Department of Planning, Housing and Infrastructure

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Guideline for planning proposals near high pressure dangerous goods pipelines

August 2024

Acknowledgement of Country

The Department of Planning, Housing and Infrastructure acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land and we show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

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Introduction

This guideline will help planning authorities, pipeline operators and proponents identify and consider safety risks for planning proposals in the vicinity of high-pressure dangerous goods (HP DG) pipelines. It also provides requirements for proponents considering land use safety risk at the planning proposal stage.

This guideline relates to the main HP DG pipelines in NSW identified in section 2.77(3) of the State Environmental Planning Policy (Transport and Infrastructure) 2021 (T&I SEPP). These contain natural gas (methane), gasoline (liquid petroleum), ethane or jet fuel.

Natural gas and gasoline are used primarily as a fuel, ethane is principally used as a raw material for manufacturing ethylene and jet fuel is used to power aircraft. The exact locations of HP DG pipelines are withheld from the public to protect them from targeted damage and ensure community safety.

Background

HP DG pipelines exist in the NSW built environment and some traverse the state. They are subject to potential hazards – mainly from leaks, due to:

- mechanical failures, such as material defects or design and construction faults
- corrosion, including both internal and external corrosion
- ground movement and other failures due to earthquakes, heavy rains/floods, operator errors, and other natural hazards such as lightning
- third-party activity such as damage from heavy plant and machinery, drills/boring machines or hot tapping.

The impact of a potential hazard is described as its risk profile. The risk profile is generally determined by the type of material being transported, the size of an HP DG pipeline, its operating pressure, and the size and sensitivity of the population near a pipeline. In extreme circumstances, the potential consequences of a pipeline failure include asphyxiation, fires, vapour cloud explosions, toxic smoke and explosions in confined spaces.

Understanding risks in land use planning

The land use safety risk consideration distances for planning proposals near HP DG pipelines have been developed using a generic risk analysis to investigate potential land use impacts from the HP DG pipelines in operation within NSW. These distances are described in the next section.

Within the NSW planning system:

- Hazardous Industry Planning Advisory Paper No 4 - Risk Criteria for Land Use Safety Planning (PDF 355 KB) (HIPAP 4) sets out the risk criteria for land use safety planning
- Hazardous Industry Planning Advisory Paper No 10 - Land Use Safety Planning (PDF 1.10 MB) (HIPAP 10) reiterates these criteria in the context of proposed developments in the vicinity of potentially hazardous infrastructure such as HP DG pipelines.

Although HIPAP 4 and HIPAP 10 apply to development applications, their principles and criteria are also applicable to planning proposals, which are the type of proposals covered by this guideline.

Risks can be considered qualitatively and quantitatively. Qualitative risk criteria consider risk acceptability by principles, such as whether there may be a more suitable location or layout for the proposal. Quantitative risk criteria measure individual injury or fatality risks and societal risks.

Individual risk analysis can determine whether risks to individuals from a potential hazard source are too high when considering a person's vulnerability/sensitivity. This will determine whether a location is suitable for certain land uses.

Societal risk describes the risk of incidents from an existing hazard source that could potentially injure many people within a broader location. This consideration is relevant if the proposal introduces a significant population or is surrounded by a large population.

Risk specialists must be engaged to undertake quantitative risk analyses. In the context of this guideline, these analyses should consider the specifications of the pipeline, locality and surrounding land uses and populations, in accordance with Hazardous Industry Planning Advisory Paper No 6 – Hazard analysis (PDF 524 KB) (HIPAP 6), and compared against the HIPAP 4 risk criteria.

Consider this guideline in conjunction with the relevant HIPAP documents, to assist with terminology and interpretation.

Local planning direction

The 'High pressure dangerous goods pipelines' local planning direction was issued under section 9.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The direction requires councils to consider risks to the integrity of relevant pipelines, human health and the environment when preparing a planning proposal that would permit certain development adjacent to HP DG pipelines. Accordingly, this guideline applies to planning proposals near HP DG pipelines.

The department also adopts the local planning direction when preparing environmental planning instruments and for strategic and precinct planning.

The local planning direction (and this guideline) apply to planning proposals that:

- are within a defined proximity to an HP DG pipeline – meaning that a portion of, or all the planning proposal area is within the land use safety risk consideration distance from a pipeline

and

- would permit development for sensitive land uses or development that may result in a significant population increase – meaning that:
  - the planning proposal seeks to permit sensitive land uses that may introduce vulnerable people to an area (such as centre-based childcare or hospitals), or
  - other development that may result in a significant population increase carried out on land that is within the land use safety risk consideration distance from a pipeline (for example, multi-dwelling housing).

Proximity to HP DG pipelines

Table 1 outlines distances from HP DG pipelines that encompass the application area for the local planning direction and this guideline. These distances were established through the generic risk analysis.

Table 1 - Land use safety risk consideration distances from either side of the pipelines measured from the centreline of the pipeline

Gasoline pipeline (m)	Natural gas pipeline (m)	Ethane pipeline (m)	Jet fuel pipeline (m)
140	200	140	140

Considerations for development that may result in a significant population increase and sensitive land uses

The type of development is a key factor when considering potential increases in population and associated risks. Developments such as a single dwelling or local shops do not introduce significant societal risks. Societal risk is relevant for:

- development that introduces multiple dwellings
- commercial and industrial development that may increase the working population in an area, such as office buildings and multi-unit industrial offices.

The existing population density should also be considered. If an area is already high density in population, a planning proposal that permits a small group of dwellings may result in a significant population increase in that area.

The following definitions are provided as a guide. The specified land uses are defined under the Standard Instrument prescribed by the Standard Instrument (Local Environmental Plans) Order 2006.

These types of development are likely to introduce population increases that warrant a pipeline risk analysis.

Development that may result in a significant population increase means any of the following development types (including as part of mixed use development):

attached dwelling	multi-dwelling housing	residential flat building	group homes
boarding house	co-living housing	seniors housing	hostel
manor houses	health services facility	centre-based childcare	educational establishment
industrial development (excluding home industry)	entertainment facility	tourist and visitor accommodation (excluding farm stay accommodation)	commercial premises (excluding take-away food and drink premises)
correctional centre			

For sensitive land uses, the following development are considered to introduce vulnerable people who would be difficult to evacuate in the event of emergency.

Sensitive land uses means any of the following development (including as part of mixed use development):

correctional centre	centre-based childcare	health services facility (if using general anaesthetic)	school
seniors housing			

Proposals near HP DG pipelines that must consider land use safety risks

Planning proposals that introduce a sensitive use or that may result in a significant population increase include (but are not limited to) proposals that:

- permit development for sensitive uses such as hospitals and other health services facilities (if using general anaesthetic), schools, childcare centres or aged care facilities
- would introduce vulnerable people (such as occupants of aged care or a childcare centre) that may be difficult to evacuate in an emergency
- would see a significant increase in the population, such as residential apartment buildings/complexes, townhouses or commercial buildings/complexes, or a planning proposal proposing large-scale land subdivision to permit any of these uses
- significantly increase the working population of an area, including strata industrial units and multistorey industrial development.

Proposed land use changes that will result in similar occupant numbers as existing uses are unlikely to be classified as a significant population increase.

Planning proposals introducing sensitive uses or a significant population increase near a HP DG pipeline must consider land use safety risks. If a planning authority deems it appropriate, other proposals near a HP DG pipeline may also need to:

- consider risk consistent with HIPAP 6 – Hazard Analysis
- compare against the HIPAP 4 risk criteria.

Examples of where the pipeline risk is likely to need consideration include:

- a development application (DA) in an area affected by a pipeline where risk has not been assessed at planning proposal stage
- where the scale of the DA exceeds the scope assessed under the planning proposal.

Planning authorities or proponents requiring further information or clarification on identifying a planning proposal that is required to consider risk from a HP DG pipeline should contact the department's hazard team via email at hazards@planning.nsw.gov.au.

Notifying a proponent that a planning proposal must consider land use safety risk

To avoid delays and costs associated with planning proposals, proponents should have a pre-lodgement meeting with the relevant planning authority. This will determine if the relevant land requires consideration of pipeline risks.

Where this is the case, the planning authority must notify the proponent as soon as practical. Maps and spatial data that identify the land use safety risk consideration distances will be provided from the pipeline operators to all relevant planning authorities. For the protection of the HP DG pipeline infrastructure and the community, this information is not made publicly available.

Process to consider risk

Step 1: Determine if a proposal needs to consider risks

When a council (or other relevant planning authority) is made aware of a planning proposal, they can use pipeline location information provided by the department to determine if the proposal is within the land risk safety consideration distance. The council can contact the department's hazards team at hazards@planning.nsw.gov.au for advice on technical information.

Step 2: Notify the proponent

Councils need to notify proponents if consideration of risks associated with HP DG pipelines is required.

Step 3: Consider the risks

If the proposal is within the land risk safety consideration distance, and is proposing to introduce sensitive uses or development that may result in a significant population increase, the proponent will need to ensure that risks associated with the infrastructure are considered.

The proponent must engage a qualified risk specialist to prepare a quantitative risk assessment in accordance with this guideline and HIPAP 6.

The assessment must:

- demonstrate consistency with the quantitative and qualitative risk criteria as provided in HIPAP 4
- be site-specific
- consider the existing and proposed population, individual risk factors and recommended setbacks (see Table 4)
- assess the risk of propagation between the pipelines (if more than one pipeline is in the vicinity of the proposal)
- illustrate a comprehensive understanding of the hazards and risks associated with the operation of the pipeline and its operational parameters.

Step 4: Progress the planning proposal

If the council wants to progress the planning proposal, they should follow the gateway process. The department will review the pipeline risk assessment. The department's hazards team can review the technical pipeline risk report before the gateway process. Specific advice may also be requested on a case-by-case basis.

Considering risk

A qualified risk specialist must undertake any required site-specific quantitative risk analyses. The risk specialist should have the qualifications and experience to deal with the scale and complexity of the planning proposal and its associated hazards. This typically requires a specialist who possesses professional qualifications and practical experience in a relevant scientific or engineering discipline. Basic expected competencies include:

- knowledge and in-depth understanding of the hazards associated with the storage, handling and processing of hazardous substances, including dangerous goods
- knowledge and experience in hazard identification, risk evaluation, risk assessment and risk control
- knowledge and understanding of safety management studies and how to consider relevant information for the risk analysis
- knowledge and understanding of relevant legislation, codes of practice and standards, including relevant HIPAPs
- report writing.

Proponents must get location-specific pipeline information for the planning proposal from the pipeline operator on each occasion. Information from other lengths of a pipeline away from the planning proposal site may not be relevant, as different segments may have different sets of operating conditions and protection factors.

The proponent should request the information from the relevant pipeline operator directly. Information obtained from the pipeline operator is sensitive for security reasons, and must not be disclosed to any third party. The technical risk analysis report should be redacted to remove all commercially sensitive and security-sensitive information for public releases. Usually, the pipeline operating conditions and the location of the pipelines should be removed. Only the risk contours should be illustrated for public exhibition.

The information outlined in the following sections was established by a generic risk assessment of selected HP DG pipelines in NSW, and is intended to establish baseline recommendations for site-specific quantitative risk assessments.

Site specific quantitative risk assessments may provide different recommendations from those outlined below. This does not make those site-specific recommendations inconsistent with this guideline or make a proposal inappropriate for approval. There may be site-specific features or mitigating factors that affect the suggested setback distances.

Population and societal risk considerations

The current and proposed population should be considered in terms of population density, which can be determined from Census data. Population density represents the population divided by the area of a lot or suburb. Table 2 shows 2016 Census data and corresponding population density ranges. This is provided for **reference only** and serves as an indication of the population density range based on typical buildings in Sydney. The population density is categorised based on the predominant building types at a suburb level.

The site-specific risk assessment will need to establish the existing population based on its locality. The qualified risk consultant can help establish this population (both residential and employment).

Table 2 – Population density range

Typical building types for the density range	Proportion of Greater Sydney (2016 Census)	Population density range (people per km ^{2})
Separate house	74%	0 to 5,500
Townhouses, semi-detached or apartment blocks up to 2 storeys	6%	5,500 to 10,500
Apartment blocks more than 3 storeys	20%	10,500 -16,300

When considering societal risk, consider both employment and residential populations. Current employment population data is available through Transport for NSW's Journey to Work data and could be used as a guide.

The scale of development or built form may need to be reconsidered or other mitigation measures included in certain circumstances. These are where societal risk (relating to the existing and proposed population) exceeds the societal risk criteria.

A planning proposal will be assessed on its merits. Consideration is given to other factors such as economic or social benefits and environmental impacts. Pipeline risks is only one consideration.

Individual risk consideration

Individual risk considers the risk profile of the hazard to an exposed individual. It is location-specific and usually illustrated as risk contours – the closer the risk source, the higher the risk level. HIPAP 4 defines NSW individual fatality risk criteria (Table 3) that considers the different vulnerabilities of recipients. It is the only individual fatality risk criteria used for pipeline risks.

HIPAP 4 also details the individual risk criteria for injury. Generally, the risk from existing pipelines is low enough that individual risk of injury does not need to be assessed for pipeline risk.

Table 3 - Individual fatality risk criteria

Land use	Suggested criteria (risk in a million per year)
Hospitals, schools, childcare facilities, seniors housing	0.5
Residential, hotels, motels, tourist resorts	1
Commercial developments, retail centres, offices and entertainment centres	5
Sporting complexes and active open space	10
Industrial	50

Setback distances

Where an individual risk criterion for a relevant land use cannot be met, a setback will usually be required. The recommended setback distances are provided in Table 4. The setback distances provide a reference for a planning proposal in the vicinity of a pipeline, indicating whether there are land use compatibility issues with the pipeline.

Setback distances are based on the quantitative risk analysis undertaken for the worst-case representative pipelines across the Sydney metropolitan area. The risk analysis methodology is consistent with HIPAP 6 and based on conservative parameters provided by pipeline operators.

A site-specific risk analysis should be undertaken that considers the pipeline specifications including diameter and maximum allowable operating pressure. The outcome of the risk analysis will determine the setback distance specific to the planning proposal.

Table 4 - Recommended setback distances for land uses from either side of the pipeline measured from the centreline

Land uses	Gasoline pipeline (m)	Natural gas pipeline (m)	Ethane pipeline (m)	Jet fuel pipeline (m)
Residential land uses	Not required	Not required	85	Not required
Sensitive uses (e.g. school, hospital, childcare, aged care)	60	100	115	60

Multiple HP DG pipelines

Some areas are affected by multiple HP DG pipelines. The risk exposure from multiple pipelines will need to be evaluated on a case-by-case basis.

A quantitative risk assessment in accordance with HIPAP 6 will likely be required to assess the potential risk from all existing pipelines. The findings from the risk study may also provide useful information to individual developers and could potentially influence the design layout for subsequent DAs.

For proposals located near multiple HP DG pipelines, the department encourages the proponent to contact the relevant planning authority and the department as early as possible to discuss and identify potential implications for the proposal.

Consistency with this guideline

Proposals that do not align with the recommended setback distances in Table 4 and/or introduce a population density more intensive than the population group in Table 2, are not necessarily inconsistent with this guideline. They can still be supported by a planning authority.

Site-specific risk analysis may support the merit of the proposal and allow for alternative approaches to ensure risks have been appropriately considered and mitigated. For example, a proposal may revise the site layout or orientation of buildings in response to site-specific risk analysis or may establish a maximum population for uses within the proposal. In addition, if sufficient design work is done during the planning proposal stage, additional safeguards may also be considered to reduce the fire or explosion impact on the buildings and windows. A qualified risk consultant can provide further recommendations.

Other alternatives may include providing more protection to the pipeline itself, such as:

- a concrete casing around the pipeline
- reducing the risk of damage to the pipeline by setting limits on the size of excavators used when undertaking site preparation and construction works.

An effective emergency plan is often recommended. However, its effectiveness is difficult to quantify and relies highly on conducting an emergency evacuation exercise which would be difficult to implement in a residential setting.

Consideration of AS 2885

All HP DG pipelines licensed under the *Pipelines Act 1967* must comply with Australian Standard AS 2885 – Pipelines – Gas and Liquid Petroleum (AS 2885). Pipeline operators are accountable for the safety and integrity of the pipeline system and its safety management. In NSW, the pipeline regulator is in the Office of Energy and Climate Change. It is responsible for licensing HP DG pipelines. The team can help councils or relevant parties in discussions on pipeline risk management, in particular when a dispute arises. Further information on pipeline licensing requirements can be found on the NSW Climate and Energy Action website.

This team can be contacted on 02 8275-1950 or energy.reporting@planning.nsw.gov.au

Parts 0 to 5 of AS 2885 details requirements for the design, construction and operations of a pipeline. Part 6 relates to pipeline safety management and explains pipeline operators' requirements when development is encroaching on existing pipelines.

The requirements under Part 6 of AS 2885 differ from the land use safety consideration principles under the planning framework as described in State Environmental Planning Policy (Resilience and Hazards) 2021 - Chapter 3 Hazardous and offensive development, and the associated HIPAP 10 guideline. However, satisfying requirements under AS 2885 is equally important to ensure the risk to the pipeline is appropriately mitigated.

AS 2885 outlines a measurement length area from a specific pipeline and is defined based on the worst-case impact distance from the pipelines without consideration of the likelihood of occurrence of such an event. It is often referred to as 'measurement length' and established in accordance with Part 0 of AS 2885.

AS 2885 requires pipeline operators to define measurement lengths from their assets that outline the worst-case scenario impact distance in the case of pipeline failure. The measurement length is established based on a consequence analysis. It sets out an area larger than the area described in the guideline, which is a risk-based approach.

Some developments near HP DG pipelines may require a review of a pipeline operator's safety management study to mitigate any potential hazards to and from the existing pipeline from the proposed development.

A planning authority should notify and gather advice from pipeline operators as early as possible on planning proposals where risks need to be considered. This helps pipeline operators to effectively fulfill their requirements under AS 2885, and efficiently begin the process of reviewing a safety

management study if required. Information and feedback from pipeline operators will also help planning authorities in their assessment of risk.