” under the Zone may be of interest.

(v) The rationale for referring “notifiable developments” includes providing the Pipeline Licensee the opportunity to influence design decisions early in the life of the project, which further reduce risks in the event of a pipeline release.

Where the Pipeline Licensee is notified of developments that may significantly increase the risk of a pipeline release, the Licensee will determine whether to convene a Land Use Change SMS workshop with the proponent to:

1) Provide input into design decisions for the proposed development to provide additional risk reduction (e.g. move facilities such as schools further away from the pipeline, increase open space around the pipeline easement, minimize buried service crossings of the pipeline, direct emergency egress away from the pipeline).

2) Determine whether additional pipeline protections need to be installed (e.g. slabs, signage) or implemented (e.g. increased patrols, awareness) to reduce risks to the pipeline and thereby reduce the risk of release). Since the Pipeline Licensee is required to comply with AS(/NZS) 2885, the onus to implement any additional protections is on the Licensee.

3) Assess / advise on any potential impacts that pipeline operations may have on the development

(e.g. noise from vents), and vice versa (discussed in the following sections).

3.6.3 Factor 3 – Ability to Safely Operate and Maintain the Pipeline?

An overlay is an appropriate mechanism to advise Pipeline Licensees of developments that may affect the ability of the Pipeline Licensee to safely operate and maintain the pipeline or facilities:

(i) Development that does not directly impact the pipeline easement may nevertheless:

- Impact on pipeline operations / maintenance activities (e.g. if there is insufficient room for maintenance dig ups at particularly locations; or ignition sources are introduced near venting operations);
- Impact on access to above ground facilities for both normal operations and emergency response; or
- Be impacted by normal pipeline operations (e.g. high noise levels during to venting operations may impact nearby residents).

(ii) Construction activities:

- Construction activities away from the easement may still have the potential to impact the pipeline (e.g. blasting, vibration due to compacting rollers or pile driving).
- Construction activities need to provide for maintaining access to above ground facilities for both normal operations and emergency response.
- In addition, advice on construction activities also provides for early engagement on potential pipeline crossings for development access or infrastructure such as buried utilities.

Where the Pipeline Licensee is notified of developments that may that affect the ability of the Pipeline Licensee to safely operate and maintain the pipeline or facilities the Licensee will determine whether to convene an Encroachment SMS workshop[10] with the proponent to:

1) Provide input into design decisions for the proposed development to minimise impacts on pipeline operations / maintenance activities, (including access).
2) Assess / advise on any potential impacts that pipeline operations may have on the development (e.g. noise from vents).
3) Document construction activities and advise on methodologies required to minimise risks to pipeline integrity during construction.

3.6.4 Factor 4 – Impacts to the Pipeline Corridor?

An overlay is not a mechanism required to advise Pipeline Licensees of developments that affect the pipeline corridor (easement or equivalent). There are alternative processes in place to notify the Pipeline Licensee of activities on the pipeline easement (or “corridor” where the pipeline is located in a road/rail reserve), including easement agreements and other legislative instruments as discussed in Section 3.2.

Where the Pipeline Licensee is notified of developments that affect the pipeline corridor (easement or equivalent), the Licensee will determine whether to convene an Encroachment SMS workshop with the proponent to review crossings designs and develop plans to manage the construction activities on the easement so that the pipeline is protected from damage.

[10] This is normally done in conjunction with the Land Use Change SMS if required for the development.

3.6.5 Maximum Credible Hole Size

The discussion above concludes that the "maximum credible hole size" (but assuming that rupture is not the failure mode) should be used to determine notification zone for each pipeline. If the "maximum credible threat" determined by the SMS can rupture the pipeline then the notification zone should be the largest hole size produced by that threat, excluding the rupture case, (refer to discussion in Appendix 7)[11].

The maximum credible hole size is documented in the SMS report. Threats fall into the following broad categories:

- Excavators and backhoes.
- Vertical bores (typically augers to install fences or powerpoles).
- Horizontal bores (e.g. horizontal directional drills, thrust bores).
- Other threats (including dozers rippers, graders, ploughs).

AS(/NZS) 2885 provides formulas that can be used to assess whether excavators can penetrate a pipeline, based on the wall thickness, pipe strength, the weight of the excavator and the type of teeth used on the excavator bucket. The methodology also provides typical hole sizes for specific excavation equipment that can be used to determine the energy release rate and energy radiation contours around a release. For thicker wall pipelines (e.g. the Longford 350 to Long Island Point Oil Pipeline) it can be demonstrated that the maximum credible excavator cannot penetrate the pipeline.

However, for other types of threats (e.g. augers or HDD) no calculation method is available, so it is more difficult to determine whether a pipeline can resist penetration for these threats. Prior to 2016, experimental data from Vic Gas & Fuel in the 1980s and APIA/RSC in the early 2000s indicated that it was very unlikely that auger equipment could penetrate 6.4 mm pipeline. However, an incident on the Dromana to Rye Pipeline in 2016 demonstrated that a 6.4 mm pipeline could be penetrated by an auger fitted to a 33 t excavator. The hole was created by the pilot of the auger and was 50 mm in diameter. While it is reasonable to argue that as the wall thickness increases, it is less likely that that the pipeline will be penetrated, the actual wall thickness for which a pipeline cannot be penetrated cannot currently be calculated. For this reason it is suggested that, for pipelines which cannot be penetrated by the maximum credible excavator threat, the maximum credible hole size for an auger (50 mm diameter, based on the Dromana to Rye Pipeline incident) be adopted to determine the notification zone.

The notification zone for any pipeline is a function of a number factors including: maximum allowable operating pressure; and the properties of the gas or liquid contained in the pipeline, the capacity of the pipeline wall thickness to resist penetration by any equipment that strikes it. Notwithstanding this, an example of how this approach can be applied for sales gas pipelines based on the equations provided in AS(/NZS) 2885 is included in Appendix 8. These calculations assume typical sales gas properties, so calculations for specific pipelines may vary slightly.

3.6.5.1 Maximum Credible Hole Size Applied to Sales Gas and LPG Pipelines

The only significant safety issue arising from a release from a sales gas or LPG pipeline is death or injury resulting from exposure to heat radiation from an ignited gas release.

[11] The Draft LCC Report proposed "The discussion above concludes that the "maximum credible hole size" (other than the rupture case) should be used to determine notification zone for each pipeline. If the "maximum credible threat" determined by the SMS can rupture the pipeline then the notification zone should be based on the threat that produces the largest hole size but does not result in rupture." Following feedback on the Draft LCC Report the proposed approach has been revised in this summary report, and the discussion in Appendix 7 has been added.

The notification zone for a sales gas or LPG pipeline is the 4.7 kW/m^2 radiation distance[12] from an ignited release.

3.6.5.2 Maximum Credible Hole Size Applied to Crude Oil Pipelines

For crude oil pipelines there are potentially two significant safety issue arising from a release:

(i) Fatality or injury due to thermal radiation resulting from an ignited fire, normally located at the leak site. For this case the notification zone is the 4.7 kW/m^2 radiation distance from an ignited release.

(ii) If the released crude does not ignite, it can flow away from the leak site. As the distance / time that the oil mixture flows from the leak site, the lighter components evaporate and the risk of ignition significantly reduces. However, the liquid oil spill may contain toxic compounds (e.g. aromatics, volatile organic compounds (VOC), carcinogens, etc), which may be harmful if there is people are exposed for an extended period time (either due to direct exposure or contaminated soil). This is a particular issue at "sensitive use" locations, where it may be difficult to quickly evacuate people a safe distance from the spill. While this may not present an immediate fatality risk, it could require hospital treatment or result in longer term health issues. For this case the notification zone is based on an estimate of the distance that an unignited oil spill will travel from the leak site.

3.6.6 "Procedural Control" for "External Interference Threats"

Section 5.4.6 of AS/NZS 2885.1:2018 allows a Planning Notification Zone to be counted as a "procedural control" for a pipeline when:

- *The external interference threat is part of a project that is required by law to be notified to the pipeline operator at the planning stage; and*
- *The pipeline operator has systems in place to ensure that the progress of the project is monitored regularly following notification.*

A suitably designed planning regime (overlay, policy and referral provisions) will provide a basis for Pipeline Licensees to count this as an effective Planning Notification Zone procedural control in Safety Management Studies, and account for the additional protection to the pipeline afforded by the overlay in risk assessments.

3.7 DEFINING "NOTIFIABLE DEVELOPMENT"

Notifiable developments are typically those which are permitted by the current zone, but may result in a change of location class as described in AS2885.

In defining notifiable developments, the following context should be considered:

- In existing locations where either *Rural R1* or *Rural Residential R2* location classes apply, the relevant AS(/NZS) 2885 requirements for "high consequence areas" ("no rupture" and "maximum energy release rate") will need to be addressed. "Notifiable developments" are those which are likely to trigger this requirement, and include new industrial developments, developments for facilities where unusually high numbers of people are expected to congregate, and developments which result in the application of a *Sensitive Use (S)* location classification (e.g. schools, hospitals,

[12] AS 2885.6-2018 Appendix B1 - A thermal radiation level of 4.7 kW/m^2 will cause injury, at least second degree burns, after 30 seconds exposure. A thermal radiation level of 12.6 kW/m^2 represents the threshold of fatality, for normally clothed people, resulting in third degree burns after 30 seconds exposure.

aged care facilities and prisons). For the case where the notification zone is assigned on the basis of an unignited crude oil release that may contain toxic compounds (e.g. aromatics, volatile organic compounds (VOC), carcinogens, etc), only developments which result in the application of a *Sensitive Use (S)* location classification need to be considered.

- In existing locations where either *Residential T1* and/or *Industrial I* locations apply, AS(/NZS) 2885 requires that the most stringent provisions for "no rupture" applies, but that the "maximum energy release rate" (10 GJ/s) is less stringent than for *High Density T2* and/or *Sensitive Use S* locations. In this case, a primary consideration is whether the development introduces a more stringent requirement for "maximum energy release rate", and review whether controls are in place so that risks are reduced to as low as reasonably practicable (ALARP). "Notifiable developments" are expected to include developments for facilities where unusually high numbers of people are expected to congregate, and developments which result in the application of a *Sensitive Use (S)* location classification (e.g. schools, hospitals, aged care facilities and prisons). It may also include industrial plants processing dangerous chemicals.
- There are no existing locations in the LCC are where either *High Density T2* and/or *Sensitive Use S* locations apply, and so this situation was not addressed as part of this project.

The 12 uses/use groups that are considered to be "notifiable developments" are outlined below. The uses are grouped as per the nesting diagrams at Clause 73.04 of the Victoria Planning Provisions (Appendix 4C3. Each use is defined at Clause 73.04 of the Victoria Planning Provisions (Appendix 4C2).

Accommodation Group:

- Residential aged care facility
- Retirement village
- Corrective institution

Education Centre Group:

- Child care centre
- Primary school
- Secondary school

Earth and Energy Resources Industry

Leisure and Recreation Group:

- Major sports and recreation facility
- Motor racing track

Place of Assembly Group

Warehouse Group:

- Fuel depot

Other uses not nested:

- Hospital

Note: Childcare centre, major sports and recreation facility and place of assembly all contain 'sub-uses' which would also be captured as nested uses. This is shown in the nesting diagrams included in Appendix 4C3.

3.8 A REVISED PLANNING CONTROL

The following section outlines the considerations in determining the most appropriate planning control to apply to licensed pipelines in LCC, including:

- What is the purpose of any control?
- Which tool within the Victoria Planning Provisions is most appropriate?
- What would the triggers be for an application?
- What decision guidelines are required?
- Should a referral authority be nominated?

These questions are considered in turn below.

3.8.1 The purpose of a planning control

'A Practitioner's Guide to Victorian Planning Schemes' sets out the 'rules' that should be applied to the preparation of all new planning scheme provisions. Whilst there is an existing overlay in place in LCC, the methodology set out in this report has been established to support a control in all locations across Victoria. It is therefore important that the purpose of such a control is understood and justified.

A summary of the rules to be applied to new planning scheme provisions and a response to each are outlined below:

A provision must be within the scope of the objectives and power of the Planning and Environment Act

Planning in Victoria expresses a vision for a particular landscape, and balances development opportunities with community expectations and needs within those landscapes. Planning also deals with risks and hazards, such as flooding, inundation, bushfire and erosion. By appropriately considering risk in the planning system we are increasing community resilience.

One of the objectives of the Act is *to protect public utilities and other assets and enable the orderly provision and co-ordination of public utilities and other facilities for the benefit of the community.*

A planning control that aims to protect critical infrastructure and the safety of the community is entirely consistent with the objectives of the Act.

A provision must implement the objectives of planning and be supported by a sound strategic planning and policy basis

Clause 19.01-3S of the Planning Policy Framework relates to Pipeline infrastructure and states:

> ***Objective***
>
> *To ensure that gas, oil and other substances are safely delivered to users and to and from port terminals at minimal risk to people, other critical infrastructure and the environment.*
>
> ***Strategies***
>
> *Plan for the development of pipeline infrastructure subject to the Pipelines Act 2005.*
>
> *Recognise existing transmission-pressure gas pipelines in planning schemes and protect from further encroachment by residential development or other sensitive land uses, unless suitable additional protection of pipelines is provided.*
>
> *Plan new pipelines along routes with adequate buffers to residences, zoned residential land and*

other sensitive land uses and with minimal impacts on waterways, wetlands, flora and fauna, erosion prone areas and other environmentally sensitive sites.

Provide for environmental management during construction and on-going operation of pipeline easements.

There is a clear policy basis for the recognition and protection of pipelines in planning schemes.

A provision must not conflict with or duplicate other legislation, instruments or planning scheme provisions

The recommendations for a new control to pipelines in LCC have been developed to ensure there is no duplication or conflict with other legislation.

The application of a provision must be necessary and proportional to the intended planning outcome

A provision must be necessary to achieve the intended planning outcomes, having regard to other possible means of implementation, including non-statutory initiatives. It must impose a level of regulatory burden that is the minimum necessary to satisfactorily address the planning and environmental risks.

This report sets out a recommended methodology for establishing an area either side of a pipeline where a legitimate risk exists, and the application of a planning control is considered necessary and proportional to the issue.

It is intended that the minimum possible area is affected by any control, and the control only capture those uses or development that are likely to change the risk profile of the pipeline.

A provision must be consistent with the operational provisions of the scheme, any parent provision and any relevant Ministerial Direction

The provision should be drafted to be consistent with the parent provision and relevant Ministerial Directions.

The application of a provision must be clear

A clear, evidence-based methodology has been established to identify the scope of its application.

The requirements of a provision must be clear and unambiguous

A provision must be structured to be clear and unambiguous

A provision must be written to be clear and unambiguous

The draft ESO should be drafted to be as clear and unambiguous as possible.

3.8.2 The most appropriate planning tool

'A Practitioners Guide to Victorian Planning Schemes' (the Practitioners Guide) describes the Design and Development Overlay (DDO) as '*principally intended to implement requirements based on a demonstrated need to control built form and the built environment, using performance-based rather than prescriptive controls'*.

The DDO is effectively a tool to influence built form outcomes. It is commonly used in locations where there is a need to control building heights, setbacks, etc, such as activity centres. The DDO is not considered to be the most appropriate tool to manage potential risk and safety issues associated with land use in proximity to pipelines.

The Practitioners Guide describes the Environmental Significance Overlay (ESO) as: '*seeks to address areas where the development of land may be affected by environmental constraints such as effects from*

noise or industrial buffer areas, as well as issues related to the natural environment, and is applied if vegetation protection is part of a wider objective to protect the environmental significance of the area'.

The ESO is already widely used in Victoria to not only protect environmental assets, flora and fauna, but to also protect areas surrounding treatment plants, landfills and other industrial facilities from the offsite amenity and safety issues presented by those activities. The Major Hazards Advisory Committee Final Report, July 2016, also recommended that, in the absence of any other suitable control, the ESO be considered for application to pipelines and that it captures sensitive uses as the permit trigger. We generally support the thinking and recommendations outlined in the Advisory Committee Report.

It is recommended that the existing Design and Development Overlay, Schedule 1 be deleted and replaced with a new schedule 4 to the Environmental Significance Overlay. Ministerial Direction 1 requires that an ESO includes the following:

- A statement of environmental significance.
- An environmental objective.
- Permit requirements.
- Application requirements.
- Decision guidelines.

3.8.3 Statement of Environmental Significance and Environmental Objective

A schedule to the ESO must include a statement of environmental significance and the environmental objectives to be achieved by the ESO. The purpose of the statement and objectives is to provide context to decision makers and proponents for the basis of the overlay and what it is seeking to achieve. The following statement of environmental significance and environmental objective are proposed to be included within the new ESO:

Statement of environmental significance

> *Pipelines licensed under the Pipelines Act 2005 carry a range of high pressure and volatile substances, such as gas, petroleum and other industrial products, throughout Victoria. A pipeline failure, such as a hole or rupture, can impact an area hundreds of metres from a pipeline.*
>
> *Pipelines are constructed in locations where threats to the pipeline, including damage caused by third parties, and the consequences of pipeline failure have been assessed and reduced to as low as reasonably practicable. Over time, as land uses change and new construction activity is undertaken near pipelines, new threats to the pipeline and increased consequences of pipeline failure can arise.*
>
> *Although pipelines are one of the safest methods and most efficient methods of transporting liquid and gaseous substances, the risks of pipeline failure must be carefully managed to protect human life and the environment.*

Environmental objective to be achieved

> *To protect human life and the environment by ensuring any increases to the risk of pipeline failure resulting from a development are mitigated to acceptable levels.*

3.8.4 Application triggers and requirements

The primary concern for Pipeline Licensees is the siting of developments that potentially result in a significant increase in the consequence of a product release in proximity to pipelines. In the terminology of AS(/NZS) 2885, these are typically developments which result in either “Sensitive Use (S)”, “Crowd (C)” or “Heavy Industrial (HI)” location classification. It is noted that the terms applied for location classification in AS(/NZS) 2885 do not correspond directly with terminology used in the Victorian Planning Scheme.

The 12 uses of interest have been identified as ‘notifiable developments’ are listed in Section 3.7.

The ESO cannot be tailored to trigger use applications, so instead the trigger must be drafted to capture buildings and works applications associated with the uses listed above. Such a trigger is commonplace in the planning system. An example of the draft that could be adopted is below:

> *A permit is not required to construct a building or construct or carry out works, except where associated with the following land uses (list uses). This does not apply if the new buildings and works are associated with an existing use and do not result in the gross floor area of all buildings associated with the use increasing by more than 25% of the existing gross floor area.*

3.8.5 Decision Guidelines

The decision guidelines in any overlay must be sufficient to enable clear, consistent decision making.

Before deciding on an application triggered by the ESO, the Responsible Authority must consider:

- *The Municipal Planning Strategy and Planning Policy Framework.*
- *The statement of environmental significance and the environmental objective contained in the relevant schedule to the ESO*
- *The need to remove, destroy or lop vegetation to create a defendable space to reduce the risk of bushfire to life and property.*
- *Any other matters specified in a schedule to this overlay.*

Decision guidelines contained within the schedule to the ESO should also be clearly aligned with the should also be aligned with the statement of environmental significance and the environmental objectives provided in that schedule. To manage the risks of land development near pipelines, decision guidelines should consider potential treats to the pipeline (including from construction activity), any increases in the consequences of pipeline failure, and also whether the design has addressed pipeline risks where practicable. As such, it is proposed to identify the following decision guidelines within the schedule to the ESO:

- The views of Energy Safe Victoria.
- Whether the buildings or works, including associated construction activities, will result in any additional threats to a licensed pipeline and how these threats will be mitigated.
- The extent to which the buildings or works will increase the consequence of a pipeline failure.
- Whether the buildings or works have been designed to reduce risks to human life in the event of a pipeline failure, where practicable, including:
    - Opportunities to locate the development further away from the pipeline.
    - Locating emergency exits away from the pipeline.
    - Siting external gathering spaces, such as playgrounds, away from the pipeline.

In reviewing these decision guidelines, the Responsible Authority will need to determine whether a proposal has achieved the environmental objective of the overlay.

3.8.6 Should a referral authority be nominated?

This section outlines the purpose and status of a referral authority in the planning system and whether it is appropriate to include a referral mechanism in any new planning control. The authors wish to acknowledge Harwood Andrews lawyers in providing input to this section.

The *Planning and Environment Act 1987* (the Act) confers a special status on referral authorities in the planning regime. It creates two types of referral authorities: recommending and determining referral authorities. The role of a referral authority in a planning application varies significantly depending on whether it is identified as a recommending or determining referral authority in clause 66 of a planning scheme.

As their titles suggest, a recommending referral authority assumes an advisory role in respect of a planning application while a determining referral authority may direct the outcome of an application. The process of referring an application is the same for both types of referral authority.

A referral authority can provide specialist or technical advice to the responsible authority that assists them in making an informed decision on an application. In the case of licensed pipelines, the responsible authority will be considering a number of other scheme requirements in addition to the requirements of the overlay for a licensed pipeline.

Given the need for the responsible authority to balance the considerations of different scheme requirements to achieve a net community benefit or product acceptable policy outcomes, it is considered that a recommending referral authority status is appropriate for licensed pipelines.

It would be inappropriate to include a decision guideline in a planning control requiring a responsible authority to consider the impact of a proposed use or development on a licensed pipeline and vice-versa absent any referral or notice requirements to ESV or a Pipeline Licensee.

Primarily, this is because a responsible authority is unlikely to be appropriately skilled or resourced to consider public safety risks from licensed pipeline operations.

ESV has the requisite specialist expertise and knowledge in the area to assist in this regard. Notifying or referring such applications to ESV would also ensure ESV can appropriately coordinate referrals to relevant Pipeline Licensees and ensure a consistent standard of responses in line with the relevant planning control.

It is recommended that ESV be identified as a recommending referral authority associated with the introduction of a new planning control to licensed pipelines in LCC.

3.9 NOMINATED NOTIFICATION ZONES

The notification zones nominated by the Pipeline Licensees is summarised in the table below:

Name	Product	Owner / (Operator)	MAOP (kPa)	Notification distance (m)
Morwell – Tramway Rd (T005)	Sales Gas	AGIG / (APA)	2,760	40
Morwell (T082)	Sales Gas	AGIG / (APA)	2,760	40
Longford 700 to Long Island Point Oil – (out of service)	*Nitrogen*	*Esso*	*4,500*	*n/a*
Longford 250 to Long Island Point LPG	LPG	Esso	8,275	180
Morwell – Dandenong (T1)	Sales Gas	APA Group	2,760	50
Supply to Maryvale (37)	Sales Gas	APA Group	6,890	85
Supply to Jeeralung (T1)	Sales Gas	APA Group	2,760	50
Longford – Dandenong (inc. Longford – Rosedale, Longford – Tyers) (T60)	Sales Gas	APA Group	6,890	85
Rosedale – Tyers (T60)	Sales Gas	APA Group	7,070	85
Longford – Rosedale (T60)	Sales Gas	APA Group	7,070	85
Tyers – Morwell (T63)	Sales Gas	APA Group	7,070	85
Longford 700 to Westbury Oil – (out of service)	*Water*	*Esso*	*4,500*	*n/a*
Longford 350 to Long Island Point Oil	Oil	Esso	9,530	70/100
Loy Yang B Gas Pipeline	Sales Gas	Alinta / (APA)	10,210	90

The basis for the nominated notification zones (which defines a corridor that extends either side of the pipeline by that distance, so that the total corridor width is double the notification distance) is included in the notes to the Pipeline Summary (Appendix 2A). For the Longford 350 to Long Island Point Oil two distances are nominated. The 70 m notification zone is based on the 4.7 kW/m^2 radiation distance from an ignited release. The 100 m is based on Esso's estimate of the distance that an unignited oil spill will travel from the leak site (refer to the discussion in Section 3.6.5.2).

4 SUMMARY

A project to develop an effective planning overlay for the high pressure oil and gas pipelines that traverse the Latrobe City Council (LCC) local government area has been undertaken in consultation with key stakeholders including APA Group / Australian Gas Infrastructure Group, Energy Safe Victoria (ESV), ExxonMobil (Esso), Latrobe City Council (LCC), Department of Environment, Land, Water and Planning (DELWP), and Loy Yang B (Alinta).

The review of the DDO1 provides an opportunity for industry, ESV and local government to work together to develop a methodology and draft a control that is useful, robust and reasonable. The outputs of the project may be a useful tool in rolling out a planning control for licensed pipelines across Victoria more broadly.

The project has:

1. Developed the principles and a methodology to determine a "notification zone" that is specific to the characteristics of each pipeline and specified the "notification zone" for each pipeline.
2. Developed the principles that determine whether a development is a "notifiable development" that takes into account the Pipeline Licensee's obligations under AS(/NZS) 2885 *Pipelines-gas and liquids petroleum,* and identified "notifiable developments" within the context of the Victorian Planning Scheme Nesting Diagrams.
3. Recommended the most appropriate planning overlay for the purposes of notification, provided draft decision guidelines for the overlay, and provided a recommendation as to whether "referral" or "notification" is the most appropriate mechanism.

4.1 PRINCIPLES AND METHODOLOGY FOR PIPELINE NOTIFICATION ZONES

1) The factors that determine whether notification via an overlay is required are:
    a) "Does the development significantly increase the consequence of a pipeline release?"; and
    b) "Does the development affect the ability of the Pipeline Licensee to safety operate and maintain the pipeline or facilities?"
        i) There are other mechanisms in place to alert the pipeline operator with respect to developments that can change the location class or directly affect the pipeline easement.
2) The purpose of the notification via an overlay is to provide an opportunity for the Pipeline Licensee to be involved in the development approvals process as early as possible, so that it can take appropriate actions to manage risks to public safety, security of supply and the environment in accordance with the requirements of AS(/NZS) 2885.
3) Developments closest to the pipeline are of the greatest interest, because, the closer they are to the pipeline, the greater the risk (regardless of the size of the release, radiation zones are greatest closest to the pipeline).
4) The pipeline notification zone as identified by an overlay should not be based on the measurement length (which assumes that the failure mode is a rupture), which, in general, is many hundreds of metres. The issues are:
    a) Based on Australian and overseas experience, gas releases from holes are far more likely than ruptures. Even if rupture is credible, it is generally a lower frequency event than a hole. In the event of a rupture it is more likely that those closer to the pipeline will be affected than those further away.

b) If notification zones are based on the measurement length then this will generate a disproportionate number of notifications that do not require any action or input from the Pipeline Licensee, while creating significant overheads for developers, councils and the Licensee.

5) Given this, the "maximum credible hole size" (but assuming that rupture is not the failure mode) should be used to determine the notification zone for each pipeline. If the "maximum credible threat" determined by the SMS can rupture the pipeline then the notification zone should be based on the largest hole size produced by that threat excluding the rupture case (refer to discussion in Appendix 7).

6) The notification zone for each pipeline needs to be determined on a basis that is consistent, transparent and understandable to all stakeholders (council, developers, ESV and Pipeline Licensees). Therefore, the nominated notification zone should describe and reference the maximum credible threat / hole size / radiation zone as determined by the current SMS. This is typically a hole created by an excavator. Where a pipeline has sufficient wall thickness to resist penetration by an excavator, it is suggested that the maximum credible hole size for an auger (50 mm diameter, based on the Dromana to Rye Pipeline incident) be adopted to determine the notification zone.

7) The notification zone for any pipeline is a function of a number of factors including: maximum allowable operating pressure; and the properties of the gas or liquid contained in the pipeline and the capacity of the pipeline wall thickness to resist penetration by any equipment that strikes it. For this reason, notification zones may vary for different pipelines.

   a) For a sales gas or LPG pipeline the notification zone is the 4.7 kW/m^2 radiation distance from an ignited release.

   b) For crude oil pipelines there are potentially two significant safety issues arising from a release, so two notification zones may need to be nominated: (1) The 4.7 kW/m^2 radiation distance from an ignited release; and (2) The estimated distance which an unignited release that may contain toxic compounds (e.g. aromatics, volatile organic compounds (VOC), carcinogens, etc), may travel. This is a particular issue at "sensitive use" locations, where it may be difficult to quickly evacuate people a safe distance from the spill.

8) The pipeline safety management study is subject to a "periodic operational review" at intervals not exceeding 5 years. There is the possibility that a subsequent review may identify a change to the threat profile that may result in an increase (or decrease) in the notification zone for a particular pipeline.

9) The proposed "notification zone" for each pipeline is summarised in Section 0.

4.2 NOTIFIABLE DEVELOPMENTS

"Notifiable developments" are typically those which are permitted by the current zone of the land, but result in a change from the current prevailing land use. This in turn may change the obligations of the Pipeline Licensee under the requirements of AS(/NZS) 2885, particularly with respect to the provisions for "high consequence areas". This depends on AS(/NZS) 2885 "location classification" of the particular pipeline at the location of the proposed development. This is discussed in detail in Section 3.7, and the identified "notifiable developments" within the context of the Victorian Planning Scheme Nesting Diagrams are provided in Appendix 4C.

4.3 REVISED PLANNING CONTROL

It is recommended that:

- The existing DDO1 be deleted and replaced with a new schedule 4 to the ESO.
- Clause 66.04 is amended to require all planning applications triggered by the ESO4 to be referred to Energy Safe Victoria (ESV). Identify ESV as a recommending referral authority.
- The ESO4 should trigger a planning permit for buildings and works associated with the following 12 notifiable developments:
    - Child care centre
    - Corrective institution
    - Earth and Energy Resources Industry
    - Fuel depot
    - Hospital
    - Major sports and recreation facility
    - Motor racing track
    - Place of assembly
    - Primary school
    - Residential aged care facility
    - Retirement village
    - Secondary school.

Appendix 1 REFERENCE DOCUMENTS AND ABBREVIATIONS

Appendix 1A List of Standards and Other References

REFERENCE	DOCUMENT TITLE
AS/NZS 2885.0-2018	Pipelines – Gas and liquid petroleum – General Requirements
AS/NZS 2885.1-2018	Pipelines – Gas and liquid petroleum – Design and construction
AS 2885.3-2012	Pipelines – Gas and liquid petroleum – Operations and Maintenance
AS/NZS 2885.6-2018	Pipelines – Gas and liquid petroleum – Pipeline Safety Management
	Planning and Environment Act 1987
	Pipelines Act 2005.

Appendix 1B List of Abbreviations

ABBREVIATION	DESCRIPTION
AGIG	Australian Gas Infrastructure Group
ALARP	As Low As Reasonably Practicable
APA	APA Group
APGA	Australian Pipeline and Gas Association
AS	Australian Standard
CDL	Critical Defect Length
DDO	Design and Development Overlay
DELWP	Department of Environment, Land, Water and Planning
DN	Nominal Diameter
ESV	Energy Safe Victoria
FBE	Fusion Bonded Epoxy
GIS	Geographic Information System
GJ/s	Gigajoules per second (energy release rate)
GP	General Purpose
HDD	Horizontal Directional Drill
HI	Heavy Industrial location classification
I	Industrial location classification
kW/m^2	Kilowatts per metre squared (heat radiation flux)
LCC	Latrobe City Council
LPG	Liquefied Petroleum Gas

ABBREVIATION	DESCRIPTION
MAOP	Maximum Allowable Operating Pressure
R1	Rural location classification
R2	Rural Residential Use location classification
ROW	Right of Way
RTP	Resistance to Penetration
S	Sensitive Use location classification
SMS	Safety Management Study
T1	Residential location classification
T2	High Density location classification
WT	Wall Thickness

Appendix 2 HIGH PRESSURE OIL AND GAS PIPELINES IN LATROBE CITY COUNCIL LGA

Appendix 2A PIPELINES SUMMARY

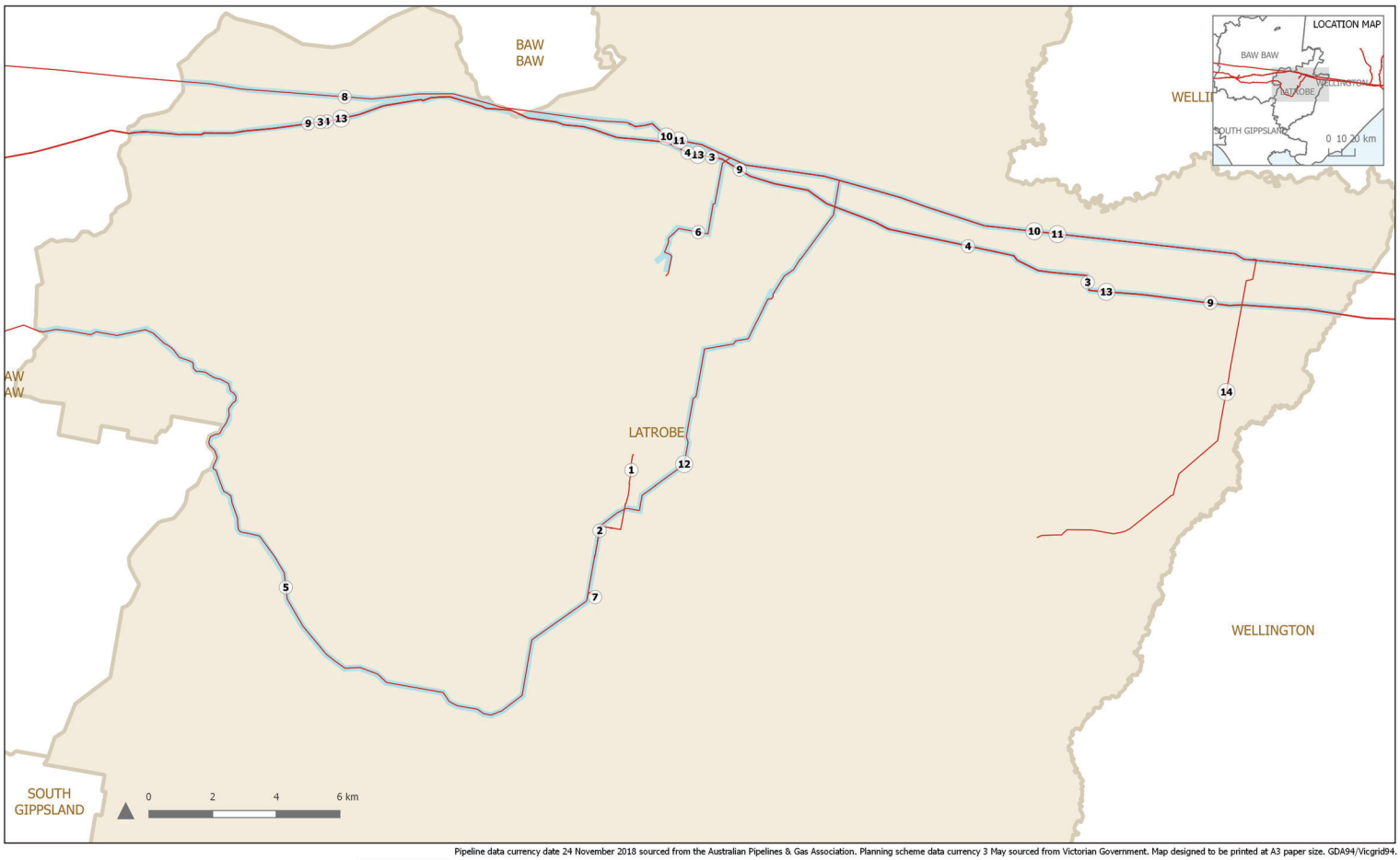
PIPELINES SUMMARY

	Name	Product	Owner	Operator	Licence	Nominal Diameter (mm)	Length (km)	MAOP (kPa)	MOP (kPa)	Measurement Length (m)	Notification Distance	Depth of Cover (mm)	Wall Thickness (mm)	Critical Defect Length (mm)	Resistance to Penetration
1	Morwell – Tramway Rd (T005)	Sales Gas	AGIG	APA Group	PL215	80/100	4.1	2,760	n/a	74	40m (Note 1)	1,200 (min)	5.5, 6.0	hoop stress < 30% SMYS	*GP - No penetration TT - >25T (2-teeth) SPTT, PT - >10T (B=1)*
2	Morwell (T082)	Sales Gas	AGIG	APA Group	n/a	100	0.8	2,760	n/a	74	40m (Note 1)	1,200 (min)	5.5	hoop stress < 30% SMYS	*GP - No penetration TT - no penetration (2-teeth) SPTT, PT - >40T (B=0.75)*
3	*Longford 700 to Long Island Point Oil – (out of service)*	*Nitrogen*	*Esso*	*Esso*	PL35	*700*	*185*	*4,500*	*0*	*0*	***n/a***	*900 - 1,200*	*9.53, 11.53, 12.7*	*250 (9.53)*	*GP - No penetration TT - no penetration (2-teeth) PT - >40T (B=0.75)*
4	Longford 250 to Long Island Point LPG	LPG	Esso	Esso	PL27, PL34	250	185	8,275	4,500	920	180m (note 4)	900 - 1,200	5.56, 6.35	90	*GP - No penetration SP/TT - >15T(B=0.75)*
5	Morwell – Dandenong (T1)	Sales Gas	APA Group	APA Group	PL50	450	127	2,760	n/a	272	50m (Note 2)	800 (min)	7.9, 9.53	268	*GP - No penetration TT - no penetration (2-teeth) SPTT, PT - >20T (B=0.75)*
6	Supply to Maryvale (37)	Sales Gas	APA Group	APA Group	PL67	150	5.4	6,890	n/a	154	85m (Note 2)	1,200 (min)	10.31, 12.7	141	*GP - No penetration TT - no penetration (2-teeth) SPTT, PT - >15 (B=0.75)*
7	Supply to Jeeralung (T1)	Sales Gas	APA Group	APA Group	PL50	300	0.76	2,760	n/a	194	50m (Note 2)	800 (min)	6.35	274	*GP - No penetration TT - no penetration (2-teeth) SPTT, PT - >15T (B=0.75)*
8	Longford – Dandenong (inc. Longford – Rosedale, Longford – Tyers) (T60)	Sales Gas	APA Group	APA Group	PL75	700	174.2	6,890	n/a	700	85m (Note 2)	1,200 (min)	10.31, 12.7	182	*GP - No penetration SPTT, PT - no penetration (B=0.75)*
9	Rosedale – Tyers (T60)	Sales Gas	APA Group	APA Group	PL117	750	34.3	7,070	n/a	708	85m (Note 2)	1,200 (min)	10.31, 12.7	196	*GP - No penetration TT - no penetration (2-teeth) SPTT, PT - >50T (B=0.75)*
10	Longford – Rosedale (T60)	Sales Gas	APA Group	APA Group	PL117	750		7,070	n/a	708	85m (Note 2)	1,200 (min)	10.31, 12.7	196	*GP - No penetration TT - no penetration (2-teeth) SPTT, PT - >50T (B=0.75)*
11	Tyers – Morwell (T63)	Sales Gas	APA Group	APA Group	PL121	500	15.7	7,070	n/a	475	85m (Note 2)	1,200 (min)	8.72, 10.59	182	*GP - No penetration TT - no penetration (2-teeth) SPTT, PT - >50T (B=0.75)*
12	*Longford 700 to Westbury Oil – (out of service)*	*Water*	*Esso*	*Esso*	PL126	*700*	88	*4,500*	*0*	*0*	***n/a***	*900 - 1,200*	*9.53, 11.53, 12.7*	*250 (9.53)*	*GP - No penetration TT - no penetration (2-teeth) PT - >40T (B=0.75)*
13	Longford 350 to Long Island Point Oil	Oil	Esso	Esso	PL282	350	185	9,530	5,000	430	70m (note 5) / 100m (Note 6)	*900 - 1,200*	*9.53 12.7*	120 (9.53) 223 (12.7)	*GP - No penetration TT - no penetration (2-teeth) SPTT, PT - >35T (B=0.75)*
14	Loy Yang B Gas Pipeline	Sales Gas	Alinta	APA Group	PL234	300	12.96	10,210	n/a	~300	90m (Note 3)	750 (min)	4.77, 5.72	TBA	TBA

NOTES
(1) refer Jarrod Dunn e-mail dated 1 August 2019. Maximum hole equivalent diameter is 50mm (based on pilot hole of an auger, based on Dromana to Rye Pipeline Incident)
(2) Refer Glenn Ogilvie e-mail dated 22 July 2019. Maximum hole diameter is 65mm (based on 25T excavator fitted with penetration teeth).
(3) Provisional estimate by GPA based on maximum hole diameter for APA pipelines, and using the calculation method from AS2885.8-2018, Appendix B.
(4) refer David Levy e-mail dated 27 August 2019. Maximum hole diameter is 60mm (based on 10T excavator fitted with tiger teeth - twin point penetration).
(5) refer David Levy e-mail dated 16 August 2019. Maximum hole equivalent diameter is 50mm. 70m is the 4.7 kW/m^2 thermal radiation distance for an ignited pool fire at the leak location.
(5) refer David Levy e-mail dated 16 August 2019. Maximum hole equivalent diameter is 50mm. 100m is the maximum distance that an unignited leak can flow, exposing the public to toxic compounds in the crude oil..

Appendix 2B PIPELINE MAPS

LICENSED PIPELINES PASSAGE THROUGH PLANNING SCHEME ZONES



Pipeline data currency date 24 November 2018 sourced from the Australian Pipelines & Gas Association. Planning scheme data currency 3 May sourced from Victorian Government. Map designed to be printed at A3 paper size. GDA94/Vicgrid94.

Legend

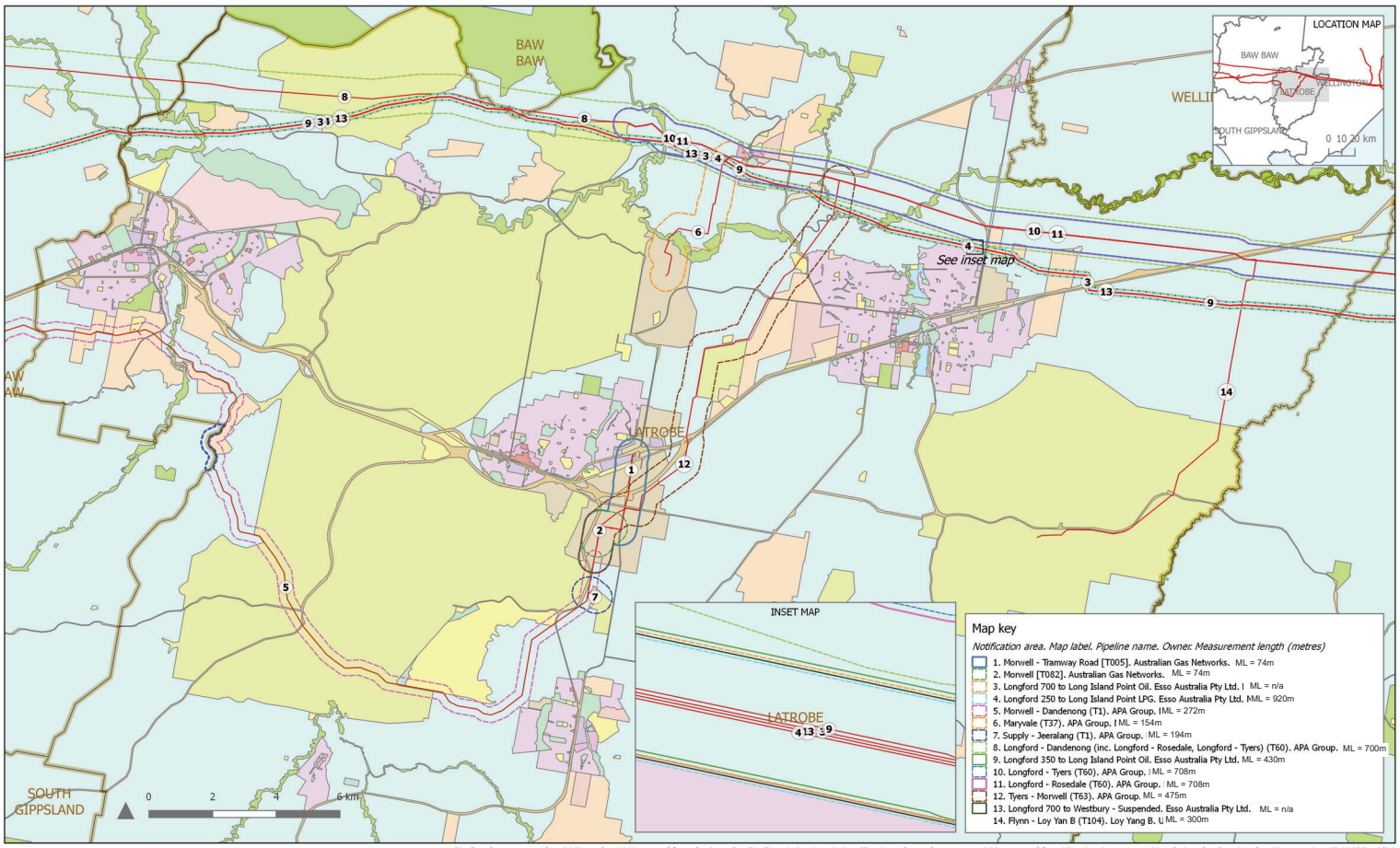
- Licensed pipeline
- Design and Development Overlay - Schedule 1
- Latrobe local government area
- Local government area boundary

Map key

Map label. Pipeline name. Owner. Measurement length (metres)

1. Morwell - Tramway Road [T005]. Australian Gas Networks. ML = 74m
2. Morwell [T082]. Australian Gas Networks. ML = 74m
3. Longford 700 to Long Island Point Oil. Esso Australia Pty Ltd. ML = n/a
4. Longford 250 to Long Island Point LPG. Esso Australia Pty Ltd. ML = 920m
5. Morwell - Dandenong (T1). APA Group. ML = 272m
6. Maryvale (T37). APA Group. ML = 154m
7. Supply - Jeeralang (T1). APA Group. ML = 194m
8. Longford - Dandenong (inc. Longford - Rosedale, Longford - Tyers) (T60). APA Group. ML = 700m
9. Longford 350 to Long Island Point Oil. Esso Australia Pty Ltd. ML = 430m
10. Longford - Tyers (T60). APA Group. ML = 708m
11. Longford - Rosedale (T60). APA Group. ML = 708m
12. Tyers - Morwell (T63). APA Group. ML = 475m
13. Longford 700 to Westbury - Suspended. Esso Australia Pty Ltd. ML = n/a
14. Flynn - Loy Yang B (T104). Loy Yang B. ML = 300m

LICENSED PIPELINES PASSAGE THROUGH PLANNING SCHEME ZONES



Pipeline data currency date 24 November 2018 sourced from the Australian Pipelines & Gas Association. Planning scheme data currency 3 May sourced from Victorian Government. Map designed to be printed at A3 paper size. GDA94/Vicgrid94.

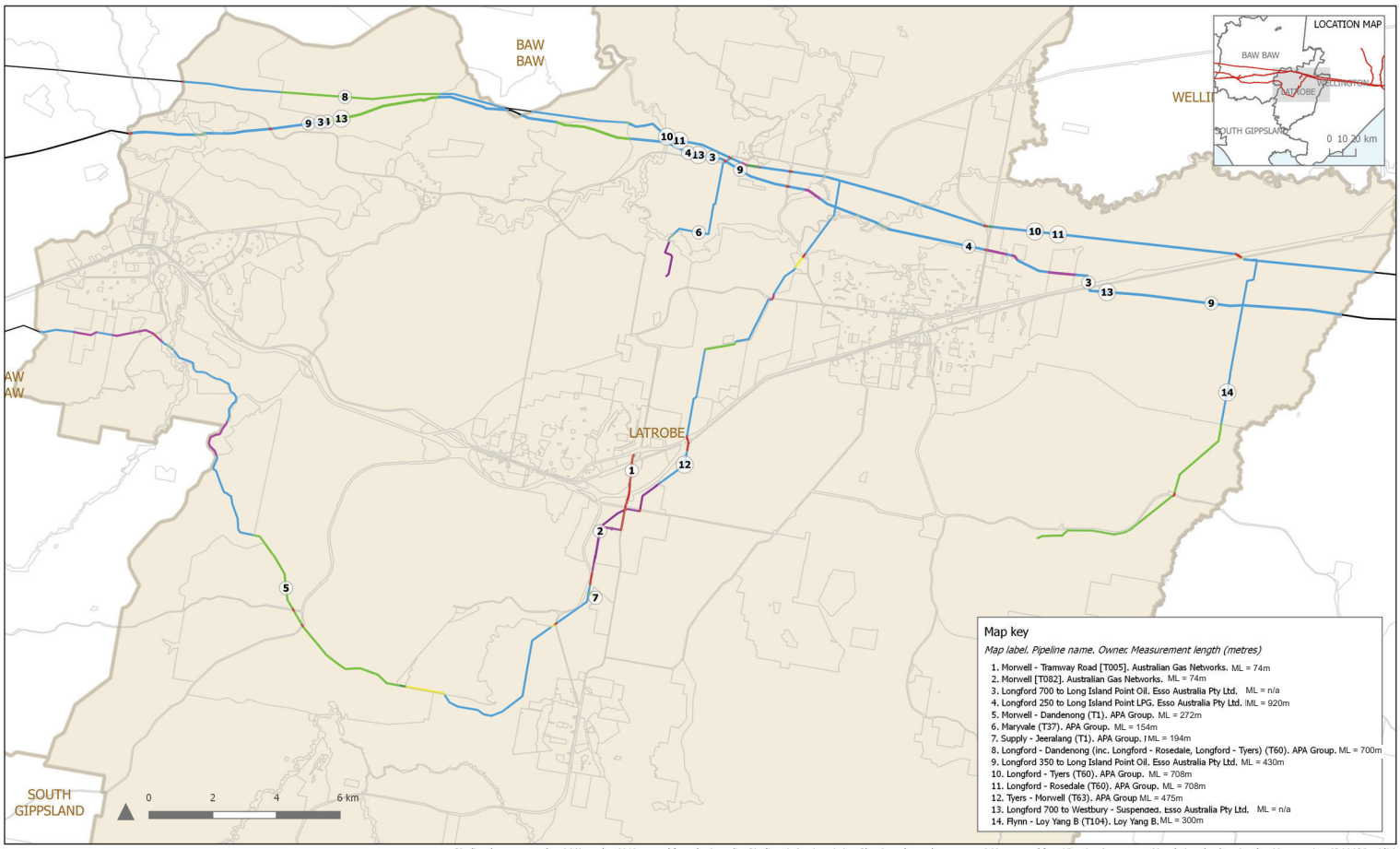
Legend

- Licensed pipeline
- Notification area of interest
- Local government area boundary

Planning scheme zones

- ACTIVITY CENTRE ZONE - SCHEDULE 1
- COMMERCIAL 1 ZONE
- COMMERCIAL 2 ZONE
- FARMING ZONE
- GENERAL RESIDENTIAL ZONE - SCHEDULE 1
- INDUSTRIAL 1 ZONE
- INDUSTRIAL 2 ZONE
- INDUSTRIAL 3 ZONE
- LOW DENSITY RESIDENTIAL ZONE
- MIXED USE ZONE
- NEIGHBOURHOOD RESIDENTIAL ZONE - SCHEDULE 1
- PUBLIC CONSERVATION AND RESOURCE ZONE
- PUBLIC PARK AND RECREATION ZONE
- PUBLIC USE ZONE - CEMETERY/CREMATORIUM
- PUBLIC USE ZONE - EDUCATION
- PUBLIC USE ZONE - HEALTH AND COMMUNITY
- PUBLIC USE ZONE - LOCAL GOVERNMENT
- PUBLIC USE ZONE - OTHER PUBLIC USE
- PUBLIC USE ZONE - SERVICE AND UTILITY
- PUBLIC USE ZONE - TRANSPORT
- RESIDENTIAL GROWTH ZONE - SCHEDULE 1
- RESIDENTIAL GROWTH ZONE - SCHEDULE 2
- ROAD ZONE - CATEGORY 1
- ROAD ZONE - CATEGORY 2
- RURAL CONSERVATION ZONE
- RURAL LIVING ZONE - SCHEDULE 1
- RURAL LIVING ZONE - SCHEDULE 2
- RURAL LIVING ZONE - SCHEDULE 3
- RURAL LIVING ZONE - SCHEDULE 4
- RURAL LIVING ZONE - SCHEDULE 5
- RURAL LIVING ZONE - SCHEDULE 6
- SPECIAL USE ZONE - SCHEDULE 1
- SPECIAL USE ZONE - SCHEDULE 2
- SPECIAL USE ZONE - SCHEDULE 3
- SPECIAL USE ZONE - SCHEDULE 4
- SPECIAL USE ZONE - SCHEDULE 6
- SPECIAL USE ZONE - SCHEDULE 7
- TOWNSHIP ZONE
- URBAN FLOODWAY ZONE
- URBAN GROWTH ZONE - SCHEDULE 1

LICENSED PIPELINES PASSAGE THROUGH PLANNING SCHEME ZONES



Pipeline data currency date 24 November 2018 sourced from the Australian Pipelines & Gas Association. Planning scheme data currency 3 May sourced from Victorian Government. Map designed to be printed at A3 paper size. GDA94/Vicgrid94.

Legend

Licensed pipeline within Latrobe

Passage through planning scheme zone

- FZ
- IN1Z
- IN2Z
- LDRZ
- PCRZ
- PPRZ
- PUZ1
- PUZ4
- PUZ5
- RDZ1
- RDZ2
- RLZ3
- RLZ5
- SUZ1
- SUZ7

Licensed pipeline not within Latrobe

Planning scheme zone boundary

Latrobe local government area

Appendix 3 SCHEDULE 1 TO THE DESIGN AND DEVELOPMENT OVERLAY

19/01/2006
VC37

SCHEDULE 1 TO THE DESIGN AND DEVELOPMENT OVERLAY

Shown on the planning scheme map as **DDO1**.

MAJOR PIPELINE INFRASTRUCTURE

1.0 Design objectives

19/01/2006
VC37

To ensure that all buildings and works and in particular buildings designed to accommodate people are sufficiently separated from high pressure pipelines to avoid a safety hazard.

2.0 Buildings and works

19/01/2006
VC37

A permit is required to:

- Construct an outdoor swimming pool associated with a dwelling.
- Construct a fence within 3 metres of any pipeline.

3.0 Advertising signs

19/01/2006
VC37

Advertising sign requirements are at Clause 52.05. This Schedule is in Category 4.

4.0 Decision guidelines

19/01/2006
VC37

Before deciding on an application, in addition to the decision guidelines in Clause 65, the responsible authority must consider:

- The appropriateness of constructing any buildings or fences within 3 metres of any pipeline.
- The appropriateness of constructing any dwelling or building designed to accommodate 20 or more people within 200 metres of a Type C Pipeline.
- The views of the Secretary of the Department administering the *Pipelines Act 1967*.

Appendix 4 WORKSHOP MATERIALS

Appendix 4A WORKSHOP AGENDA

Memorandum

To: Auld Planning & Projects

Pages: 1

Attn: Sarah Auld

Reference: 18836-MEMO-002

CC: N/A

Project Number: 18836

Subject: Revised Agenda – Latrobe CC DDO1 Workshop

Date: 20/05/2019

TIME	ITEM	RESP.
09:00 – 09:15	Introductions and Welcome	GPA
09:15 – 09:30	Purpose of Project	APP
09:30 – 09:45	Objectives – What are we trying to achieve?	GPA / APP
09:45 – 10:15	Overview of DDO1 and Planning Scheme Zones	LCC
10:15 – 10:30	MORNING TEA	Everyone
10:15 – 10:45	Overview of growth and settlement patterns and forecast projects for the region	LCC
10:45 – 11:00	Overview of AS/NZS 2885 requirements	GPA
11:00 – 11:30	APA Pipelines Overview	APA
11:30 – 12:00	Esso Pipelines Overview	ExxonMobil
12:00 – 12:30	Review of Model for Notifiable Developments (Section 3 of this Report)	GPA
12:30 – 13:00	LUNCH	Everyone
13:00 – 13:30	Discussion of Objectives • Do we agree / disagree? • Have we missed anything?	GPA
13:30 – 15:00	Discussion of Model for Notifiable Developments • Factors that determine “notifiable developments” • *Rural (R1)* and *Rural Residential (R2)* locations: • *Residential (T1)* and *Industrial (I)* locations: • *High Density (T2)* and/or *Sensitive Use (S)* locations: • *Other Questions to be addressed*	GPA
15:00 – 15:15	BREAK	Everyone
15:15 – 16:30	Discussion (Continued) • What is the nature of the overlay, taking into account measure length, location class, etc. • What types of uses and development do Pipeline Licensees need to know about? • Why do they need to know? • What will be the things that are considered as these will feed into decision guidelines?	GPA
16:30 – 17:00	Summary and Next Steps	GPA / APP

Richard McDonough

Appendix 4B ATTENDANCE SHEET

LATROBE CITY COUNCIL

DDO1 Major Pipelines Infrastructure Review Workshop, APA Melbourne Office, 21 May 2019

Name	Position	Organization
Richard McDonough	Facilitator	GPA.
Nick Kastelein	Minute-taker	GPA
KAREN EGAN	COORDINATOR STATUTORY PLANNING	LCC
Lorrae Dukes	coordinator strategic Planning	Latrobe City Council
JARROD DUNN	MANAGER PLANNING + INTEGRITY	APA.
Michael Mielczarek	Senior Urban Planner	APA
Sarah Auld	Director,	Auld Planning & Projects
FARRAH TAN-SAVVA	PIPELINES SUPERVISOR	ESSO AUSTRALIA
Glenn Ogilvie	Senior Risk Engineer	APA
DANIEL TUCCI	ASSET MANAGER (UTS)	APA
IAN STEWART	TECH & REG Compliance	APA
Chris Liew*	Asset Integrity Manager	APA. TELECONF
Zubair Cheema	~~Energy Safe Vic~~ Sr. Tech engineer	ESV
DAVID LEVY	PIPELINE ENGINEER	ESSO.

note DELWP – apology

* teleconference

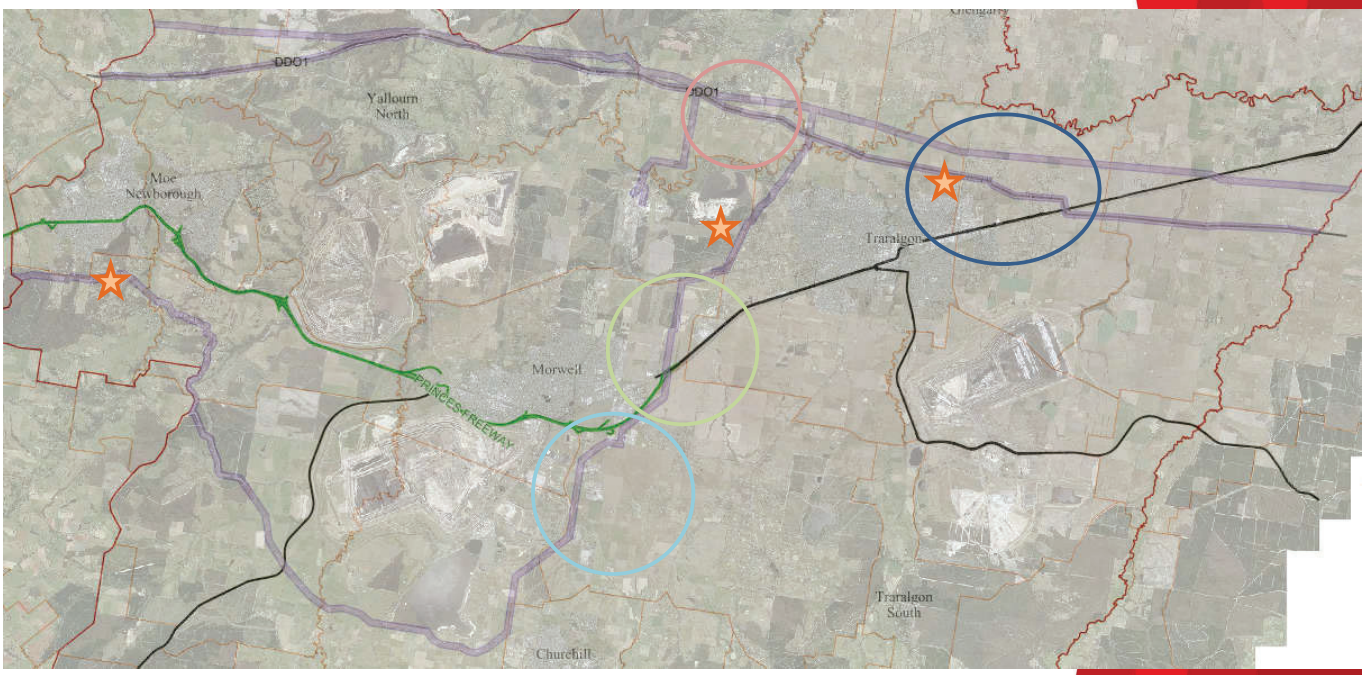
Appendix 4C LATROBE CITY COUNCIL PRESENTATION & PLANNING DOCUMENTS

1. Latrobe City Council Workshop Presentation
2. Victoria Planning Provisions – Land Use Terms
3. Victoria Planning Provisions – Nesting Diagrams

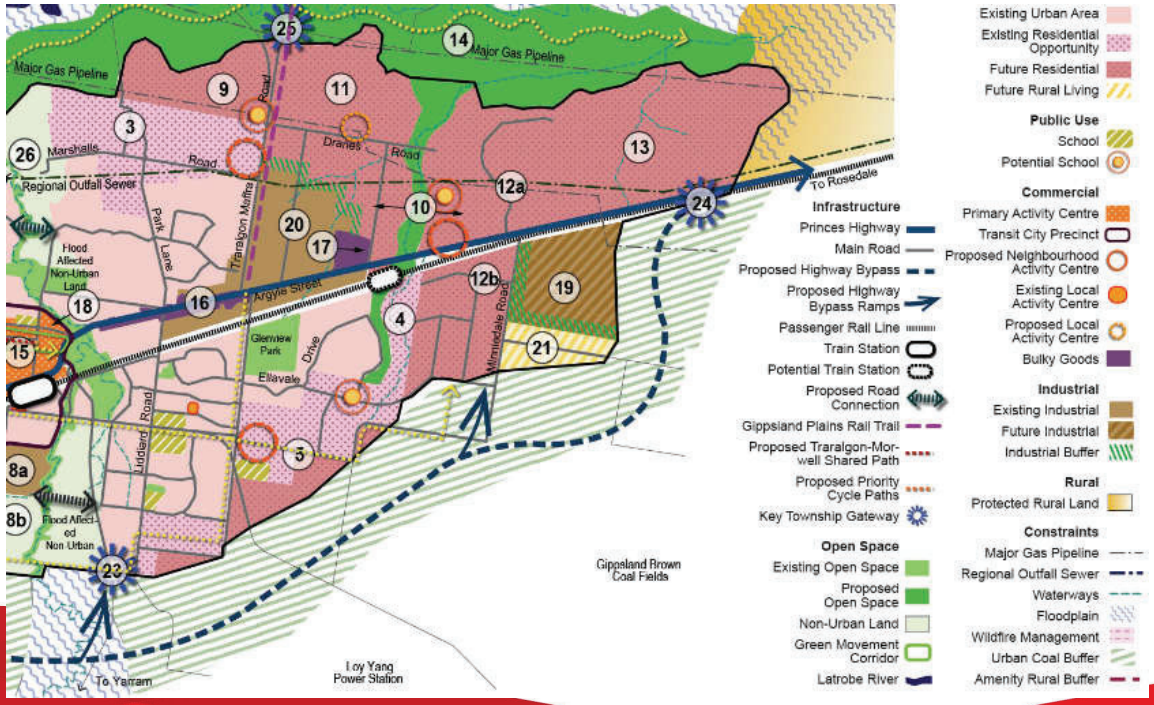
Latrobe Growth Areas and DDO1

Latrobe City
a new energy

Extent of DDO1

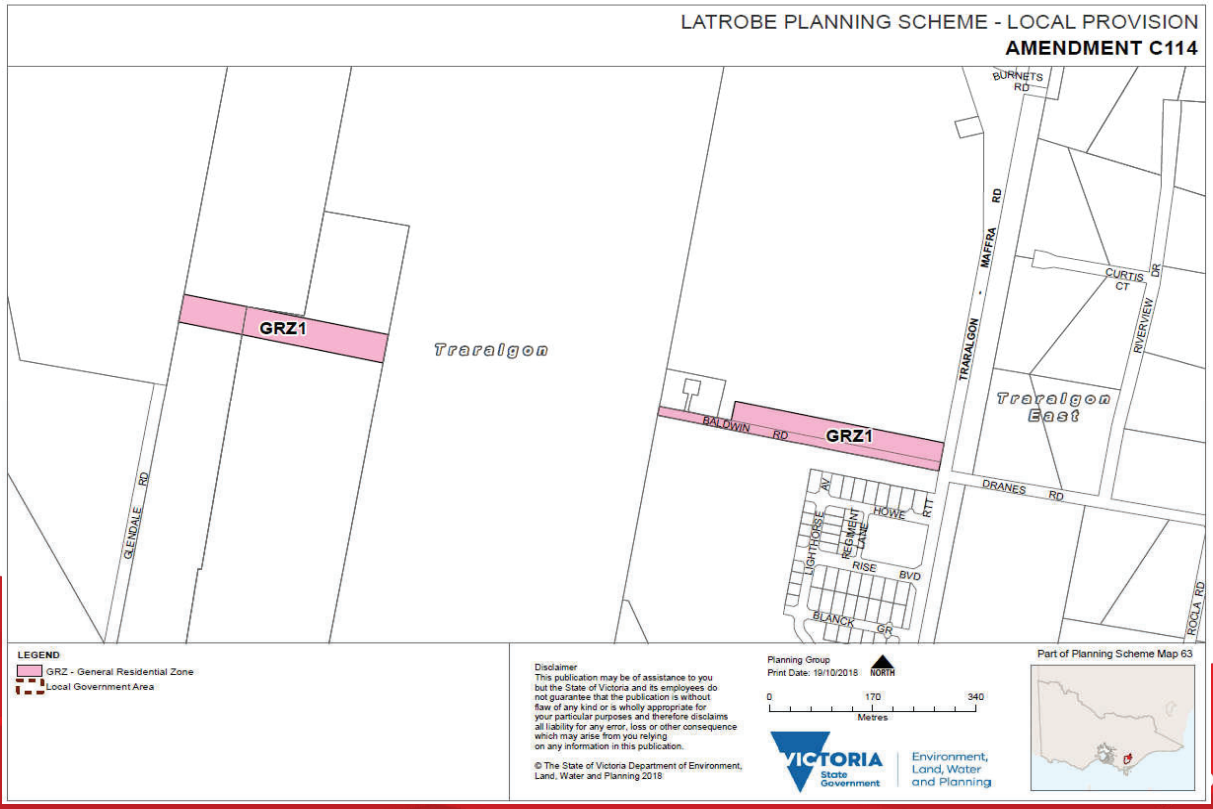


Traralgon

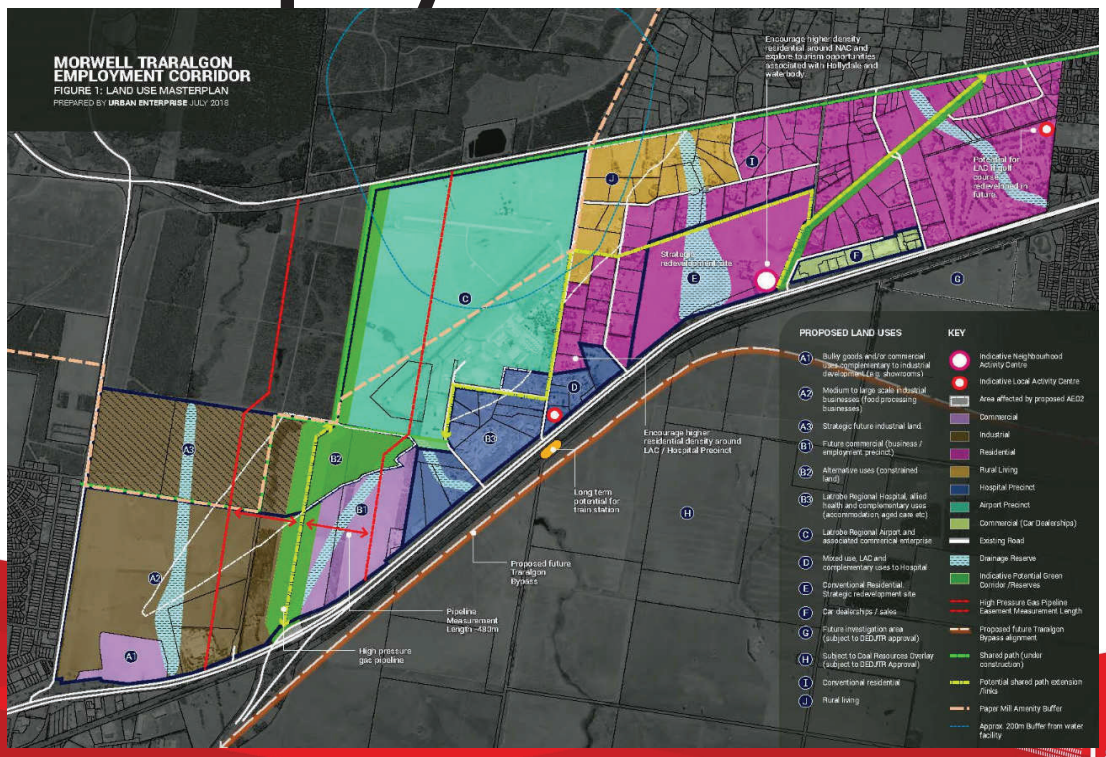


LatrobeCity
a new energy

Traralgon North

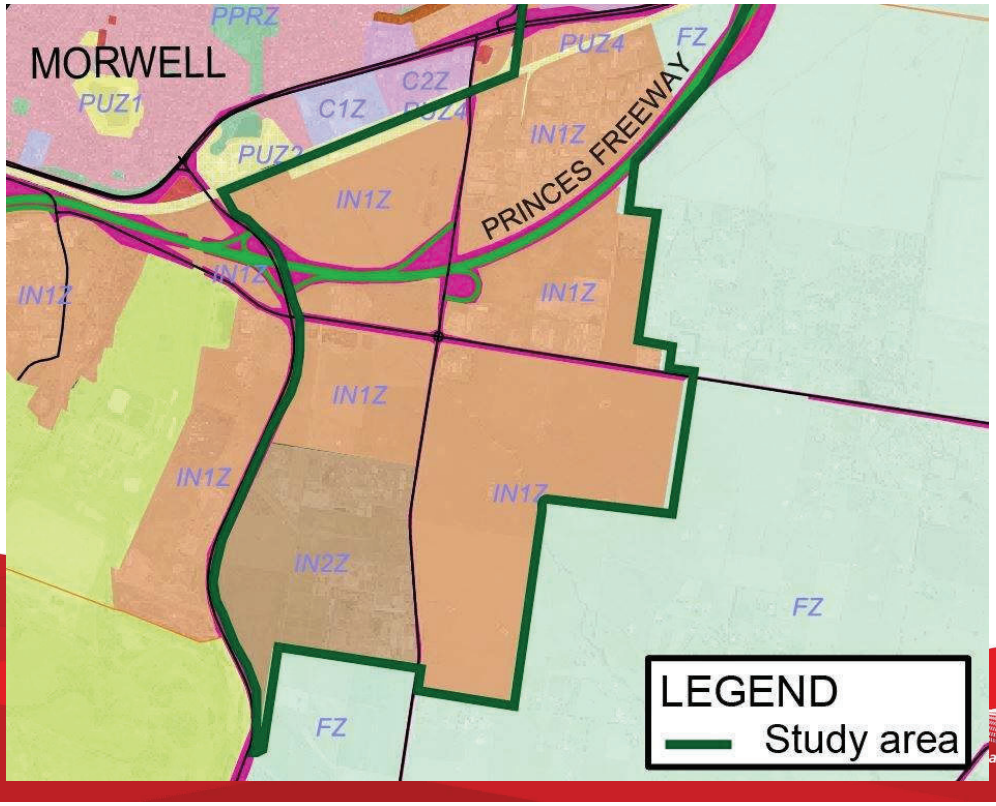


Morwell to Traralgon Employment Corridor

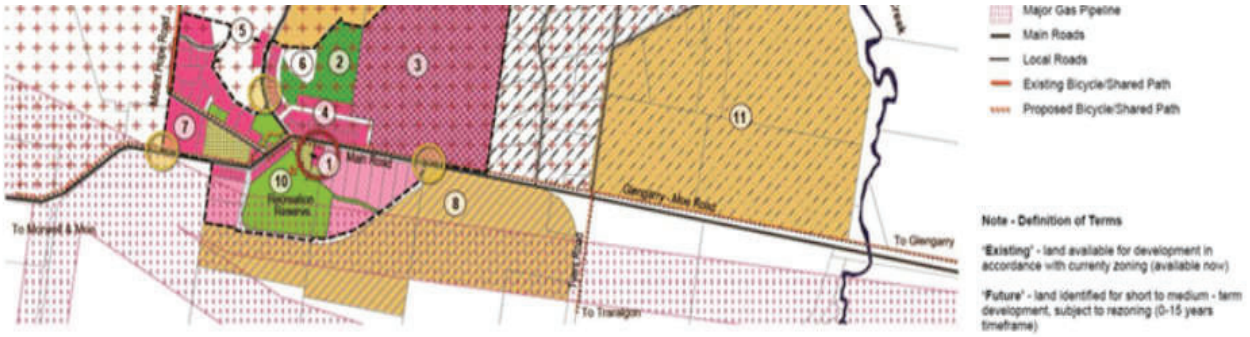


LatrobeCity
a new energy

Morwell Heavy Industrial Precinct



Tyers


Major Gas Pipeline
Main Roads
Local Roads
Existing Bicycle/Shared Path
Proposed Bicycle/Shared Path
Note - Definition of Terms
'Existing' - land available for development in accordance with currenty zoning (available now)
'Future' - land identified for short to medium - term development, subject to rezoning (0-15 years timeframe)
Main Road
Recreation Reserve
To Glengarry
To Traralgon
To Morwell & Moe

Moe Water Treatment Plant

Moe WTP Land

73.03
17/09/2019
VC161

LAND USE TERMS

The table to this clause lists terms which may be used in this planning scheme in relation to the use of land. A term describing a use or activity in relation to land which is not listed in the table must not be characterised as a separate use of land if the term is obviously or commonly included within one or more of the terms listed in the table.

Meaning of terms

A term listed in the first column, under the heading "Land use term", has the meaning set out beside that term in the second column, under the heading "Definition".

No definition of listed term indicates ordinary meaning

A term listed in the first column, under the heading "Land use term", which does not have a meaning set out beside that term in the second column, under the heading "Definition", has its ordinary meaning.

Terms which specifically include other listed terms

A term listed in the first column, under the heading "Land use term", which has other terms listed beside it in the third column, under the heading "Includes", includes any term so listed in the third column and any term included within that term in the third column, but does not include any other term listed in the first column.

A term listed in the first column which has other terms listed beside it in the third column may also include other terms which are not listed in the first column.

All terms listed in the third column are also listed in the first column.

Terms which do not specifically include other listed terms

If a term listed in the first column, under the heading "Land use term", does not have any term listed beside it in the third column, under the heading "Includes", that term does not include any term listed in the first column.

However, a term listed in the first column which does not have any term listed beside it in the third column may include other terms which are not listed in the first column.

Terms which are included within other listed terms

A term listed in the first column, under the heading "Land use term", which has a term listed beside it in the fourth column, under the heading "Included in", is included within the term so listed in the fourth column and any term which includes that term in the fourth column.

All terms listed in the fourth column are also listed in the first column.

Terms which are not included within other listed terms

If a term listed in the first column, under the heading "Land use term", does not have a term listed beside it in the fourth column, under the heading "Included in", that term is not included within any other term listed in the first column.

Table to Clause 73.03

Land use term	Definition	Includes	Included in
Abattoir	Land used to slaughter animals, including birds. It may include the processing of animal products.		**Rural industry**
Accommodation	Land used to accommodate persons.	**Camping and caravan park**	

Land use term	Definition	Includes	Included in
		Corrective institution **Dependent person's unit** **Dwelling** **Group accommodation** **Host farm** **Residential aged care facility** **Residential building** **Residential village** **Retirement village**	
Adult sex product shop	Land used to sell or hire sexually explicit material, including: a) publications classified as restricted under the *Classification (Publications, Films and Computer Games) (Enforcement) Act 1995*; and b) materials and devices (other than contraceptives and medical treatments) used in conjunction with sexual behaviour.		**Shop**
Agriculture	Land used to: a) propagate, cultivate or harvest plants, including cereals, flowers, fruit, seeds, trees, turf, and vegetables; b) keep, breed, board, or train animals, including livestock, and birds; or c) propagate, cultivate, rear, or harvest living resources of the sea or inland waters.	**Animal husbandry** **Aquaculture** **Crop raising**	
Airport			**Transport terminal**
Amusement park			**Outdoor recreation facility**
Amusement parlour	A building that contains: a) three or more coin, card, or token operated amusement machines;		**Place of assembly**

Land use term	Definition	Includes	Included in
	b) one or more coin, card, or token operated amusement machines with more than one screen or console that can be played by three or more people simultaneously; or c) two or more coin, card, or token operated billiard, snooker, or pool tables. It does not include coin, card, or token operated children's rides, amusement machines if there is the ability to receive a monetary reward, or premises used for a Bar or Hotel.		
Animal husbandry	Land used to keep, breed, board, or train animals, including birds.	**Animal production** **Animal training** **Apiculture** **Domestic animal husbandry** **Horse husbandry** **Racing dog husbandry**	**Agriculture**
Animal production	Land used to keep or breed farm animals for the production of livestock, eggs, fibre, meat, milk or other animal products.	**Grazing animal production** **Intensive animal production** **Pig farm** **Poultry farm** **Poultry hatchery**	**Animal husbandry**
Animal training	Land used to train animals, other than domestic animals, horses, or racing dogs.		**Animal husbandry**
Apiculture	Land used to keep honeybee hives and to extract honey or other bee hive products.		**Animal husbandry**
Aquaculture	Land used to keep or breed aquatic animals, or cultivate or propagate aquatic plants.		**Agriculture**
Art and craft centre	Land used to manufacture, display, and sell, works of art or craft, such as handicrafts, paintings, and sculptures.		

Land use term	Definition	Includes	Included in
Art gallery	Land used to display works of art, including ceramics, furniture, glass, paintings, screen based art, sculptures, and textiles.		**Exhibition centre**
Bank			**Office**
Bar	Land used to sell liquor for consumption on the premises. It may include accommodation, food for consumption on the premises, entertainment, dancing, amusement machines, and gambling.		**Food and drink premises**
Beauty salon			**Shop**
Bed and breakfast	A dwelling used, by a resident of the dwelling, to provide accommodation for persons away from their normal place of residence.		**Dwelling**
Betting agency	Land used for gambling by wagering, and where there is the ability to receive a monetary reward.		**Gambling premises**
Boat and caravan storage	Land used to store boats, caravans, or vehicle-towed boat trailers.		**Store**
Boat launching facility	Land used to launch boats into the water and to retrieve boats from the water.	**Boat ramp slipway**	**Recreational boat facility**
Boat ramp			**Boat launching facility**
Bottle shop	Land used to sell packaged liquor for consumption off the premises.		**Shop**
Broiler farm	Land used to keep broiler chickens for the production of meat.		**Poultry farm**
Brothel	Land made available for prostitution by a person carrying on the business of providing prostitution services at the business's premises.		
Bus terminal			**Transport terminal**
Camping and caravan park	Land used to allow accommodation in caravans, cabins, tents, or the like.		**Accommodation**

Land use term	Definition	Includes	Included in
Caretaker's house	A dwelling on the same site as a building, operation, or plant, and occupied by a supervisor of that building, operation, or plant.		**Dwelling**
Carnival	Land, other than an Exhibition centre or trade fair, used for a temporary fair or amusements which provide entertainment such as side shows, merry-go-rounds, and stalls for games or snacks.		**Place of assembly**
Car park	Land used to park motor vehicles. It may include charging of electric vehicles.		
Car sales			**Motor vehicle, boat, or caravan sales**
Car wash			**Service industry**
Cattle feedlot	Land used for a cattle feedlot as defined by the Victorian Code for Cattle Feedlots 1995.		**Intensive animal production**
Cemetery	Land used to dispose of human remains by burial. It may include funeral chapels or the like.		
Child care centre	Land used to care for five or more children who are not permanently resident on the land.	**Kindergarten**	**Education centre**
Cinema	Land used to provide screen based entertainment or information to the public.		**Place of assembly**
Cinema based entertainment facility	Land used to provide screen based entertainment or information to the public, in association with the provision of meals or sporting, amusement, entertainment, leisure or retail facilities.		**Place of assembly**
Circus	Land used, by performers, to provide entertainment such as acrobatic feats, tricks of skill, and exhibiting animals.		**Place of assembly**
Commercial display area	Land used only to display goods.		**Warehouse**
Community care accommodation	Land used to provide accommodation and care services. It includes permanent, temporary		**Residential building**

Land use term	Definition	Includes	Included in
	and emergency accommodation. It may include supervisory staff and support services for residents and visitors.		
Conference centre			**Function centre**
Convenience restaurant	Land used to prepare and sell food and drink for immediate consumption, where substantial provision is made for consumption both on and off the premises.		**Food and drink premises**
Convenience shop	A building with a leasable floor area of no more than 240 square metres, used to sell food, drinks, and other convenience goods. It may also be used to hire convenience goods.		**Shop**
Corrective institution	Land used to hold and reform persons committed to it by the courts, such as a prison, remand centre, and other type of detention facility.		**Accommodation**
Crematorium	Land used to cremate human remains. It may include funeral chapels or the like.		
Crop raising	Land used to propagate, cultivate or harvest plants, including cereals, flowers, fruit, seeds, trees, turf, and vegetables.	**Horticulture** **Rice growing** **Timber production**	**Agriculture**
Dance studio			**Indoor recreation facility**
Data centre			**Utility installation**
Department store			**Shop**
Dependent person's unit	A movable building on the same lot as an existing dwelling and used to provide accommodation for a person dependent on a resident of the existing dwelling.		**Accommodation**
Display home centre	One or more buildings constructed as a dwelling, but used for display, to encourage people to buy or construct similar dwellings. It may include a sales office.		
Dog breeding			**Domestic animal husbandry**

Land use term	Definition	Includes	Included in
Domestic animal boarding	Land used to board domestic animals, such as boarding kennels and a cattery. It includes domestic animal day care.		**Domestic animal husbandry**
Domestic animal husbandry	Land used to keep, breed, board or train domestic animals.	**Dog breeding** **Domestic animal boarding**	**Animal husbandry**
Drive-in theatre			**Place of assembly**
Dry cleaner	Land used to professionally clean or launder clothing or household articles. It may include the use of dry cleaning processes.		**Service industry**
Dry cleaning agent	Land used to arrange for professional cleaning or laundering of clothing or household articles predominantly at another location. It does not include the use of dry cleaning processes on the land.		**Shop**
Dwelling	A building used as a self-contained residence which must include: a) a kitchen sink; b) food preparation facilities; c) a bath or shower; and d) a toilet and wash basin. It includes outbuildings and works normal to a dwelling.	**Bed and breakfast** **Caretaker's house**	**Accommodation**
Education centre	Land used for education.	**Child care centre** **Employment training centre** **Primary school** **Secondary school** **Tertiary institution**	
Earth and energy resources industry	Land used for the exploration, removal or processing of natural earth or energy resources. It includes any activity incidental to this purpose including the construction and use of temporary accommodation.	**Greenhouse gas sequestration** **Greenhouse gas sequestration exploration** **Geothermal energy exploration** **Geothermal energy extraction**	

Land use term	Definition	Includes	Included in
		Mineral exploration **Mineral extraction** **Petroleum exploration** **Petroleum extraction** **Stone exploration** **Stone extraction**	
Electoral office	An office used for electioneering by a candidate in a local, State, or Federal Government election.		**Office**
Emergency services facility	Land used to provide facilities for emergency services, such as fire prevention and ambulance services. It may include administrative, operational or storage facilities associated with the provision of emergency services.		
Employment training centre			**Education centre**
Energy generation facility	Land used to generate energy for use off site other than geothermal energy extraction. It includes any building or other structure or thing used in or in connection with the generation of energy.	**Renewable energy facility** **Waste-to-energy facility**	
Equestrian supplies			**Restricted retail premises**
Exhibition centre	Land used to display works of art, artefacts, or historical, cultural, or other like works or artefacts.	**Art gallery** **Museum**	**Place of assembly**
Food and drink premises	Land used to prepare and sell food and drink for immediate consumption on, or off, the premises.	**Bar** **Convenience restaurant** **Hotel** **Restaurant** **Take away food premises**	**Retail premises**
Freeway service centre	Land which has direct access to a freeway and is used to provide essential services and facilities which encourage drivers to stop and take an effective break in the interests of driver safety.		

Land use term	Definition	Includes	Included in
Freezing and cool storage			**Store**
Fuel depot	Land used to store, sell, and distribute fuel.	**Liquid fuel depot** **Solid fuel depot**	**Warehouse**
Function centre	Land used, by arrangement, to cater for conferences, private functions, and in which food and drink may be served. It may include entertainment and dancing.	**Conference centre** **Reception centre**	**Place of assembly**
Funeral parlour	Land used to organise and conduct funerals, memorial services, or the like. It includes the storage and preparation of bodies for burial or cremation.		
Gambling premises	Land used for gambling by gaming or wagering, and where there is the ability to receive a monetary reward.	**Betting agency** **Gaming premises**	**Retail premises**
Gaming premises	Land used for gambling by gaming, and where there is the ability to receive a monetary reward.		**Gambling premises**
Garden supplies	Land used to sell and distribute garden supplies such as sand, soil, railway sleepers, screenings, rock, and the like.		**Landscape gardening supplies**
Geothermal energy exploration	Land used for geothermal energy exploration in accordance with the Geothermal *Energy Resources Act 2005.*		**Earth and energy resources industry**
Geothermal energy extraction	Land used for geothermal energy extraction in accordance with the Geothermal *Energy Resources Act 2005.*		**Earth and energy resources industry**
Golf course			**Outdoor recreation facility**
Golf driving range			**Outdoor recreation facility**
Grazing animal production	Land used for animal production where the animals' food is obtained by directly grazing, browsing or foraging plants growing on the land. It includes:		**Animal production**

Land use term	Definition	Includes	Included in
	▪ emergency, seasonal and supplementary feeding; ▪ the incidental penning, feeding and housing of animals for weaning or other husbandry purposes. In this definition: *Emergency feeding* means providing feed to animals when an emergency event such as a flood, bushfire or biosecurity event, restricts or prevents the animals from grazing, browsing or foraging plants growing on the land; *Seasonal feeding* means providing feed to animals when seasonal conditions, including drought, restrict or prevent the animals from grazing, browsing or foraging plants growing on the land; *Supplementary feeding* means providing feed to animals to supplement the food the animals obtain by directly grazing, browsing or foraging plants growing on the land.		
Greenhouse gas sequestration	Land used for greenhouse gas substance injection and monitoring in accordance with the *Greenhouse Gas Geological Sequestration Act 2008.*		**Earth and energy resources industry**
Greenhouse gas sequestration exploration	Land used for the exploration of greenhouse gas sequestration formations in accordance with the *Greenhouse Gas Geological Sequestration Act 2008.*		**Earth and energy resources industry**
Group accommodation	Land, in one ownership, containing a number of dwellings used to accommodate persons away from their normal place of residence.		**Accommodation**
Hairdresser			**Shop**
Hall			**Place of assembly**
Helicopter landing site	Land used for the take-off and landing of a helicopter, with or without a permanent landing pad,		

Land use term	Definition	Includes	Included in
	but without permanent facilities for the assembly and distribution of goods or passengers.		
Heliport			**Transport terminal**
Home based business	An occupation carried on in a dwelling, or on the land around a dwelling, by a resident of the dwelling. It may include a use defined elsewhere, but not a Brothel.		
Horse husbandry	Land used to keep, breed, board or train horses.	**Horse riding school** **Horse stables**	**Animal husbandry**
Horse riding school			**Horse husbandry**
Horse stables			**Horse husbandry**
Horticulture	Land used to propagate, cultivate, or harvest flowers, fruit, vegetables, vines, or the like.	**Market garden**	**Crop raising**
Hospital	Land used to provide health services (including preventative care, diagnosis, medical and surgical treatment, and counselling) to persons admitted as in-patients. It may include the care or treatment of out-patients.		
Host farm	An agricultural property used to provide accommodation for persons, away from their normal place of residence, to experience living on land used for agricultural purposes.		**Accommodation**
Hotel	Land used to sell liquor for consumption on and off the premises. It may include accommodation, food for consumption on the premises, entertainment, dancing, amusement machines, and gambling.		**Food and drink premises**
Indoor recreation facility	A building used for indoor leisure, recreation, or sport.	**Dancing studio**	**Minor sports and recreation facility**
Industry	Land used for any of the following operations: a) any process of manufacture;	**Materials recycling** **Refuse disposal** **Transfer station**	

Land use term	Definition	Includes	Included in
	b) dismantling or breaking up of any article; c) treating waste materials; d) winning clay, gravel, rock, sand, soil, stone, or other materials (other than Mineral, stone, or soil extraction); e) laundering, repairing, servicing or washing any article, machinery, or vehicle, other than on-site work on a building, works, or land; or f) any process of testing or analysis. If on the same land as any of these operations, it also includes: a) storing goods used in the operation or resulting from it; b) providing amenities for people engaged in the operation; c) selling by wholesale, goods resulting from the operation; and d) accounting or administration in connection with the operation. If Materials recycling, goods resulting from the operation may be sold by retail.	**Research and development centre** **Rural industry** **Service industry**	
Informal outdoor recreation	Land open to the public and used by non-paying persons for leisure or recreation, such as a cycle track, park, picnic or barbecue area, playground, plaza, and walking or jogging track.		**Minor sports and recreation facility**
Intensive animal production	Land used for animal production where the animals' food is imported from outside the immediate building, enclosure, paddock or pen. It does not include: ▪ an abattoir or sale yard; or ▪ grazing animal production, pig farm, poultry farm or poultry hatchery.	**Cattle feedlot** **Intensive dairy farm**	**Animal production**
Intensive dairy farm	Land used for intensive animal production where cattle are kept or bred for the production of milk.		**Intensive animal production**
Jetty			**Marina**

Land use term	Definition	Includes	Included in
Kindergarten			**Child care centre**
Landscape gardening supplies	Land used to propagate, grow, and sell plants, or sell and distribute garden supplies.	**Garden supplies** **Plant nursery**	**Retail premises**
Laundromat	Land used to clean or launder clothing or household items using self-service machines.		**Shop**
Leisure and recreation	Land used for leisure, recreation, or sport.	**Major sports and recreation facility** **Minor sports and recreation facility** **Motor racing track**	
Library			**Place of assembly**
Liquid fuel depot	Land used to store, sell by wholesale, and distribute fuel.		**Fuel depot**
Mail centre	Land used to sort mail for distribution.		**Warehouse**
Major sports and recreation facility	Land used for leisure, recreation or sport, and where there is substantial provision made for spectators, such as a grandstand, and to which spectators are usually charged admission.	**Race course**	**Leisure and recreation**
Manufacturing sales	Land used, as an incidental part of an industry, to retail goods made materially different on the land by that industry.		**Retail premises**
Marina	Land used to moor boats, or store boats above or adjacent to the water. It may include boat recovery facilities, and facilities to repair, fuel, and maintain boats and boat accessories.	**Jetty** **Mooring pole** **Pier** **Pontoon**	**Recreational boat facility**
Market	Land used to sell goods, including foodstuffs, from stalls.		**Retail premises**
Market garden			**Horticulture**
Materials recycling	Land used to dismantle, treat, process, store, recycle, or sell refuse, used or surplus materials.		**Industry**

Land use term	Definition	Includes	Included in
Medical centre	Land used to provide health or surgical services (including preventative care, diagnosis, medical and surgical treatment, pathology services, and counselling) to out-patients only.		**Office**
Milk depot	Land used to receive milk and milk products for distribution to consumers, but where milk is not processed or pasteurised.		**Warehouse**
Mineral exploration	Land used for the exploration of minerals in accordance with the *Mineral Resources (Sustainable Development) Act 1990.*		**Earth and energy resources industry**
Mineral extraction	Land used for extraction of minerals in accordance with the *Mineral Resources (Sustainable Development) Act 1990.*		**Earth and energy resources industry**
Minor sports and recreation facility	Land used for leisure, recreation, or sport, without substantial provision for spectators, and which is usually open to non-paying spectators.	**Indoor recreation facility** **Informal outdoor recreation** **Open sports ground** **Outdoor recreation facility** **Restricted recreation facility**	**Leisure and recreation**
Minor utility installation	Land used for a utility installation comprising any of the following: a) sewerage or water mains; b) storm or flood water drains or retarding basins; c) flow measurement device or a structure to gauge waterway flow; d) siphons, water storage tanks, disinfection booster stations and channels; e) gas mains providing gas directly to consumers; f) a sewerage treatment plant, and any associated disposal works, required to serve a neighbourhood; g) a pumping station required to serve a neighbourhood;	**Water retarding basin**	**Utility installation**

Land use term	Definition	Includes	Included in
	h) power lines designed to operate at less than 220,000 volts but excluding any power lines directly associated with an Energy generation facility or Geothermal energy extraction; or i) an electrical sub-station designed to operate at no more than 66,000 volts but excluding any sub-station directly associated with an Energy generation facility or Geothermal energy extraction.		
Mooring pole			**Marina**
Motel	Land used to provide accommodation in serviced rooms for persons away from their normal place of residence, and where provision is made for parking guests' vehicles convenient to the rooms.		**Residential hotel**
Motor racing track	Land used to race, rally, scramble, or test, vehicles, including go-karts, motor boats, and motorcycles, and includes other competitive motor sports. It may include training.		**Leisure and recreation**
Motor repairs	Land used to repair or service motor vehicles, and includes the fitting of accessories.	**Panel beating**	**Service industry**
Motor vehicle, boat, or caravan sales	Land used to sell or hire motor vehicles, boats, or caravans. It may include the minor repair or servicing of motor vehicles, boats, or caravans, and the sale or fitting of accessories.	**Car sales**	**Retail premises**
Museum	Land used to display archaeological, biological, cultural, geographical, geological, historical, scientific, or other like works or artefacts.		**Exhibition centre**
Natural systems	Land in substantially its natural state which is used to maintain ecological systems, or to preserve an area of historic, scientific, aesthetic, or cultural significance.		
Nightclub	A building used to provide entertainment and dancing. It may include the provision of food and		**Place of assembly**

Land use term	Definition	Includes	Included in
	drink for consumption on the premises. It does not include the sale of packaged liquor, or gaming.		
Office	Land used for administration, or clerical, technical, professional or other like business activity. No goods or materials intended for manufacture, sale, or hire may be stored on the land. Other than electoral office and medical centre, it does not include any other defined use.	**Bank** **Electoral office** **Medical centre** **Real estate agency** **Travel agency**	
Open sports ground	Land used for organised games of sport, but which is available for informal outdoor leisure or recreation when not being used or prepared for an organised game. It may include lights, change rooms, pavilions, and shelters.		**Minor sports and recreation facility**
Outdoor recreation facility	Land used for outdoor leisure, recreation, or sport. It does not include an Open sports ground or Informal outdoor recreation.	**Amusement park** **Golf course** **Golf driving range** **Paintball games facility** **Zoo**	**Minor sports and recreation facility**
Paintball games facility			**Outdoor recreation facility**
Panel beating	Land used to repair or replace damaged motor vehicle bodies and panels, and carry out any associated mechanical work or spray painting.		**Motor repairs**
Party supplies			**Restricted retail premises**
Petroleum exploration	Land used for petroleum exploration in accordance with the *Petroleum Act 1998.*		**Earth and energy resources industry**
Petroleum extraction	Land used for petroleum extraction in accordance with the *Petroleum Act 1998.*		**Earth and energy resources industry**
Pier			**Marina**
Pig farm	Land used to keep or breed pigs.		**Animal production**

Land use term	Definition	Includes	Included in
Place of assembly	Land where people congregate for religious, spiritual or cultural activities, entertainment, or meetings.	**Amusement parlour** **Carnival** **Cinema** **Cinema-based entertainment facility** **Circus** **Drive-in theatre** **Exhibition centre** **Function centre** **Hall** **Library** **Nightclub** **Place of worship** **Restricted place of assembly**	
Place of worship	Land used for religious activities, such as a church, chapel, mosque, synagogue, and temple.		**Place of assembly**
Plant nursery	Land used to propagate, grow, and sell plants. It may include the sale of gardening equipment and horticultural products.		**Landscape gardening supplies**
Pontoon			**Marina**
Postal agency			**Retail premises**
Poultry farm	Land used to keep or breed poultry.	**Broiler farm**	**Animal production**
Poultry hatchery	Land used to incubate and hatch poultry eggs.		**Animal production**
Primary produce sales	Land used to display and sell primary produce, grown on the land or adjacent land. It may include processed goods made substantially from the primary produce.		**Retail premises**
Primary school			**Education centre**
Race course			**Major sports and recreation facility**
Racing dog husbandry	Land used to keep, breed, board or train racing dogs.	**Racing dog training**	**Animal husbandry**

Land use term	Definition	Includes	Included in
Racing dog training			**Racing dog husbandry**
Railway station	Land used to assemble and distribute goods and passengers and includes facilities to park and manoeuvre vehicles. It may include the selling of food, drinks and other convenience goods and services.		**Transport terminal**
Real estate agency			**Office**
Reception centre			**Function centre**
Recreational boat facility	Land used to provide facilities for boats operated primarily for pleasure or recreation, including boats operated commercially for pleasure or recreation.	**Boat launching facility** **Marina**	
Refuse disposal	Land used to dispose of refuse, by landfill, incineration, or other means.		**Industry**
Renewable energy facility	Land used to generate energy using resources that can be rapidly replaced by an ongoing natural process. Renewable energy resources include the sun, wind, the ocean, water flows, organic matter and the earth's heat. It includes any building or other structure or thing used in or in connection with the generation of energy by a renewable resource. It does not include a renewable energy facility principally used to supply energy for an existing use of the land.	**Wind energy facility**	**Energy generation facility**
Research and development centre	Land used to develop or test electronic technology, biotechnology, or any other scientific discipline. It may include administration, promotion, conference, display, laboratory, assembly, and manufacturing areas.		**Industry**
Research centre	Land used only for scientific research.		
Reservoir	A natural or artificial lake used as a source of water supply that is owned or managed by a public authority.		**Utility installation**

Land use term	Definition	Includes	Included in
Residential aged care facility	Land used to provide accommodation and personal or nursing care for the aged. It may include recreational, health or laundry facilities and services for residents of the facility.		**Accommodation**
Residential building	Land used to accommodate persons, but does not include camping and caravan park, corrective institution, dependent person's unit, dwelling, group accommodation, host farm, residential village or retirement village.	**Community care accommodation** **Residential hotel** **Rooming house**	**Accommodation**
Residential hotel	Land used to provide accommodation in serviced rooms for persons away from their normal place of residence. If it has at least 20 bedrooms, it may include the sale of liquor for consumption on, or off, the premises, function or conference rooms, entertainment, dancing, amusement machines, and gambling.	**Motel**	**Residential building**
Residential village	Land, in one ownership, containing a number of dwellings, used to provide permanent accommodation and which includes communal, recreation, or medical facilities for residents of the village.		**Accommodation**
Restaurant	Land used to prepare and sell food and drink, for consumption on the premises. It may include: a) entertainment and dancing; and b) the supply of liquor other than in association with the serving of meals, provided that tables and chairs are set out for at least 75% of patrons present on the premises at any one time. It does not include the sale of packaged liquor.		**Food and drink premises**
Restricted place of assembly	Land used by members of a club or group, or by members' guests, for religious or cultural activities, entertainment, or meetings. It may		**Place of assembly**

Land use term	Definition	Includes	Included in
	include food and drink for consumption on the premises, and gaming.		
Restricted recreation facility	Land used by members of a club or group for leisure, recreation, or sport, such as a bowling or tennis club, gymnasium and fitness centre. It may include food and drink for consumption on the premises, and gaming. It may also include use by members' guests, or by the public on payment of a fee.		**Minor sports and recreation facility**
Restricted retail premises	Land used to sell or hire: a) automotive parts and accessories; b) camping, outdoor and recreation goods c) electric light fittings; d) animal supplies including equestrian and pet goods; e) floor and window coverings; f) furniture, bedding, furnishings, fabric and manchester and homewares; g) household appliances, household electrical goods and home entertainment goods; h) party supplies; i) swimming pools; j) office equipment and supplies; k) baby and children's goods, children's play equipment and accessories; l) sporting, cycling, leisure, fitness goods and accessories; or m) goods and accessories which: ▪ Require a large area for handling, display and storage of goods; or ▪ Require direct vehicle access to the building by customers for the purpose of loading or unloading goods into or from their vehicles after purchase or hire.	**Equestrian supplies** **Party supplies**	**Shop**

Land use term	Definition	Includes	Included in
	It does not include the sale of food, clothing and footwear unless ancillary to the primary use.		
Retail premises	Land used to: a) sell goods by retail, or by retail and wholesale; b) sell services; or c) hire goods.	**Food and drink premises** **Gambling premises** **Landscape gardening supplies** **Manufacturing sales** **Market** **Motor vehicle, boat, or caravan sales** **Postal agency** **Primary produce sales** **Shop** **Trade supplies**	
Retirement village	Land used to provide permanent accommodation for retired people or the aged and may include communal recreational or medical facilities for residents of the village.		**Accommodation**
Rice growing			**Crop raising**
Road freight terminal			**Transport terminal**
Rooming house	Land used for a rooming house as defined in the *Residential Tenancies Act 1997*.		**Residential building**
Rural industry	Land used to: a) handle, treat, process, or pack agricultural produce; b) service or repair plant, or equipment, used in agriculture; or c) manufacture mud bricks.	**Abattoir** **Sawmill**	**Industry**
Rural store	Land used to store unprocessed agricultural produce, or products used in agriculture.		**Store**
Saleyard	Land used to hold, sell, and buy farm animals.		
Sawmill	Land used to handle, cut, and process timber from logs.		**Rural industry**

Land use term	Definition	Includes	Included in
Secondary school			**Education centre**
Service industry	Land used to launder, repair, service or wash articles, machinery, or vehicles.	**Car wash** **Dry cleaner** **Motor repairs**	**Industry**
Service station	Land used to sell motor vehicle fuel from bowsers, and lubricants. It may include the: a) selling of motor vehicle accessories or parts; b) selling of food, drinks and other convenience goods; c) hiring of trailers; d) servicing or washing of motor vehicles; and e) installing of motor vehicle accessories or parts.		
Shipping container storage	Land used to store shipping containers. It may include the cleaning, repair, servicing, painting or fumigation of the shipping containers.		**Store**
Shop	Land used to sell goods or services, or to hire goods. It includes: ▪ the selling of bread, pastries, cakes or other products baked on the premises; ▪ demonstrations of products including music performances in shops selling recorded music. It does not include: ▪ food and drink premises; ▪ gambling premises; ▪ landscape gardening supplies; ▪ manufacturing sales; ▪ market; ▪ motor vehicle, boat, or caravan sales; ▪ postal agency; ▪ primary produce sales; or ▪ trade supplies.	**Adult sex product shop** **Beauty salon** **Bottle shop** **Convenience shop** **Dry cleaning agent** **Department store** **Hairdresser** **Laundromat** **Restricted retail premises** **Supermarket**	**Retail premises**
Sign			

Land use term	Definition	Includes	Included in
Slipway			**Boat launching facility**
Solar energy facility	Land used to generate electricity from solar energy using ground-mounted photovoltaic and thermal technology, where the primary role is to export power to the electricity network. It does not include the generation of electricity principally used for an existing use of land.		**Renewable energy facility**
Solid fuel depot	Land used to sell solid fuel, such as briquettes, coal, and fire wood.		**Fuel depot**
Stone exploration	Land used to search for stone, including: a) conducting geological, geophysical, and geochemical surveys; b) costeaning and bulk sampling; c) drilling; and d) taking samples for chemical, physical, or other testing.		**Earth and energy resources industry**
Stone extraction	Land used for the extraction or removal of stone in accordance with the *Mineral Resources (Sustainable Development) Act 1990.*		**Earth and energy resources industry**
Store	Land used to store goods, machinery, or vehicles.	**Boat and caravan storage** **Freezing and cool storage** **Rural store** **Shipping container storage** **Vehicle store**	**Warehouse**
Supermarket			**Shop**
Take away food premises	Land used to prepare and sell food and drink for immediate consumption off the premises. It may include up to 10 seats available for consumption on the premises.		**Food and drink premises**
Telecommunications facility	Land used to accommodate any part of the infrastructure of a Telecommunications network. It		**Utility installation**

Land use term	Definition	Includes	Included in
	includes any telecommunications line, equipment, apparatus, telecommunications tower, mast, antenna, tunnel, duct, hole, pit, pole, or other structure or thing used, or for use in or in connection with a Telecommunications network.		
Tertiary institution			**Education centre**
Timber production	Land used to propagate, cultivate, manage and harvest timber.		**Crop raising**
Timber yard	Land used to sell sawn, dressed, and treated timber, wood fibre boards, and the like. It includes cutting the timber and boards to order, and selling hardware, paints, tools, and materials used in conjunction with the use and treatment of timber.		**Trade supplies**
Trade supplies	Land used to sell by both retail and wholesale, or to hire, materials, tools, equipment, machinery or other goods for use in: a) automotive repairs and servicing; b) building; c) commerce; d) industry; e) landscape gardening; f) the medical profession; g) primary production; or h) local government, government departments or public institutions.	**Timber yard**	**Retail premises**
Tramway	Land used to provide a system of transport in vehicles connected to a network of tracks, and includes tram stops, shunting areas and associated passenger facilities.		
Transfer station	Land used to collect, consolidate, temporarily store, sort or recover refuse, used or surplus materials before transfer for disposal, recycling or use elsewhere.		**Industry**

Land use term	Definition	Includes	Included in
Transport terminal	Land used to assemble and distribute goods or passengers. It includes facilities to park and manoeuvre vehicles. It does not include a Tramway.	**Airport** **Bus terminal** **Heliport** **Railway station** **Road freight terminal** **Wharf**	
Travel agency			**Office**
Utility installation	Land used: a) for telecommunications; b) to transmit or distribute gas or oil; c) to transmit, distribute or store power, including battery storage; d) to collect, treat, transmit, store, or distribute water; or e) to collect, treat, or dispose of storm or flood water, sewage, or sullage. It includes any associated flow measurement device or a structure to gauge waterway flow.	**Data centre** **Minor utility installation** **Reservoir** **Telecommunications facility**	
Vehicle store	Land used to park or store vehicles in connection with a goods or passenger transport business.		**Store**
Veterinary centre	Land used to: a) diagnose animal diseases or disorders; b) surgically or medically treat animals; or c) prevent animal diseases or disorders. It may include keeping the animals on the premises for treatment.		
Warehouse	Land used to store or display goods. It may include the storage and distribution of goods for wholesale and the storage and distribution of goods for online retail. It does not include premises allowing in-person retail or display of goods for retail, or allowing persons to collect goods that have been purchased online.	**Commercial display area** **Fuel depot** **Mail centre** **Milk depot** **Store**	

Land use term	Definition	Includes	Included in
Waste-to-energy facility	Land used for the combustion, treatment or bio-reaction of waste to produce energy for use off site. It includes the activities to collect, temporarily store, process, or transfer waste materials for energy production.		**Energy generation facility**
Water retarding basin	Land used to store storm or flood water on a temporary basis.		**Minor utility installation**
Wharf	Land used to provide facilities for ships, such as bulk and container ships, passenger ships, and defence force marine craft.		**Transport terminal**
Wind energy facility	Land used to generate electricity by wind force. It includes land used for: a) any turbine, building or other structure or thing used in or in connection with the generation of electricity by wind force b) an anemometer. It does not include turbines principally used to supply electricity for domestic or rural use of the land.		**Renewable energy facility**
Winery	Land used to display, and sell by retail, vineyard products, in association with the growing of grape vines and the manufacture of the vineyard products. It may include the preparation and sale of food and drink for consumption on the premises.		
Zoo			**Outdoor recreation facility**

73.04 NESTING DIAGRAMS

08/08/2019
VC159

The information in the table to Clause 73.03 is set out in the following diagrams as a means of indicating the nesting of land use terms.

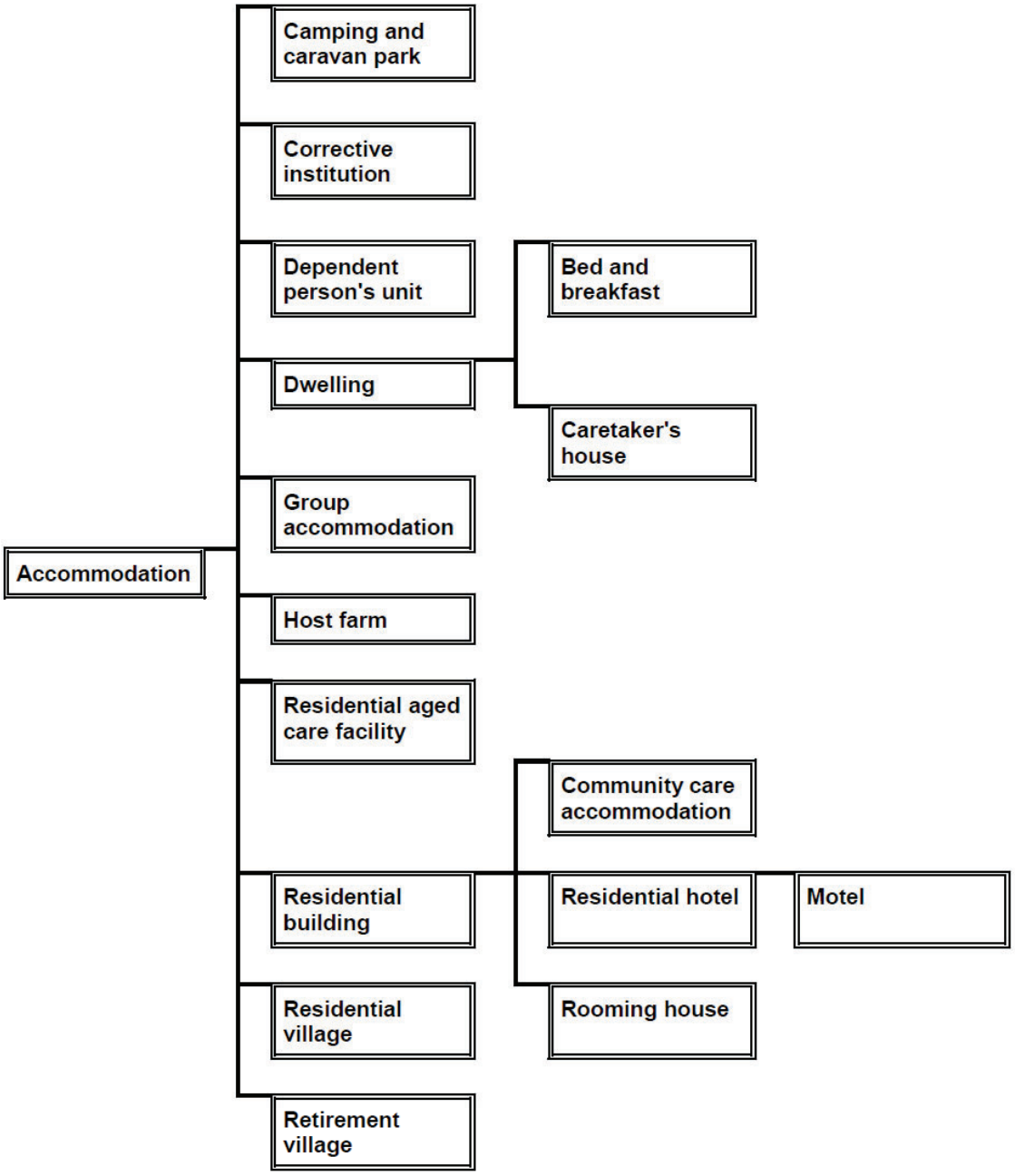
The table to Clause 73.03 prevails if there is any inconsistency between the table and the diagrams or list.

Land use terms that are not nested are listed at Clause 73.04-17.

Land use terms in bold font are defined in Clause 73.03.

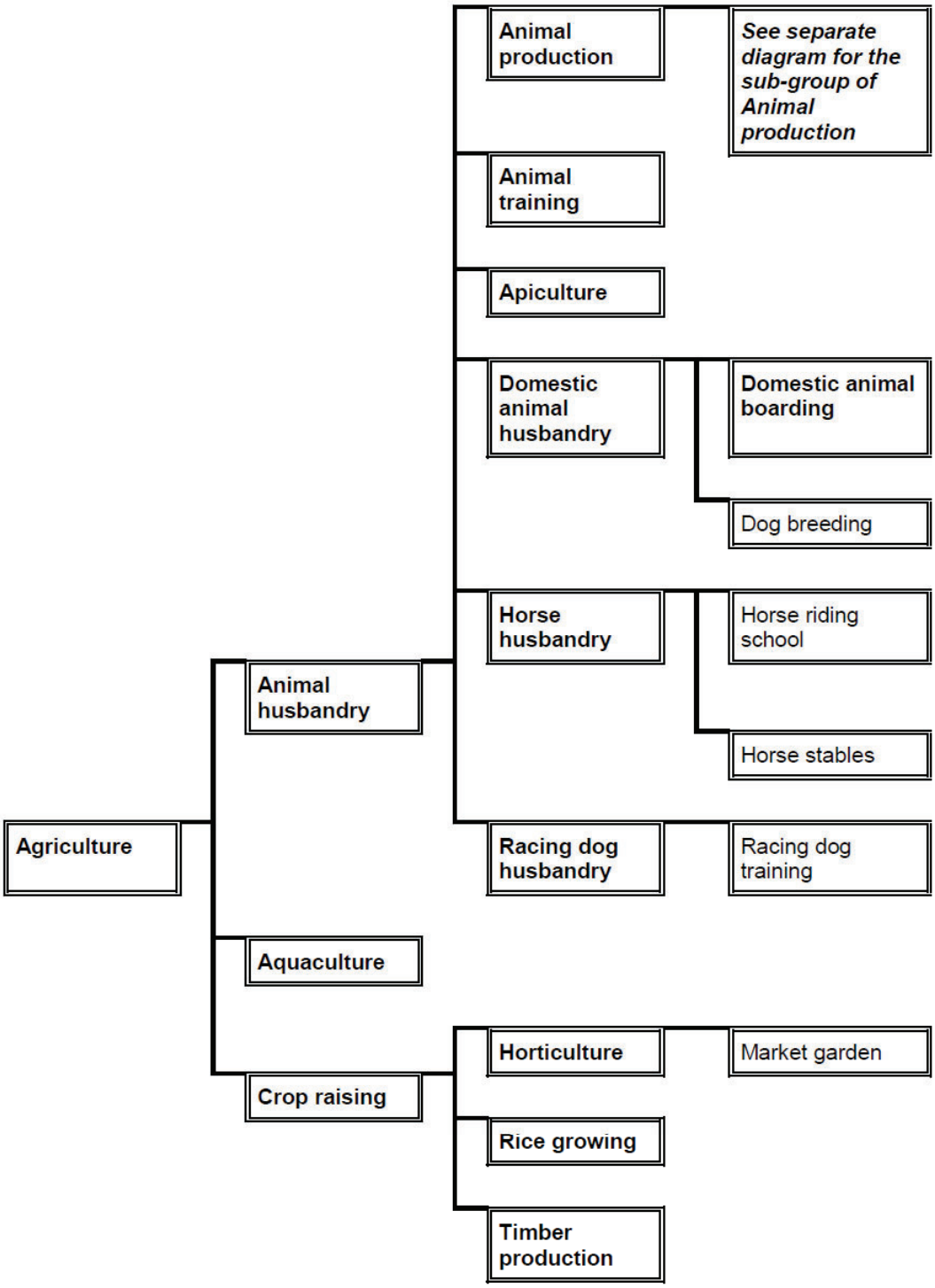
73.04-1 Accommodation group

08/08/2019
VC159



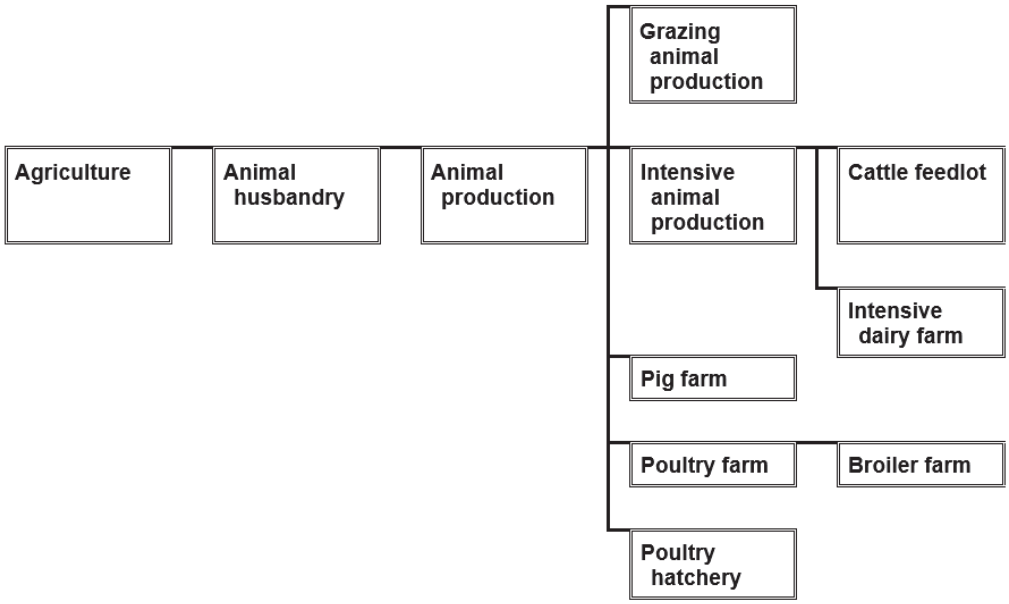
73.04-2 Agriculture group

08/08/2019
VC159



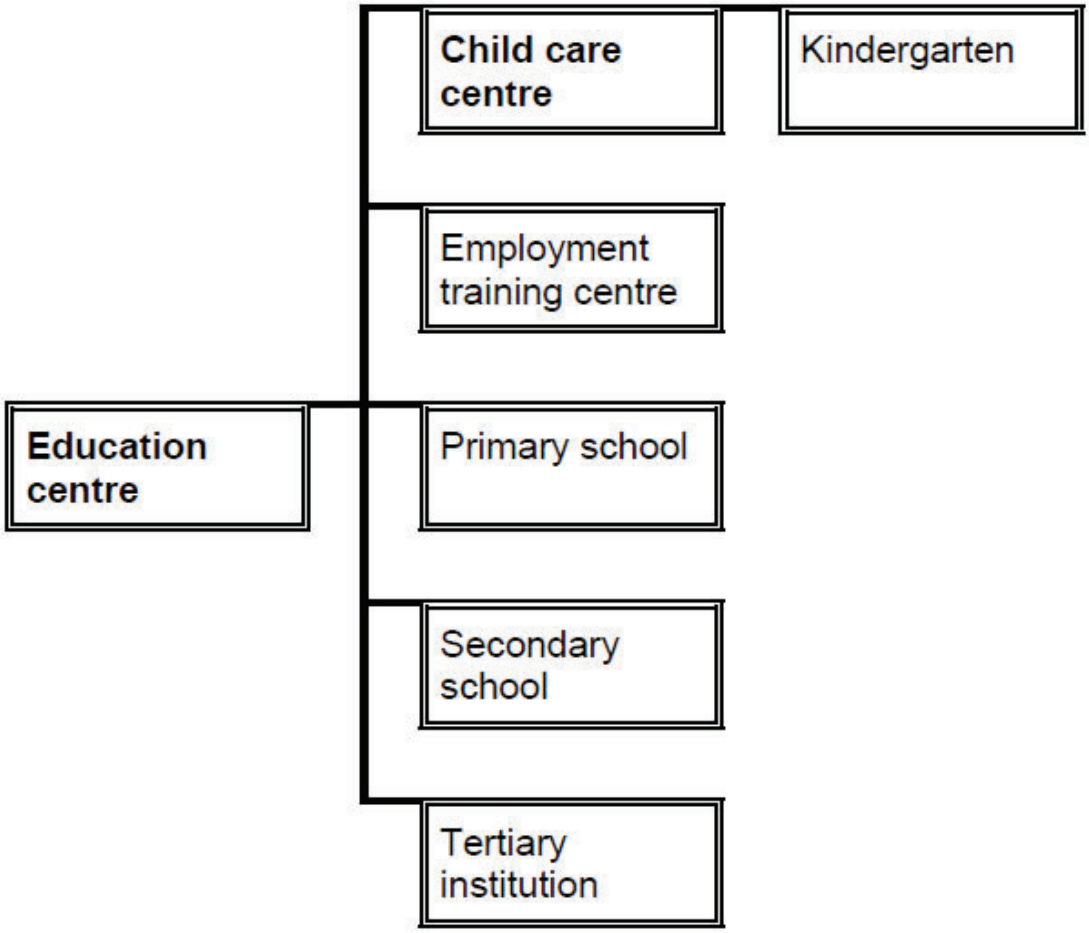
73.04-3 Agriculture group (sub-group of Animal production)

21/09/2018
VC150



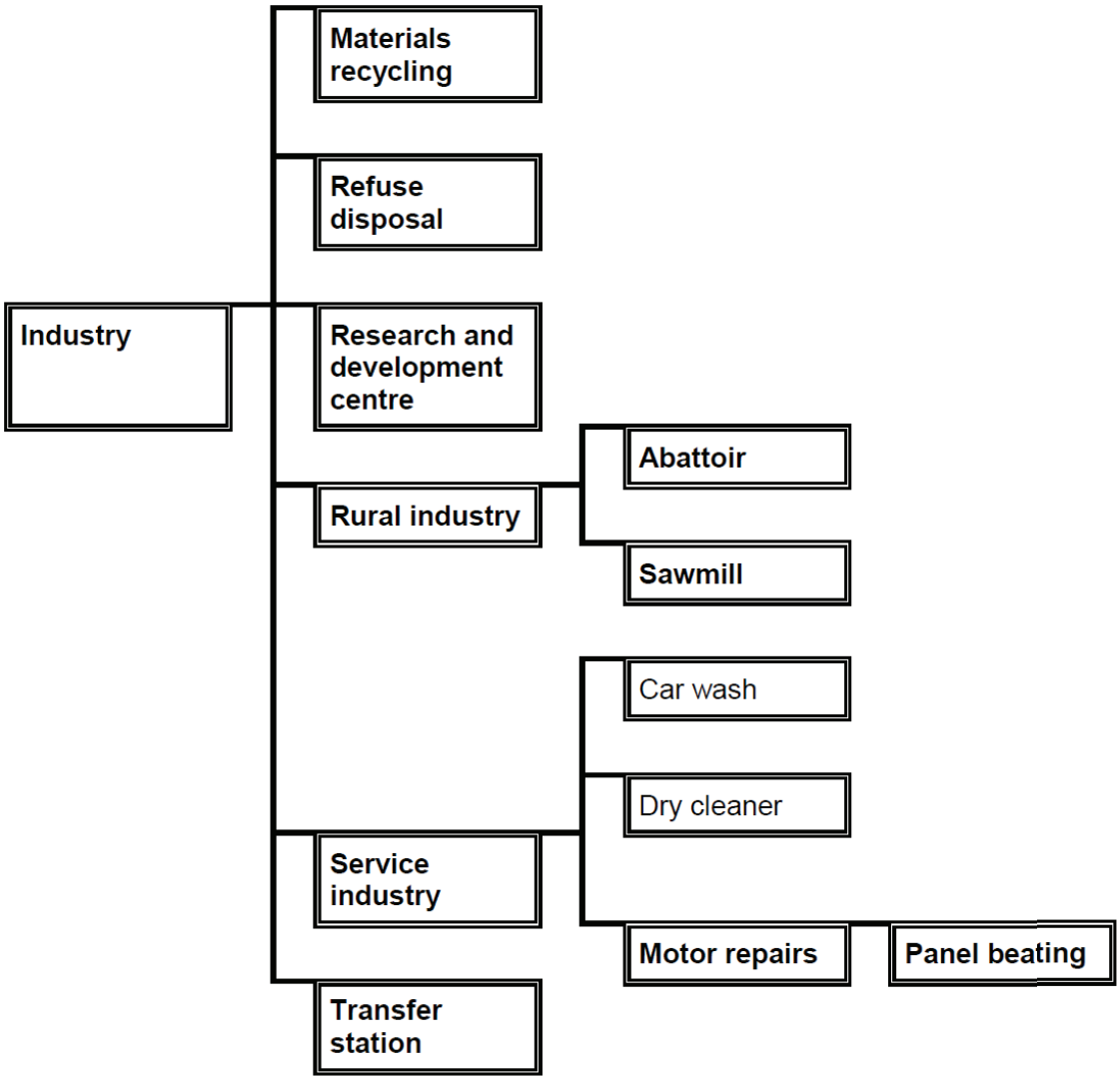
73.04-4 Education centre group

08/08/2019
VC159



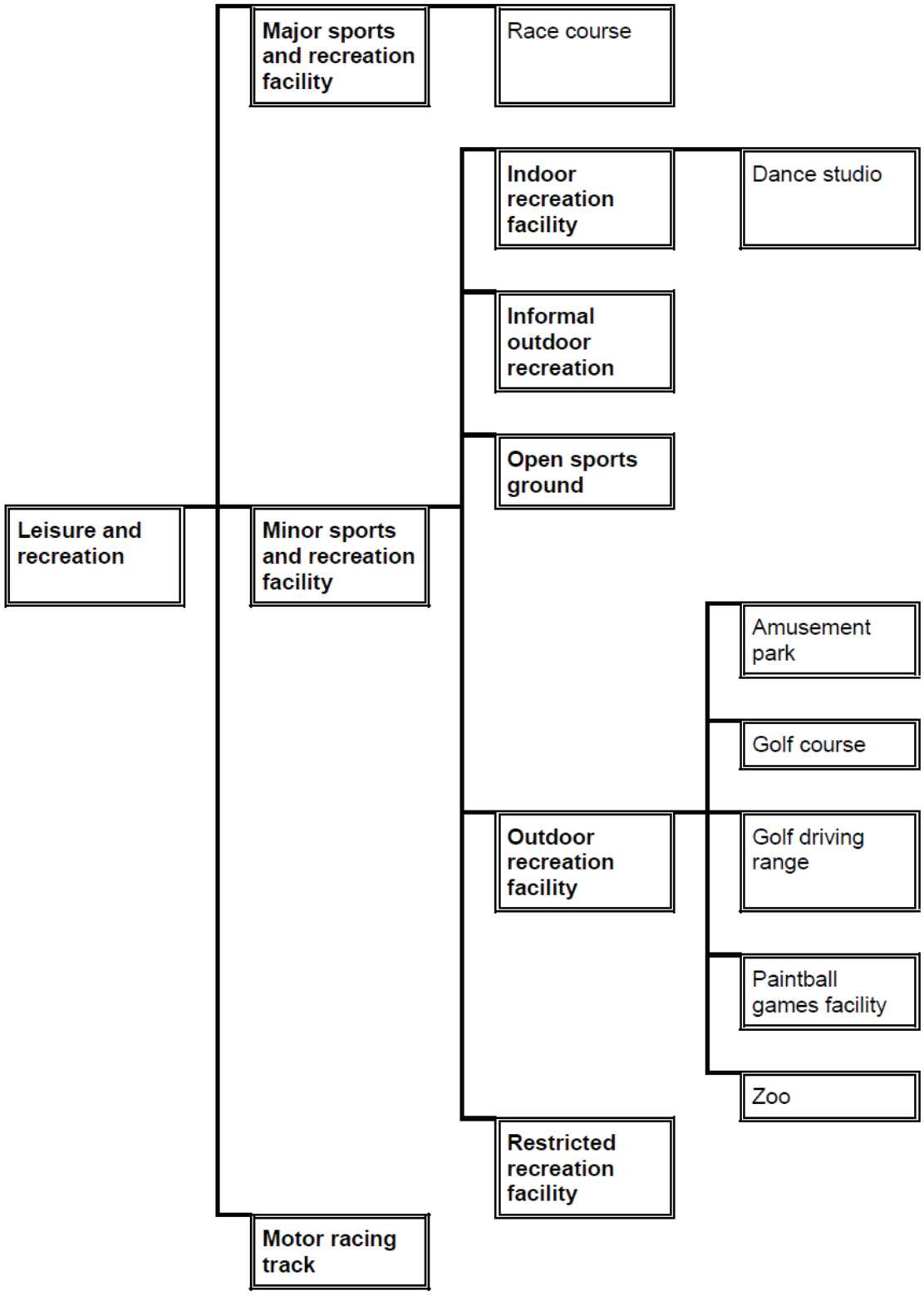
73.04-5 Industry group

08/08/2019
VC159



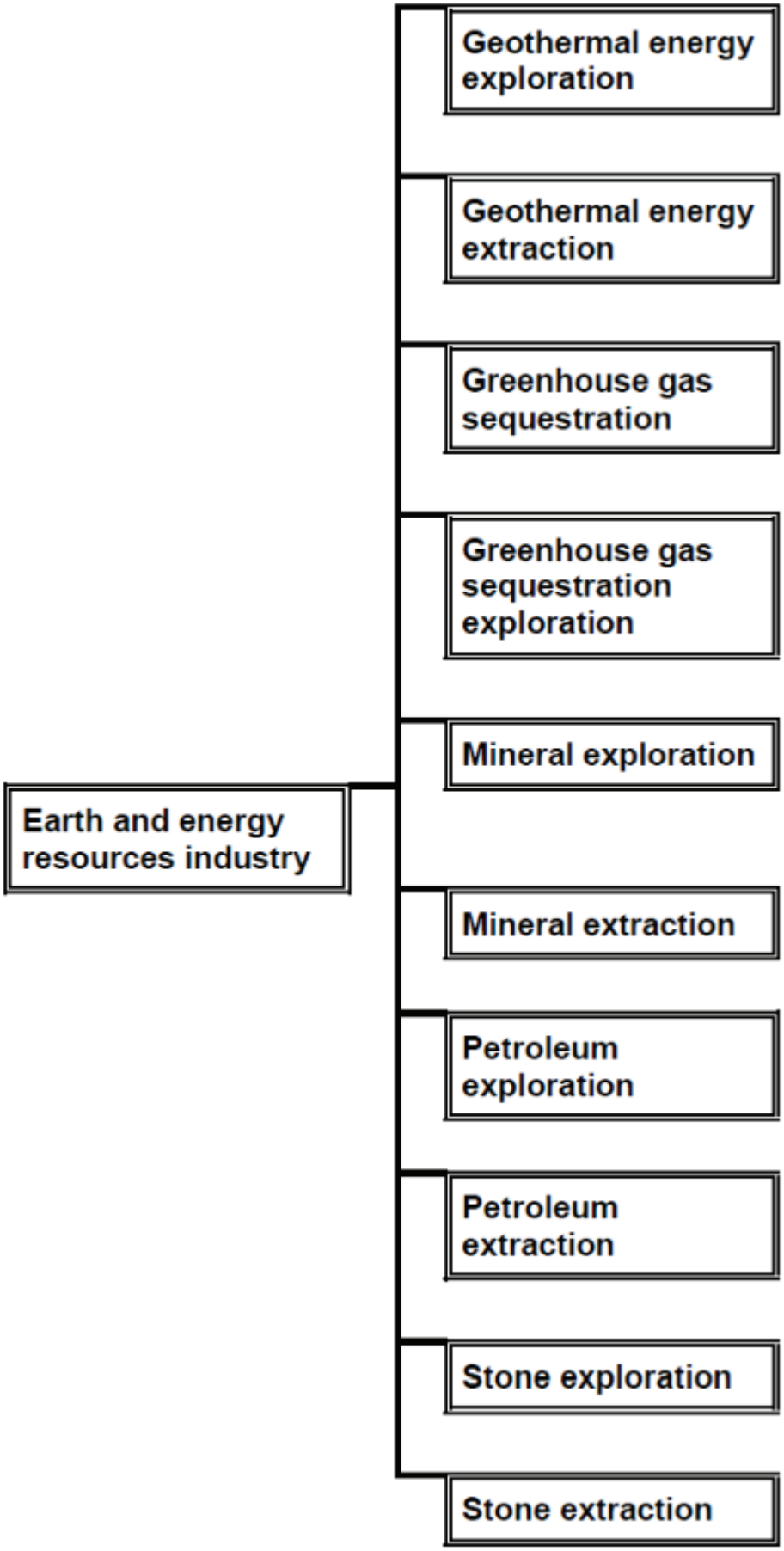
73.04-6 Leisure and recreation group

16/08/2019
VC163



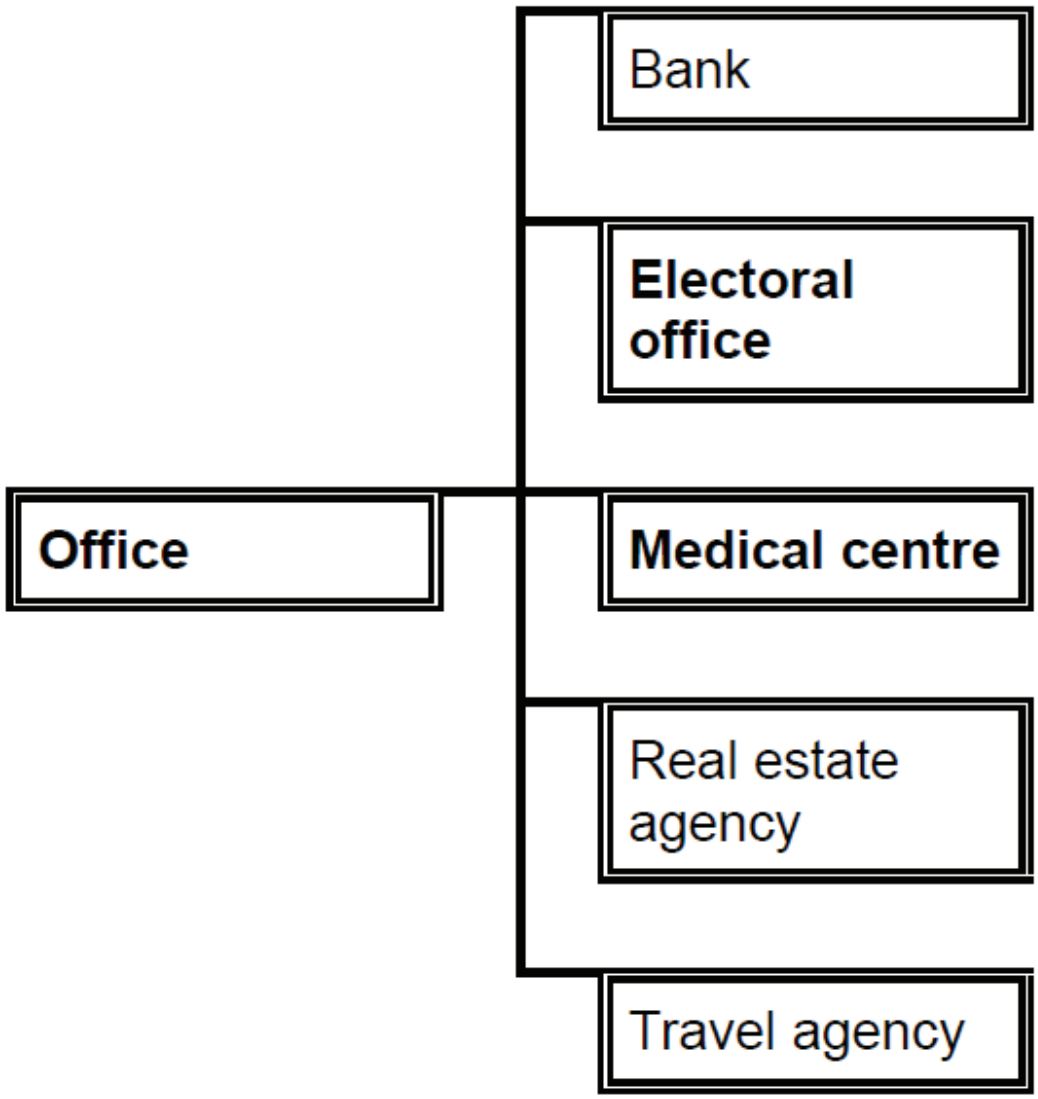
73.04-7 Earth and energy resources group

16/08/2019
VC163



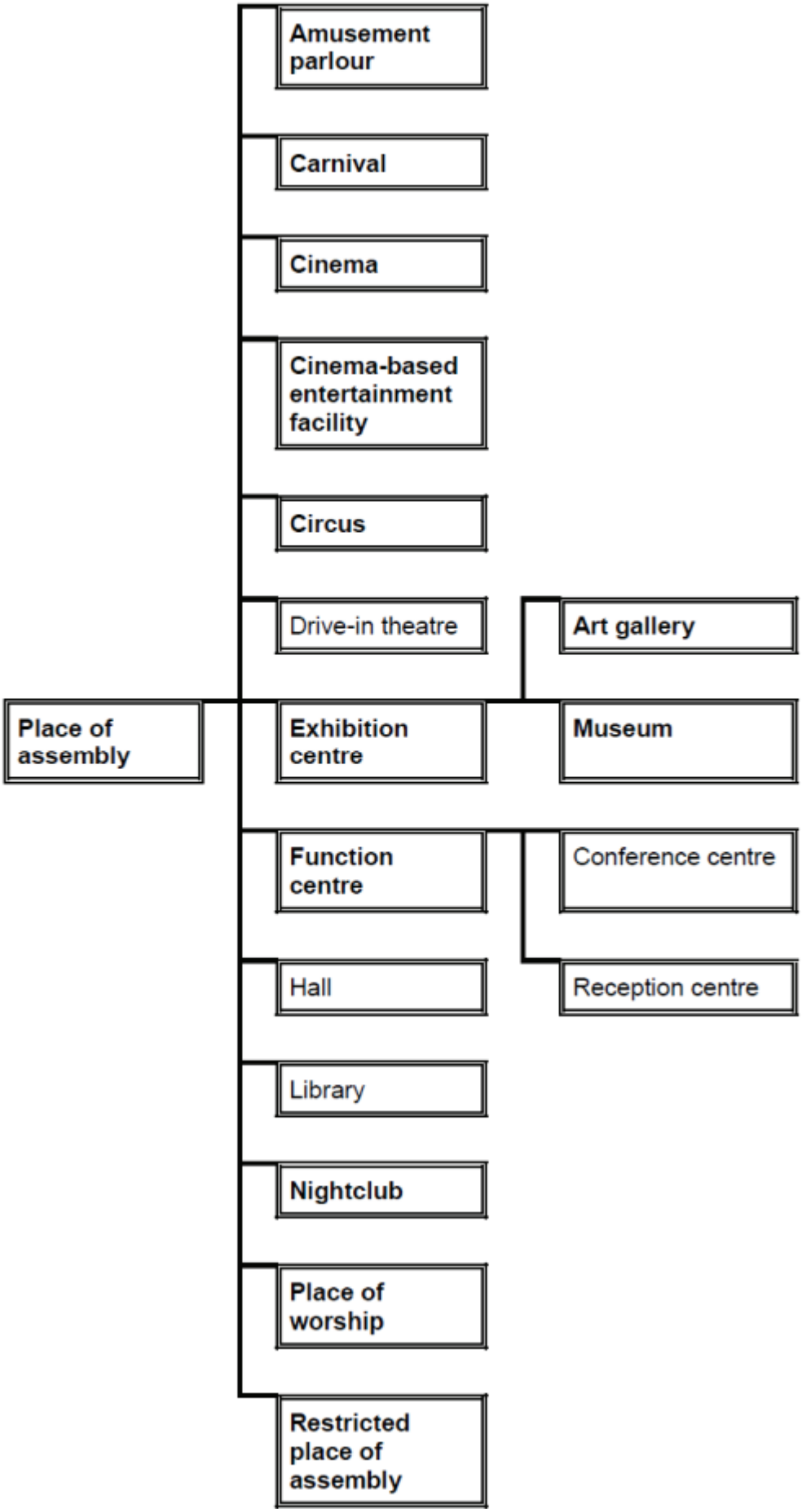
73.04-8 Office group

08/08/2019
VC159



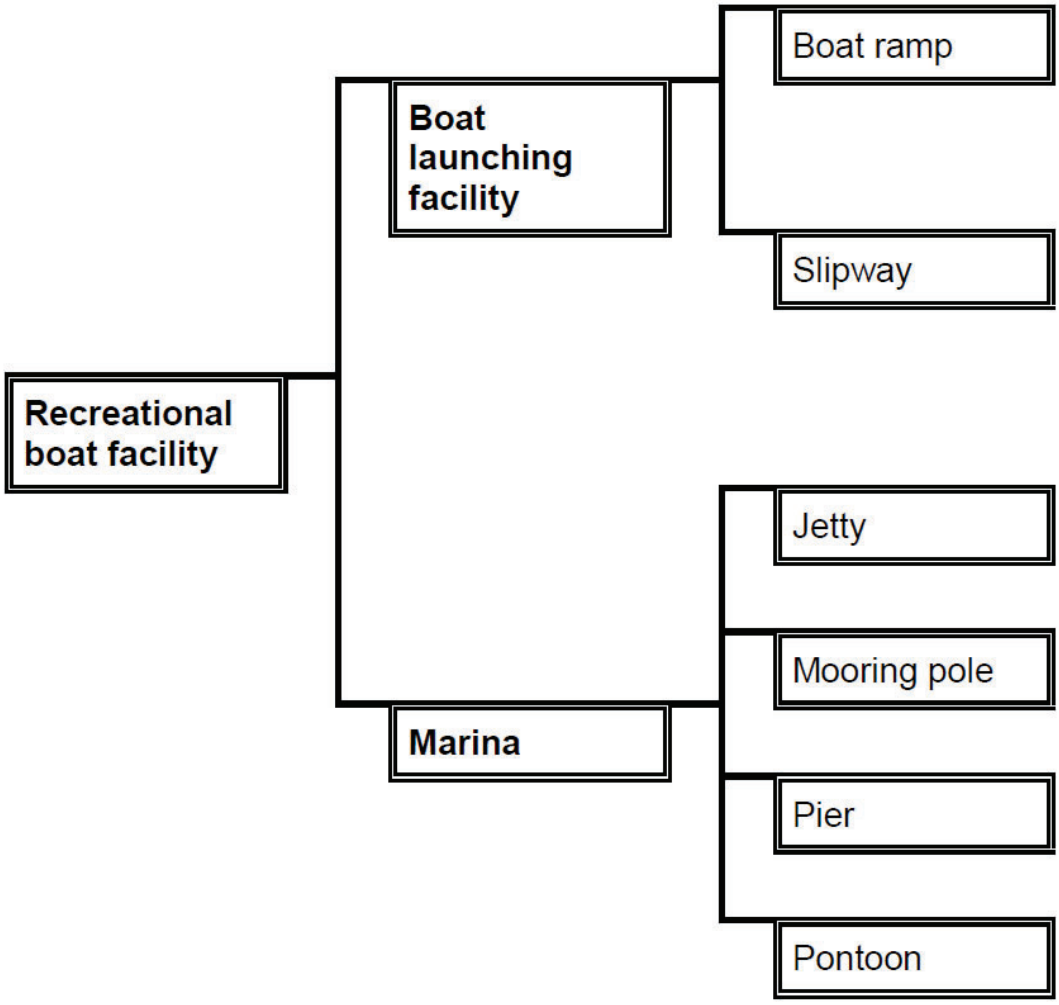
73.04-9 Place of assembly group

16/08/2019
VC163



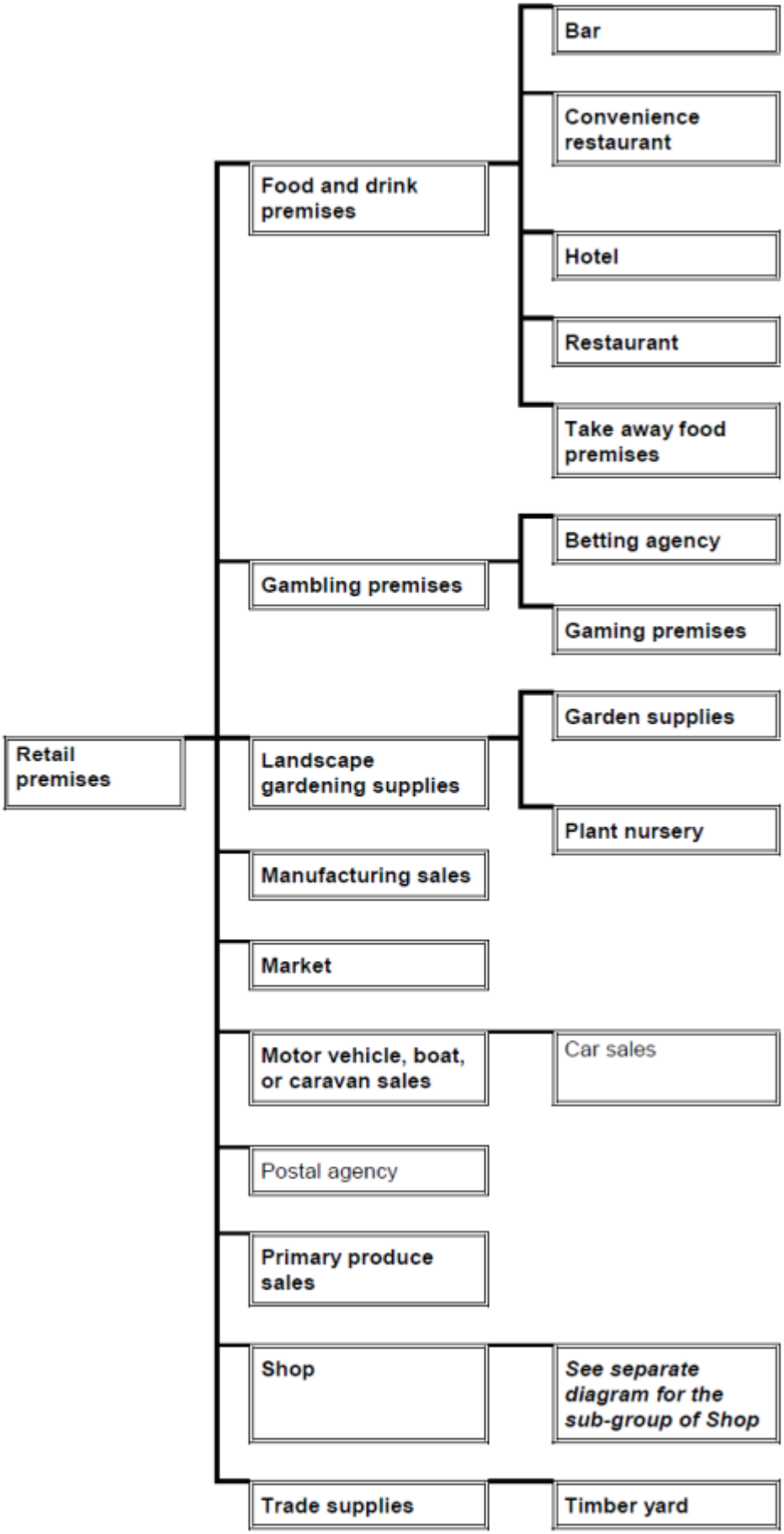
73.04-10 Recreational boat facility group

08/08/2019
VC159



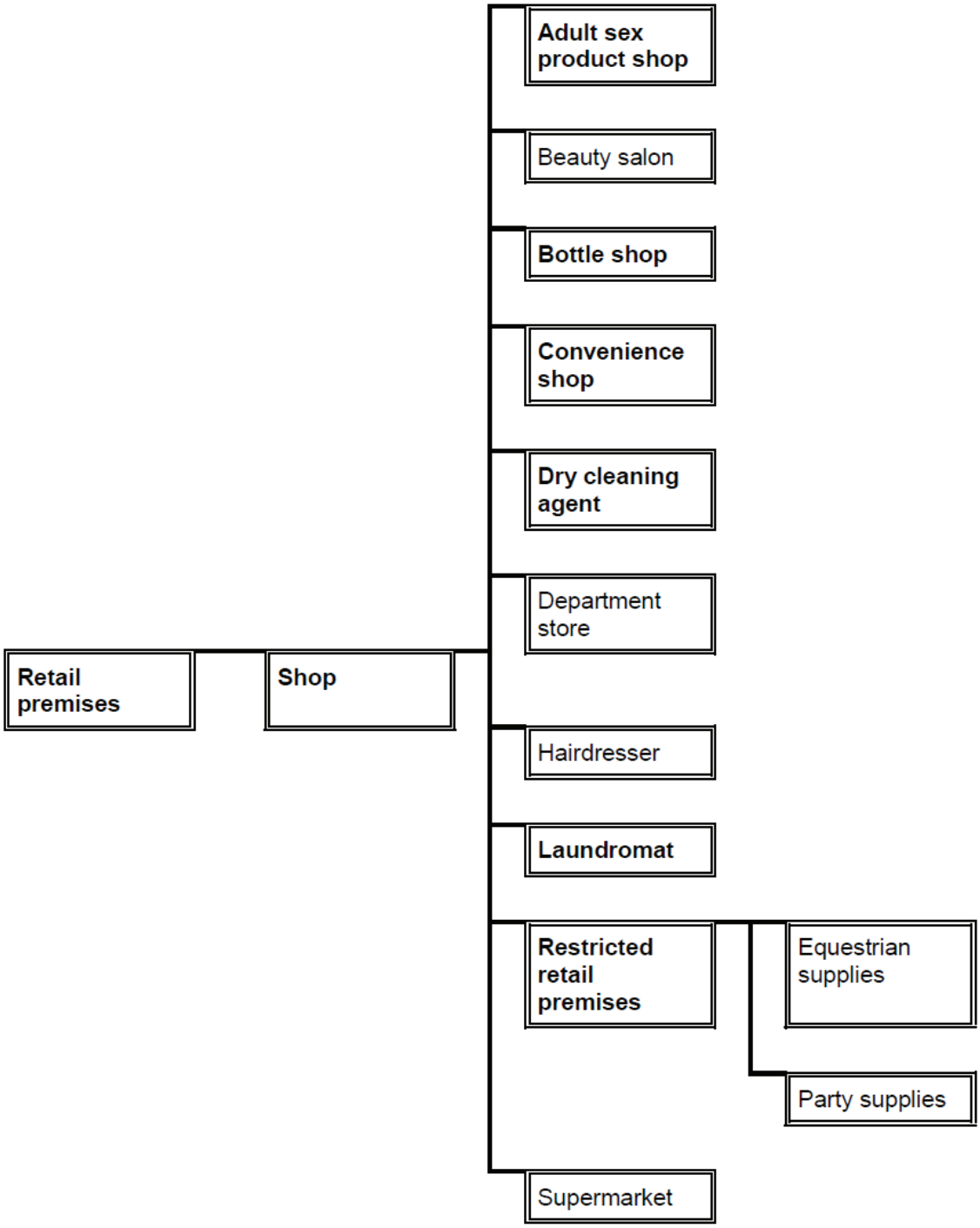
73.04-11 Retail premises group

16/08/2019
VC163



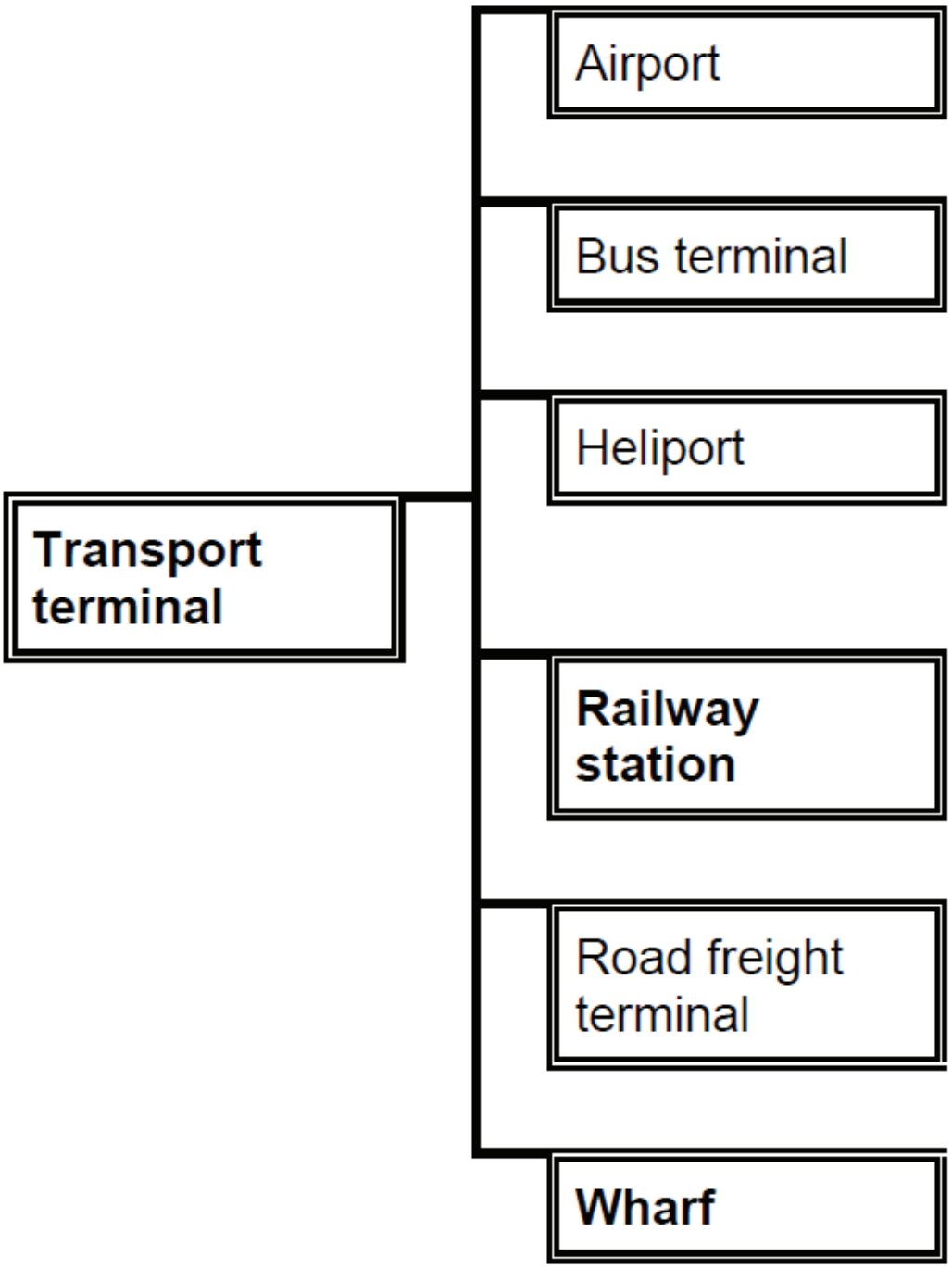
73.04-12 Retail premises group (sub-group of Shop)

08/08/2019
VC159



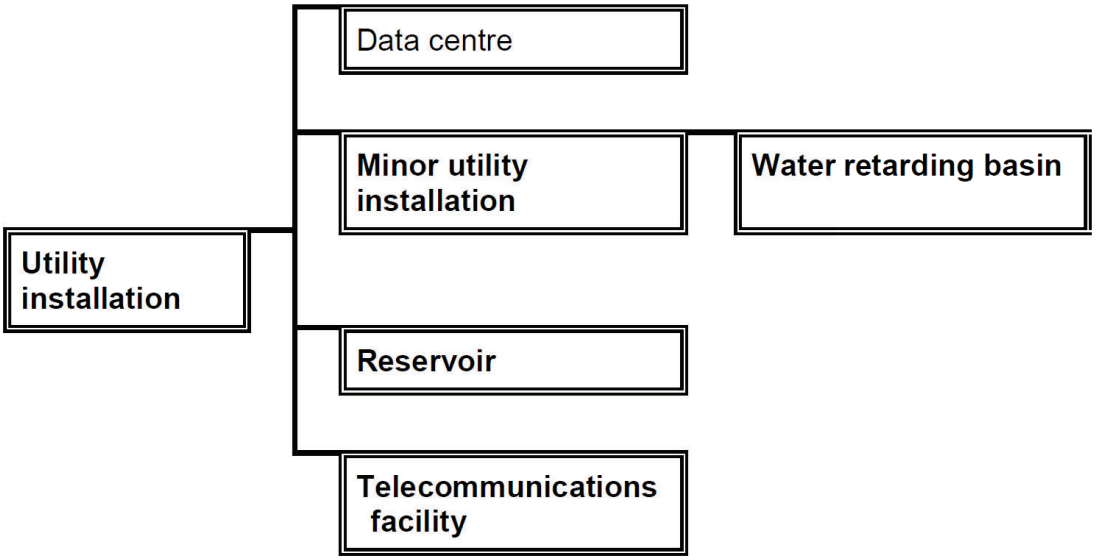
73.04-13 Transport terminal group

08/08/2019
VC159



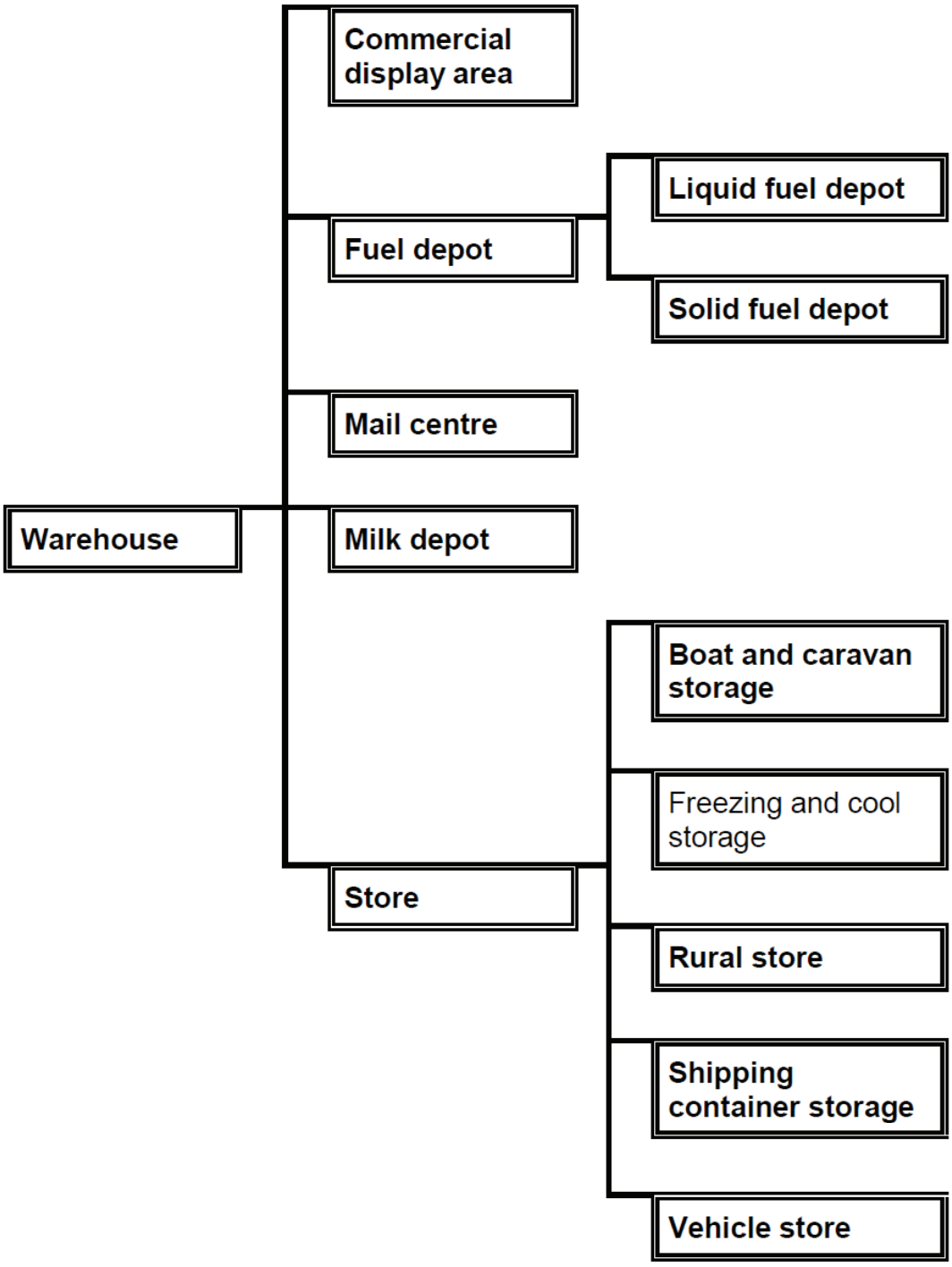
73.04-14 Utility installation group

08/08/2019
VC159



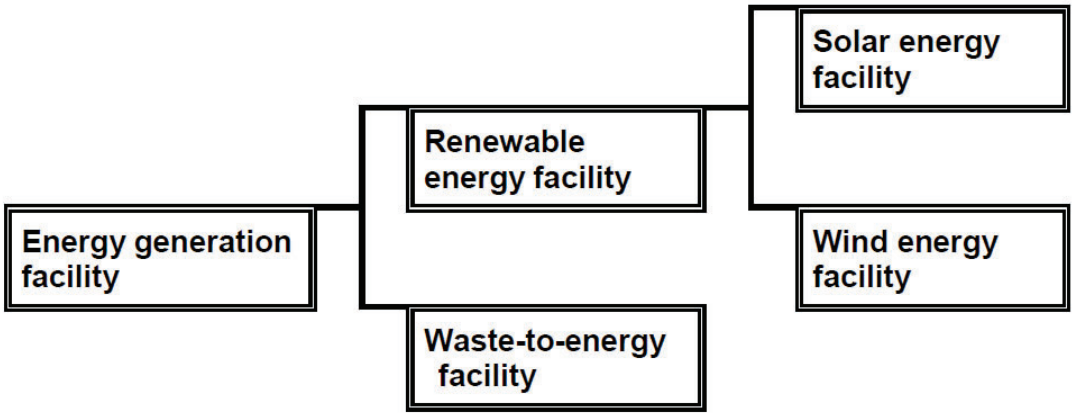
73.04-15 Warehouse group

08/08/2019
VC159



73.04-17 Energy Group

17/09/2019
VC161



73.04-17 Land use terms that are not nested

08/08/2019
VC159

Art and craft centre

Brothel

Car park

Cemetery

Crematorium

Display home centre

Emergency services facility

Freeway service centre

Funeral parlour

Helicopter landing site

Home based business

Hospital

Natural systems

Research centre

Saleyard

Service station

Sign

Tramway

Veterinary centre

Winery

Appendix 5 KEY TERMS IN AS(/NZS) 2885

The following provides a summary and explanatory notes on key terms from AS(NZS) 2885 that are used in this report, and is provided for information only. AS 2885.0 Clause 1.5 lists all the definitions that are applicable to the AS(NZS) 2885 series and should be consulted for the formal definition of any term discussed below.

Term	AS 2885.0 Clause	Comment
Critical defect length	1.5.10	The critical defect length (CDL) is the length of a through-wall defect in the axial direction of the pipe that, if exceeded, will result in a rupture. In other words, if a defect is shorter than the CDL, then the pipe will leak, whereas if the pipe has a defect larger than the CDL then the pipe will burst, resulting in "full-bore" release of the contents..
Encroachment	1.5.16	AS 2885.0 Clause 1.5.16 defines encroachment as “work by third parties within the pipeline corridor or activities in close proximity that could affect the pipeline system (e.g. blasting or earthworks)”.
Failure event	1.5.18	In the context of this report a failure event is an event that results in product escaping from the pipeline in an uncontrolled or unplanned manner.
High consequence area	1.5.24	AS 2885.0 Clause 1.5.24 defines a high consequence area as a “location where a failure event can be expected to result in multiple fatalities or significant environmental damage, including as a minimum location classes T1, T2, I, S and E.” Location classes are summarised in the Appendix 6.
Land use change	1.5.34	AS 2885.0 Clause 1.5.34 defines land use change as “any change outside the pipeline corridor but within the measurement length, such that there is either a change of location class, or an increase in the likelihood of the consequences of failure event without change in location class”.
Location class	1.5.37	The location classification is determined on the basis of a number of factors including population density and predominant activities within the measurement length. This in turn defines the design and operational requirements of AS(/NZS) 2885. In broad terms, as the consequence of a hydrocarbon release increase, the requirements of AS(/NZS) 2885 become more stringent. AS/NZS 2885.6 Section 2 describes the principles applied to location classification and defines both primary and secondary location classes. These are summarised in the Appendix 6.
Measurement length	1.5.41	The measurement length is the distance at which heat radiation from an ignited hydrocarbon release in the event of a pipeline rupture can cause hospitalizing injuries. All land use within the measurement length determines the location class, regardless of whether rupture is, or is not, a credible failure mode.

Term	AS 2885.0 Clause	Comment
Physical control	1.5.46	Physical controls are measures that either prevent mechanical equipment from contacting the pipeline (e.g. depth of cover greater than excavation depth), or that prevent the mechanical equipment from penetrating the pipeline wall (e.g. sufficient wall thickness so that equipment cannot penetrate).
Pipeline corridor	1.5.49	The pipeline corridor is the pipeline easement or equivalent (e.g. where the pipeline is installed in a road reserve).
Procedural control	1.5.57	Procedural controls are measures that alert personnel who plan activities or operate equipment to the presence of the pipeline (e.g. signs, dial-before-you-dig) so that the pipeline operator is informed and is able to safely manage the proposed activity.
Rupture	1.5.61	Rupture describes when a pipeline is damaged sufficiently that it bursts due to internal pressure. This results in a "full bore" release of the pipeline contents. Rupture is also used to describe a release from any hole that is larger than the pipeline diameter. A failure event that does not result in rupture is a hole, a release from which is called a leak.

APPENDIX 6 LOCATION CLASS IN AS(/NZS) 2885

The following provides a summary and explanatory notes on key terms from AS(NZS) 2885 that are used in this report, and is provided for information only. AS/NZS 2885.6 Section 2 describes the principles applied to location classification and defines both primary and secondary location classes and should be consulted for the formal definition of any term discussed below.

PRIMARY LOCATION CLASS OVERVIEW

The following primary location classes are used to broadly characterise land use in terms of the safety consequence of a pipeline failure:

- **Rural (R1)** – broad acre agricultural, sparse population
- **Rural Residential (R2)** – small farm allotments, increased population (as typically occur on the outskirts of towns and cities)
- **Residential (T1)** – community living / suburban areas with associated public utilities
- **High Density (T2)** – high rise development, town and city centre, high population areas, high people concentration

SECONDARY LOCATION CLASS OVERVIEW

Secondary locations classes are subclasses that may occur within any primary location class:

- **Sensitive Use (S)** – Land use developed for sectors of the community who may be unable to protect themselves if a pipeline failure event occurs. In this case the consequence of a failure event may be greater than if the for a similar primary location class where Sensitive Use (S) does not apply. Sensitive uses include schools, hospitals, aged care facilities, and prisons. Design requirements for **High Density (T2)** applies.
- **Industrial (I)** – light or general industrial areas (e.g. factories, warehouses), which are generally has a population density similar to **Residential (T1)**. Design requirements for **Residential (T1)** applies.
- **Heavy Industrial (HI)** – heavy industry / toxic industrial use with unusual threats or considerable escalation consequents. Design requirements for **Rural Residential (R2)**, **Residential (T1)**, or **High Density (T2)** depending on circumstances.
- **Common Infrastructure Corridor (CIC)** – multiple infrastructure within a common reserve. Location class is a per surrounding area, but special threats are to be considered.
- **Crowd (C)** – intermittent high population locations (e.g. sports grounds, race tracks, high traffic congestion areas). Design requirements determined by circumstances at that location.
- **Environmental (E)** – locations of high environmental sensitivity to pipeline failure, including particularly areas where pipeline failure may impact on threatened ecological communities or species or where rectification of environmental damage may be difficult. Design requirements for **Rural Residential (R2)**, **Residential (T1)**, or **High Density (T2)** depending on circumstances.

Appendix 7 DISCUSSION OF FACTORS THAT INFLUENCE FAILURE MODE

As discussed in Section 3.4, based on Australian and overseas experience, releases from holes are far more likely than ruptures. There are a number of reasons that contribute to this:

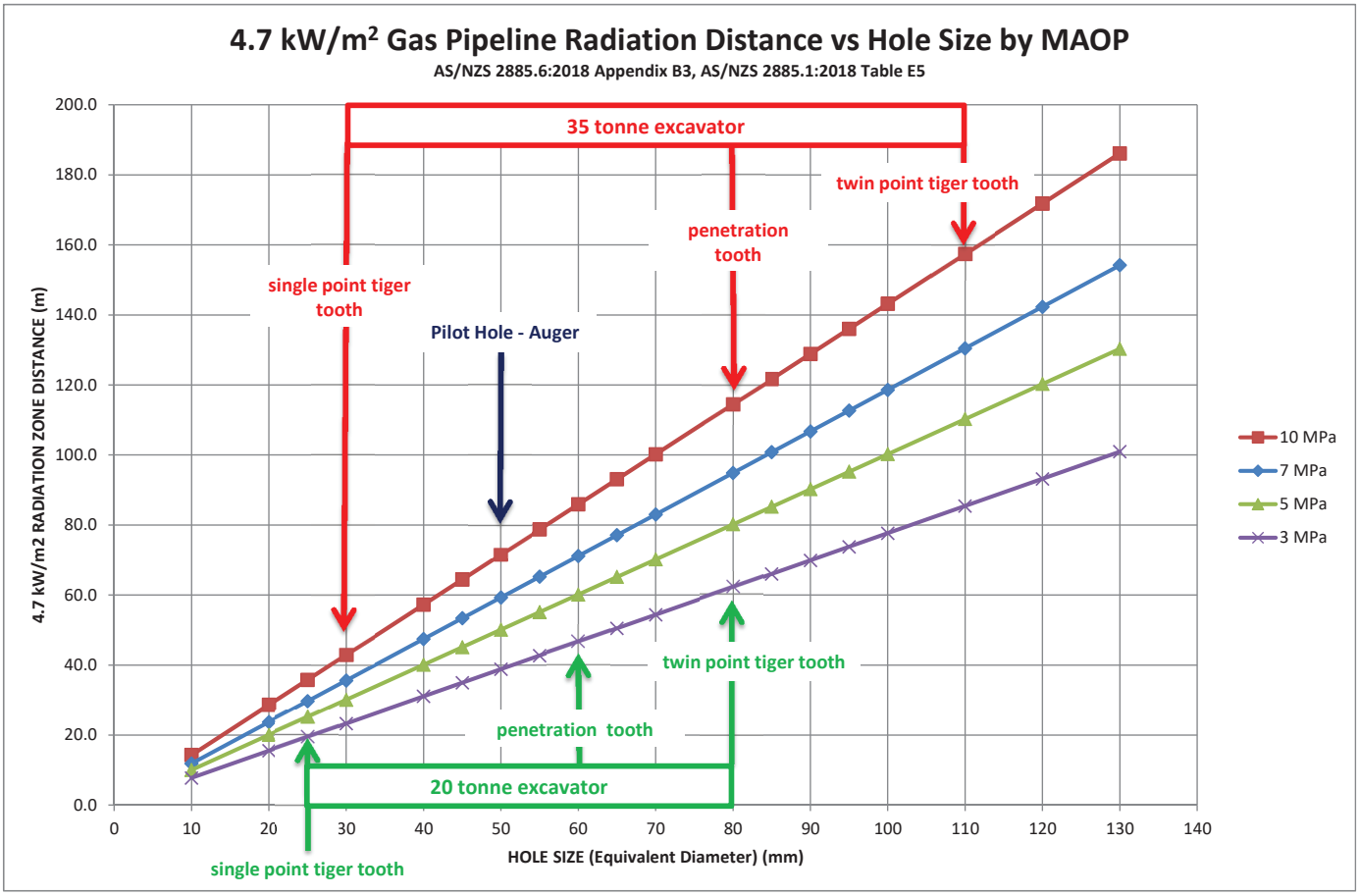
1) In many cases it is not physically possible to rupture the pipe (i.e. rupture is a not credible failure mode); or
2) Where rupture is a credible failure mode, the actual damage caused is not likely to be sufficient to result in rupture (i.e. even in the worst case the damage does not exceed the critical defect length); or
3) Even if, in the worst case, the damage can exceed the critical defect length, in most cases the actual geometry and orientation of the damage is likely to be such that damage in the axial direction does not exceed the critical defect length and therefore rupture does not occur.

To further expand on item (3) above, pipeline rupture can only occur when the defect length in the axial direction exceeds the critical defect length (CDL). The following discussion uses damage by excavators as an example to illustrate the general points.

While it may be theoretically possible for a single excavator tooth to create a defect in the axial direction that exceeds the CDL, in practice this is difficult to achieve, as the actual damage caused is influenced by the angle of attack and whether one or more teeth contact the pipeline:

- When the excavator bucket is aligned parallel to the pipeline axis, a number of teeth strike the pipeline more or less simultaneously. This distributes the weight of the bucket across a number of teeth, thus reducing the force available for a single tooth to penetrate the pipeline.
- Penetration by one tooth is more likely if the bucket is aligned perpendicular to the pipeline, since in this case weight of the excavator is more likely to be concentrated on a single tooth. However, in this case the maximum hole length caused by the tooth is oriented perpendicular to the axis of the pipeline, while the damage in the axial direction does not exceed the CDL. In this case the failure mode is a hole.

The point is that while rupture cannot be discounted, it does not follow that damage by equipment that has the potential to cause rupture will indeed result in rupture.



18836 Radiation Contours Rev 1.xlsx

4.7 kW/m^2 Gas Pipeline Radiation Distance vs Hole Size by MAOP

AS/NZS 2885.6:2018 Appendix B3, AS/NZS 2885.1:2018 Table E5

					NOTIFICATION ZONE FOR MAXIMUM CREDIBLE THREAT			
Pipeline MAOP	**Weight**	**Equipment**	**Hole Size**	**4.7 kW/m^2 distance (m)**	**Single Point of Tiger Tooth**	**Auger (50mm)**	**Penetration Tooth**	**Twin Point Tiger Tooth**
10 MPa	10T	Single Point of Tiger Tooth	20	29	30m	70m	70m	90m
		Auger	50	72				
		Penetration Tooth	45	64				
		Twin Point Tiger Tooth	60	86				
	15T	Single Point of Tiger Tooth	20	29				
		Auger	50	72				
		Penetration Tooth	55	79				
		Twin Point Tiger Tooth	70	100				
	20T	Single Point of Tiger Tooth	25	36	35m	70m	90m	120m
		Auger	50	72				
		Penetration Tooth	60	86				
		Twin Point Tiger Tooth	80	115				
	25T	Single Point of Tiger Tooth	25	36				
		Auger	50	72				
		Penetration Tooth	65	93				
		Twin Point Tiger Tooth	85	122				
	30T	Single Point of Tiger Tooth	30	43	45m	70m	105m	150m
		Auger	50	72				
		Penetration Tooth	70	100				
		Twin Point Tiger Tooth	95	136				
	35T	Single Point of Tiger Tooth	30	43				
		Auger	50	72				
		Penetration Tooth	80	115				
		Twin Point Tiger Tooth	110	157				
7 MPa	10T	Single Point of Tiger Tooth	20	24	25m	60m	50m	80m
		Auger	50	59				
		Penetration Tooth	45	53				
		Twin Point Tiger Tooth	60	71				
	15T	Single Point of Tiger Tooth	20	24				
		Auger	50	59				
		Penetration Tooth	55	65				
		Twin Point Tiger Tooth	70	83				
	20T	Single Point of Tiger Tooth	25	30	30m	60m	75m	100m
		Auger	50	59				
		Penetration Tooth	60	71				
		Twin Point Tiger Tooth	80	95				
	25T	Single Point of Tiger Tooth	25	30				
		Auger	50	59				
		Penetration Tooth	65	77				
		Twin Point Tiger Tooth	85	101				
	30T	Single Point of Tiger Tooth	30	36	35m	60m	90m	120m
		Auger	50	59				
		Penetration Tooth	70	83				
		Twin Point Tiger Tooth	95	113				
	35T	Single Point of Tiger Tooth	30	36				
		Auger	50	59				
		Penetration Tooth	80	95				
		Twin Point Tiger Tooth	110	130				
5 MPa	10T	Single Point of Tiger Tooth	20	20	20m	50m	50m	70m
		Auger	50	50				
		Penetration Tooth	45	45				
		Twin Point Tiger Tooth	60	60				
	15T	Single Point of Tiger Tooth	20	20				
		Auger	50	50				
		Penetration Tooth	55	55				
		Twin Point Tiger Tooth	70	70				
	20T	Single Point of Tiger Tooth	25	25	25m	50m	65m	80m
		Auger	50	50				
		Penetration Tooth	60	60				
		Twin Point Tiger Tooth	80	80				
	25T	Single Point of Tiger Tooth	25	25				
		Auger	50	50				
		Penetration Tooth	65	65				
		Twin Point Tiger Tooth	85	85				
	30T	Single Point of Tiger Tooth	30	30	30m	50m	75m	100m
		Auger	50	50				
		Penetration Tooth	70	70				
		Twin Point Tiger Tooth	95	95				
	35T	Single Point of Tiger Tooth	30	30				
		Auger	50	50				
		Penetration Tooth	80	80				
		Twin Point Tiger Tooth	110	110				

4.7 kW/m^2 Gas Pipeline Radiation Distance vs Hole Size by MAOP

AS/NZS 2885.6:2018 Appendix B3, AS/NZS 2885.1:2018 Table E5

					NOTIFICATION ZONE FOR MAXIMUM CREDIBLE THREAT			
Pipeline MAOP	**Weight**	**Equipment**	**Hole Size**	**4.7 kW/m^2 distance (m)**	**Single Point of Tiger Tooth**	**Auger (50mm)**	**Penetration Tooth**	**Twin Point Tiger Tooth**
3 MPa	10T	Single Point of Tiger Tooth	20	16	**15m**	**40m**	**30m**	**50m**
		Auger	50	39				
		Penetration Tooth	45	35				
		Twin Point Tiger Tooth	60	47				
	15T	Single Point of Tiger Tooth	20	16				
		Auger	50	39				
		Penetration Tooth	55	43				
		Twin Point Tiger Tooth	70	54				
	20T	Single Point of Tiger Tooth	25	19	**20m**	**40m**	**50m**	**65m**
		Auger	50	39				
		Penetration Tooth	60	47				
		Twin Point Tiger Tooth	80	62				
	25T	Single Point of Tiger Tooth	25	19				
		Auger	50	39				
		Penetration Tooth	65	50				
		Twin Point Tiger Tooth	85	66				
	30T	Single Point of Tiger Tooth	30	23	**25m**	**40m**	**60m**	**80m**
		Auger	50	39				
		Penetration Tooth	70	54				
		Twin Point Tiger Tooth	95	74				
	35T	Single Point of Tiger Tooth	30	23				
		Auger	50	39				
		Penetration Tooth	80	62				
		Twin Point Tiger Tooth	110	85				

Appendix 8 EXAMPLE APPROACH FOR GAS PIPELINES

The notification zone for any pipeline is a function of a number factors including: maximum allowable operating pressure; and the properties of the gas or liquid contained in the pipeline, the capacity of the pipeline wall thickness to resist penetration by any equipment that strikes it. Notwithstanding this, an example of how this approach can be applied for sales gas pipelines based on the equations provided in AS(/NZS) 2885 below. These calculation assume typical sales gas properties, so calculations for the pipelines that are the subject of this report may vary slightly.

The analysis is based on the information presented in AS/NZS 2885.6:2018 Appendix B3 (Radiation distances from pipeline leaks), AS/NZS 2885.1:2018 Table E5 (Excavator tooth dimensions). In the charts / tables attached:

- The chart shows the 4.7 kW/m^2 radiation distance for a leak in a gas pipeline at MAOPs of 10 MPa, 7 MPa, 5 MPa, and 3 MPa.
- The chart also highlights the hole sizes for 20t and 35t excavators fitted with tiger teeth or penetration teeth. The single point tiger teeth hole is based on a single point penetration (the likely case). The twin point tiger tooth hole is based on both points penetrating the pipeline (the absolute worst case – considered to be theoretically possible, and can occur in the lab, but is highly unlikely in field conditions). However, as per AS/NZS 2885.1, Appendix E5, this needs to be assessed on a case-by-case basis.
- Also shown is a 50 mm hole (the pilot hole of an auger, which is the damage that occurred on the Dromana to Rye pipeline).
- The table shows a more complete set of data for holes produced by excavators and augers for gas pipelines at MAOPs of 10 MPa, 7 MPa, 5 MPa, and 3 MPa.
- The final four columns provide a simplified list of choices for notification zones based on the maximum credible threat identified by the Pipeline Licensee in the most current SMS.

While distances for: 1) the Single Point of a Tiger Tooth; 2) Auger; 3) Penetration Tooth; and 4) Twin Points of Tiger Teeth are presented, the key threats are either the auger or penetration tooth, based on:

- While use of tiger teeth is common, as discussed above, twin point penetration is a very unlikely outcome - it is more likely that single point penetration will penetrate and gas release will alert the operator before additional damage is done (this is discussed in AS/NZS 2885.1, Appendix E5 (the last paragraph discusses existing pipelines)).
- If use of a penetration tooth is credible then this creates the next largest hole.
- If use of a penetration tooth is not credible then a hole caused by an auger is the next largest hole that can be created. The hole caused by an auger is always greater than the hole caused by the single point of a tiger tooth. In addition, more often than not, penetration by vertical boring (or HDD) resulting in a 50mm hole is assessed to be a credible threat.
- If vertical boring (or HDD) cannot penetrate the pipeline, then the single point of a tiger tooth creates the smallest hole.
- If other threats (e.g. rippers) are credible, then these will have to be addressed on a case-by-case basis.

It is important to note that the hole sizes and radiation zones are not precise calculations and are subject to uncertainty. The numbers presented in AS/NZS 2885 include a degree of conservatism to recognise this uncertainty.

The table provides a summarised / simplified list of notification distances to choose from (recognising that none of this is an exact science) based on the maximum credible threat identified by the Pipeline Licensee in the most current SMS. Excavator sizes are grouped into ranges of 10T-15T, 20T-25T and 30T-35T for simplicity.

Examples:

a) Maximum excavator size is 25t, however penetration teeth or tiger teeth are not used in the area. Auger can penetrate the pipeline. For a 7 MPa pipeline, the notification zone is 50 m.

b) Maximum excavator size is 30t. Penetration teeth are not used in the area, but tiger teeth are used in the area. Auger cannot penetrate the pipeline. Given that the most twin point penetration of tiger teeth is not expected, the worst case penetration is by the single point of a tiger tooth. For a 5 MPa pipeline, the notification zone is 30 m.

c) Maximum excavator size is 30t. Penetration teeth and tiger teeth are used in the area. Auger cannot penetrate the pipeline. Given that the most twin point penetration of tiger teeth is not expected, the worst case penetration is by the penetration tooth. For a 10 MPa pipeline, the notification zone is 105 m.

Appendix 9 DRAFT PLANNING SCHEME ORDINANCES

SCHEDULE 4 TO THE ENVIRONMENTAL SIGNIFICANCE OVERLAY

Shown on the planning scheme maps as ESO4

MAJOR PIPELINE INFRASTRUCTURE

1.0 Statement of environmental significance

Pipelines licensed under the *Pipelines Act 2005* carry a range of high pressure and volatile substances, such as natural gas, LPG, liquid petroleum and other industrial products throughout Victoria. A pipeline failure that results in a release of the contents of the pipeline can impact an area many hundreds of metres from the pipeline

Licensed pipelines are required to be designed, constructed, operated and maintained so that threats to the pipeline, including damage caused by third parties and the consequences of pipeline failure are assessed and risks are reduced to as low as reasonably practicable. Over time, as land uses change and new construction activity is undertaken near pipelines, new threats to the pipeline and increased consequences of pipeline failure can arise.

Although pipelines are one of the safest and most efficient methods of transporting liquid and gaseous substances, the risks of pipeline failure must be carefully managed to protect human life and the environment.

2.0 Environmental objective to be achieved

To protect human life and the environment for risks resulting from developments near pipeline licensed under the *Pipelines Act 2005*.

3.0 Permit requirement

A permit is not required to:

- Construct a building or construct or carry out works, unless the buildings or works are associated with the following uses:
  - Child care centre
  - Corrective institute
  - Earth and energy resources industry
  - Fuel depot
  - Hospital
  - Major sports and recreation facility
  - Motor racing track
  - Place of assembly
  - Primary school
  - Residential aged care facility
  - Retirement village
  - Secondary school.
- Construct a fence.
- Subdivide land.
- Remove, destroy or lop any vegetation, including dead vegetation.

This does not apply if the new buildings or works are associated with an existing use and do not result in the gross floor area associated with the use increasing by more than 25%.

4.0 Application requirements

None specified.

5.0 Decision guidelines

The following decision guidelines apply to an application for a permit under Clause 42.01, in addition to those specified in Clause 42.01 and elsewhere in the scheme which must be considered, as appropriate, by the responsible authority:

- The views of Energy Safe Victoria.
- Whether the buildings or works, including associated construction activities, will result in any additional threats to a licensed pipeline and how these threats will be controlled.
- The extent to which the buildings or works will increase the consequence of a pipeline failure.
- Whether the buildings or works have been designed to reduce risks to human life in the event of a pipeline failure, where practicable, including:
  - Opportunities to locate the development further away from the pipeline
  - Directing emergency exit routes away from the pipeline
  - Opportunities for siting external gathering spaces further away from the pipeline.

SCHEDULE TO CLAUSE 66.04 REFERRAL OF PERMIT APPLICATIONS UNDER LOCAL PROVISIONS

Clause	Kind of application	Referral authority	Referral authority type
[Existing referral requirements for local provisions to be retained]			
Clause 3.0 to Schedule 4 of Clause 42.01 (ESO)	All applications	Energy Safe Victoria	Recommending referral authority