Appendix G: Schedule to District Plan Section on Hazardous Facilities

Appendix G: Schedule to District Plan Section on Hazardous Facilities

1 Background

The HFSP is applied to hazardous facilities in all land use zones and in addition to other zone-specific land use controls. The procedure is applied to all new hazardous facilities, irrelevant of their type and size. The HFSP should also be applied to existing hazardous facilities if a significant change occurs in the character, nature and scale of effects.[22]

Fundamentally, the HFSP is used to screen hazardous facilities **and** their sites. However, where hazardous facilities on the same site are separated by more than 30 metres from each other, they may be dealt with as separate facilities and the HFSP is applied to each of them separately.

2 Terminology

The HFSP uses a number of terms. These are listed and explained below.

Term	Explanation
Proposed Quantity (P)	The quantity of a hazardous substance proposed to be used or stored on a site.
Base Quantity (B)	Pre-calibrated quantity of a hazardous substance that is deemed to be acceptable on a heavy industrial site without causing any significant off-site effects.
Adjustment Factor	Pre-calibrated factors that take into account substance, storage and site-specific circumstances.
Adjusted Quantity (A)	Equivalent to the Base Quantity that has been adjusted using Adjustment Factors.
Effect Type	Three Effect Types are used by the HFSP: Fire/Explosion Effects on Human Health Effects on the Environment.
Quantity Ratio (Q)	The ratio of the proposed quantity of a substance over the applicable Base Quantity.
Consent Status Index	Numerical values in the district plan that are used to determine the consent status of a facility.

3 Overview

The HFSP is designed to assess the environmental effects of hazardous substances proposed to be stored or used on a site, taking into account their quantities, characteristics, location, type of activity and local environmental conditions. This assessment is carried out for three defined Effect Types:

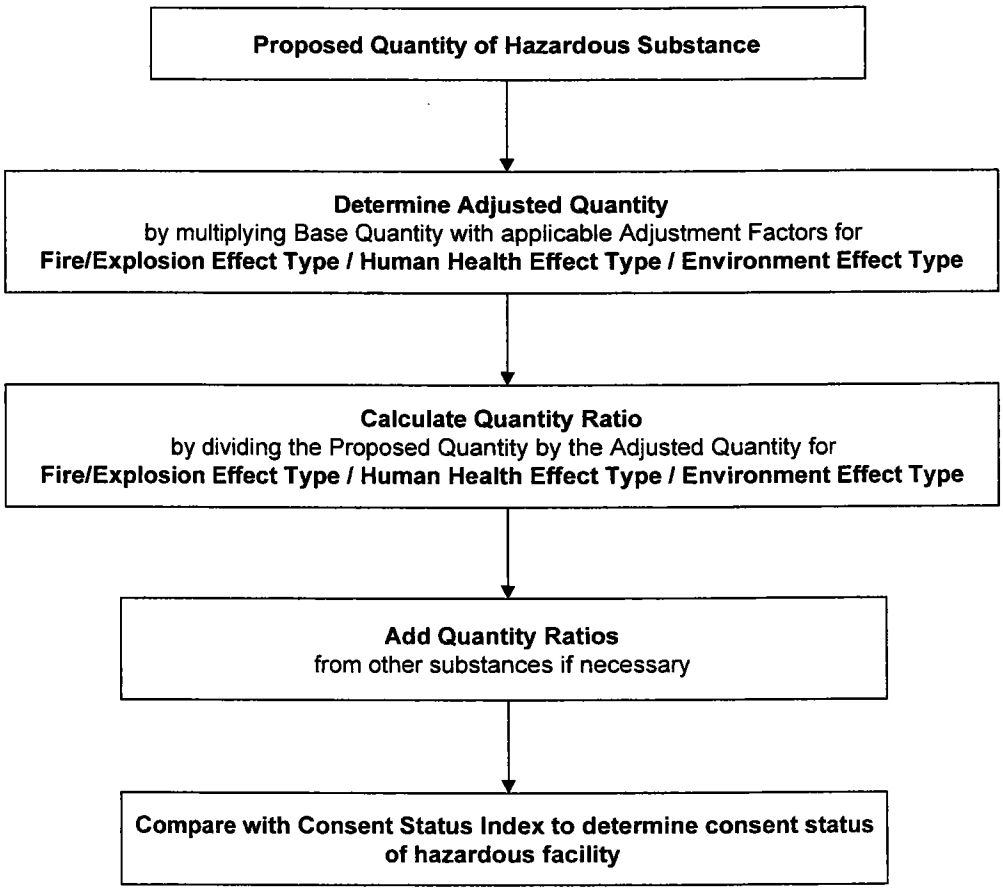
[22] It is recommended that councils define what constitutes a significant change.

- Fire/Explosion
- Human Health
- Environment.

Basically, the HFSP compares proposed quantities of hazardous substances with maximum allowable quantities (Adjusted Quantities) which depend on the type of substances, how they are used and stored, and the location of the facility. A Quantity Ratio is calculated by dividing the proposed quantity of each hazardous substance with the Adjusted Quantity. The Quantity Ratios of individual substances are added up for each of the Effect Types. Cumulative Quantity Ratios are then compared with defined limits called Consent Status Indices which are listed in the rules of the district plan. If any of the Quantity Ratios exceed specified Consent Status Indices, the hazardous facility in question requires a resource consent.

Some information needs to be assembled at the outset about the hazards of the substances concerned. This includes site layout and location, types of activities as well as the sensitivity of the surrounding environment. In most cases, only a limited number of substances need to be assessed to determine the resource consent status of an activity. This applies in particular if one, two or three substances are either very hazardous or stored/used in large quantities.
An overview of the HFSP is presented in Figure F1.

Figure F1: Overview of HFSP (process for single substance)



4 Rating hazardous substances for the HFSP

To be able to assess hazardous substances under the HFSP, they must be rated first. These rating criteria are based on the classification system specified by regulations under the Hazardous Substances and New Organisms Act 1996 (HSNO) and are provided in Attachment A.

For the purposes of the HFSP, each substance is rated based on three Effect Types:

- Fire/Explosion Effects: concerned with damage to property, the built environment and safety of people
- Human Health Effects: concerned with the well-being, health and safety of people
- Environmental Effects: concerned with damage to ecosystems and natural resources.

Each Effect Type is divided into a maximum of three hazard levels:

♦ high ♦ medium ♦ low

The rating of a hazardous substance for the HFSP requires each substance to be assessed in terms of every hazard category listed in Attachment A. Hazard ratings may be obtained as follows:

1 Some commonly used hazardous substances in New Zealand have already been assessed and pre-rated for the HFSP. This information is available from the council desk or from the MfE website.

2 Under HSNO, all substances previously controlled by repealed legislation (such as the Dangerous Goods and Toxic Substances Acts) will be classified using HSNO classification criteria. Once a substance is classified under HSNO, it can be easily rated for the HFSP based on Attachment A. Information on the classification of hazardous substances under HSNO will be available from ERMA New Zealand (the Environmental Risk Management Authority) and be accessible through the ERMA website.

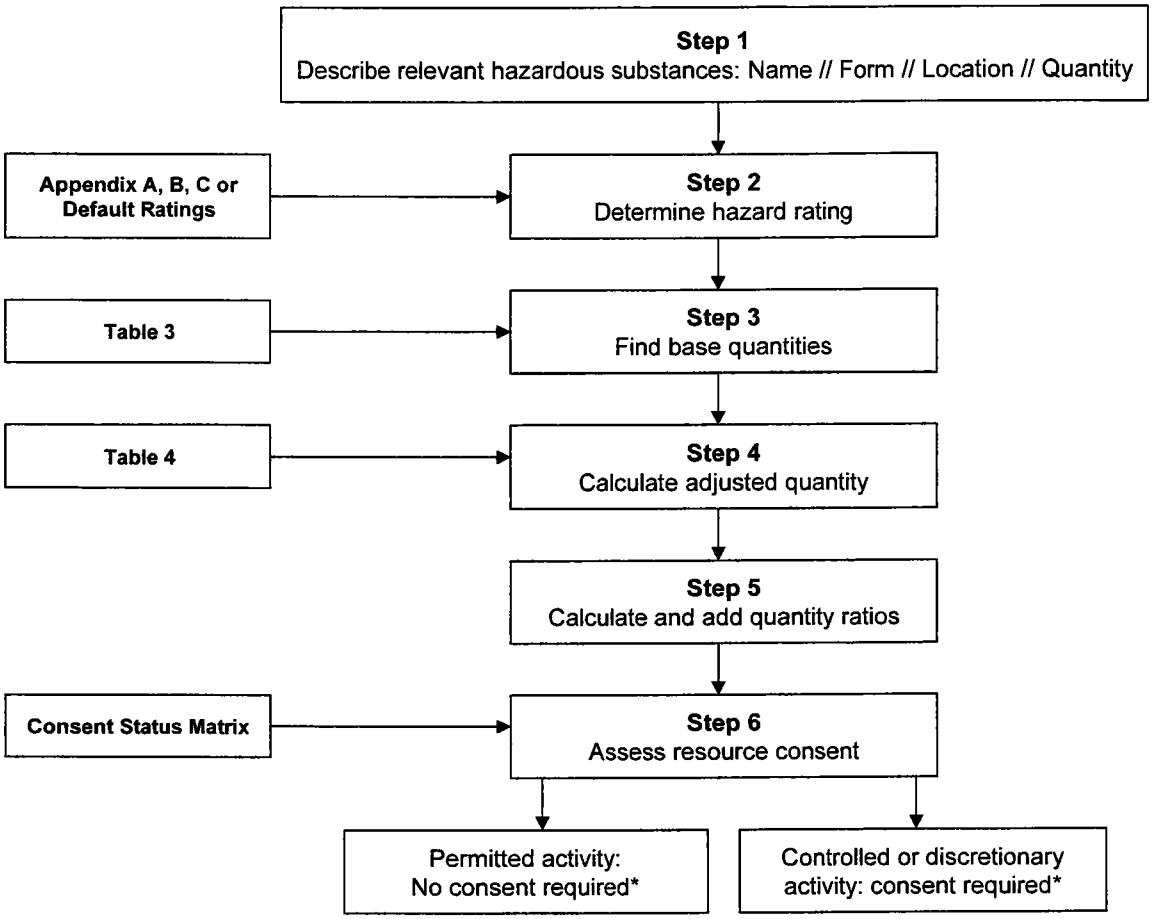
3 Where information for the rating of a hazardous substance for the HFSP is not or only partially available from the above discussed sources, a **precautionary default rating** of Medium for the Fire/Explosion and Human Health Effect Types, and High for the Environmental Effect Type should be applied to the hazardous substance in question.

4. Where no HFSP rating is available through Options 1 or 2 above and the default ratings given in Option 3 are not considered suitable, the rating Guide in Appendix C may be used to research and assign HFSP ratings to hazardous substances.

5 Step-by-step guide to the HFSP

This section works through a step-by-step guide on how to use the Hazardous Facility Screening Procedure, following the steps shown in Figure F2 and Table F1.

Figure F2: Step-by-step guide to the HFSP



* **Note:** Compliance with minimum performance standards is always required.

Table F1: HFSP – Step-by-Step Guide

<table>
<tr><th>Steps</th><th colspan="4">HFSP calculations</th><th>Explanation</th></tr>
<tr><td rowspan="2">1 Describe the hazardous facility
Prior to using the HFSP, it is necessary to compile a full description of the hazardous facility in question. This includes the creation of an inventory of hazardous substances held on the site, including:
• names of the hazardous substances
• quantities of the hazardous substances
• the physical form of the substances at 20°C and 101.3 kPa
• the location of use or storage on the site, including separation distances from the site boundary and neighbouring hazardous facilities (on-site and off-site).
The description should also include site-specific details, including neighbouring land uses and the surrounding environment, with a focus on sensitive land uses and receptors (e.g. retirement accommodation, aquifers or wetlands).</td><td>Substance name
Substance 1
Substance 2
...
Substance 10</td><td>Substance form (liquid, solid, gas)</td><td>Location of substances on site</td><td>Proposed quantity (P) (tonnes or m³)</td><td rowspan="2">The HFSP uses standard units of tonnes (t) (for solids, liquids and liquefied gases) and cubic metres (m³) (for compressed gases). In some cases, it may therefore be necessary to convert substance quantities to these units. In the case of liquids, specific gravity (or density) must be taken into consideration when converting litres or m³ to tonnes (i.e.
$\frac{\text{volume of liquid (litres)} \times \text{specific gravity}}{1000}$ = tonnes).
Adjustments to quantities are also necessary where a substance is diluted with water or mixed with another substance. In this instance, only the percentage quantity of the hazardous substance or product in the dilution or mixture is assessed for the purposes of HFSP calculations (unless a mixture is more hazardous than its components, in which case data on the mixture need to be used).
An exception to this are products or brands that already constitute dilutions or mixtures of hazardous substances and which have been classified in terms of their hazardous properties as the 'whole' dilution or mixture for life cycle management purposes. Examples of this are corrosives, oxidising substances and pesticides, which are often sold commercially as standard solutions or strengths. In these cases, quantity adjustments are only applied when these commercially supplied concentrations are further diluted or mixed.</td></tr>
<tr><td colspan="4">Example
Petrol | Liquid | < 30 metres | 50 +</td></tr>
<tr><td rowspan="2">2 Determine hazard rating
For the purposes of the HFSP, the effects of substances are categorised into three Effect Types:
• Fire/Explosion Effect Type: addressing damage to the built environment and safety of people
• Human Health Effect Type: addressing adverse effects on the well-being, health and safety of people
• Environmental Effect Type: addressing adverse effects on ecosystems and natural resources.
Each Effect Type is divided into three Hazard Rating Levels:
♦ High ♦ Medium ♦ Low
The rating levels are based predominantly on the HSNO classification system.</td><td>Substance name
Substance 1
Substance 2
...
Substance 10</td><td colspan="3">Hazard rating
Fire/ Explosion | Human Health | Environ-ment
High (H) or Medium (M) or Low (L) | High (H) or Medium (M) or Low (L) | High (H) or Medium (M) or Low (L)</td><td rowspan="2">The HFSP rates hazardous substances in terms of each of the three Effect Types as having a high, medium or low hazard. The Hazard Rating of a substance is derived from:
1 The list of HFSP-rated hazardous substances in Appendix B.
2 The HSNO classification (refer Appendix A). Once a substance has been classified under HSNO, Hazard Ratings can be assigned for each Effect Type as shown in Appendix A.
3 Where a substance is neither found in Appendix B nor the HSNO database on the ERMA website, the following default ratings should be used:
• Fire/Explosion Effect Type: Medium
• Human Health Effect Type: Medium
• Environment Effect Type: High
4 The substance may be rated using Appendix C as a guide.</td></tr>
<tr><td colspan="4">Example
Petrol | High | Low | Medium</td></tr>
</table>

Steps	HFSP calculations				Explanation
3 Find base quantities The Base Quantity (B) is pre-calibrated. It is the amount of a substance that has been assessed as generating no significant off-site effects in a heavy industrial area before site- and substance-specific considerations have been taken into account (refer Step 4). Base Quantities for different hazardous properties and hazard ratings in each Effect Type are listed in Table 3.	**Substance name**	**Base quantities (B)**			For example, in the Fire/Explosion Effect Type (Sub-category Flammables), non-significant off-site effects in a heavy industrial area are represented by a Base Quantity of: • 100 tonnes of a HSNO Category D flammable liquid which has a low hazard level for the Fire/Explosion Effect Type. • 30 tonnes of a HSNO Category C flammable liquid which has a medium hazard level for the Fire/Explosion Effect Type.
	Substance 1 **Substance 2** ... **Substance 10**	Fire/ Explosion B_1 B_2 ... B_{10}	Human Health B_1 B_2 ... B_{10}	Environ-ment B_1 B_2 ... B_{10}	
	Example				
	Petrol	10 t	30 t	30 t	
4 Calculate Adjusted Quantity (A) The precalibrated Adjustment Factors (FF, HF, EF) are multiplied with the Base Quantities (B) to account for substance properties and site-specific environmental circumstances. This multiplication yields the Adjusted Quantity (A). Adjustment Factors differ for each of the Effect Types, and take into account the following considerations: • the physical state of the substance • the type of storage • the type of activity or use • separation distances to the site boundary • the environmental sensitivity of the site location. The Adjustment Factors are listed in Table 4.	**Substance name**	**Adjusted quantities (A)**			Different Adjustment Factors are applied for each Effect Type. For example, for the Fire/Explosion Effect Type, the temperature is relevant, while for the Human Health Effect Type, proximity to a potable water resource is important. In some instances, more than one Adjustment Factor within each Effect Type must be applied, which then need to be multiplied with each other to yield the total Adjustment Factor for the Effect Type. When the Adjustment Factors for each Effect Type have been calculated, they in turn are multiplied with the Base Quantity to yield the Adjusted Quantity). In the example given, the following parameters have been assumed: • <30m to site boundary • not adjacent to water body • underground storage.
	Substance 1 **Substance 2** ... **Substance 10**	Fire/ Explosion A_1 A_2 ... A_{10}	Human Health A_1 A_2 ... A_{10}	Environ-ment A_1 A_2 ... A_{10}	
	Example				
	Petrol	100 t (10 tonnes x 10)	300 t (30 tonnes x 30)	90 t (30 tonnes x 3)	
5 Calculate and add Quantity Ratios (FQ, HQ, EQ) This step requires the calculation of the Quantity Ratio for each hazardous substance in question. The Quantity Ratio is a dimensionless number. It is obtained by dividing the quantity of a substance that is proposed to be used or stored on a site, i.e. the Proposed Quantity (P) by the Adjusted Quantity (A). If several hazardous substances are used or stored on a site, the Quantity Ratios calculated for each of these substances are added up for each Effect Type. Note that $FQ/HQ/EQ_{Total}$ stands for the total sum of Quantity Ratio values from all assessed hazardous substances, within each Effect Type.	**Substance name**	**Quantity ratios (FQ, HQ, EQ)**			By using the dimensionless ratio of the Proposed Quantity of a hazardous substance over the Adjusted Quantity, it is possible to aggregate the effects presented by multiple substances held on the same site. Hence, it becomes possible to assess the cumulative potential effects which may be created by several substances present on the same site.
	Substance 1 **Substance 2** ... **Substance 10**	Fire/ Explosion FQ_1 FQ_2 ... FQ_{10} FQ_{Total}	Human Health FQ_1 FQ_2 ... FQ_{10} HQ_{Total}	Environ-ment FQ_1 FQ_2 ... FQ_{10} $EQ_{Tpta;}$	
	Example				
	Petrol	0.50 **(50 tonnes / 100 tonnes)**	0.1667 **(50 tonnes / 300 tonnes)**	0.5556 **(50 tonnes / 90 tonnes)**	
6 Assess resource consent status of hazardous facility When assessing the resource consent status of a particular hazardous facility, the added Quantity Ratios for each Effect Type are compared with relevant Consent Status Indices in the Resource Consent Matrix in the district plan. If they are exceeded, a resource consent is required.	**Substance name**	**Does quantity ratio exceed consent status index?**			When examining total Quantity Ratios against applicable Consent Status Indices, one or several substances may trigger a resource consent. This highlights the fact that when assessing hazardous facilities, it is often sufficient to assess just a few hazardous substances to start off with, mainly those that are either highly hazardous or are used/stored in high quantities.
	Substance 1 **Substance 2** ... **Substance 10**	Fire/ Explosion **Yes / No**	Human Health **Yes / No**	Environ-ment **Yes / No**	
	Example In a typical industrial zone:				
	Petrol	No	No	No	

Table F2: Base quantities for all effect types and hazard levels

HSNO category	UN class equivalent	Hazard level	Unit tonnes or cubic metres	Base quantity (B)		
				Fire/ explosion	Human health	Environment
Explosive substances						
1.1	1.1	High	tonnes	0.1	–	–
1.2	1.2	Medium	tonnes	1	–	–
1.3	1.3	Low	tonnes	3	–	–
1.5	1.5	Low	tonnes	3	–	–
Flammable gases						
2.1.1A	2.1	High	m^3 tonnes	10,000* 10	–	–
2.1.2A	2.1	High	m^3 tonnes	10,000* 10	–	–
	LPG	Medium	tonnes	30	–	–
Flammable liquids						
3.1 A	3PGI	High	tonnes	10	–	–
3.1 B	3PGII	High	tonnes	10	–	–
3.1 C	3PGIII	Medium	tonnes	30	–	–
3.1 D	Combustible liquids	Low	tonnes	100	–	–
Liquid desensitised explosives						
3.2 A 3.2 B 3.2 C	3 PGI 3 PGII 3 PGIII	High	tonnes	1		
Flammable solids						
4.1.1.A	4.1 (a) PGII	Medium	tonnes	10	–	–
4.1.1 B	4.1 (a) PGIII	Low	tonnes	30	–	–
4.1.2 A 4.1.2 B	4.1 (b) PGII	High	tonnes	1	–	–
4.1.2 C 4.1.2 D	4.1 (b) PGII	Medium	tonnes	10	–	–
4.1.2 E 4.1.2 F 4.1.2 G	4.1 (b) PGII	Low	tonnes	30	–	–
4.1.3 A	4.1 (c) PGI	High	tonnes	1	–	–
4.1.3 B	4.1 (c) PGII	High	tonnes	1	–	–
4.1.3 C	4.1 (c) PGIII	High	tonnes	1	–	–
4.2 A	4.2 PGI	High	tonnes	1	–	–
4.2 B	4.2 PGII	High	tonnes	1	–	–
4.2 C	4.2 PGIII	Medium	tonnes	10	–	–
4.3 A	4.3 PGI	High	tonnes	1	–	–
4.3 B	4.3 PGII	High	tonnes	1	–	–
4.3 C	4.3 PGIII	Medium	tonnes	10	–	–

HSNO category	UN class equivalent	Hazard level	Unit tonnes or cubic metres	Base quantity (B)		
				Fire/ explosion	Human health	Environment
Oxidising substances						
5.1.1 A	5.1 PGI	High	tonnes	1		
5.1.1 B	5.1 PGII	High	tonnes	1		
5.1.1 C	5.1 PGIII	Medium	tonnes	10		
5.1.2 A	2.2	High	m^3 tonnes	10,000 10		
5.2 A 5.2 B	5.2 Types A and B	High	tonnes	1		
5.2 C 5.2 D	5.2 Types C and D	Medium	tonnes	10		
5.2 E 5.2 F 5.2 G	5.2 Types E, F and G	Low	tonnes	30		
Toxic substances						
6.1 A	6.1 PGI 2.3	High	tonnes m^3	–	1 50	–
6.1 B	6.1 PGII 2.3	High	tonnes m^3	–	1 50	–
6.1 C	6.1 PGIII 2.3	Medium	tonnes m^3	–	10 150	–
6.1 D	Standard poison	Low	tonnes m^3	–	30 500	–
Corrosive substances						
8.2 A	8 PGI	High	tonnes	–	1	–
8.2 B	8 PGII	Medium	tonnes	–	10	–
8.2 C	8 PGIII	Low	tonnes	–	30	–
Ecotoxic substances						
9.1 A	GHS	High	tonnes	–	–	3
9.1 B	GHS	Medium	tonnes	–	–	30
9.1 C	GHS	Low	tonnes	–	–	100
9.1 D	GHS	Low	tonnes			100

* Base quantity in m^3 at 101.3 kPA and 20°C for permanent or compressed gases.

Table F3: Adjustment factors

Fire/explosion	Human health	Environment
FF1: Substance form	***FH1: Substance form***	***FE1: Substance form***
Solid = 1 Liquid, powder = 1 Gas (101.3 kPa, 20°C) = 0.1	Solid = 3 Liquid, powder = 1 Gas (101.3 kPa and 20°C) = 0.1	Solid = 3 Liquid, powder = 1 Gas (101.3 kPa and 20°C) = 0.1
FF2: Separation distance from site boundary (sub-facility)	***FH2: Separation distance from site boundary (sub-facility)*** *(gases only)*	***FE2: Environmental sensitivity***
< 30 m = 1 > 30 m (>60 m)[23] = 3	< 30 m = 1 > 30 m (>60 m)[2] = 3	Normal = 1 Adjacent to water resource[24] = 0.3
FF3: Type of activity	***FH3: Type of activity***	***FE3: Type of activity***
Use = 0.3 Above ground storage = 1 [Underground storage[25] = 10]	Use = 0.3 Above ground storage = 1 [Underground storage[6] = 10]	Use = 0.3 Above ground storage = 1 [Underground storage[6] = 3]
Final fire/explosion adjustment factor **FF = FF1 x FF2 x FF3**	Final human health adjustment factor **FH = FH1 x FH2 x FH3**	Final environment adjustment factor **FE = FE1 x FE2 x FE3**

Attachment A: HFSP Rating of Hazardous Substances

The full description of HSNO Classes, Sub-classes and Categories as well as explanations of terms used is contained in the HSNO Regulations. Further details on their use may also be found in the ERMA 'Users Guide to the HSNO Thresholds and Classifications of Hazardous Substances'.

It is important to note that:

- HSNO Classes and categories do not always correspond perfectly with the UN Classification. The list provided in this Appendix should therefore only be used for HFSP purposes.
- A number of HSNO classes or sub-classes do not have an HFSP hazard rating in the land use planning context as the potential for off-site effect of these substances is low.

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[23] If the facility is assessed as a sub-facility, the distance to the neighbouring sub-facility must be more than 60 metres (i.e. 2 x 30 metres) to qualify for an Adjustment Factor of 3 (refer Section 5.5.4 of the main document).

[24] Water resources include aquifers and water supplies, streams, springs, lakes, wetlands, estuaries and the sea, but do not include entry points to the stormwater drainage network. 'Adjacent' must be defined in respective district plans and will depend on the type of water resource potentially affected (adjacent is variably defined as between 30 and 100 metres).

[25] Applicable to UN Class 3 substances (flammable liquids) only.

Hazard	HSNO Class and Category	(UN Division)	Description	Effect type	Hazard rating
Explosive substances	1.1	1.1	Substances and articles that have a mass explosion hazard.	Fire/ explosion	High
	1.2	1.2	Substances and articles that have a projection hazard but not a mass explosion hazard.	Fire/ explosion	Medium
	1.3	1.3	Substances and articles that have a fire hazard and either a minor blast hazard or a minor projection hazard or both.	Fire/ explosion	Low
	1.5	1.5	Very insensitive substances that have a mass explosion hazard.	Fire/ explosion	Low
Flammable gases	2.1.1A High hazard	2.1	a) Ignitable when in a mixture of 13% or less by volume with air; or b) Has a flammable range with air of at least 12%, regardless of the lower flammability limit.	Fire/ explosion	High
	2.1.2A Flammable aerosols	2.1	An aerosol comprising 45% or more by mass of flammable ingredients.	Fire/ explosion	High
		LPG		Fire/ explosion	Medium
Flammable liquids	3.1.A Very high hazard	3 PGI	A flash point of less than 23°C and an initial boiling point of less than or equal to 35°C.	Fire/ explosion	High
	3.1B High hazard	3 PGII	A flash point of less than 23°C and an initial boiling point of greater than 35°C.	Fire/ explosion	High
	3.1C Medium hazard	3 PGIII	A flash point of greater than or equal to 23°C but less than or equal to 60°C.	Fire/ explosion	Medium
	3.1D Low hazard	Combustible liquids	A flash point of greater than 60°C but less than or equal to 93°C.	Fire/ explosion	Low
Liquid desensitised explosives	3.2A 3.2B 3.2C	3 PGI 3 PGII 3 PG III	a) A substance that: (i) is listed as a liquid desensitised explosive and is assigned Packing Group I, II or III in the UN Model Regulations; or b) A liquid desensitised explosive that: (i) is formed from an explosive of Class I by adding a desensitising agent to form a liquid that no longer meets the threshold for Class I; and (ii) is not listed in the UN Model Regulations and is not assigned a Packing Group.	Fire/ explosion	High
Flammable solids – readily combustible solids and solids that may cause fire through friction	4.1.1A Medium hazard	4.1(a) PG II	A substance that burns rapidly or the reaction spreads rapidly or may cause fire through low friction in the relevant tests of the UN Manual of Tests and Criteria.	Fire/ explosion	Medium
	4.1.1B Low hazard	4.1(a) PG III	A substance that has lower ratings than 4.1.1A in the relevant tests of the UN Manual of Tests and Criteria.	Fire/ explosion	Low
Self-reactive substances	4.1.2A 4.1.2B	4.1(b) Type A Type B	A thermally unstable substance that propagates a detonation or rapid deflagration or violent effect or thermal explosion in the relevant tests of the UN Manual of Tests and Criteria.	Fire/ explosion	High
	4.1.2C 4.1.2D	4.1(b) Type C Type D	A substance with lower ratings than the above two categories in the relevant tests.	Fire/ explosion	Medium

Hazard	HSNO Class and Category	(UN Division)	Description	Effect type	Hazard rating
	4.1.2E 4.1.2F 4.1.2G	4.1(b) Type E Type F	A substance with even lower ratings than the above two categories in the relevant tests.	Fire/ explosion	Low
Solid desensitised explosives	4.1.3A 4.1.3B 4.1.3C	4.1(c) PG I PG II PG III	a) A substance with one of the specified UN serial numbers listed in the UN Model Regulations; or b) A solid desensitised explosive that is formed from an explosive of Class I by adding a desensitising agent to form a solid substance that no longer meets the threshold for Class I.	Fire/ explosion	High
Spontaneously combustible substances	4.2A Spontaneously combustible and pyrophoric substances High hazard	4.2 PG I	a) A solid substance that does not meet the criteria for subclass 4.1.2, but ignites within 5 minutes on contact with air under the relevant test conditions in the UN Manual of Tests and Criteria; or b) A substance that does not meet the criteria for subclass 4.1.2, but is a liquid which ignites or chars the filter paper under the relevant test conditions.	Fire/ explosion	High
	4.2B Spontaneously combustible and self-heating substances Medium hazard	4.2 PG II	A substance that does not meet the criteria for subclass 4.1.2 but meets specified criteria under the relevant test conditions.	Fire/ explosion	High
	4.2C Spontaneously combustible and self-heating substances Low hazard	4.2 PG III	A substance that does not meet the criteria for subclass 4.1.2, which, depending on quantity, meets specified criteria under the relevant test conditions.	Fire/ explosion	Medium
Solids that emit flammable gas when in contact with water	4.3A High hazard	4.3 PG I	a) A substance that emits a gas that ignites when a small quantity of the substance is brought into contact with water; or b) A substance that reacts readily with water at ambient temperatures such that the rate of evolution of flammable gas is > 10 litres/kg over any 1 minute.	Fire/ explosion	High
	4.3B Medium hazard	4.3 PG II	A substance that reacts readily with water at ambient temperatures such that the maximum rate of evolution is > 20 litres/ kg per hour.	Fire/ explosion	High
	4.3C Low hazard	4.3 PG III	A substance that reacts slowly with water at ambient temperatures so that the maximum rate of evolution of flammable gas is > 1 litre /kg per hour.	Fire/ explosion	Medium
Oxidising substances – liquids or solids	5.1.1A High hazard	5.1 PG I	a) A substance listed as 5.1 in the UN Model Regulations and assigned Packing Group I; or b) A solid that when mixed with dry cellulose either spontaneously ignites or exhibits a mean burning time less than that of a specified reference material; or c) A liquid that when mixed with dry cellulose forms a mixture that either spontaneously ignites or exhibits a mean pressure rise time less than that of a specified reference material.	Fire/ explosion	High

Hazard	HSNO Class and Category	(UN Division)	Description	Effect type	Hazard rating
	5.1.1B Medium hazard	5.1 PG II	a) A substance listed as 5.1 in the UN Model Regulations and assigned Packing Group II; or b) A solid that does not meet the criteria of 5.1.1A and that when mixed with dry cellulose forms a mixture that exhibits a mean burning time equal to or less than a specified reference material; or c) A liquid that does not meet the criteria of 5.1.1A and that when mixed with dry cellulose forms a mixture that exhibits a mean pressure rise time less than or equal to that of a specified reference material.	Fire/ explosion	High
	5.1.1C Low hazard	5.1 PG III	a) A substance listed as 5.1 in the UN Model Regulations and assigned Packing Group III; or b) A solid that does not meet the criteria of 5.1.1A or B and that when mixed with dry cellulose forms a mixture that exhibits a mean burning time equal to or less than that of a specific reference material; or c) A liquid that does not meet the criteria of 5.1.1A or B and that when mixed with dry cellulose forms a mixture that exhibits a mean pressure rise time less than or equal to that of a specified reference material.	Fire/ explosion	Medium
Gases	5.1.2A	2.2	a) A gas that is listed as 5.1 in the UN model Regulations; or b) A gas that causes or contributes to combustion of other material at a faster rate than air.	Fire/ explosion	High
Organic peroxides	5.2A 5.2B	5.2 Type A Type B	A substance that propagates a detonation or rapid deflagration or violent effect or thermal explosion in the relevant tests of the UN Manual of Tests and Criteria.	Fire/ explosion	High
	5.2C 5.2D	5.2 Type C Type D	A substance with lower ratings than 5.2A or B in the relevant tests.	Fire/ explosion	Medium
	5.2E 5.2F 5.2G	5.2 Type E Type F Type G	A substance with even lower ratings than 5.2A or B in the relevant tests.	Fire/ explosion	Low
Toxic substances	6.1A	6.1 PGI 2.3 (gases)	Oral toxicity: LD_{50} of less than or equal to 5 mg/kg Dermal toxicity: LD_{50} of less than or equal to 50 mg/kg Inhalation toxicity (gas): LC_{50} of less than or equal to 100 ppm Inhalation toxicity (vapour): LC_{50} of less than or equal to 0.5 mg/l Inhalation toxicity (dust/mist): LC_{50} of less than or equal to 0.05 mg/l	Human health	High

Hazard	HSNO Class and Category	(UN Division)	Description	Effect type	Hazard rating
	6.1B	6.1 PGII 2.3 (gases)	Oral toxicity: LD_{50} of greater than 5 mg/kg but less than or equal to 50 mg/kg Dermal toxicity: LD_{50} of greater than 50 mg/kg but less than or equal to 200 mg/kg Inhalation toxicity (gas): LC_{50} of greater than 100 ppm but less than or equal to 500 ppm Inhalation toxicity (vapour) LC_{50} of greater than 0.5 mg/l but less than or equal to 2.0 mg/l Inhalation toxicity (dust/mist) LC_{50} of greater than 0.05 mg/l but less than or equal to 0.5 mg/l	Human health	High
	6.1C	6.1 PGIII	Oral toxicity: LD_{50} of greater than 50 mg/kg but less than or equal to 300 mg/kg Dermal toxicity: LD_{50} of greater than 200 mg/kg but less than or equal to 1000 mg/kg Inhalation toxicity (gas): LC_{50} of greater than 500 ppm but less than or equal to 2500 ppm Inhalation toxicity (vapour) LC_{50} of greater than 2.0 mg/l but less than or equal to 10.0 mg/l Inhalation toxicity (dust/mist) LC_{50} of greater than 0.5 mg/l but less than or equal to 1.0 mg/l	Human health	Medium
	6.1D	Toxic Substances Regulations: Standard Poison	Oral toxicity: LD_{50} of greater than 300 mg/kg but less than or equal to 2000 mg/kg Dermal toxicity: LD_{50} of greater than 1000 mg/kg but less than or equal to 2000 mg/kg Inhalation toxicity (gas): LC_{50} of greater than 2500 ppm but less than or equal to 5000 ppm Inhalation toxicity (vapour) LC_{50} of greater than 10 mg/l but less than or equal to 20 mg/l Inhalation toxicity (dust/mist) LC_{50} of greater than 1.0 mg/l but less than or equal to 5.0 mg/l	Human health	Low
Corrosive substances	8.2A	8 PG I	Data indicate irreversible destruction of dermal tissue following brief exposure	Human health	High
	8.2B	8 PG II	Data indicate irreversible destruction at dermal tissue following moderate exposure	Human health	Medium
	8.2C	8 PG III	Data indicate irreversible destruction at dermal tissue following lengthy exposure (up to four hours)	Human health	Low

Hazard	HSNO Class and Category	(UN Division)	Description	Effect type	Hazard rating
Ecotoxic substances	9.1A Substances that are very ecotoxic in the aquatic environment	GHS	Acute aquatic toxicity value[26] of less than or equal to 1 mg/l	Environ-ment	High
	9.1B Substances that are ecotoxic in the aquatic environment	GHS	Chronic aquatic toxicity[27] of less than or equal to 1 mg/l and a) acute aquatic toxicity value of greater than 1 mg/l but less than 10 mg/l; and b not rapidly degradable or is bioaccumulative, or is not rapidly degradable and is bioaccumulative.	Environ-ment	Medium
	9.1C Substances that are harmful in the aquatic environment	GHS	Chronic aquatic toxicity of less than or equal to 1 mg/l and: a) acute aquatic toxicity value of greater than 10 mg/l but less than 100 mg/l; and b) not rapidly degradable or is bioaccumulative or, is not rapidly degradable and is bioaccumulative.	Environ-ment	Low
	9.1D Substances that are slightly harmful in the aquatic environment or are otherwise designed for biocidal action	GHS	a) Acute aquatic toxicity value of greater than 1 mg/l but less than 100 mg/l, but does not meet classification criteria for 9.1A, 9.1B or 9.1C; or b) Chronic aquatic toxicity value is less than or equal to 1 mg/l but does not meet classification criteria for 9.1B or 9.1C; or c) Not rapidly degradable and is bioaccumulative but does not meet classification criteria for 9.1A, 9.1B or 9.1C.	Environ-ment	Low

[26] 'Acute aquatic toxicity value' means the lowest value expressed in units of milligrams of a substance per litre of water from:
(a) fish LC_{50} data after a 96-hour exposure period; or
(b) crustacean EC_{50} data after a 48-hour exposure period; or
(c) algal, or other aquatic plant EC_{50} data after a 72-hour exposure period.

[27] 'Chronic aquatic toxicity' means the lowest value expressed in units of milligrams of a substances per litre of water from chronic fish, crustacean, algal, or other aquatic plant NOEC (no observed effect concentration) data.