RISK ASSESSMENT

in terms of

THE MAJOR HAZARD INSTALLATION REGULATIONS

and

SANS 1461:2018

for the installations at

ALLIANCE FUEL

on their property at

Klein Dassenberg Road, Philadelphia

by

MHR Consultants

Major Hazard Risk Consultants

Nominated Representative C C Thackwray
Technical Signatory T C Thackwray

18 April 2023

GOVERNMENT APPROVED INSPECTION AUTHORITY No MHI 0007

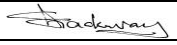
sanas Inspection Body

MHI 0017

DETAILS AND CONTROL PAGE

TYPE OF ASSESSMENT							
New Installation	**X**	**Changes to Installation**		**5 Year Renewal**		**Other:**	

Name	Alliance Fuel		
Address	Portion 64 of Farm Zoutrivier Klein Dassenberg Road, Philadelphia Western Cape **GPS Coordinates: 33°34'50.71" S and 18°35'31.28" E**		
Contact Person	Ashraf Sedick 074 114 7147 Email: ashie.majestic@gmail.com		
Date of Site Visit	11 April 2023		
Date of Report	15 April 2023		
Dates of Previous Assessments	**Date**	**Reference**	**AIA**
	None		
Technical Manager	T C Thackwray 13 Slade Street Parklands North Tel: 083 746 8933		
Reference Number	ALLFUELZOUT001		
Revision	First		

Action	Date	Checked By	Sign
Report Checked	16 April 2023	C Thackwray	

This is to verify that an MHI Risk Assessment has been completed in accordance with the Major Hazard Installation Regulations. The risks associated with the MHI were found to be acceptable.

This Risk Assessment is valid for the duration of 5 years from the above date, unless:

- Changes have been made to the plant that can alter the risks on the facility
- The Emergency Plan was invoked or there was a near miss
- The changing neighbourhood resulted in offsite risks
- There is reason to suspect that the current Assessment is no longer valid

Signed

T C THACKWRAY
TECNICAL MANAGER

QUANTITATIVE RISK ASSESSMENT OF THE PROPOSED FUEL INSTALLATIONS AT ALLIANCE FUEL, PHILADELPHIA

EXECUTIVE SUMMARY

1. INTRODUCTION

Alliance Fuel is a fuel storage and distribution company. They are in the process of establishing a new bulk fuel facility in the Western Cape. They will have storage and distribution infrastructure for diesel only.

As diesel has the potential to cause onsite and offsite incidents, Major Hazard Risk Consultants cc was commissioned to conduct a Risk Assessment in accordance with the Major Hazard Installation Regulations to determine the impact of the facility on the surrounding area.

This investigation would serve as a basis for the notification of the facility in accordance with the Major Hazard Installation Regulations. The purpose of this report is to convey the essential details, including a short description of the hazards, the receiving environment, the design, the risks, and consequences of an accident.

The main aim of the investigation was to quantify the risks to employees and neighbours regarding the proposed facility on the outskirts of Philadelphia.

Risk is the severity of the consequence of a hazardous event and the probability of the event occurring.

This Risk Assessment was conducted in accordance with the Major Hazard Installation Regulations and SANS 1461:2018 Codes of Practice and could be used as notification of the facility. The Risk Assessment includes the following:

- Identifying likely hazards associated with the processes of the installations including the causes, consequences, and their effects
- Quantifying the likely hazards in terms of their magnitude
- Quantifying the consequences for each hazard (thermal radiation, domino effect, and toxic cloud formation)
- Determining the lethality of the effects of the consequences
- Determining the frequency of all the hazardous events
- Calculating the individual risk values considering all accidents, meteorological conditions and lethality
- Using the population density around the facility to determine the societal risk posed by the facility
- Reporting on the risks in terms of internationally acceptable criteria
- Providing an assessment of the adequacy of emergency response programmes, fire prevention and fire-fighting measures
- Proposing measures to reduce or eliminate the risks

The Risk Assessment may not meet the requirements of environmental legislation as it is not intended as an Environmental Risk Assessment

2. CONCLUSIONS

This Risk Assessment has modelled the effects of the proposed bulk diesel installations.

- The 1.0e-5 contour (one-in-a-hundred thousand) orange contour is confined to the road tanker loading area and tank farm 1
- The 1.0e-6 contour (one-in-a-million) yellow contour, extends past the diesel installations as follows:

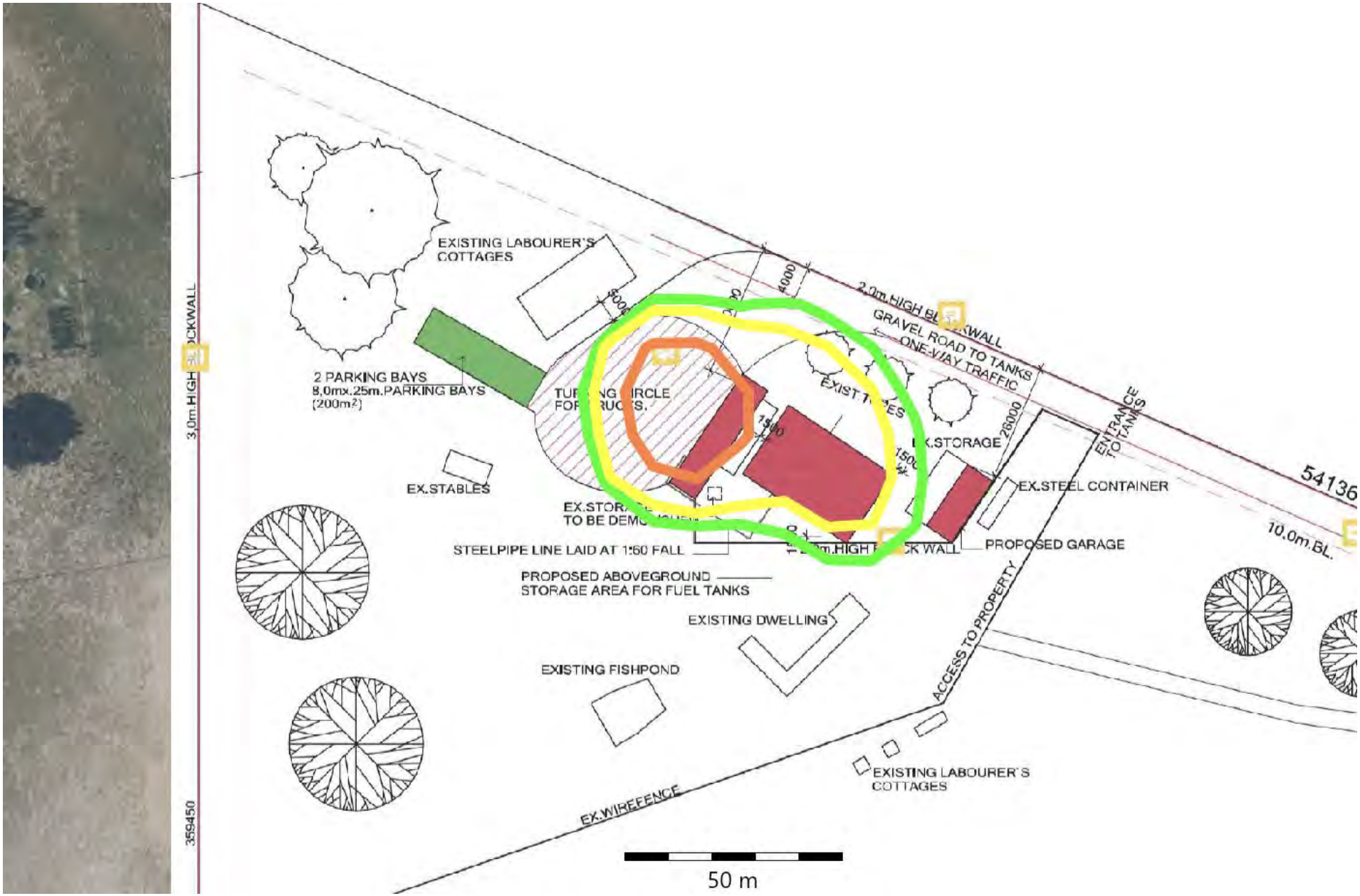
  North – 13m
  South – 0m
  West – 24m
  East – 0m

  The contour does not reach the property boundaries
- The 3.0e-7 contour (one-in-thirty million) green contour, extends past the diesel installations as follows:

  North – 20m
  South – 4m
  West – 28m
  East – 12m

  The contour does not reach the property boundaries

The contours do not reach any sensitive areas.



Individual Risk

3. RECOMMENDATIONS

The scenario contributing the most towards the total risk at the facility is a loading hose rupture of a diesel road tanker.

The risks posed by the installations were found to be acceptable for the area in which the facility is located.

Recommendations are as follows:

- Good housekeeping must always be observed on site
- Emergency Plan must be implemented to address the risks identified in this report
- Emergency Plan must comply with the MHI Regulations and SANS:1514 Codes
- Incident Register must be kept to detail all near misses
- Maintenance on equipment to be done as per manufacturer requirements
- Fuel installations must comply with relevant SANS Codes and Municipal Bylaws
- All work must be done by qualified companies
- Council to approve drawings
- Fire department to issue a flammable substance certificate
- Area around the depot must be kept clean and clear of ignition sources and combustible materials
- This MHI report must be distributed to Local, Provincial and National Government as per MHI Regulations

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DEFINITIONS

As Low as Reasonably Practicable (ALARP)

Risks in this range are risks that the public are generally prepared to tolerate in order to secure certain benefits. A risk in the ALARP range risk means that for new installations or modifications/ expansions to existing installations, the risk assessment shall not advise against the development. For existing installations (without modifications/ expansions) a broadly acceptable risk means that risk should continue to be monitored and all reasonably practicable risk reduction measures shall be implemented. A level of risk that is tolerable and cannot be reduced further without expenditure at costs that are disproportionate to the benefit gained, or where the solution is impractical to implement.

Broadly Acceptable

Risks which are broadly acceptable are generally regarded as insignificant and adequately controlled. Risk in the region would usually not require further action to reduce risks unless reasonably practicable measures are available. A broadly acceptable risk means that for new installations or modifications/ expansions to existing installations the risk assessment shall not advise against the development. For existing installations (without modifications/ expansions) a broadly acceptable risk means that risk should continue to be monitored and reduction implemented if necessary. For either new or existing installations, if reasonably practicable risk reduction measures are available, then these should be implemented.

BLEVE

Boiling liquid expanding vapour explosion.

Containment System

One or several devices, any parts of which are continuously in open contact with one another and are intended to contain one or several substances.

Critical Scenarios

Intended to mean:

- The scenarios that when added together define at least 90% of the location-specific risk for the 1.0e-6 contour (i.e. the ‘remainder’ that has not been defined in detail is added together as < 10%);
- The scenarios that are added together define at least 90% of the societal risk in the intervals 10 – 100 and 100 – 1000.

Informal Residential Area

A residential area where the structures are not formally approved.

Inspection

An examination or measurement to verify whether an item or activity conforms to specified requirements.

Intolerable

Risks in this range are generally regarded as unacceptable whatever the level of benefits associated with the activity. An intolerable risk means that for new installations or modifications/ expansions to existing installations the risk assessment shall advise against the development. For existing installations (without modifications/ expansions)

an intolerable risk means that risk reduction shall be implemented until the risks fall within the ALARP range or the broadly acceptable range.

Location Specific Individual Risk

The probability that during a period of one year a person will become the victim of an accident, in which case this person is in a particular location permanently and without protection and without means of escape.

Major Hazard Installation

The Operational Health and Safety Act defines a Major Hazard Installation as the following:

- where more than the prescribed quantity of any substance is or may be kept, whether permanently or temporarily; or
- where any substance is produced, used, handled or stored in such a form and quantity that it has the potential to cause a major incident.

Maximum Capacity

For equipment this is the total amount of material that can be accommodated in that equipment in the absence of equipment inventory control. For example, the volume of a cube vessel would be the product of the width, length and height of the vessel.

Occupied Building

Permanent or temporary structures/ buildings within a major hazard installation that are occupied by employees and/or contractors or that contain critical process control equipment (e.g. control rooms).

Procedure

Description of how to perform an activity, usually in the form of a document.

Recommendations

Suggestions put forward by the AIA, within the scope of the accreditation of the AIA, for consideration by the owner/ user of an MHE/ MHI.

Regulations

Regulations promulgated under the relevant Act.

Regulatory Authority

Body authorised to make Regulations or to control the application of such Regulations, in the field of Major Hazard Installations (see 3.1.22) which includes the Occupational Health and Safety Act, 1993 (Act 85 of 1993) and the South African National Accreditation System.

Restricted Development Distance

The maximum distance from an MHI/ MHE where land use planning restrictions should be considered. This is defined as the 3.0e-7 fatalities / person / year location specific individual risk contour.

Safety Report

A report which addresses major incident prevention and safety management systems at the installation/ establishments.

Sensitivity Level

The sensitivity levels of a proposed development take into consideration the structure of the development and the characteristics of the population occupying the development. The larger the development and the more vulnerable the occupying population, the higher the level of sensitivity.

Societal Risk (F-N Curve)

Societal risk is a measure of the risk posed on a society and an F-N Curve is a tool to indicate societal risk. They are plots of the cumulative frequency (F) of various accident scenarios against the number (N) of fatalities associated with the modelled incidents. The plot is cumulative in the sense that, for each frequency, N is the number of fatalities that could be equalled or exceeded.

Verification

The act of reviewing, inspecting, testing, checking, auditing or otherwise determining and documenting whether items, processes, services or documents conform to specified requirements.

Vulnerable Groups/ Populations

The elderly, children, persons in hospitals/ clinics and people with certain disabilities are considered particularly vulnerable and may need special attention. In the South African context, concentrations of homeless persons and persons occupying informal settlements should also be considered vulnerable.

ABBREVIATIONS

The following are key abbreviations used in this document:

ACDS	Advisory Committee on Dangerous Substances
AIA	Approved Inspection Authority
ALARP	As Low as Reasonably Practicable
API	American Petroleum Institute
BEVI	Besluit Externe Veiligheid Inrichtingen (Dutch safety legislation)
BLEVE	Boiling Liquid Expanding Vapour Explosion
BP	Boiling Point (usually at 101.325 kPa)
CAS	Chemical Abstracts Service
CASRN	Chemical Abstracts Service Registry Number
RDD	Restricted Development Distance
CFD	Computational Fluid Dynamics
CIA	Chemical Industries Association
DTL	Dangerous Toxic Load
ERPG	Emergency Response Planning Guideline
F – N (cumulative)	Frequency - Number
FMECA	Failure Mode Effect and Criticality Analysis

FP	Flash Point
HAZID	HAZard IDentification
HAZAN	HAZard ANalysis
HEL	Higher Explosive Limits
IBC	Intermediate Bulk Container (typically 1m^3 capacity)
IDLH	Immediately Dangerous to Life and Health
IEC	International Electro-technical Commission
ISO	International Standards Organisation
IZ	Inner Zone
kPa	Kilopascal
kW/m^2	Kilowatts Per Square Meter
L/D	Length/ Diameter
LEL	Lower Explosive Limits
LFL	Lower Flammable Limit
LOC	Loss of Containment
LOPA	Layer of Protection Analysis
LPG	Liquefied Petroleum Gas
MAHPs	Major Accident Hazard Pipelines
MAPP	Major Accident Prevention Policy
mg/m^3	Milligram Per Cubic Meter
MHI	Major Hazard Installation
MZ	Middle Zone
OHS	Occupational Health and Safety
OZ	Outer Zone
PAC	Protective Action Criteria
PAHDI	Planning Advice for Developments near Hazardous Installations
PFD	Process Flow Diagram
P&ID	Piping and Instrumentation Diagram
ppm	Parts-per-million (volume basis)
PSM	Process Safety Management
QRA	Quantitative Risk Assessment
UFL	Upper Flammable Limit

QUANTITATIVE RISK ASSESSMENT OF THE PROPOSED FUEL INSTALLATIONS AT ALLIANCE FUEL, PHILADELPHIA

1. INTRODUCTION

Alliance Fuel is a fuel storage and distribution company. They are in the process of establishing a new bulk fuel facility in the Western Cape. They will have storage and distribution infrastructure for diesel only.

As diesel has the potential to cause onsite and offsite incidents, Major Hazard Risk Consultants cc was commissioned to conduct a Risk Assessment in accordance with the Major Hazard Installation Regulations to determine the impact of the facility on the surrounding area.

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The main aim of the investigation was to quantify the risks to employees and neighbours regarding the proposed facility on the outskirts of Philadelphia.

Risk is the severity of the consequence of a hazardous event and the probability of the event occurring.

This report summarises the results of the Risk Assessment conducted by MHR Consultants.

This Assessment is based on the best possible information and expertise and MHR Consultants cannot be held liable for any incident which may occur at this facility which directly or indirectly relates to the work in this report.

1.1. Legal Framework

The Occupational Health and Safety Act (OHS Act) defines an Approved Inspection Authority (AIA) in Section 1(1)(i) as *“An inspection authority approved by the Chief Inspector: Provided that an inspection authority approved by the Chief Inspector with respect to any particular service shall be an approved inspection authority with respect to that service only.”*

The Major Hazard Installation Regulations (MHI Regulations), which were promulgated under the OHS Act provides more specifically for an AIA in terms of MHI Regulation 5 (5)(a) as *“An employer, self-employed person and a user shall ensure that the assessment contemplated in Sub-regulation (1), shall be carried out by an Approved Inspection Authority which is competent to express an opinion as to the risks associated with the major hazard installation.”*

This Risk Assessment was conducted as per SANS 1461:2018 Codes of Practice.

1.2. Purpose and Scope of Investigation

The purpose of this investigation was to quantify the risks to employees and neighbours regarding the proposed facility on the outskirts of Philadelphia.

This Risk Assessment was conducted in accordance with the Major Hazard Installation Regulations and could be used as notification of the facility. The Risk Assessment includes the following:

- Identifying likely hazards associated with the processes of the installations including the causes, consequences, and their effects
- Quantifying the likely hazards in terms of their magnitude
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1.3. Methodologies

Methodologies and techniques used for this Assessment are as follows.

- Site visits and meetings were conducted to collect as much technical information to accurately determine all the processes and materials
- It was accepted that the process and storage installations were designed using the correct Codes of Practice and design specifications, and that the installations were built by qualified professionals
- For this report the public refers to all people outside the boundaries of the facility, including neighbouring facilities and everyone inside the facility is regarded as employees, including visitors
- The hazards were identified at the site visits and meetings and analysed using international reference publications
- The consequences were calculated using the computer software *'Effects'* by TNO in the Netherlands
- The risk calculations were made using the computer software *'Risk Curves'* by TNO in the Netherlands

2. COMPANY, SITE, AND INSTALLATION DESCRIPTION

2.1. Main Activity

The main activity of the Alliance Fuel depot on the farm Zoutrivier will be the storage and distribution of diesel.

The site will be used as a fuel depot.

(See site plan in the Appendices).

2.2. Site Address

Portion 64 of Farm Zoutrivier
Klein Dassenberg Road, Philadelphia
Western Cape
GPS Coordinates: 33°34'50.71" S and 18°35'31.28" E

2.3. Site Installations

The site will consist of the following.

Tank/ Vessel Size	Tank Type	Throughput per Year
8x 23m^3	Above-ground Diesel Tanks	Proposed Installation
2x 32m^3	Above-ground Diesel Tanks	
3x 83m^3	Above-ground Diesel Tanks	

The tank filling area is to the west of the installations.

2.4. Process and Flow Diagram

Tank Farm

A road tanker will offload diesel into the above-ground tanks from where it will be pumped into road tankers for distribution.

Process Flow

2.5. Diesel Installations

The diesel installations will consist of two diesel tank farms located on the northern side of the property.

Tank Farm 1

This tank farm will consist of 8x23m^3 above-ground diesel tanks. The tanks will be in a single bunded area.

Tank Farm 2

This tank farm will consist of 2x32m^3 and 3x83m^3 tanks. The tanks will be in a single bunded area. The tank farm will be located to the east of tank farm 1.

The loading area will be located to the west of tank farm 1. The slab will be sloped towards to a catchment drain. The drain will be connected and the water/ oil mixture

from spills and rainwater will be fed through an oil/ water separator before going into a soakaway system.

There will be two road tanker deliveries twice per week.

2.6. Assumptions

The following assumptions have been made for the installations:

- The installations will be done by suitably qualified and experienced companies
- The installations will be designed to comply with applicable SANS Standards and Municipal Bylaws
- All safety systems will be checked and serviced as per manufacturer requirements
- It is assumed that all equipment will be kept in good working order

2.7. Receiving Environment

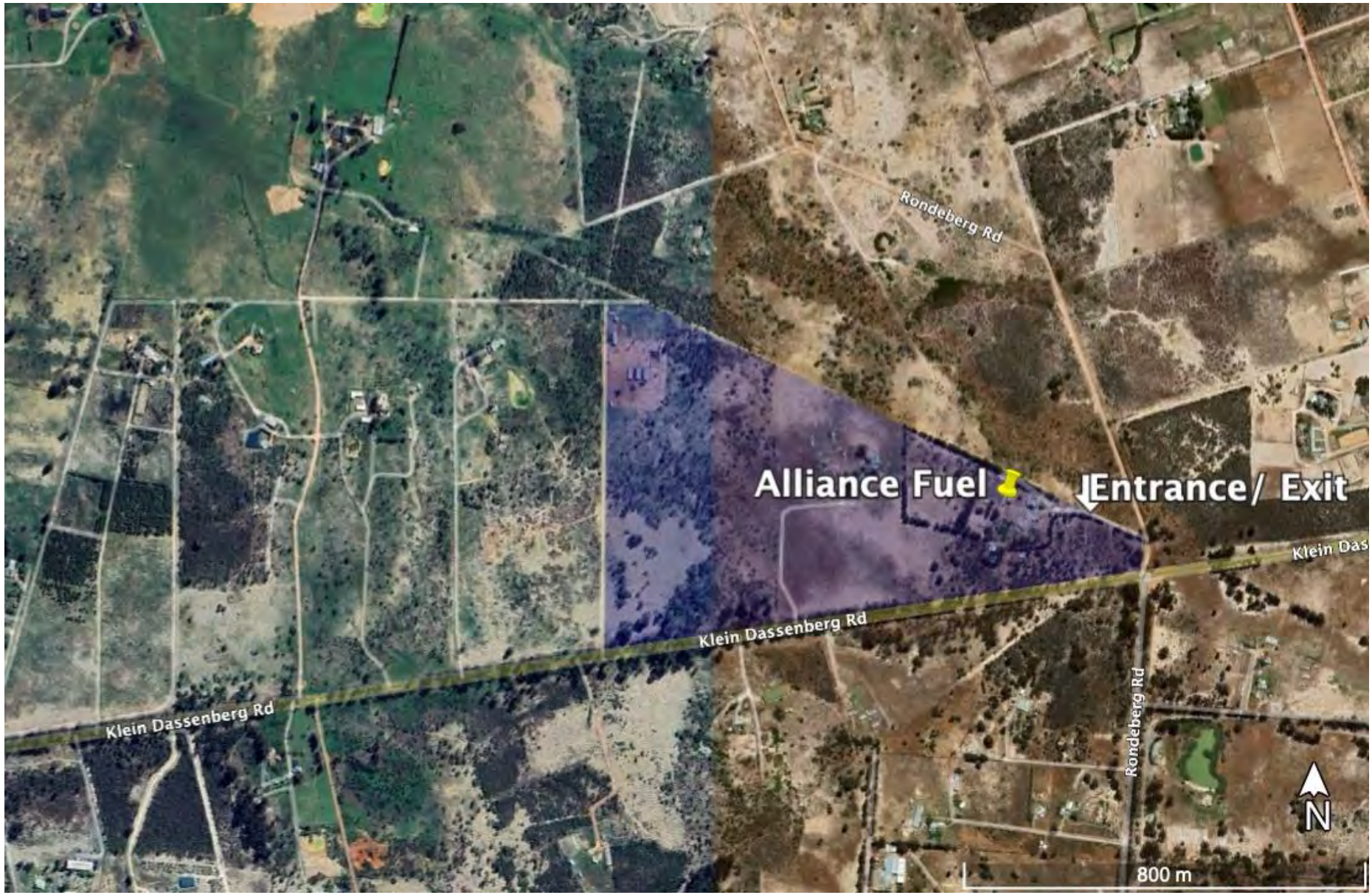
The site is situated in the agricultural area of Philadelphia.

2.7.1. Topography of the Surrounding Area

The area surrounding the facility is agricultural.

The topography is flat with no natural waterbodies close to the site.

(See satellite image below.)



Location of Site

2.7.2. Location Population Information

Area	Population Type	Daytime Person/ Hectare	Night-time Person/ Hectare
Site	Staff	25	25
Agricultural Neighbours	Staff	1	1

2.7.3. Surrounding Facilities and Other MHIs

The area surrounding the site is agricultural.

There are no known MHIs close to the depot.

(See satellite image on previous page.)

2.8. Meteorological Information

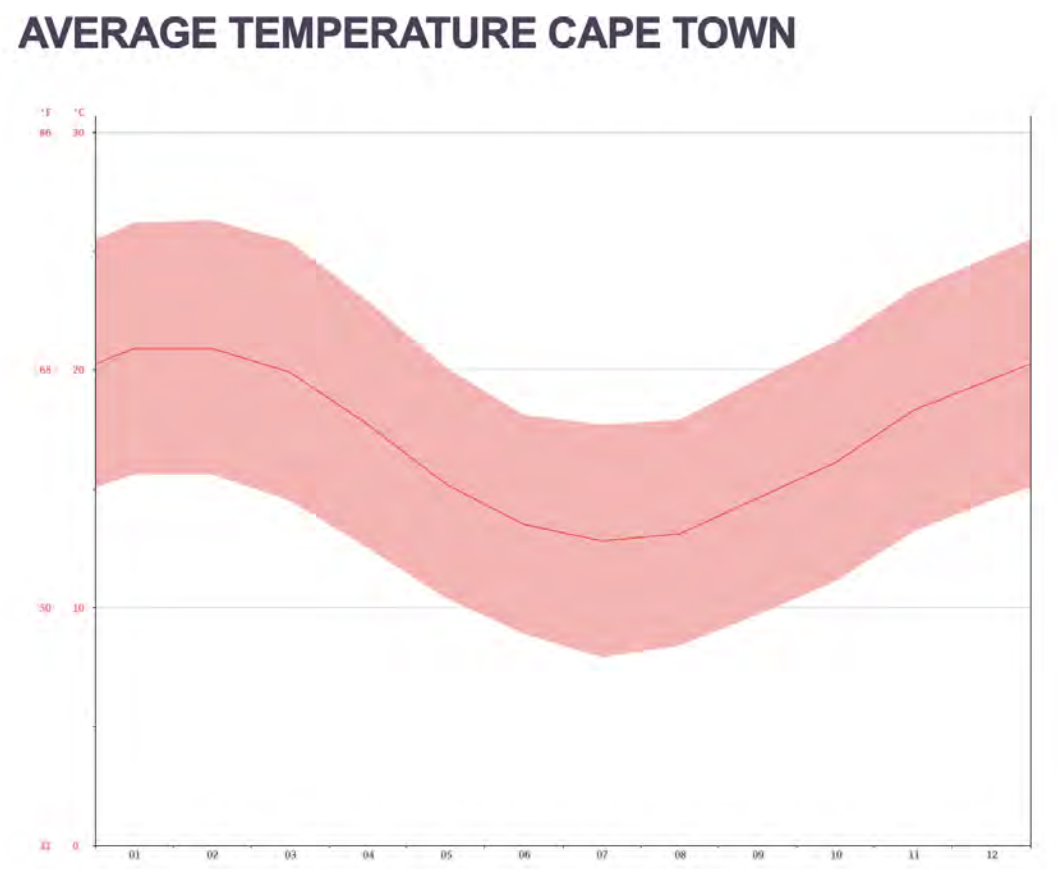
2.8.1. Climate

The warm season lasts from January to March with an average daily high temperature above 25°C. The hottest day of the year is in January/ February, with an average high above 26°C.

The cold season lasts from June to August with an average daily high temperature below 18°C. The coldest day of the year is in July, with an average low of 8°C.

CAPE TOWN WEATHER BY MONTH // WEATHER AVERAGES

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	20.9	20.9	19.9	17.7	15.2	13.5	12.8	13.1	14.6	16.1	18.3	19.6
Min. Temperature (°C)	15.6	15.6	14.5	12.5	10.4	8.9	7.9	8.4	9.7	11.1	13.2	14.5
Max. Temperature (°C)	26.2	26.3	25.4	22.9	20.1	18.1	17.7	17.9	19.6	21.2	23.4	24.8
Avg. Temperature (°F)	69.6	69.6	67.8	63.9	59.4	56.3	55.0	55.6	58.3	61.0	64.9	67.3
Min. Temperature (°F)	60.1	60.1	58.1	54.5	50.7	48.0	46.2	47.1	49.5	52.0	55.8	58.1
Max. Temperature (°F)	79.2	79.3	77.7	73.2	68.2	64.6	63.9	64.2	67.3	70.2	74.1	76.6
Precipitation / Rainfall (mm)	24	25	30	74	117	143	131	126	70	55	31	27

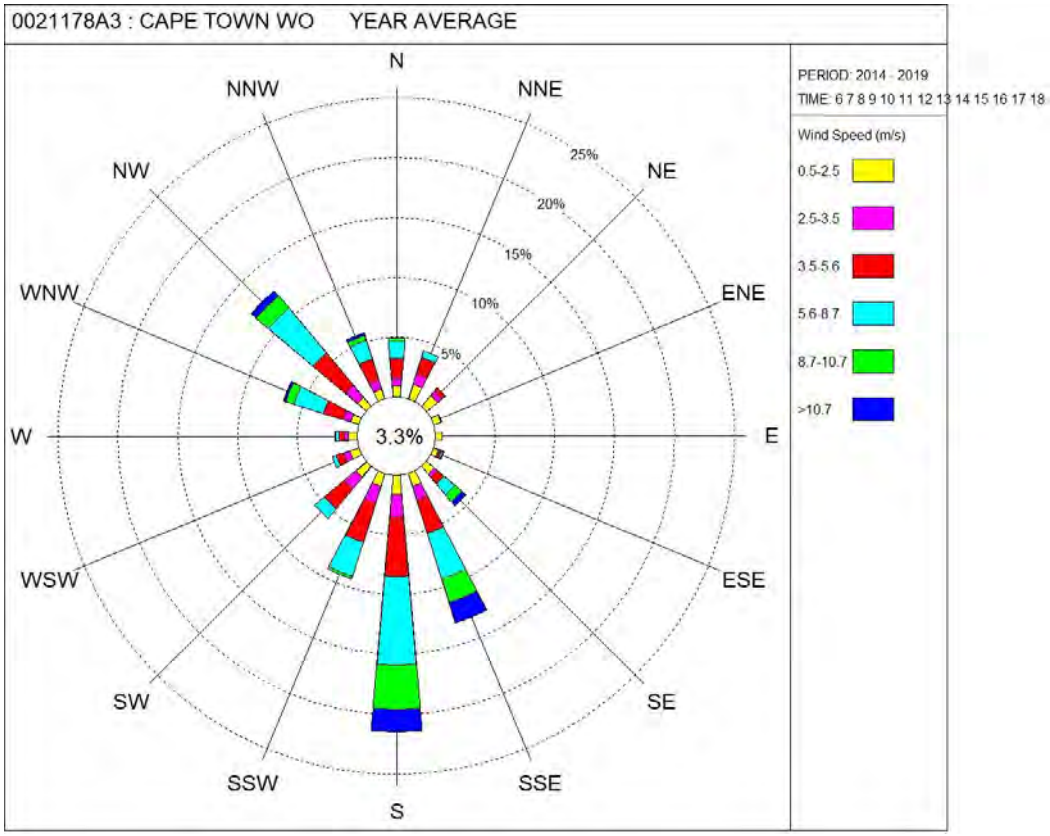


2.8.2. Wind Direction

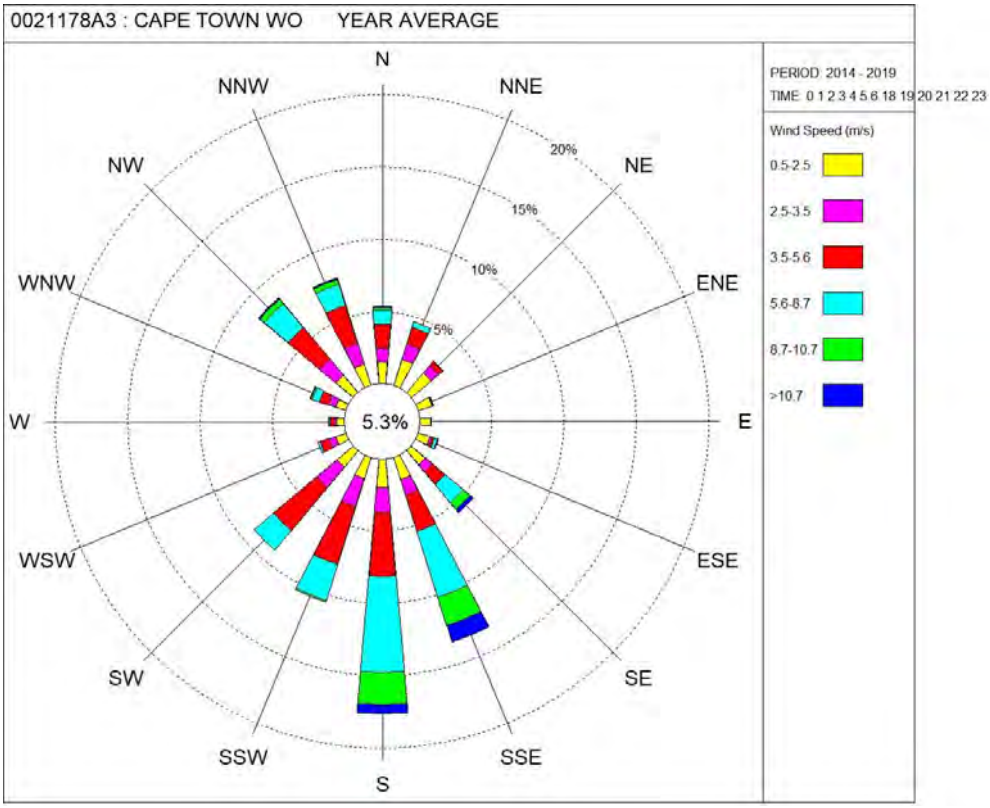
Over the course of the year typical wind speeds vary from 5m/s to 9m/s (light breeze to strong breeze), rarely exceeding 9m/s (strong breeze). The predominant wind direction during the day and night is south.

2.8.3. Wind Roses

The annual wind roses for the area are as follows:



Daytime Wind Rose



Night-time Wind Rose

Dispersion models also require the atmospheric condition to be categorised into one of six stability classes, namely:

Stability Category	Meteorological Conditions	Occurrence
A	Very Unstable	Hot daytime conditions, clear skies, calm wind
B	Unstable	Daytime conditions, clear skies
C	Slightly Unstable	Daytime conditions, moderate winds, slightly overcast
D	Neutral	Day and night, high winds or cloudy conditions
E	Stable	Night-time, moderate winds, slightly overcast conditions
F	Very Stable	Night-time, low winds, clear skies, cold conditions

2.8.4. Summary

Based on the above information the meteorological information extracted for the modelling of scenarios was as follows:

- Wind, stability, and temperature information:
  - B 4m/s meaning a stability class of B (moderately unstable conditions) where the wind speed is 4m/s with the maximum daytime temperature.
  - D 7m/s meaning stability class of D (neutral conditions) where the wind speed is greater than 7m/s. D 7m/s gives a conservative daytime and night-time weather condition.
  - F 2m/s meaning a stability class of F (moderately stable) where the wind speed is less than or equal to 2m/s with the min daytime temperature.
- The relative humidity was set to be 0.7.
- The solar radiation flux was set to be 0.5KW/m^2 during the day and 0KW/m^2 at night.
- The *Pasquil Stability* was selected instead of the mixing layer height.

3. HAZARD IDENTIFICATION

This is the process of examining each work area and work task for the purpose of identifying all the hazards which are inherent to the job.

Hazard analysis is used as the first step in a process used to assess risk. The result of a hazard analysis is the identification of different types of hazards. A hazard is a potential condition and exists or not (probability is 1 or 0). It may be in single existence or in combination with other hazards (sometimes called events) and conditions become an actual Functional Failure or Accident (mishap). Once a hazard has been identified, it is necessary to evaluate it in terms of the risk it presents to the employees and the neighbouring community. In principle, both probability and consequence should be considered, but there are occasions where if either the probability or the consequence can be shown to be sufficiently low or sufficiently high, decisions can be made on just one factor.

During the hazard identification process the complete system of assets, materials, human activities, and process operations within the boundaries of the site should be clearly defined and understood, taking account of the original design, subsequent changes and current conditions. Typically, the system should be divided into distinct separate components or sections to enable manageable quantities of information to be handled at each stage.

Some key questions and issues could be:

- What is the design intent, what are the broad ranges of activities to be conducted, what is the condition of equipment, and what limitations apply to activities and operations?
- What are the critical operating parameters? What process operations occur, and how could they deviate from the design intent or critical operating parameters? This should consider routine and abnormal operations, start-up, shutdown and process upsets.
- What materials are present? Are they a potential source of major accidents in their own right? Could they cause an accident involving another material? Could two or more materials interact with each other to create additional hazards?
- What operations, construction or maintenance activities occur that could cause or contribute towards hazards or accidents? How could these activities go wrong? Could other hazardous activities be introduced into this section by error or by work in neighbouring sections of the facility?
- Could other materials, not normally or not intended to be present, be introduced into the process?
- What equipment within the section could fail or be impacted by internal or external hazardous events? What are the possible events?
- What could happen in this section to create additional hazards, e.g. temporary storage or road tankers?
- Could a particular section of the facility interact with other sections (e.g. adjacent equipment, an upstream or downstream process, or something sharing a service) in such a way as to cause an accident?

3.1. Site Layout Details

The Site Plan is included in the Appendices.

3.2. Significant Incidents at the Site and Related Sites

No incidents have been recorded at the Alliance Fuel depot as it is a proposed facility.

The few incidents that have occurred at similar installations were mainly caused by a lack of maintenance and operator negligence.

3.3. Preventative Measures

A good Maintenance Plan and Maintenance Register must be compiled for the site.

3.4. Hazard Details

3.4.1. Hazardous Materials

The materials on site were categorised as per SANS 10228:2003 classes of dangerous substances as per the table below:

Class	Description
1	Explosives (Not included in MHI Regulations)
2	Gases (Flammable or Toxic gases only)
3	Flammable Liquids
4	Flammable Solids
5	Oxidising Substances and Peroxides
6	Toxic and Infectious Substances
7	Radioactive Materials (Not included in MHI Regulations)
8	Corrosives
9	Combustible Materials

3.4.2. Hazardous Materials on Site

Alliance Fuel depot will be using hazardous product on site, categorised as per the table below:

Substance	CAS Number	Gases	Flammable Liquids	Flammable Solids	Potential for an MHI
Class		2	3	4	
Diesel	68334-30-5		Yes		Yes

This Assessment deals with diesel, the detailed properties of which are included in the Appendices.

3.5. Accidents and Incidents

No incidents have been reported at the facility as it is a proposed facility.

Numerous small and catastrophic leaks have occurred at similar installations.

These include the following incidents:

Date	Location	Company	Description	Deaths/ Injuries
November 2020	Tehran, Pakistan	Service Station	Fuel tanker caught fire while unloading fuel into tanks	1 Injured
August 2020	Volgograd, Russia	Service Station	Fuel tanker exploded while unloading petrol into tanks	13 Injured
March 2012	Cape Town	Brent Oil Road Tanker	Road tanker accident	No Injuries

The incidents mentioned above could have been avoided if proper maintenance was done by qualified companies/ people. It is imperative that a maintenance register be compiled as per the requirements of the pressure vessel regulations, as well as the requirements of the manufacturer.

Training of employees must be done to ensure that proper maintenance is observed, along with the use of the equipment as specified by the manufacturer. Employees must be trained what to do in the event of an accident/ incident. Regular training and updating of the Emergency Plan are essential to limit the effects of accidents/ incidents.

3.6. Containment and Safety Systems in Design

The following containment and safety systems have been incorporated in the design of the installations:

- Diesel tanks will be in bunded areas
- The loading area will have spill slabs to contain surface spills
- Road tankers will be fitted with breakaway couplings
- Pumps will be fitted with auto stop
- Staff to be trained in the safe handling of fuel

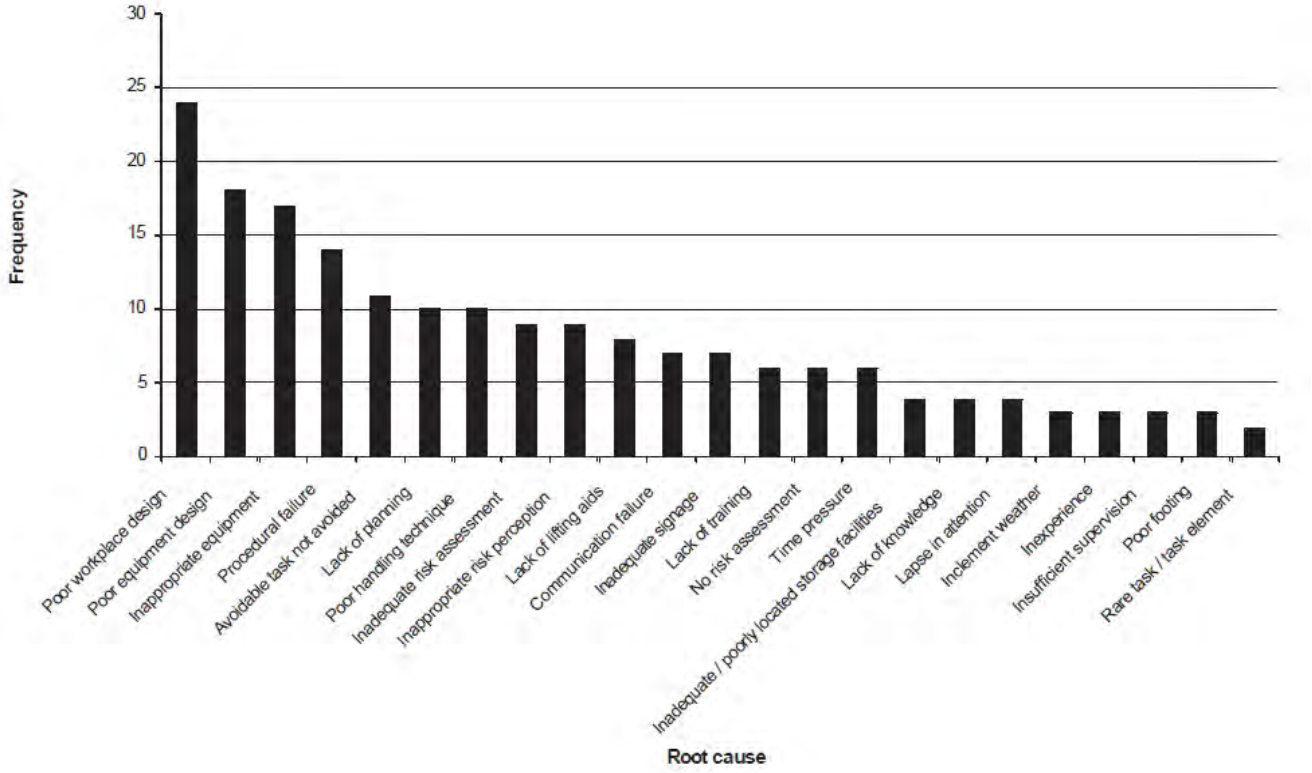
3.7. Environmental Hazards

Environmental Hazards are not included in the MHI Regulations and were not included in this report.

4. HAZARD ANALYSIS

4.1. Incident Root Causes

One hundred and twenty-six incidents were recorded an HSE report database in the UK. A greater number were reviewed but were not taken forward for analysis. The graph below shows the frequency with which each root cause was identified for the 126 incidents analysed.



The most common causes shown above are linked to the workplace and equipment available:

- Poor workplace design (representing 13%)
- Poor equipment design (10%)
- Inappropriate equipment (9%)
- Procedural failure (7%)

The next most found issues are more closely linked with day-to-day organisation and management:

- Avoidable task not avoided (6%)
- Lack of planning (5%)
- Poor handling technique (5%)
- Inadequate risk assessment (5%)
- Inappropriate risk perception (5%)

The report mentions more than one root cause could be present in the same incident. In the sample analysed, 78 incidents were attributed to a single root cause; the remaining 48 had two or more root causes.

Most incidents are due to a mismatch between the operators' requirements or expectations and workplace or equipment design. If the root causes were principally to do with training or risk assessment (i.e., linked to risk perception and avoidance), it would imply that personnel were failing to use their experience and prior training to predict and avoid manual handling risks. Where an individual has unintentionally harmed themselves or others, it follows that the task carried risks which the operator(s) had to avoid by using safe working procedures and their skill and knowledge. The root cause in fact lies with one or more risky elements of the task that the operator then must deal with. Training and experience help only to avoid the background risks.

The findings suggest that operators are mostly being injured because of poor equipment, task, or workplace design, and to a lesser extent misunderstanding the level of risk. Failure to avoid an avoidable task is like a lack of planning as both indicate that an overview of the work was not held that could have highlighted alternatives to risky manual handling. 'Procedural failure' is linked to planning and overview too as this root cause indicates that agreed procedures inadvertently placed operators at risk of injury.

4.2. Events Following a Loss of Containment

4.2.1. Flammable Gas/ Liquid

Where no Boiling Liquid Expanding Vapour Explosion (BLEVE) and fireball occur following an instantaneous release with direct ignition, a liquid pool is formed, and a vapour cloud will expand to atmospheric pressure. The direct ignition of the vapour cloud is modelled as a flash fire (probability 0.6) and explosion (probability 0.4).

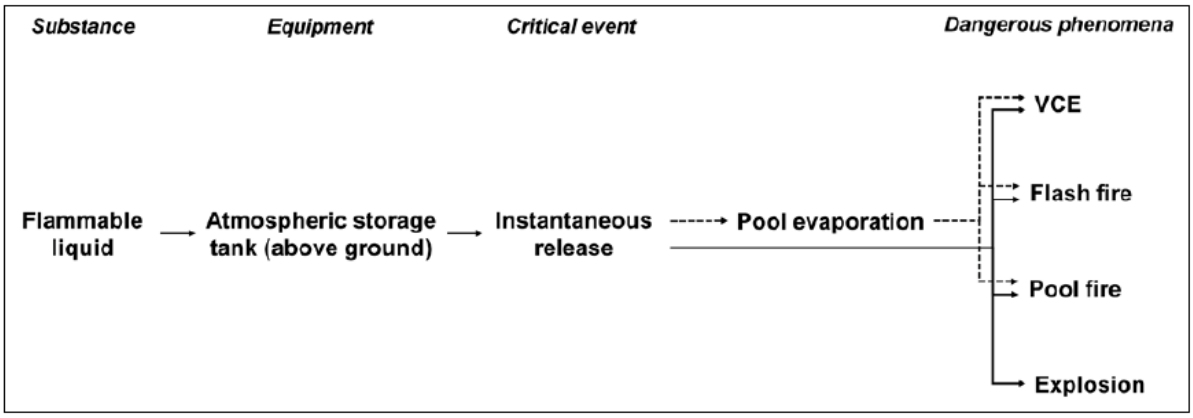
For an above-ground storage tank (or road tanker), a BLEVE or fireball may occur. A BLEVE can occur when a flame impinges on a tank containing a material that is a gas at atmospheric pressure and temperature but is a liquid at storage temperature and pressure. Again, it is assumed that a BLEVE occurs when the vessel or road/ rail tanker is full. While BLEVEs are possible because of catastrophic vessel failure and localised vessel failure, they typically occur outside of these two events. Should this not occur, a vapour cloud may form. The ignition of the vapour cloud is modelled as a flash fire and explosion.

The flash fire is modelled through simulating the expansion of the initial cloud to the lower flammability limit (LFL) with air entrainment. The damage area then corresponds to the LFL cloud footprint. The explosion is modelled using the total mass subject to the lower flammability limit (LFL).

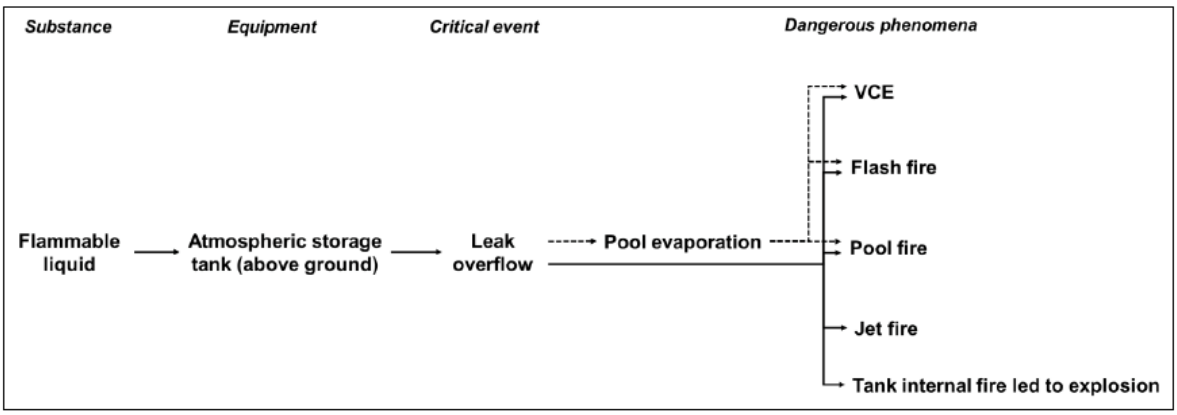
Accidental high velocity releases of ignited flashing liquids of pressurised flammable material at ambient temperature are classed as liquid jet fires. Jet fires occur when the jet of hydrocarbon can entrain air and burn at its edge. The jet remains ignited because the burning of the flame is greater than the velocity of the hydrocarbon jet, i.e. the flame can burn back towards the source of the jet. As a worst-case scenario, it is assumed that all failures occur in a horizontal position, i.e., the flame is orientated horizontally.

4.3. Event Trees

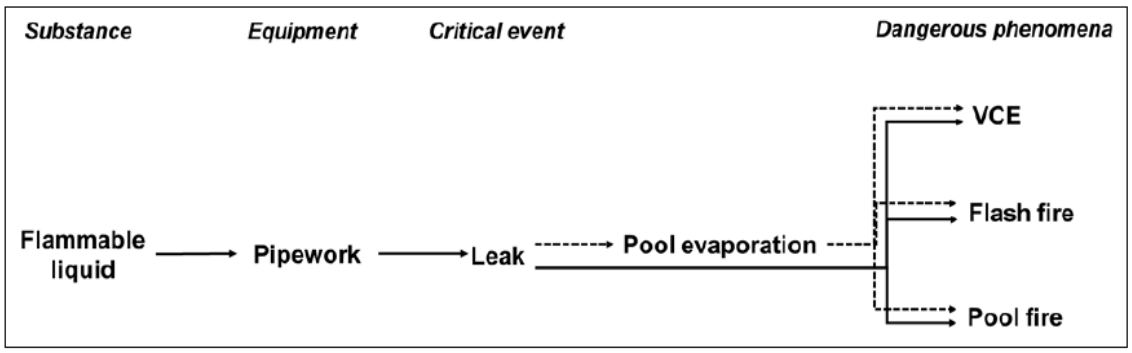
The probability of the flammable gas/ liquid identified above is represented as *event trees* for working daytime and night-time periods in the following diagrams.



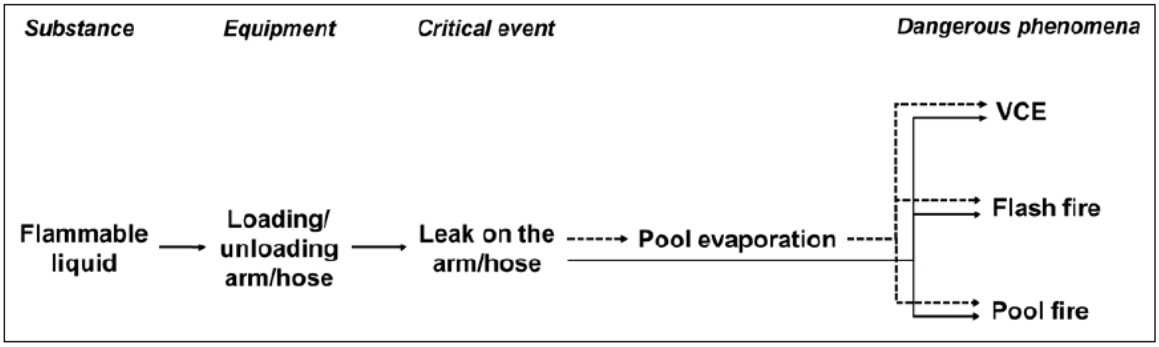
Event Tree of an Instantaneous Release of an Atmospheric Tanks



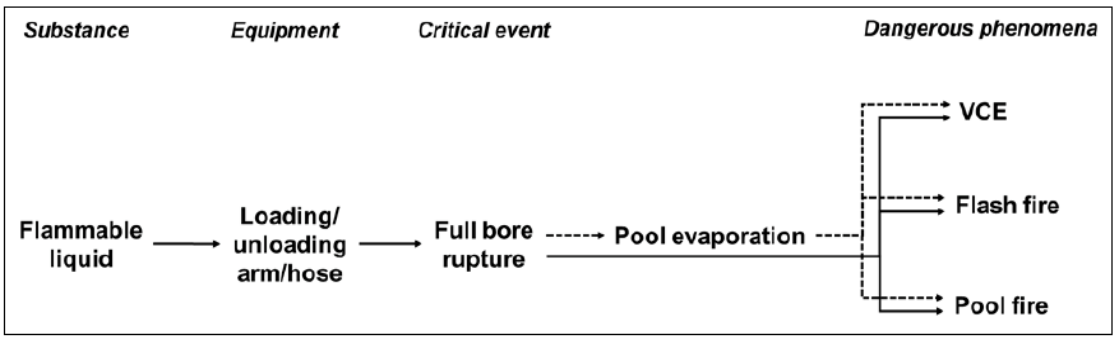
Event Tree of an Atmospheric Tank Leak



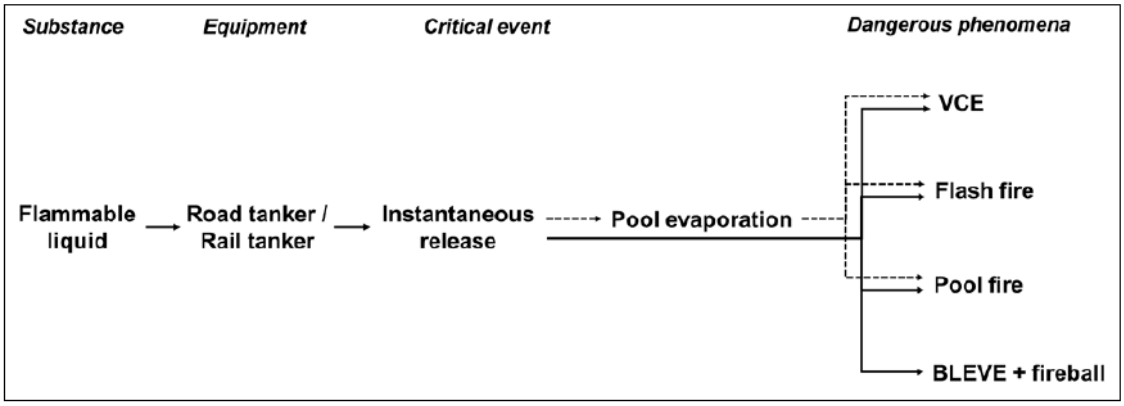
Event Tree of Flammable Liquid Pipe Leak



Event Tree of Flammable Liquid Loading Hose Leak



Event Tree of Flammable Liquid Loading Hose Rupture



Event Tree of Instantaneous Release of a Flammable Liquid Road Tanker

4.4. Scenarios Modelled

The following scenarios were modelled for this Risk Assessment:

Fuel Fire Scenarios

- Pool fire as the result of a catastrophic tank failure
- Pool fire as the result of a loading hose shear
- Pool fire as the result of a 10mm hole in a loading hose
- Pool fire as the result of a catastrophic tank failure
- Pool fire as the result of a 10mm hole in one of the tanks

4.5. Hazard Analysis Breakdown

Fuel Installations					
Equipment	**Failures and Causes**	**Preventative Measures**	**Hazardous Event**	**Protective Measures**	**Final Consequence**
Diesel Tank	- Leak - Catastrophic Leak - Catastrophic Rupture	- Installations will comply with relevant SANS Standards - Tanks will be installed in bunded areas	- Pipe leak/ rupture resulting in a pool fire - Tank leak/ rupture resulting in a pool fire	- Firefighting equipment will be installed - Tanks will be installed in bunded areas to contain spills - Emergency Plan to be implemented, and regular drills performed - Regular maintenance to be done as per company policy	- Possible employee injuries or fatalities - Possible public injuries or fatalities - Possible domino effects on road tanker causing pool fire or catastrophic failure
Road Tanker	- Hose Leak - Hose Rupture - Catastrophic Rupture	- Installations will comply with relevant SANS Standards - Two Road tankers to visit the site twice per week - Only trained staff and driver to exercise offloading procedures	- Hose leak/ rupture resulting in a pool fire - Road Tanker leak resulting in a pool fire	- Loading hose to be inspected and maintained - Firefighting equipment will be installed - Emergency Plan to be implemented, and regular drills performed - Road tanker maintenance to be done as per company policy - Driver to be suitably trained in offloading procedure and emergency procedure - Tanker to be earthed prior and during loading operation	- Possible employee injuries or fatalities - Possible public injuries or fatalities - Possible domino effects on storage tanks causing pool fire or catastrophic failure

5. CONSEQUENCE ANALYSIS

5.1. Background

The consequence analysis describes the extent of impacts from major events. The results of this analysis are used as input to the risk analysis section as well as providing guidance to emergency planning.

To establish the impact following an accident, it is necessary to first estimate the physical process of the spill (i.e., rate and size), spreading of the spill, the evaporation from the spill and the subsequent atmospheric dispersion of the airborne cloud or, in the case of ignition, the burning rate, the resulting thermal radiation or the overpressures from an explosion.

The second step is to estimate the consequences of a spill on humans and structures. For humans this is normally expressed as a probability of fatality at distances from the release point.

The consequence analysis as documented in the Risk Assessment report is to provide sufficient process data and calculations to allow for a reasonable verification of key consequence modelling results.

5.2. Source Term Analysis

When determining the volume of materials possibly released or involved in an incident, the following aspects should be considered:

- The amount of material available for release from each item should be at least the full inventory of the piece of equipment when it is filled to its maximum capacity. The maximum capacity of equipment is the total amount of fluid that can be accommodated in that equipment in the absence of equipment inventory control. For example, the volume of a cube vessel would be the product of the width, length and height of the vessel.
- When a component fails, such as a vessel, subsequent delivery of other system components which are connected to the vessel may take place. If the quantity that is subsequently delivered is significant, the combined volume/flows need to be taken into consideration.
- If in the case of an on-site pipeline failure an increased pumping rate occurs, this is modelled by increasing the flow rate to that of 1.5 times the pumping rate.
- The effects of measures affecting outflow, such as shutting off valves can be considered.
- In the case of a ‘long pipeline’ rupture scenario the outflow is calculated based upon the content of the pipeline and a pumping rate. This means that the outflow from a reservoir that may be connected is not included. The ‘long pipeline’ scenario can therefore only be used when the pumping rate and the content of the transport pipeline is critical for the outflow. It is also important that the condition that L/D > 1000 is complied with, where L is the (total) length of the pipeline and D is the diameter of the pipeline.
- In the case of a line rupture, outflow occurs from both ends of the rupture. There are several possibilities:

- If the outflow mainly takes place from one end, the scenario can be modelled as a rupture of one pipeline ('line rupture').
- If the rupture occurs in a long transport pipeline, the various contributions from both ends of the rupture are included in the calculation of the outflow.
- If the contributions from both ends of the line rupture are relevant to the outflow, one effective pipeline diameter must be used in the calculation, for which the outflow rate matches the outflow rate from both ends added together.

5.3. Site Specific Consequence Analysis

At the installations, the impacts of a loss of containment have been calculated without taking the probability of it occurring into account. This is done to show the consequence of an incident and how it will impact on the site and the surrounding area.

Domino effects were also investigated in this section.

In the following sections various scenarios were calculated for the installations.

5.4. Fires

Flammable liquids and gases may explode and burn if ignited. This normally occurs because of a loss of containment and ignition. Fires include pool fires, jet fires and flash fires.

The consequence of a fire will be thermal radiation.

It is expected that an individual either in pain from a thermal dose received or suffering from first degree burns should escape rapidly as the injury should not be sufficient to impede movement, yet the pain will be too uncomfortable to bear standing still.

An individual with second degree burns will have even greater motivation to escape, commonly referred to as the fight or flight response. However, at this level of injury, any exposed skin will be uncomfortable and difficult to use in contact with another surface. Simple tasks, such as turning door handles or dressing in survival equipment will take longer, if possible. Depending on the location and extent of injury, more difficult tasks such as operating control panels or turning valves may be impossible.

With third degree burns an individual will be in severe pain and will realise that they are in immediate danger of losing their life. Individual response is hard to predict. Fine control of injured extremities will be impossible and other functions will be severely impaired. Escape will probably incur further injury as skin may fall away from the wound. Individuals with third degree burns should be considered as casualties who cannot evacuate unaided.

Thermal radiation levels used in this report are as follows:

- 4.5 kW/m^2 is the radiation that would cause pain and second degree burns within 20 seconds (Yellow Contour)
- 12.5 kW/m^2 represents a 1% fatality for people exposed to the fire for 20 seconds (Orange Contour)
- 37.5 kW/m^2 indicates the lower limit of damage to steel equipment and represents a 100% fatality for people exposed to the flame (Red Contour)

5.4.1. Thermal Radiation

The effect of thermal radiation is dependent on the type of fire and duration exposed to the thermal radiation. Codes such as API 520 and 2000 suggest the maximum heat absorbed on vessels for adequate relief designs to prevent the vessel from failure due to overpressure. Other codes such as API 510 and BS 5980 give guidelines for the maximum thermal radiation intensity as a guide to equipment layout.

The effect of thermal radiation on human health has been widely studied and it has been found that injuries developed due to the exposure and intensity of the radiation. Two values normally quoted are 1.5kW/m^2 or 'safe' value where people can be exposed for a long period of time and 5kW/m^2 for people performing an emergency operation for short periods of time.

Thermal Radiation Guidelines (BS 5980-1990)

Thermal Radiation Intensity (kW/m^2)	Limit
1.5	Will cause no discomfort for long exposure
2.1	Sufficient to cause pain if unable to reach cover within 40 seconds
4.5	Sufficient to cause pain if unable to reach cover within 20 seconds
12.5	Minimum energy required for piloted ignition of wood and melting of plastic tubing
25	Minimum energy required to ignite wood at indefinitely long exposures
37.5	Sufficient to cause serious damage to process equipment

5.4.2. Pool Fires

On ignition of a flammable pool, the fire would extend to the limit of the pool but would shrink rapidly as the fuel within the pool is consumed.

The fuel at the facility will be stored as flammable liquid under atmospheric temperatures and pressures. A loss of containment of a storage tank would result in a pool. The pool will be contained within the bunded area.

The diesel tanks are installed in bunded areas.

On ignition of a contained flammable pool, the fire would extend to the limit of the pool but would shrink rapidly as the fuel within the pool is consumed.

The consequences of pool fires of the various diesel tanks are as follows:

23m^3 Diesel Tank				
Tank	**Radiation Contour 37.5kW/m^2**	**Radiation Contour 12kW/m^2**	**Radiation Contour 4.5kW/m^2**	**1% Lethality Contour**
Catastrophic Tank Failure	17m	25m	35m	27m
Catastrophic Tank Leak	17m	25m	35m	27m
10mm Leak	0	4m	6m	5m

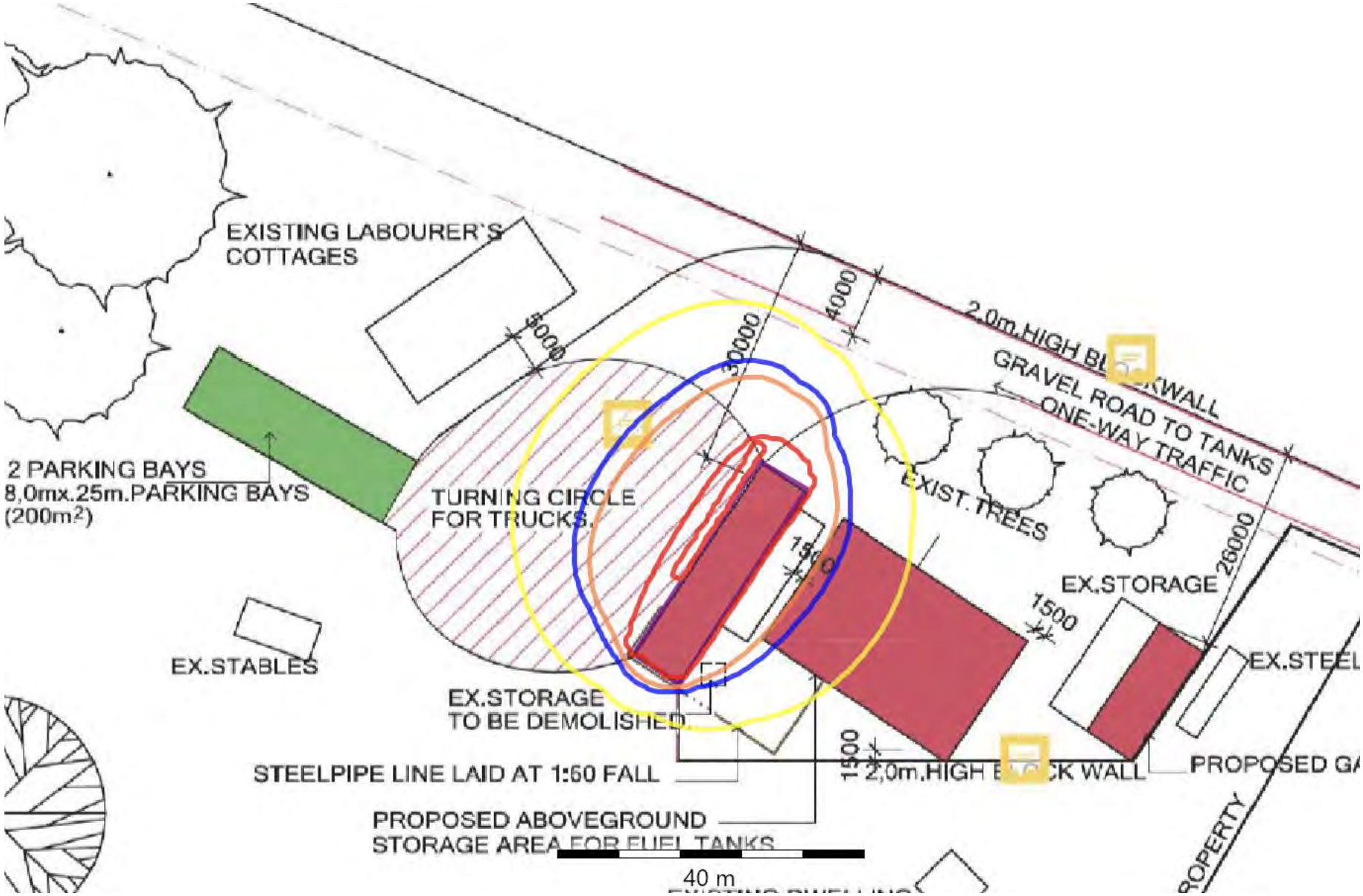
32m³ Diesel Tank				
Tank	**Radiation Contour 37.5kW/m²**	**Radiation Contour 12kW/m²**	**Radiation Contour 4.5kW/m²**	**1% Lethality Contour**
Catastrophic Tank Failure	10m	24m	42m	28m
Catastrophic Tank Leak	4m	18m	32m	21m
10mm Leak	0	5m	4m	5m
83m³ Diesel Tank				
Tank	**Radiation Contour 37.5kW/m²**	**Radiation Contour 12kW/m²**	**Radiation Contour 4.5kW/m²**	**1% Lethality Contour**
Catastrophic Tank Failure	19m	34m	51m	38m
Catastrophic Tank Leak	19m	34m	51m	38m
10mm Leak	0	4m	6m	4m

The consequences of pool fires at the tank filling area are as follows:

Diesel Road Tanker				
Scenario	**Radiation Contour 37.5kW/m²**	**Radiation Contour 12kW/m²**	**Radiation Contour 4.5kW/m²**	**1% Lethality Contour**
Catastrophic Tank Failure	18m	25m	33m	27m
Hose Rupture	19m	24m	33m	26m
10mm Hose Leak	0m	4m	5m	4m

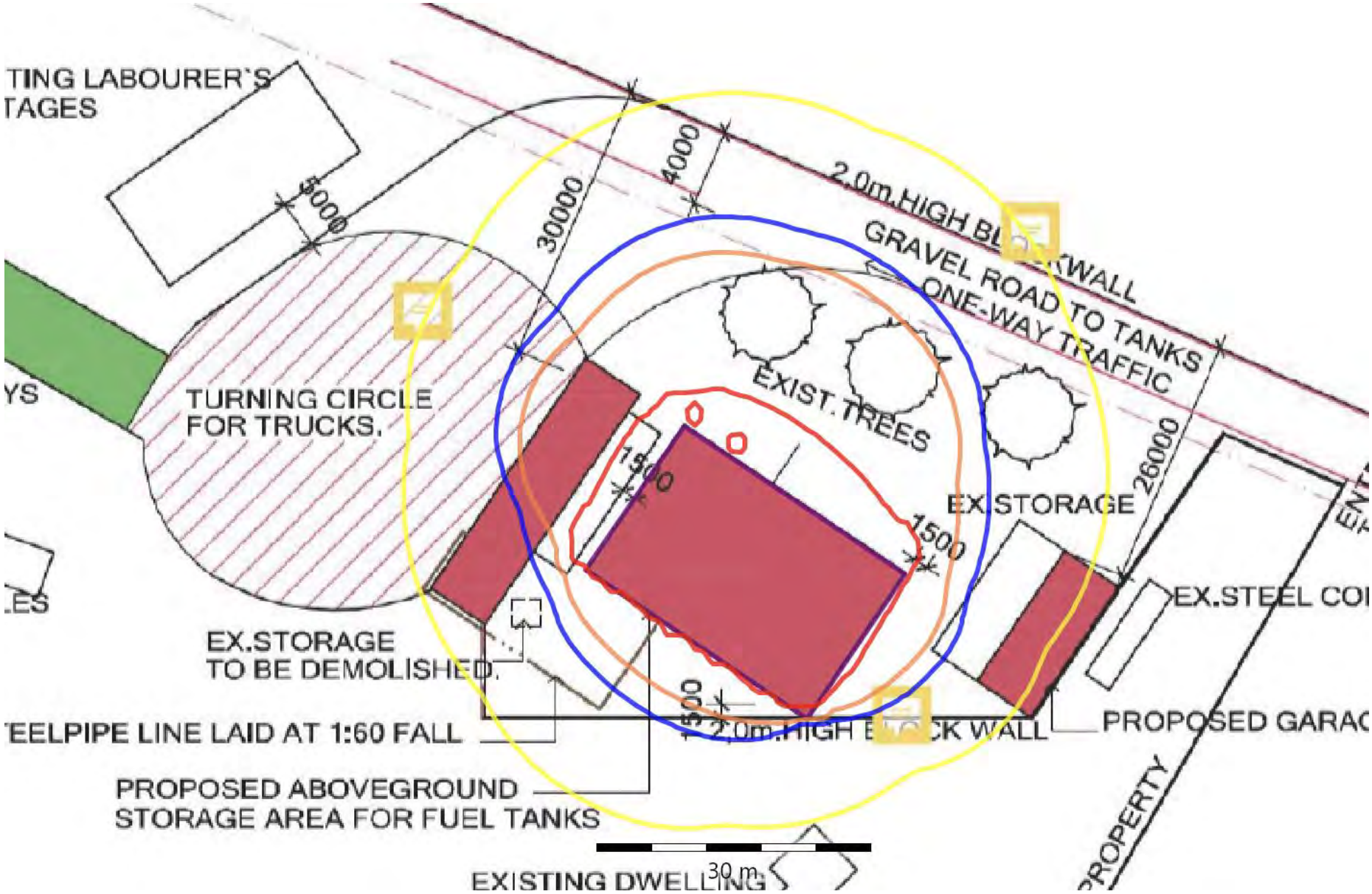
Thermal radiation levels from pool fires at the diesel installations are shown below.

- 4.5 kW/m^2 is the radiation that would cause pain and second degree burns within 20 seconds (Yellow Contour)
- 12.5 kW/m^2 is the energy required for pilot ignition of wood (Orange Contour)
- 37.5 kW/m^2 indicates the lower limit of damage to steel equipment and represents a 100% fatality for people exposed to the flame (Red Contour)
- 1% Lethality contour represents a 1% fatality for people exposed to the fire for 20 seconds (Blue Contour)
- The flame is represented by the purple contour

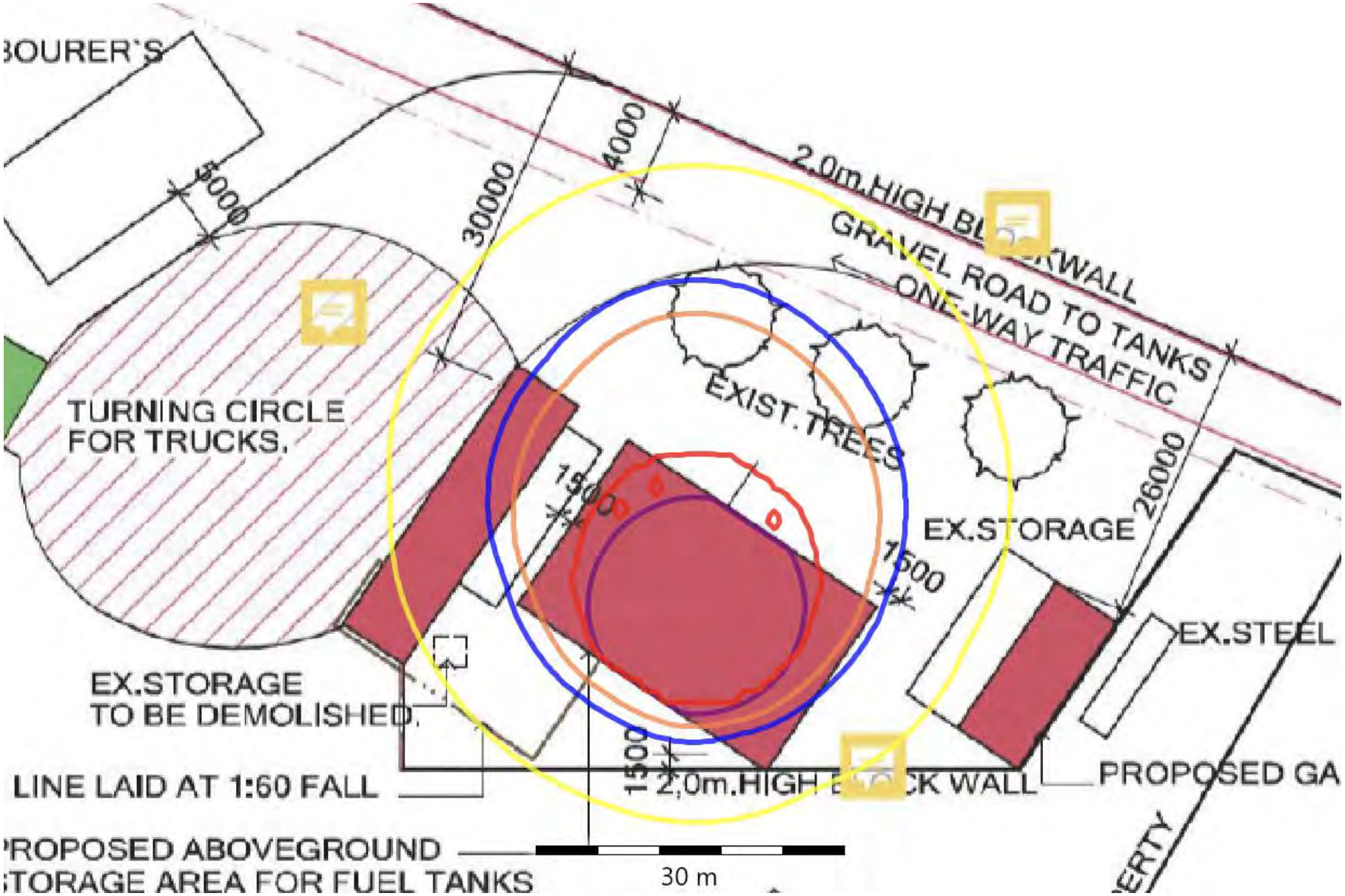


Pool Fire Consequences of a Catastrophic Tank Failure/ Leak at Tank Farm 1 of a 23m^3 Diesel Tank

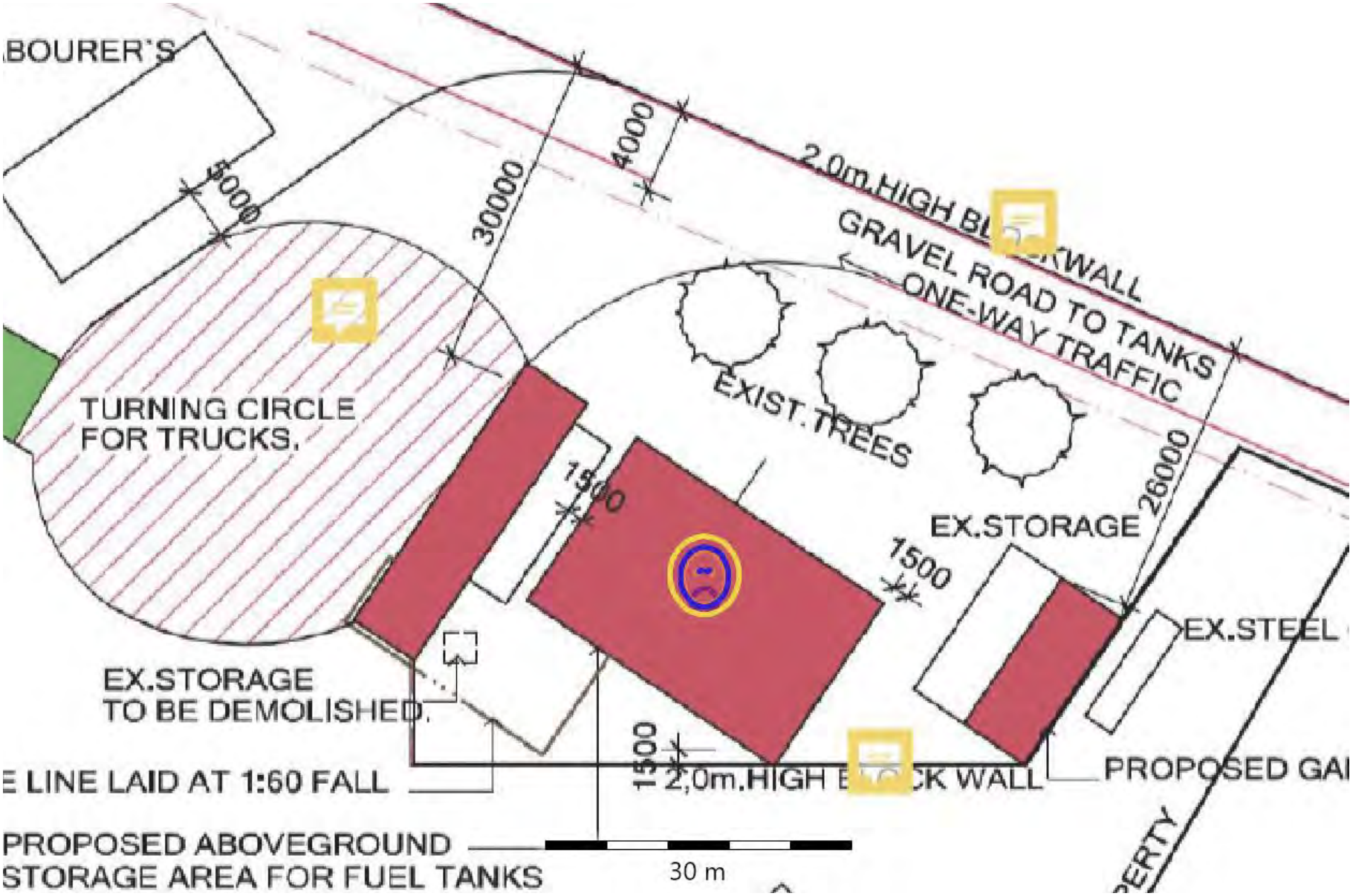
Pool Fire Consequences of a Small Leak at Tank Farm 1 of a 23m^3 Diesel Tank



Pool Fire Consequences of a Catastrophic Tank Failure at Tank Farm 2 of a 32m^3 Diesel Tank

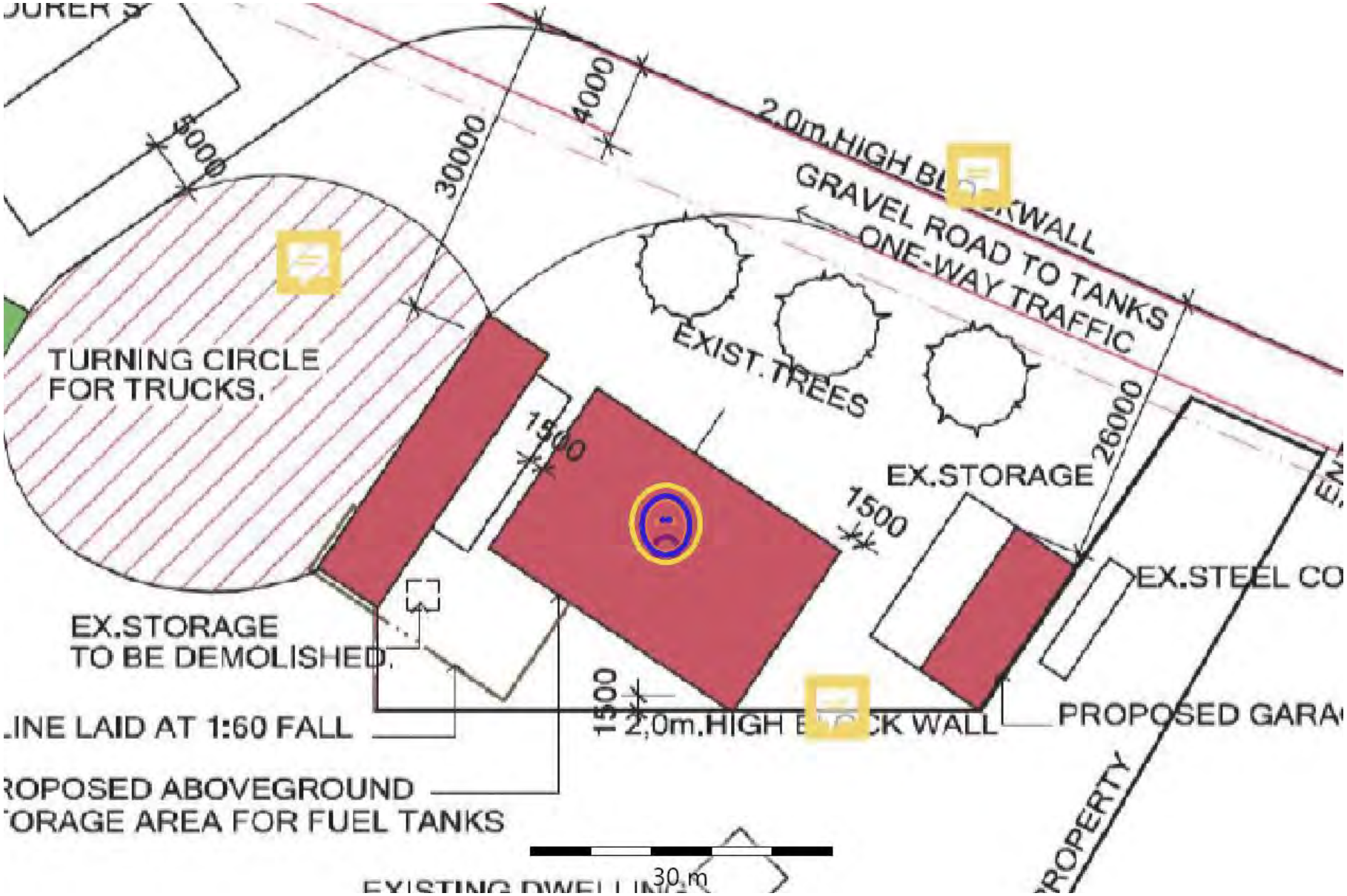


Pool Fire Consequences of a Catastrophic Tank Leak at Tank Farm 2 of a 32m^3 Diesel Tank

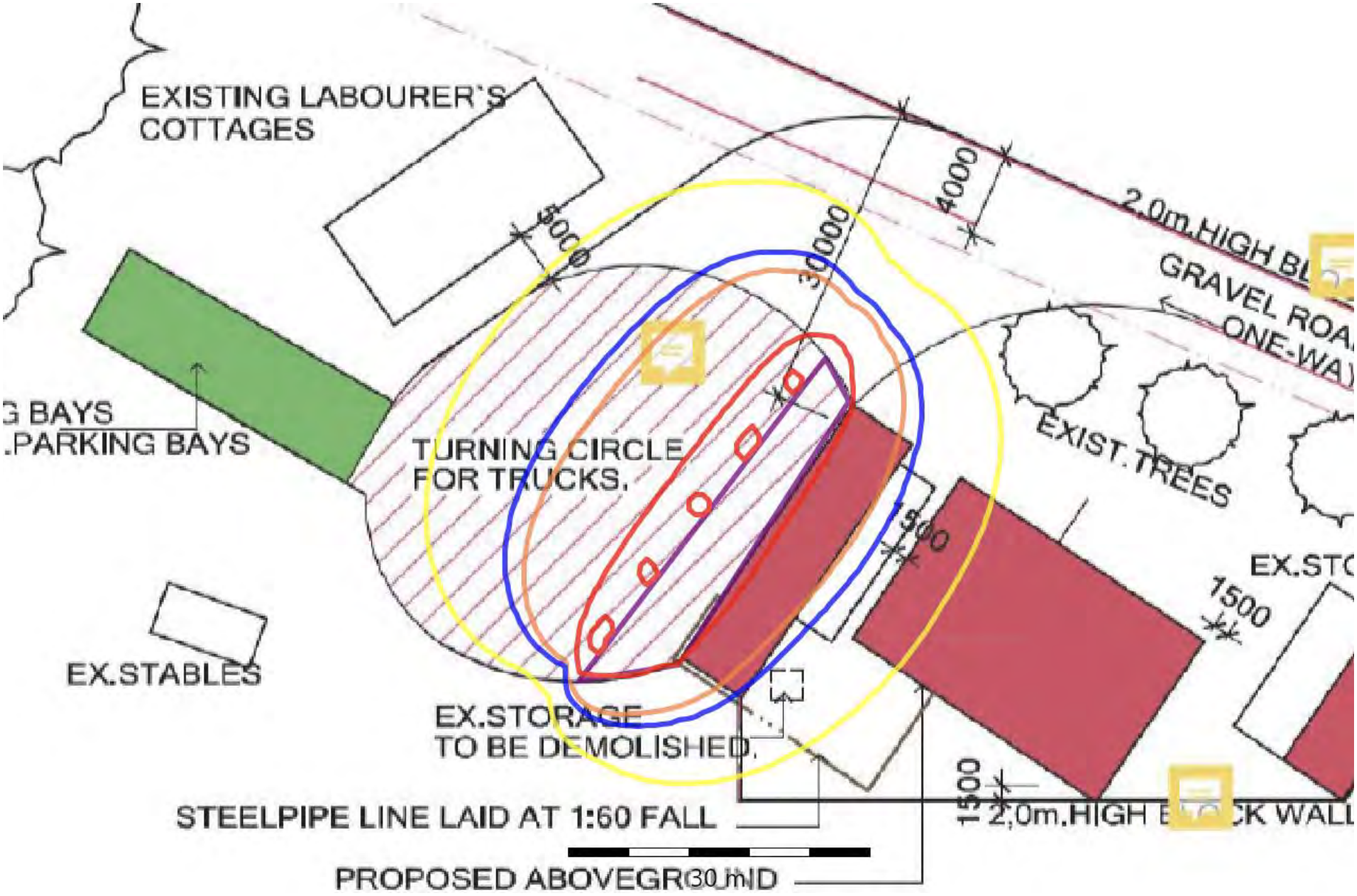


Pool Fire Consequences of a Small Leak at Tank Farm 2 of a 32m^3 Diesel Tank

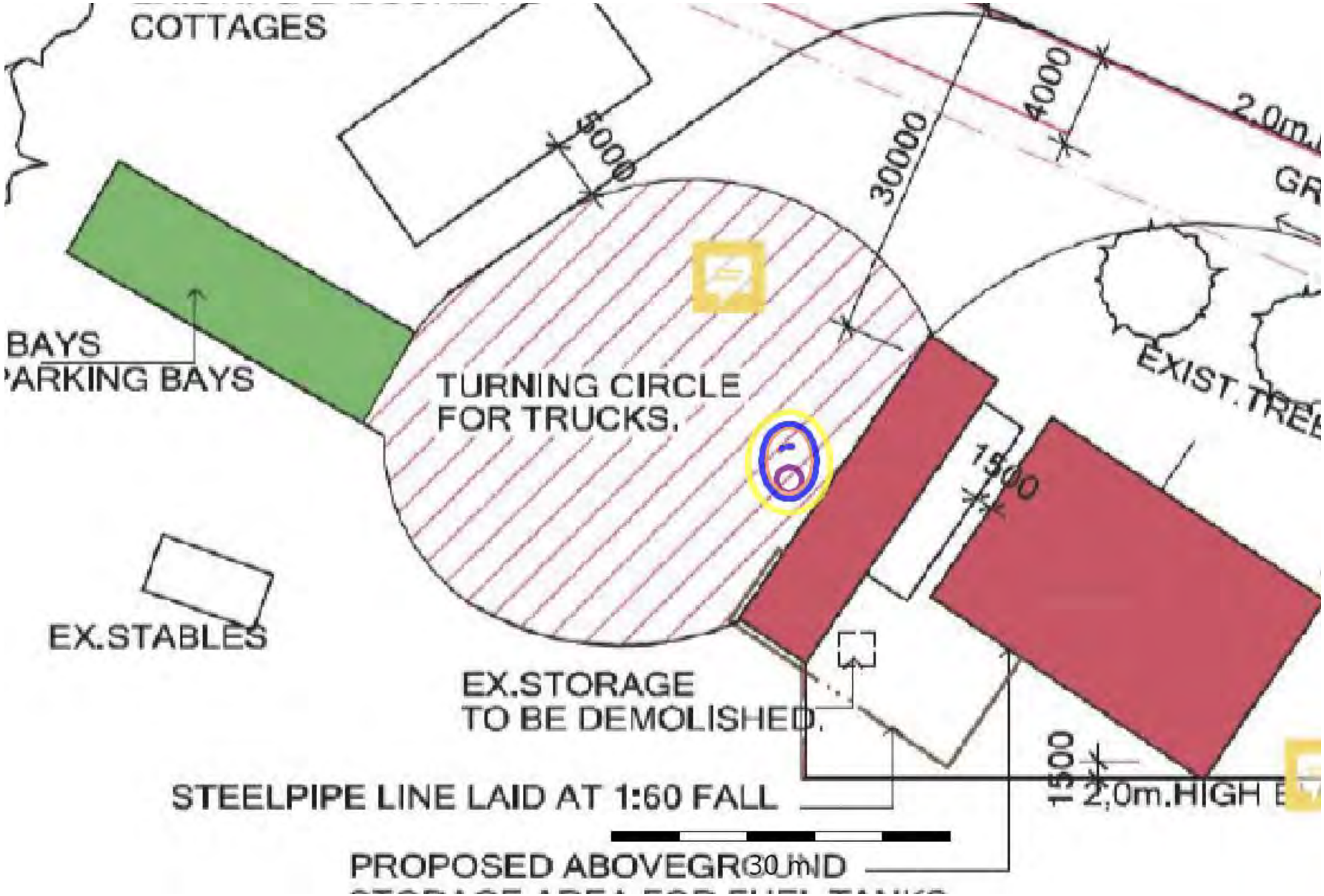
Pool Fire Consequences of a Catastrophic Tank Failure/ Leak at Tank Farm 2 of the 83m^3 Diesel Tank



Pool Fire Consequences of a Small Leak at Tank Farm 1 of the 83m^3 Diesel Tank



Pool Fire Consequences of a Catastrophic Failure/ Loading Hose Rupture of the Diesel Road Tanker



Pool Fire Consequences of a Loading Hose Leak at the of the Diesel Road Tanker

5.5. Potential Offsite and Onsite Domino Effects

Domino effects occur when the failure/leak of one installation causes a catastrophic failure of another. Domino effects are considered where the consequence of a scenario exceeding 35kPa overpressure or 37kW/m^2 reaches an adjacent Major Hazard Installation.

There are no surrounding MHIs that can affect the installations at the Alliance Fuel depot.

The following domino effects were considered:

- The road tankers and the above-ground tanks
- The diesel tanks with each other

The domino effects will be mitigated by the following:

- The tanks will be installed in bunded areas
- Delivery drivers are trained in the safe handling of flammable fuels
- Regular maintenance on all equipment
- The truck loading area will have a spill slab which will divert spills away from the road tanker and into an oil/ water separator

6. FREQUENCY ANALYSIS

6.1. Site Specific (Final) Frequencies

The frequencies indicated below are generic frequencies as specified in *BEVI*. Site specific frequencies are calculated utilising these generic frequencies as a base. The final frequency calculations are included in the Appendices.

6.2. Generic Equipment Failure Scenarios

The main hazard when storing flammables is the loss of containment, which when/if ignited may result in a fire or an explosion. In the absence of ignition, the flammable vapour cloud would move with the wind until the effects of dispersion dilute the vapours below the flammable concentration. A loss of containment of flammables may occur during delivery, storage, or distribution. The possible hazards are to be identified, together with the failure modes and the possible initiating events that may cause such a failure. Failure rates were obtained from *'RIVM - Reference Manual Bevi Risk Assessments'.*

6.3. Blocking Systems

Blocking systems are used to limit the released quantity following a loss of containment. A blocking system consists of a detection system, for example gas detection, combined with shut-off valves. The shut-off valves can be closed automatically or manually. The effectiveness of a blocking system is determined by various factors, such as the position of gas detection monitors and their distribution throughout the various wind directions. Furthermore, the detection limit and the response time of the system as well as the operator's intervention time are also relevant.

The following conditions must be met to include the operation of a blocking system in the risk analysis:

- An automatic detection system must be present that results in signalling within the control room, or automatic control of the blocking valves. An example of this is a gas detection system with sufficiently sensitive monitors and adequate detection points. In the case of signalling in the control room this room must be continuously staffed.
- The detection system and the shut-off valves must regularly be tested.

The default values specified here for three representative systems were used as a guideline:

1. Automatic blocking system

An automatic blocking system is a system in which the detection of the leak and the closing of the blocking valves take place automatically. Action by an operator is not necessary.

2. Semi-automatic blocking system

A semi-automatic blocking system is a system in which the detection of the leak takes place automatically and leads to an alarm signal in a continuously staffed control room. After validation of the signal the operator closes the blocking valves by actuating a switch in the control room. The probability of failure per operation is equal to 0.01, the time required for closing the blocking valves is equal to 10 minutes.

3. Non-automated blocking system

A non-automated blocking system is a system in which the detection of the leak takes place automatically and leads to an alarm signal in a continuously staffed control room. The operator does not have the facilities to shut off the blocking valves by actuating a switch in the control room but must take action outside the control room. For such a system the time required to effectively perform the required actions is so long that there is no effect on the QRA, given the maximum duration of an outflow of 30 minutes that is generally applied.

The diesel installations were modelled as having an automatic blocking system as an operator will always be present while the tanks are being filled. The loading hose will be fitted with breakaway couplings.

6.4. Atmospheric Tanks

The failure frequencies for above-ground atmospheric tanks are as follows:

	Frequency (per annum)
Instantaneous release of entire contents	5 x 1.0e-6
Release of entire contents in 10 minutes in a continuous and constant stream	5 x 1.0e-6
Continuous release of contents from a hole with an effective diameter of 10mm	1 x 1.0e-4

6.5. Valves

The failure frequency of valves is dependent on the valve and the leak size. The ratio of the leak size *(d)* to the valve size *(D)* should firstly be determined to determine the valve failure frequency per year, for example:

d/D	**Leak Frequency (per valve per year)**
0.1	1.4 x 1.0e-4
0.2	1.9 x 1.0e-4
0.5	2.5 x 1.0e-4
1.0	3.0 x 1.0e-4

6.6. Flanges

Pressure surge or significant deviations of pressure or temperature may cause a flanged joint to be over stressed, resulting in a small leak. Larger holes through to complete line fracture may conceivably result from mechanical impact or pressure surge. These events are likely to be detected more rapidly, resulting in a quicker isolation of the leak.

The flange failures per year vary greatly with the flange and gasket quality. A reasonable average based on current practices is summarised below:

Pipe Diameter (mm)	**Equivalent Hole Size (mm)**	**Leak Frequency (per item per year)**
100	5	1 x 1.0e-5
> 100	25	1 x 1.0e-6

6.7. Ignition Probability of Flammable Gases

6.7.1. Direct Ignition

The probability of direct ignition depends on the type of installation (stationary installation or transport unit), the substance category and the outflow quantity.

- Values for stationary installations are given in the table below
- Values for transport units are given in the next table
- Definition of the substance category is given in the third table

Substance Category	Source Term Continuous	Source Term Instantaneous	Probability of Direct Ignition
Category 0 Average/High reactivity	<10 kg/s 10 – 100 kg/s >100 kg/s	<1000 kg 1000 – 10000 kg >10000 kg	0.2 0.5 0.7
Category 0 Low reactivity	<10 kg/s 10 – 100 kg/s >100 kg/s	<1000 kg 1000 – 10000 kg >10000 kg	0.2 0.4 0.9
Category 1	All flow rates	All quantities	0.065
Category 2	All flow rates	All quantities	0.01
Category 3, 4	All flow rates	All quantities	0

Substance Category	Transport Unit	Scenario	Probability of Direct Ignition
Category 0	Road tanker	Continuous	0.1
	Road tanker	Instantaneous	0.4
	Tank wagon	Continuous	0.1
	Tank wagon	Instantaneous	0.8
	Ships – gas tankers	Continuous, 180m^3	0.7
	Ships – gas tankers	Continuous, 90m^3	0.5
	Ships – semi gas tankers	Continuous	0.7
Category 1	Road tanker, tank Ships	Continuous, instantaneous	0.065
Category 2	Road tanker, tank ships	Continuous, instantaneous	0.01
Category 3, 4	Road tanker, tank ships	Continuous, instantaneous	0

Category	WMS Category	Limits
Category 0	Extremely flammable	Liquid substances and preparations with a flash point lower than 0°C and a boiling point (or the start of a boiling range) less than or equal to 35°C Gaseous substances and preparations which may ignite at normal temperature and pressure when exposed to air
Category 1	Highly flammable	Liquid substances and preparations with a flash point below 21°C, which are not extremely flammable
Category 2	Flammable	Liquid substances and preparations with a flash point greater than or equal to 21°C and less than or equal to 55°C
Category 3	Flammable	Liquid substances and preparations with a flash point greater than 55°C and less than or equal to 100°C
Category 4	Flammable	Liquid substances and preparations with a flash point greater than 100°C

6.7.2. Delayed Ignition

The probability of delayed ignition depends on the end point of the calculation. In the calculation of the location-specific risk only ignition sources on the site of the establishment are considered. Ignition sources outside the establishment are ignored; it is assumed that if the cloud does not ignite on site and a flammable cloud form outside the establishment, ignition always occurs at the biggest cloud size. In the calculation of societal risk, all ignition sources are considered, including population. If ignition sources are absent, it is possible in the societal risk calculation that the flammable cloud does not ignite (see the table below).

Substance Category	Probability of Delayed Ignition for the Biggest Cloud Size, PRm	Probability of Delayed Ignition, GR
Category 0	$1 - P_{direct\ ignition}$	Ignition sources
Category 1	$1 - P_{direct\ ignition}$	Ignition sources
Category 2	0	0
Category 3	0	0
Category 4	0	0

7. RISK CALCULATIONS

Consequence analysis has been the focus of the report up to now while the consideration of probability has not been discussed. Risk is defined as consequence times probability.

Probability is defined as the risk of an event occurring and impacting on the individual and society at large.

7.1. Location Specific Individual Risk Levels

The likelihood that a person in some fixed relation to a hazard (e.g., at a particular location, level of vulnerability, protection, and escape) might sustain a specific level of harm.

The frequency at which an individual may be expected to sustain a given level of harm from the realisation of specified hazards. For example, there may be an individual risk of one-in-a-million that a particular person would be killed by an explosion at a major hazard near their home for every year that a person lives at that address. *[HSE Societal Risk: Initial briefing to Societal Risk Technical Advisory Group: p60].*

7.2. Employee Risk

Scenarios considered regarding risk to employees are fires due to plant failures. Employees and the public are indoors and outdoors during the day and major events associated with these installations would occur outside of the building in the vicinity of the installation areas. When exposed to hazards such as fires, people who are indoors (sheltered) will generally be less vulnerable than those outdoors (unsheltered). The risks should not be more than one-in-a-thousand (1.0e-3 per year).

7.3. Individual Risk

This Risk Assessment has modelled the effects of the proposed bulk diesel installations.

- The 1.0e-5 contour (one-in-a-hundred thousand) orange contour, is confined to the road tanker loading area and tank farm 1
- The 1.0e-6 contour (one-in-a-million) yellow contour, extends past the diesel installations as follows:

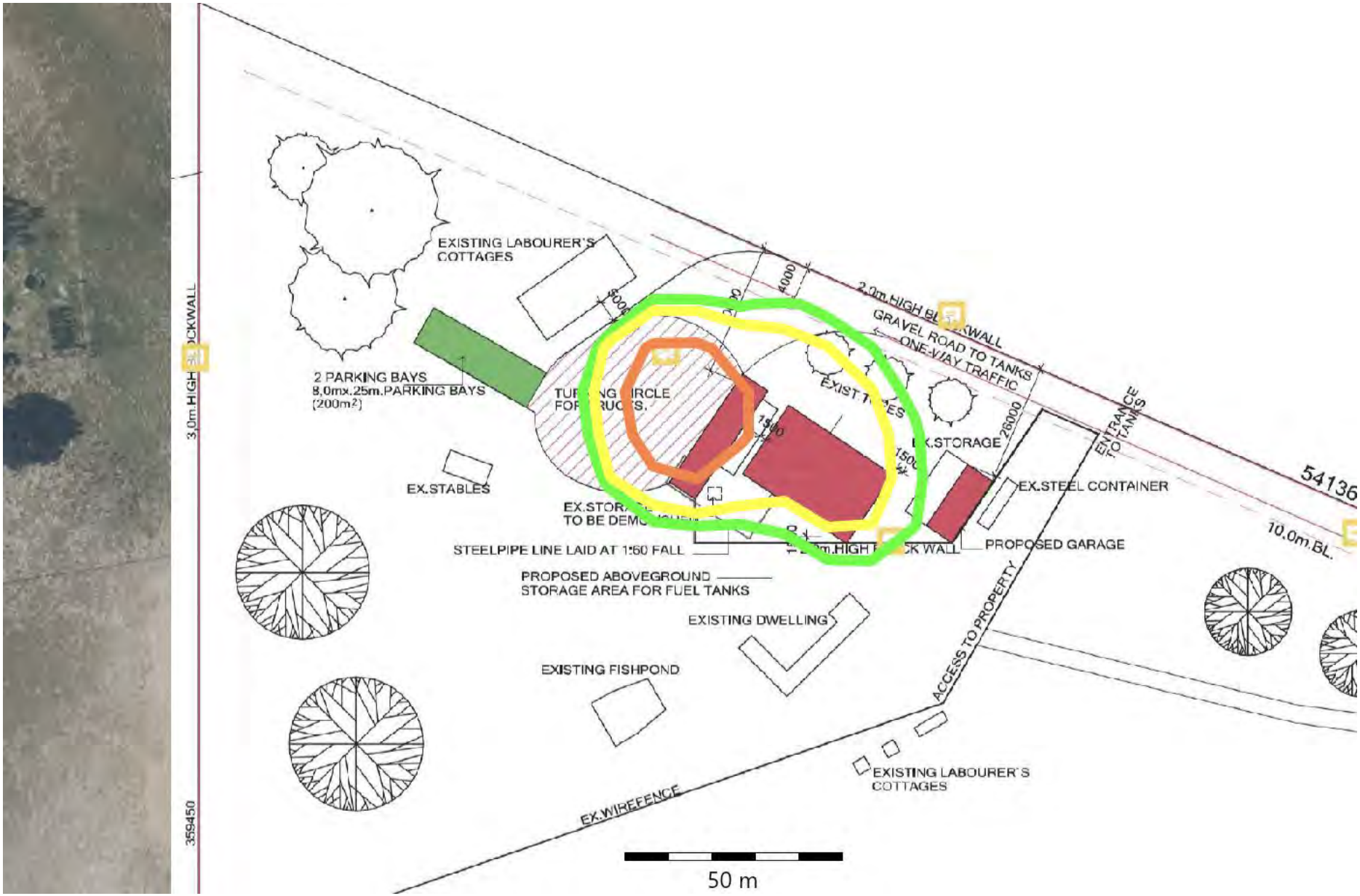
  North – 13m
  South – 0m
  West – 24m
  East – 0m

  The contour does not reach the property boundaries
- The 3.0e-7 contour (one-in-thirty million) green contour, extends past the diesel installations as follows:

  North – 20m
  South – 4m
  West – 28m
  East – 12m

  The contour does not reach the property boundaries

The contours do not reach any sensitive areas.



Individual Risk

7.4. Risk Levels and Ranking

Individual risk levels at several important points around the installations:

At Office/ Manager House

	Scenario	Contribution %	Risk Value
1.	Catastrophic Failure Tank Farm 2 83m^3 Diesel Tank 5	50	1.56e-09
2.	Catastrophic Leak Tank Farm 2 83m^3 Diesel Tank 5	50	1.56e-09

At Main Entrance

None

At Neighbour (North)

None

At Neighbour (West)

None

Staff Accommodation (West)

	Scenario	Contribution %	Risk Value
1.	Catastrophic Failure Diesel Road Tanker	100	3.66e-10

Risk Ranking

	Scenario	Contribution %	Risk Value
1.	Loading Hose Rupture Diesel Road Tanker	90.1	1.66e-05
2.	Catastrophic Failure Tank Farm 2 83m^3 Diesel Tank 5	0.725	1.34e-07
3.	Catastrophic Leak Tank Farm 2 32m^3 Diesel Tank 1	0.725	1.34e-07
4.	Catastrophic Failure Tank Farm 2 32m^3 Diesel Tank 1	0.725	1.34e-07
5.	Catastrophic Failure Tank Farm 2 32m^3 Diesel Tank 2	0.725	1.34e-07
6.	Catastrophic Leak Tank Farm 2 32m^3 Diesel Tank 2	0.725	1.34e-07
7.	Catastrophic Leak Tank Farm 2 83m^3 Diesel Tank 5	0.725	1.34e-07
8.	Catastrophic Leak Tank Farm 2 83m^3 Diesel Tank 4	0.725	1.34e-07
9.	Catastrophic Failure Tank Farm 2 83m^3 Diesel Tank 4	0.725	1.34e-07
10.	Catastrophic Failure Tank Farm 1 23m^3 Diesel Tank 5	0.494	9.10e-08

7.5. Societal Risk

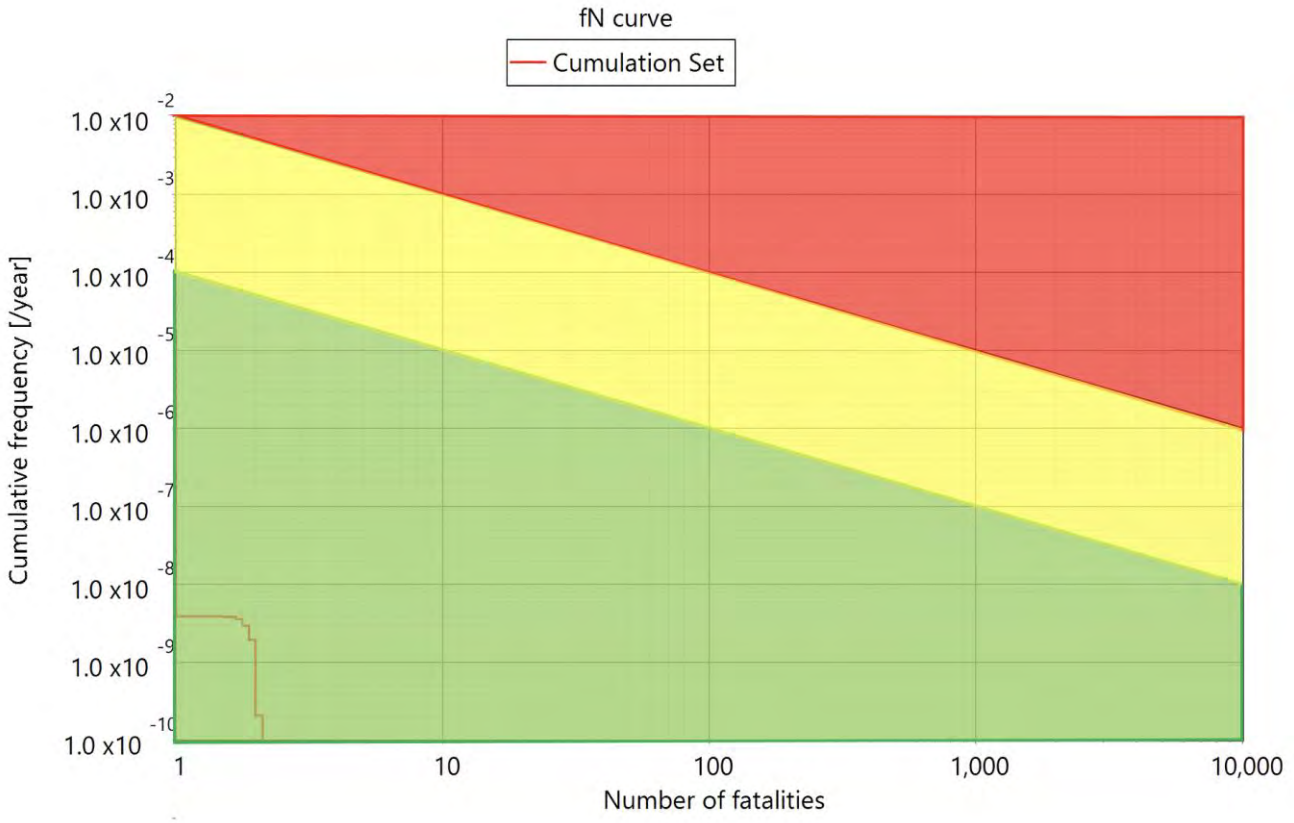
Societal risk is defined as the relationship between frequency and the number of people suffering from a specified level of harm in each population from the realisation of specified hazards *[Jones, 1985].* Societal risk evaluation is concerned with estimation of the chances of more than one individual being harmed simultaneously by an incident. The likelihood of the primary event (an accident at a major hazard installation) is still a factor, but the consequences are assessed in terms of level of harm and the numbers affected (severity), to provide an idea of the scale of an accident in terms of numbers killed or harmed.

Societal risk is dependent on the risks from the substances and processes located on a major hazard installation. A key factor in estimating societal risk is the population around the site, in particular its location and density. For example, the more (occupied) buildings in any particular area, the more people could be harmed by a flammable gas cloud passing through that area. For an installation with a population located in a specific compass

direction, the chance of a flammable gas release would depend on the probability of drift in that direction.

Scenarios to be included in a risk assessment can be characterised as having a frequency (F) and a consequence (N, number of casualties). *F* is used to denote the sum of the frequencies of all the individual events that could lead to *N* or more fatalities (hence the reference to *FN Curves*).

Societal risk can be represented by FN Curves, which are plots of the cumulative frequency (F) of various accident scenarios against the number (N) of casualties associated with the modelled incidents. The plot is cumulative in the sense that, for each frequency, N is the number of casualties that could be equalled or exceeded. Often ‘casualties’ are defined in a risk assessment as fatal injuries, in which case N is the number of people that could be killed by the incident.



FN Curves for the Diesel Installation

The red area is the upper limit area. Should the societal risk be in this area, the societal risk for the installations would be unacceptable.

The yellow area is an acceptable area. Should the societal risk be in this area, the societal risk for the installations would be acceptable, but mitigation measures should be investigated.

The green area is the lower limit area. Should the societal risk be in this area, the societal risk for the installations would be acceptable.

As can be seen on the graph above, the societal risk (Red Line) is less than 1.e-08 of one fatality, which is acceptable.

8. RISK JUDGEMENT

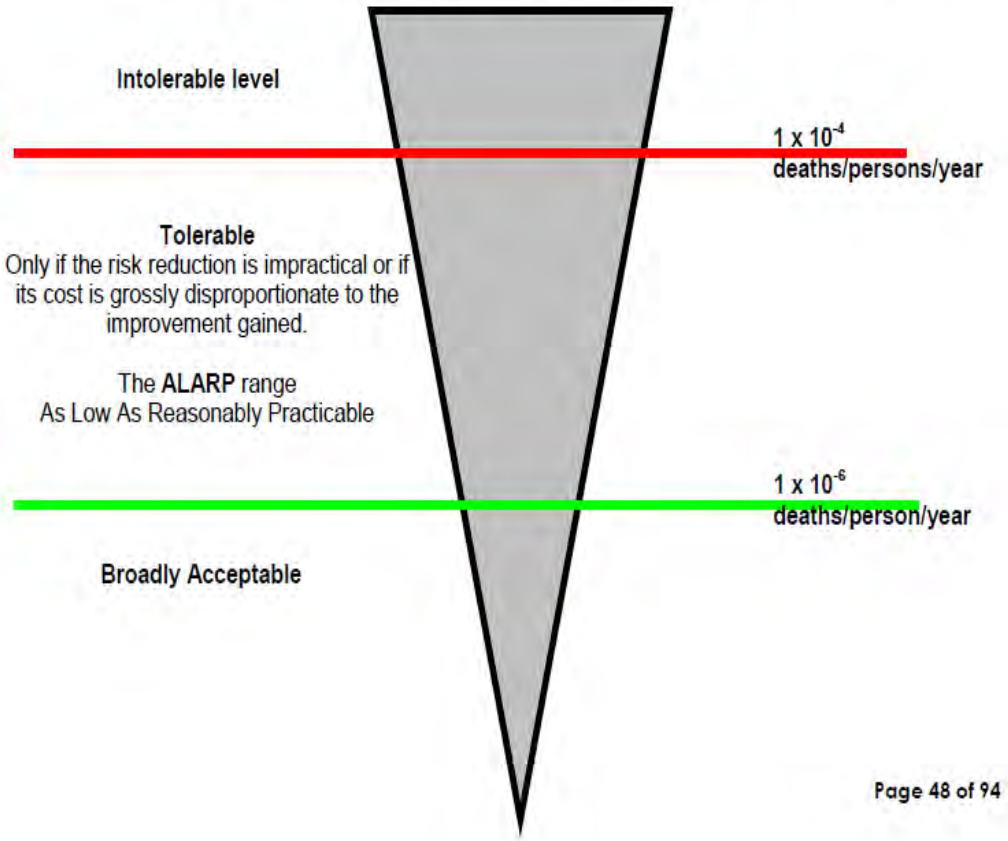
8.1. Risk Judgement Criteria

This Assessment indicates in a clear statement whether the risks or aspects of the risks are intolerably high, tolerable provided ALARP or broadly acceptable, both in terms of location specific, individual risk and societal risk.

The risk evaluation criteria are set out as follows:

- A risk of death for members of the public greater than 1.0e-4 (one-in-ten thousand) per year is considered intolerable.
- A risk of death below 1.0e-6 (one-in-a million) per year for members of the public is considered broadly acceptable provided sensitive or vulnerable receptors in the vicinity have been considered.
- Risks between 1.0e-6 per year and 1.0e-4 per year for members of the public can be considered tolerable, provided the risks have been reduced so far as is reasonably practicable, i.e., this is referred to as the ALARP region.

Figure 1 - The public ALARP risk decision making framework



The individual risks at the Alliance Fuel depot site are ‘Broadley Acceptable’, as they fall within the ALARP range.

9. RISK TREATMENT

9.1. Major Hazard Installation

The scenario contributing most towards the total risk at the proposed facility is a loading hose rupture of a diesel road tanker.

9.2. Risk Reduction

The recommendations are as follows:

- Good housekeeping must always be observed on site
- Emergency Plan must be implemented to address the risks identified in this report
- Emergency Plan must comply with the MHI Regulations and SANS:1514 Codes
- Incident register must be kept to detail all near misses
- Maintenance on equipment to be done as per manufacturer requirements
- Fuel installations must comply with relevant SANS Codes and Municipal Bylaws
- All work must be done by qualified companies
- Council to approve drawings
- Fire department to issue a flammable substance certificate
- Area around the depot must be kept clean and clear of ignition sources and combustible materials
- This MHI report must be distributed to Local, Provincial and National Government as per MHI Regulations

9.3. ALARP Conclusions

It is assumed that the proposed facility will be designed as per the relevant SANS Codes and Municipal Bylaws.

The installations must be done by competent and suitably qualified companies.

It is assumed that the installations will be maintained as per the relevant SANS Codes and the necessary safety equipment and procedures are in place.

Given the above, this Risk Assessment concluded that the risk of the proposed facility is within the ALARP range.

10. LAND USE PLANNING

Where a site near to a major hazard chemical installation or pipeline is being developed, the City Council's Planning Authority has a statutory duty to refer to this Risk Assessment. This report will help the Planning Authority to 'Advise Against' or 'Don't Advise Against' the granting of planning permission on health and safety grounds that arise from the possible consequences of a major accident at the hazardous installation.

This report is designed to help planners, developers and others who want to work out for themselves about a planning proposal. In some cases, it may be that working through the report will allow one to modify the size, layout, or location of a proposed development.

This report was compiled as per SANS 1461:2018 Codes of Practice. Land use planning is based on the United Kingdom's Health and Safety Executive *HSEs 'Planning Advice for Developments near Hazardous Installations (PADHI)'*.

10.1. The Principles Behind Land Use Planning Methodology

- The risk considered is the residual risk which remains after all reasonably practicable preventative measures have been taken to ensure compliance with the requirements of the Major Hazard Regulations.
- Advice takes account of risk as well as hazard, that is the likelihood of an accident as well as its consequences.
- Account is taken of the size and nature of the development, the inherent vulnerability of the exposed population and the ease of evacuation or other emergency procedures for the type of development proposed. Some categories of development (e.g. schools and hospitals) are regarded as more sensitive than others (e.g. light industrial) and advice is weighted accordingly.
- Consideration of the risk of serious injury, including that of fatality, attaching weight to the risk where a proposed development might result in many casualties in the event of an accident.

10.2. Introduction to PADHI

The Risk Assessor sets a consultation distance (CD) around major hazard sites and pipelines after assessing the risks and likely effects of major accidents at the installation or pipeline.

Major hazards comprise a wide range of chemical process sites, fuel and chemical storage sites, and pipelines. The CDs are based on scientific knowledge using quantitative risk assessments.

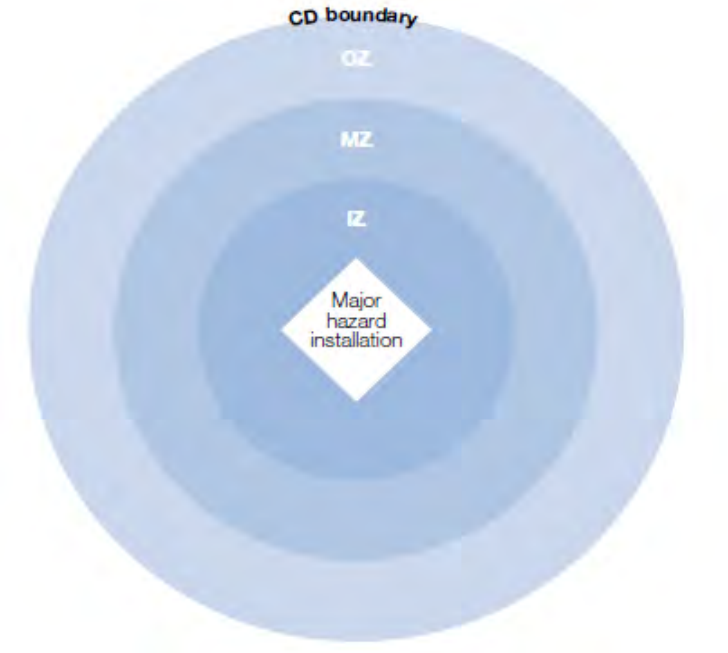
PADHI uses two inputs to a decision matrix to generate the CDs or 'Restricted Development Distances'

- The zone in which the development is located of the three zones (that make up the CD)
- The 'sensitivity level' of the development (see 'Development Type Tables')

10.3. Zone Mapping

PADHI uses a ‘three-zone’ system. (‘inner’ (IZ), ‘middle’ (MZ) and ‘outer’ (OZ);) The zones are determined by a detailed assessment of the risks of the installation or pipeline which takes the following factors into account:

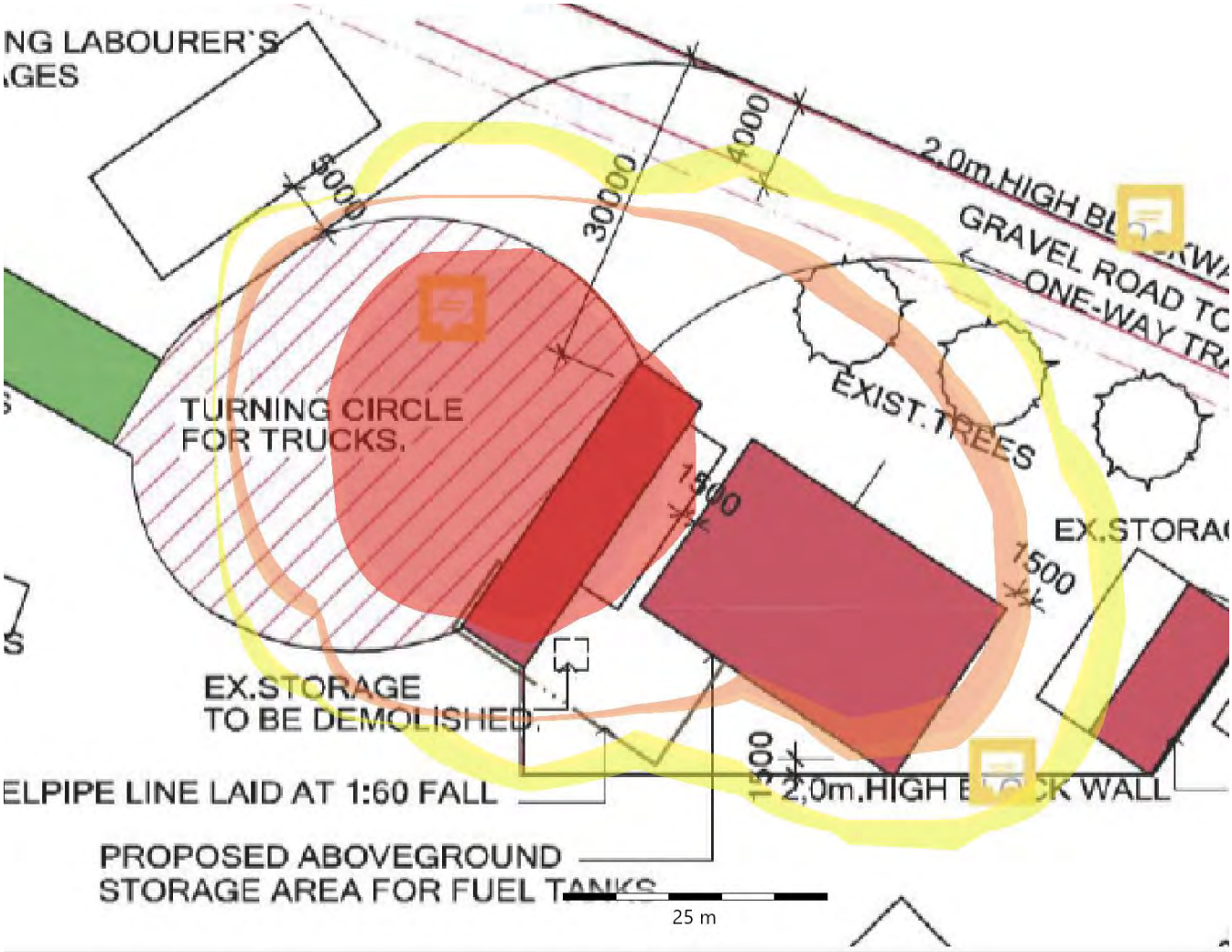
- The hazard ranges and consequences of the flammable substances present
- The volume of those substances for which the site has consent
- The method of storage. The risks and hazards from the major hazard are greatest in the inner zone, so the restrictions on development are strictest. The CD is all the land enclosed by all the zones and the installations itself
  - Inner zone includes all areas where risk is > 10 chances per million per annum (Red Contour)
  - Middle zone > 1 chance per million per annum (Orange Contour)
  - Outer zone > 0.3 chances per million per annum (Yellow Contour)



Three Zone Map

The development zones around the installations are indicated on the map below.

The inner, middle, and outer zones are confined to the site and do not extend past the boundaries.



Upgraded Installations Development Zone Map

10.4. Development 'Sensitivity Levels

The sensitivity levels are based on a clear rationale to allow progressively more severe restrictions to be imposed as the sensitivity of the development increases. There are four sensitivity levels:

- Level 1 – Based on normal working population
- Level 2 – Based on the general public – at home and involved in normal activities
- Level 3 – Based on vulnerable members of the public (children, those with mobility difficulties or those unable to recognise physical danger)
- Level 4 – Large examples of Level 3 and very large outdoor examples of Level 2

The tables in the Appendices expand on the four basic development types.

10.5. Decision Matrix

Having determined which risk zone, the surrounding developments fall into and the sensitivity level of these developments, the matrix below can be utilised to decide whether one should advise for or against a specific development. Beyond the outer risk zone there are no specified restrictions on developments.

Level of Sensitivity	Development in Inner Zone	Development in Middle Zone	Development in Outer Zone
Level 1	Do not Advise Against (DAA)	Do not Advise Against (DAA)	Do not Advise Against (DAA)
Level 2	Advise Against (AA)	Do not Advise Against (DAA)	Do not Advise Against (DAA)
Level 3	Advise Against (AA)	Advise Against (AA)	Advise Against (AA)
Level 4	Advise Against (AA)	Advise Against (AA)	Advise Against (AA)

Decision Matrix

10.6. Site Specific Zoning

- The area surrounding the site is agricultural
- The proposed developments are Level 1
- The zoning around the Alliance Fuel depot site is correct

10.7. Land Use Conflicts

There are no land use conflicts at the site.

11. EMERGENCY RESPONSE DATA

11.1. Emergency Plan

Document Name	**Not Available**
Date of Document	N/A
Firefighting Addressed	N/A
Emergency Evacuation Addressed	N/A
Statutory Requirements	N/A

12. CONCLUSION

12.1. Major Hazard Installation

This Assessment established that an incident involving the proposed facility at the Alliance Fuel depot on the outskirts of Philadelphia could impact past the boundaries.

The risks associated with this MHI were found to be acceptable.

A site is deemed to be an MHI if more than the prescribed quantity is stored as per the General Machinery Act or if a product is stored, handled or produced which has the potential to cause a major incident as per the Operational Health and Safety Act.

12.2. 1% Consequence Lethality Distances

Component	Scenarios	1% Fatality Distance
Fuel Installation		
23m^3 Diesel Tank	Catastrophic Tank Failure	27m
23m^3 Diesel Tank	Catastrophic Tank Leak	27m
23m^3 Diesel Tank	Small Tank Leak	5m
32m^3 Diesel Tank	Catastrophic Tank Failure	28m
32m^3 Diesel Tank	Catastrophic Tank Leak	21m
32m^3 Diesel Tank	Small Tank Leak	5m
83m^3 Diesel Tank	Catastrophic Tank Failure	38m
83m^3 Diesel Tank	Catastrophic Tank Leak	38m
83m^3 Diesel Tank	Small Tank Leak	4m
Diesel Loading Road Tanker	Catastrophic Tank Failure	27m
Diesel Loading Road Tanker	Loading Hose Rupture	26m
Diesel Loading Road Tanker	Loading Hose Leak	4m

12.3. Risk Level Posed to Various Populations

Individual risk levels at several important points around the installations:

At Office/ Manager House

	Scenario	Contribution %	Risk Value
1.	Catastrophic Failure Tank Farm 2 83m^3 Diesel Tank 5	50	1.56e-09
2.	Catastrophic Leak Tank Farm 2 83m^3 Diesel Tank 5	50	1.56e-09

At Main Entrance

None

At Neighbour (North)

None

At Neighbour (West)

None

Staff Accommodation (West)

	Scenario	Contribution %	Risk Value
1.	Catastrophic Failure Diesel Road Tanker	100	3.66e-10

Risk Ranking

	Scenario	Contribution %	Risk Value
1.	Loading Hose Rupture Diesel Road Tanker	90.1	1.66e-05
2.	Catastrophic Failure Tank Farm 2 83m^3 Diesel Tank 5	0.725	1.34e-07
3.	Catastrophic Leak Tank Farm 2 32m^3 Diesel Tank 1	0.725	1.34e-07
4.	Catastrophic Failure Tank Farm 2 32m^3 Diesel Tank 1	0.725	1.34e-07
5.	Catastrophic Failure Tank Farm 2 32m^3 Diesel Tank 2	0.725	1.34e-07
6.	Catastrophic Leak Tank Farm 2 32m^3 Diesel Tank 2	0.725	1.34e-07
7.	Catastrophic Leak Tank Farm 2 83m^3 Diesel Tank 5	0.725	1.34e-07
8.	Catastrophic Leak Tank Farm 2 83m^3 Diesel Tank 4	0.725	1.34e-07
9.	Catastrophic Failure Tank Farm 2 83m^3 Diesel Tank 4	0.725	1.34e-07
10.	Catastrophic Failure Tank Farm 1 23m^3 Diesel Tank 5	0.494	9.10e-08

12.4. Risk Reduction Recommendations

The following is recommended to reduce the risks associated with the installations:

- Good housekeeping must always be observed on site
- All work must be done by qualified companies
- Council to approve drawings for proposed installations
- Fire department to issue a flammable substance certificate
- Installations must be maintained as per applicable SANS Codes and Local Bylaws
- This MHI report must be distributed to Local, Provincial and National Government as per MHI Regulations

12.5. Emergency Plan

It is recommended that an Emergency Plan be compiled, and the following adhered to:

- Must comply with SANS:1514 Codes
- Must comply with MHI Regulations
- Must be accepted and signed by management and the Local Authority

12.6. Review of Risk Assessment

This Risk Assessment is valid for the duration of 5 years from the above date unless:

- Changes have been made to the plant that can alter the risks on the facility
- The Emergency Plan was invoked or there was a near miss
- The changing neighbourhood could result in offsite risks
- There is reason to suspect that the current Assessment is no longer valid

12.7. Risk Reduction Programmes

Risk reduction programmes should continually be investigated to reduce the impact from accidental fires and explosions on surrounding communities.

12.8. Uncertainties and Sensitivities

The information provided by the client was sufficient so that there are no technical uncertainties or sensitivities. The information supplied included process descriptions, site operations, product storage and throughput.

12.9. Surrounding Land Development

The development of land surrounding the site should be done with caution as not to pose unnecessary risks onto the surrounding communities. This caution is aimed at ensuring the adjacent developments are suitable for the risk imposed.

12.10. MHI Notification

Notification of this Major Hazard Installation (MHI) as per the Major Hazard Installation Regulations, 2022 Regulation No. 2989.

Copy of these requirements are included in the Appendices.

13. PROOF OF COMPETENCY

sanas
South African National Accreditation System

CERTIFICATE OF ACCREDITATION

In terms of section 22(2)(b) of the Accreditation for Conformity Assessment, Calibration and Good Laboratory Practice Act, 2006 (Act 19 of 2006), read with sections 23(1), (2) and (3) of the said Act, I hereby certify that:-

MAJOR HAZARD RISK CONSULTANTS CC
Co. Reg. No.: 2007/079078/23
CAPE TOWN

Accreditation Number: **MHI0017**

is a South African National Accreditation System Accredited Inspection Body to undertake **TYPE A** Inspection provided that all SANAS conditions and requirements are complied with

This certificate is valid as per the scope as stated in the accompanying scope of accreditation, Annexure "A", bearing the above accreditation number for

THE ASSESSMENT OF RISK ON MAJOR HAZARD INSTALLATIONS

The facility is accredited in accordance with the recognised International and National Standard

ISO/IEC 17020:2012 and SANS 1461:2018

The accreditation demonstrates technical competency for a defined scope and the operation of a management system

While this certificate remains valid, the Accredited Facility named above is authorised to use the relevant SANAS accreditation symbol to issue facility reports and/or certificates

Mr M Phaloane
Acting Chief Executive Officer

Effective Date: 21 January 2021
Certificate Expires: 20 January 2025

This certificate does not on its own confer authority to act as an Approved Inspection Authority as contemplated in the Major Hazard Installation Regulations. Approval to inspect within the regulatory domain is granted by the Department of Employment and Labour.

ANNEXURE A

SCOPE OF ACCREDITATION

Accreditation Number: MHI0017

TYPE A

Permanent Address: MHR Consultants CC 13 Slade Street Parklands Tableview 7441 Tel: (021) 426-5688 Fax: 086 520-4872 E-mail: claude@petrostruct.co.za		**Postal Address:** 13 Slade Street Parklands Tableview 7441 Issue No.: 10 Date of Issue: 27 February 2022 Expiry Date: 20 January 2025
Nominated Representative: Mr CC Thackwray **Quality Manager:** Mr CC Thackwray	**Technical Manager:** Mr CC Thackwray	**Technical Signatory** Mr TC Thackwray
Field of Inspection	**Type and Range of Inspection**	**Standards and Specifications**
Regulatory: The supply of services as an Inspection Authority for Major Hazard Risk Installation as defined in the Major Hazard Risk Installation Regulations, Government Notice No. R 692 of 30 July 2001.	Major Hazard Installation Risk Assessments for the following material categories: 2) Gases: i) Flammable Gases ii) Non-flammable, non-toxic gases (asphyxiants) iii) Toxic gases 3) Flammable liquids 4) Flammable solids, substances liable to spontaneous combustion, substances that on contact with water release flammable gases 5) Oxidizing substances and organic peroxides	MHI regulation par. **5 (5) (b)** i) Frequency/Probability Analysis ii) Consequence Modelling iii) Hazard Identification and Analysis iv) Emergency planning reviews SANS 31000 SANS 31010 SANS1461:2018 CPR 14 E. Methods for the Calculation of Physical Effects ("Yellow Book"), 3rd Edition, TNO, Apeldoorn. Guideline for Quantitative Risk Assessment ("Purple Book") CPR 18E, First Ed. 1999 A Guide for the Control of Major Accident Hazard Regulations 1999, UK HSE.

Original Date of Accreditation: 21 January 2009

ISSUED BY THE SOUTH AFRICAN NATIONAL ACCREDITATION SYSTEM

Accreditation Manager

employment & labour

Department:
Employment and Labour
REPUBLIC OF SOUTH AFRICA

National Department of Employment and Labour
Republic of South Africa

APPROVED INSPECTION AUTHORITY

Registered in accordance with the provisions of the Occupational Health and Safety Act, Act 85 of 1993, as amended and the Major Hazard Installation Regulations.

THIS IS TO CERTIFY THAT:

MAJOR HAZARD RISK CONSULTANTS CC

has been registered by the Department of Employment and Labour as an Approved Inspection Authority: Type A, to conduct Major Hazard Installation Risk Assessment, in terms of Regulation 5(5)(a), of the Major Hazard Installation Regulations.

CONDITIONS OF REGISTRATION:

- *The AIA must at all time comply with the requirements of the Occupational Health and Safety Act, Act 85 of 1993, as amended.*
- *This registration certificate is not transferable.*
- *This registration will lapse if there is a name change of the AIA or change in ownership.*

CHIEF INSPECTOR

Valid from: 21 January 2021
Expires: 20 January 2025
Certificate Number: CI MHI 0007

14. REFERENCES

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CPR 12 E (1997). 'Methods for Determining and Processing Probabilities' ("Red Book") First Edition, TNO, Apeldoorn

CPR 14 E (1997). 'Methods for the Calculation of Physical Effects' ("Yellow Book"), Third Edition, TNO, Apeldoorn.

CPR 16 E (1992). 'Methods for the Determination of Possible Damage' ("Green Book"), First Edition, TNO, Apeldoorn.

CPR 18 E (1999). 'Guidelines for Quantitative Risk Assessment. ("Purple Book"), First Edition, TNO, Apeldoorn.

EPA (1993). 'Offsite Consequence Analysis: Risk Management Programme Guidance', May 1996.

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'Reference Manual Bevi Risk Assessments Version 3.2'

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HSE "*Planning advice for developments near hazardous installations (PADHI)*"

JRC Technical Reports (2017). 'Handbook of Scenarios for Assessing Major Chemical Accident Risks', Gyenes., Wood M-H, Struckl M.

RIVM Report 620100003/2005. 'Distance Table Ammonia Refrigeration' PAM Uijt the Hague

15. APPENDICES

15.1. Emergency Plan

Not Available

15.2. Material Safety Data Sheets

ENGEN DIESEL (STD, 0.05)

MATERIAL SAFETY DATA SHEET

Revision Date : 27.05.2008

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	ENGEN DIESEL (STD, 0.05)
Chemical name	:	Diesel fuel
Synonyms	:	Hydrocarbon Liquid
Product use	:	Automotive diesel fuel
UN number	:	1202
Supplier	:	Engen Petroleum Limited (Tel: 021-403 4911, a/h: 021-403 4099)
Health Emergency Telephone	:	021-689 5227 (Red Cross Poison Service)
Transport Emergency Telephone	:	011-975 1278/83 (Hazchemwise)
Customer Service Center	:	0860 036 436 (Sales and Technical Information)
MSDS Internet website	:	www.engen.co.za/content/products/default2.htm

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name	CAS-No.	Weight%	Symbol Codes	R-Phrase Numbers
Diesel fuel	68334-30-5	> 98.00	Xn, N	R40, R51/53, R65, R66
Ethyl Benzene	100-41-4	< 1.00	Xn	R20, R45
Naphthalene	91-20-3	< 1.00		R45

See Section 15 for European Label Information.

See Section 8 for Exposure Limits (if applicable).

3. HAZARDS IDENTIFICATION

Emergency response data : Light Amber Liquid. Flammable. Product can accumulate a static charge and release vapours which may cause a fire or explosion. DOT ERG No. : 128

Potential health effects

Inhalation : Respiratory irritation, dizziness, nausea and loss of consciousness. In cases of extreme exposure death is possible. Diesel exhaust may cause lung cancer.

Skin : Irritation or more serious skin disorders. Note: This product may contain polycyclic aromatic hydrocarbons, some of which have been reported to cause skin cancer in humans under conditions of poor personal hygiene, prolonged repeated contact, and exposure to sunlight.

Eye : Irritant.

Ingestion : Low viscosity material if swallowed may enter the lungs and cause lung damage.

Potential environmental effects : Toxic to fish, aquatic organisms and wildlife. Do not discharge into lakes, streams, ponds and ground water supply.

See Section 11 for further health effects/toxicological data.

4. FIRST AID MEASURES

Inhalation : Remove from further exposure. If respiratory irritation, dizziness,

		nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with mechanical device or use mouth-to-mouth resuscitation with a mouthpiece.
Skin contact	:	Remove contaminated clothing. Dry wipe exposed skin and cleanse with hand cleaner, soap and water. Launder contaminated clothing before reuse. (See Section 16 - Injection Injury)
Eye contact	:	Flush thoroughly with water for at least 15 minutes. Get medical assistance.
Ingestion	:	Seek immediate medical attention. Do not induce vomiting.
Note to doctors	:	Material if aspirated into the lungs may cause chemical pneumonitis. Skin contact may aggravate an existing dermatitis. Treat appropriately.

5. FIRE-FIGHTING MEASURES

Extinguishing media	:	Carbon dioxide, foam, dry chemical and water fog.
Special fire fighting procedure	:	Water spray should only be used to keep fire-exposed containers cool, flush spills away from exposures, disperse vapours and protect personnel attempting to stop leak. Prevent runoff from fire control or dilution from entering streams, municipal sewers, or drinking water supply.
Special protective equipment for firefighters	:	For fires in enclosed areas, fire fighters must use Self-Contained Breathing Apparatus.
Products of decomposition	:	Fumes, smoke, carbon monoxide, sulphur oxides, aldehydes and other decomposition products, in the case of incomplete combustion.
Flash Point	:	> 55 °C (ASTM D-93)
Upper Explosion Limit (UEL)	:	7 %(V)
Lower Explosion Limit (LEL)	:	0.6 %(V)
NFPA Hazard Id	:	Health: 1; Flammability: 2; Reactivity: 0

6. ACCIDENTAL RELEASE MEASURES

Procedure if material is released or spilled	:	Report spills/releases as required to appropriate authorities.
Methods for cleaning up	:	Eliminate sources of ignition. Warn occupants and/or ships in the downwind areas of fire and explosion hazard, and warn them to stay clear. LAND SPILL: Shut off source taking normal safety precautions. Take measures to minimize the effects on ground water. Recover by pumping using explosion-proof equipment or contain spilled liquid with sand or other suitable absorbent and remove mechanically into containers. If necessary, dispose of absorbed residues as directed in Section 13. WATER SPILL: Notify port and relevant authorities. Confine with booms if skimming equipment is available to recover the spill for later recycling or disposal. If permitted by local authorities and environmental agencies disperse in unconfined waters. If allowed by regulatory authorities the use of suitable dispersants should be considered where recommended in local oil spill procedures.
Personal precautions	:	See Section 8.
Environmental precautions	:	Prevent spill from entering municipal sewers, water sources or low lying areas. Advise the relevant authorities if contaminations have occurred.

7. HANDLING AND STORAGE

Safe handling advice	:	Keep product away from high energy ignition sources, heat, sparks, pilot lights, static electricity, and open flames. Harmful in contact with or if absorbed through the skin. Avoid inhalation of vapours or mists. Use in well ventilated area away from all ignition sources. See Section 8 for additional personal protection advice when handling this product.

Storage information	:	Store away from all ignition sources in a cool, well ventilated area. This product is a static accumulator, therefore, all storage containers should be grounded and bonded. Drums should also be equipped with self-closing valves, pressure vacuum bungs and flame arresters.
Storage and handling procedures	:	Electrical equipment and fittings must comply with local fire prevention regulations for this class of product. Refer to national or local regulations covering safety at petroleum handling and storage areas for this product.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits (OELs)

Components	CAS-No.	Source	TWA	Value		Notations
Naphthalene	91-20-3	ACGIH TLV	LTEL	52 mg/m3	10 ppm	Skin; A4
			STEL	79 mg/m3	15 ppm	
		OSHA PEL	LTEL	50 mg/m3	10 ppm	
			STEL	75 mg/m3	15 ppm	
Diesel fuel	68334-30-5	ACGIH TLV	LTEL	100 mg/m3	15 ppm	Skin; A3
Ethyl Benzene	100-41-4	ACGIH TLV	LTEL	434 mg/m3	100 ppm	A3; BEI
			STEL	543 mg/m3	125 ppm	
		OSHA PEL	LTEL	435 mg/m3	100 ppm	
			STEL	545 mg/m3	125 ppm	

LTEL: Long Term Exposure Limits - Time Weight Average (TWA) over 8 hours.

STEL: Short Term Exposure Limits - Time Weight Average (TWA) over 15 Minutes

Note: Limits Shown for guidance only. Follow applicable regulations.

Personal Protection Equipment (PPE)

Engineering controls	:	Use in well ventilated area. Explosive-proof ventilation equipment with local exhaust is desirable.
Respiratory protection	:	Approved respiratory equipment must be used when airborne concentrations are unknown or exceed the recommended exposure limit. Self-Contained Breathing Apparatus may be required for use in confined or enclosed spaces.
Eye protection	:	If splash with liquid is possible, chemical type goggles should be worn.
Skin and body protection	:	Impervious gloves must be worn. If body contact is likely, appropiate personal protective equipment must be worn. Good personal hygiene practices should always be followed.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Liquid.
Colour	:	Light Amber
Odour	:	Hydrocarbon
Solubility	:	Negligible
Boiling point	:	> 180 °C
Flash Point	:	> 55 °C (ASTM D-93)
Upper Explosion Limit (UEL)	:	7 %(V)
Lower Explosion Limit (LEL)	:	0.6 %(V)
Vapour pressure	:	0.5 hPa
Relative vapour density	:	2
Density	:	0.8450 g/cm3 @ 20 °C
Pour point	:	< -7 °C
Viscosity, kinematic	:	3.5 mm2/s @ 40 °C (ASTM D-445) < 1 mm2/s @ 100 °C (ASTM D-445)

10. STABILITY AND REACTIVITY

Stability	:	Stable.
Conditions to avoid	:	Extreme heat and high energy sources of ignition, such as sparks and static electricity.
Materials to avoid	:	Halogens, strong acids, alkalis and oxidizers.
Hazardous decomposition products	:	Fumes, smoke, carbon monoxide, sulphur oxides, aldehydes and other decomposition products, in the case of incomplete combustion.

11. TOXICOLOGICAL INFORMATION

Acute oral toxicity	:	(Rats): Practically non-toxic (LD50: Greater than 2000 mg/kg). Based on testing of similar products and/or components.
Acute inhalation toxicity	:	(Rats): Practically non-toxic (LC50: greater than 5mg/l). Based on testing of similar products and/or the components.
Acute dermal toxicity	:	(Rabbits): Practically non-toxic (LD50: greater than 2000 mg/kg). Based on testing of similar products and/or the components.
Skin irritation	:	(Rabbits): Practically non-irritating. (Primary Irritation Index: greater than 0.5 but less than 3). Based on testing of similar products and/or the components.
Eye irritation	:	(Rabbits): Practically non-irritating. (Draize score: greater than 6 but 15 or less). Based on testing of similar products and/or the components.
Sensitization	:	Middle distillate oils were not skin sensitizers when tested in a Modified Buehler Guinea Pig Sensitization Assay.
Repeated dose toxicity	:	Repeated dermal application of middle distillates, heating oils and diesel oils to rabbits for 2-4 weeks at up to 1 gm/kg resulted in strong to severe skin irritation with some weight loss at the higher dose. Toxic effects ranging from weight loss to mortality was observed in rabbits treated repeatedly with very high doses (6 gm/kg) of these oils. Repeated inhalation exposure of middle distillate and diesel vapour and aerosol to rats for 2-4 weeks at up to 6 mg/l resulted in respiratory tract irritation, lung changes/infiltration/accumulation, and some reduction in lung function.
Teratogenicity	:	Diesel fuel vapours were tested in an inhalation teratology (developmental toxicity) study in rats and when only minimal maternal toxicity was observed, no fetotoxic or developmental effects were observed. A developmental toxicity study of dermally applied middle distillates did indicate fetotoxicity (reduced litter size, litter weight, increased resorptions) at doses that also caused significant maternal toxicity.
Carcinogenicity	:	Diesel fuel vapours were tested in an inhalation teratology (developmental toxicity) study in rats and when only minimal maternal toxicity was observed, no fetotoxic or developmental effects were observed. A developmental toxicity study of dermally applied middle distillates did indicate fetotoxicity (reduced litter size, litter weight, increased resorptions) at doses that also caused significant maternal toxicity.
Other toxicological information	:	Overexposure to diesel exhaust fumes may result in eye irritation, headaches, nausea, and respiratory irritation. Animal studies involving lifetime exposure to high levels of diesel exhaust have produced variable results, with some studies indicating a potential for lung cancer. Limited evidence from epidemiological studies suggest an association between long-term occupational exposure to diesel engine emissions and lung cancer. Diesel engine exhaust typically consists of gases and particulates, including carbon dioxide, carbon monoxide, nitrogen compounds, oxides of sulphur, and hydrocarbons. Diesel exhaust composition will vary with fuel, engine type, load cycle, engine maintenance, tuning and exhaust gas treatment. Use of adequate

ventilation and/or respiratory protection in the presence of diesel exhaust is recommended to minimize exposures. This product contains ethylbenzene. The International Agency for Research on Cancer (IARC) has evaluated ethylbenzene and classified it as possibly carcinogenic to humans (Group 2B) based on sufficient evidence for carcinogenicity in experimental animals, but inadequate evidence for cancer in exposed humans.

12. ECOLOGICAL INFORMATION

Elimination information (persistence and degradability)

Biodegradability	:	The majority of the components in this product would be expected to be inherently biodegradable. The constituents of diesel fuels which are volatilized will photodegrade in the atmosphere. The less volatile, more water-soluble components which are aromatic hydrocarbons will also undergo aqueous photodegradation.
Physico-chemical removability	:	Dissolution of the higher molecular weight hydrocarbon components in water will be limited, but losses through sediment adsorption may be significant.
Bioaccumulation	:	Not established.

Ecotoxicity effects

Toxicity to fish	:	This substance has also been shown to be toxic to specific fish species (LL50 = 1-10 mg/l for rainbow trout, Atlantic silverside).
Toxicity to aquatic organisms	:	Based on test results for similar products, this substance may to toxic to aquatic organisms such as algae and daphnia (EL50/IrL50 = 1-10 mg/l).

Further information on ecology

Remarks	:	In the absence of specific environmental data for this product, this assessment is based on information for representative substances.

13. DISPOSAL CONSIDERATIONS

Waste disposal	:	Product is suitable for burning for fuel value in compliance with applicable laws and regulations, and consideration of product characteristics at time of disposal.
Other regulations	:	Disposal of unused product may be subject to RCRA regulations (40 CFR 261). Disposal of the used product may also be regulated due to ignitability, corrosivity, reactivity, or toxicity as determined by the Toxicity Characteristic Leaching Procedure (TCLP).
Flash Point	:	> 55 °C (ASTM D-93)

14. TRANSPORT INFORMATION

Note	:	The flash point of this material is > 55 °C, and hence regulatory classifications for flammability may vary.

In accordance with 49 CFR 173.150(f)(2), non-bulk quantities of this material (<119 gallons per container) may be shipped as non regulated for USA domestic shipments.

ADR

Proper shipping name	:	GAS OIL
UN number	:	1202
DOT ERG number	:	128
Class	:	3
Letter	:	F
Packing group	:	III
Labelling number	:	3
Placard	:	Flammable

CFR

Proper shipping name	:	GAS OIL
UN number	:	1202
DOT ERG number	:	128
Class	:	3
Letter	:	F
Packing group	:	III
Labelling number	:	3
Placard	:	Combustible

IATA_C

Proper shipping name	:	GAS OIL
UN number	:	1202
DOT ERG number	:	128
Class	:	3
Letter	:	F
Packing group	:	III
Labelling number	:	3
Placard	:	Flammable

IMDG

Proper shipping name	:	GAS OIL
UN number	:	1202
DOT ERG number	:	128
Class	:	3
Letter	:	F
Packing group	:	III
Labelling number	:	3
Placard	:	Flammable
Marine pollutant	:	Marine pollutant
Medical First Aid Guide (MFAG) table	:	311
Emergency Schedule (EmS) number	:	3-07
IMDG code page number	:	3375
Static Accumulator (50 picosiemens or less)	:	Yes

15. REGULATORY INFORMATION

US OSHA Hazard Communication Standard	:	Product assessed in accordance with OSHA 29 CFR 1910.1200 and determined to be hazardous.
Governmental Inventory Status	:	All components comply with TSCA, EINECS/ELINCS, AICS, METI, DSL, KECI, ENCS, PICCS and IECSC.
EU Labelling	:	Product is dangerous as defined by the European Union Dangerous Substances/Preparations Directives.
Symbols	:	F, T, N Flammable, Toxic, Dangerous for the environment
R-Phrase(s)	:	R10, R40, R65, R66, R51/53 Flammable., Limited evidence of a carcinogenic effect., Harmful: may cause lung damage if swallowed., Repeated exposure may cause skin dryness or cracking., Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S-phrase(s)	:	S24, S2, S36/37, S62 Avoid contact with the skin., Keep out of the reach of children., Wear suitable protective clothing and gloves., If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.
Note	:	Contains Gas Oil - unspecified.

SARA

U.S. Superfund Amendments and	:	This product contains no "EXTREMELY HAZARDOUS SUBSTANCES".

Reauthorization Act SARA Title III

SARA (311/312) Reportable Hazard Categories : Fire Chronic Acute

SARA (313) Toxic Release Chemicals : Ethyl Benzene (100-41-4) - Conc < 1 %.

The following product ingredients are cited on the lists below

Chemical name	CAS-No.	Concentration [%]	List Citations
Diesel fuel	68334-30-5	> 98.00	21, 26
Ethyl Benzene	100-41-4	< 1.00	1, 8, 10, 18, 19, 20, 21, 23, 24, 25, 26
Naphthalene	91-20-3	< 1.00	16, 22

Regulatory List Searched

1 = ACGIH ALL	6 = IARC 1	11 = TSCA 4	17 = CA P65	22 = MI 293
2 = ACGIH A1	7 = IARC 2A	12 = TSCA 5a2	18 = CA RTK	23 = MN RTK
3 = ACGIH A2	8 = IARC 2B	13 = TSCA 5e	19 = FL RTK	24 = NJ RTK
4 = NTP CARC	9 = OSHA CARC	14 = TSCA 6	20 = IL RTK	25 = PA RTK
5 = NTP SUS	10 = OSHA Z	15 = TSCA 12b	21 = LA RTK	26 = RI RTK

Code Key: CARC = Carcinogen; SUS = Suspected Carcinogen

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16. OTHER INFORMATION

Note: Engen products do not contain PCBs.

Health studies have shown that many hydrocarbons pose potential human health risks which may vary from person to person. Information provided on this MSDS reflects intended use. This product should not be used for any other applications. In any case, the following advice should be considered:

INJECTION INJURY WARNING: If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a doctor as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

Precautionary Label Text:

CONTAINS DIESEL OIL.. C9-20

WARNING!

COMBUSTIBLE LIQUID AND VAPOUR. RESPIRATORY IRRITATION, HEADACHE, DIZZINESS, NAUSEA, LOSS OF CONSCIOUSNESS, AND IN CASES OF EXTREME EXPOSURE, POSSIBLY DEATH. LOW VISCOSITY MATERIAL-IF SWALLOWED, MAY BE ASPIRATED AND CAN CAUSE SERIOUS OR FATAL LUNG DAMAGE.

MAY CAUSE SKIN CANCER ON PROLONGED, REPEATED SKIN CONTACT. ANIMAL SKIN ABSORPTION STUDIES RESULTED IN INCREASED MORTALITY, EFFECTS ON BODY WEIGHT, THE IMMUNE SYSTEM AND THE UNBORN CHILD. PROLONGED, REPEATED SKIN CONTACT MAY CAUSE IRRITATION. DIESEL FUMES MAY CAUSE LUNG CANCER.

SAFETY: Keep away from heat and flame. Avoid prolonged or repeated overexposure by skin contact or inhalation. Use with adequate ventilation. Keep container closed. Keep out of reach of children.

FIRST AID: If inhaled, remove from further exposure. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation. In case of contact, remove contaminated clothing. Dry wipe the exposed skin and cleanse with waterless hand cleaner and follow by washing thoroughly with soap and water. For those providing assistance, avoid further skin contact to yourself and others. Wear impervious gloves. If swallowed, seek immediate medical attention. Do not induce vomiting. Only induce vomiting at the instruction of a doctor.

This warning is given to comply with California Health and Safety Code 25249.6 and does not constitute an admission or a waiver of rights. This product contains a chemical known to the State of California to cause cancer, birth defects, or other reproductive harm. Chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm are created by the combustion of this product. Refer to product

ENGEN DIESEL (STD, 0.05)

Material Safety Data Sheet for further safety and health information.

Disclaimer

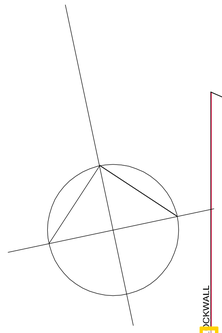
Information given herein is offered in good faith as accurate, but without guarantee. Conditions of use and suitability of the product for particular uses are beyond our control; all risks of use of the product are therefore assumed by the user and we expressly disclaim all warranties of every kind and nature, including warranties of merchantability and fitness for a particular purpose in respect to the use or suitability of the product. Nothing is intended as a recommendation for uses which infringe valid patents or as extending license under valid patents. Appropriate warnings and safe handling procedures should be provided to handlers and users.

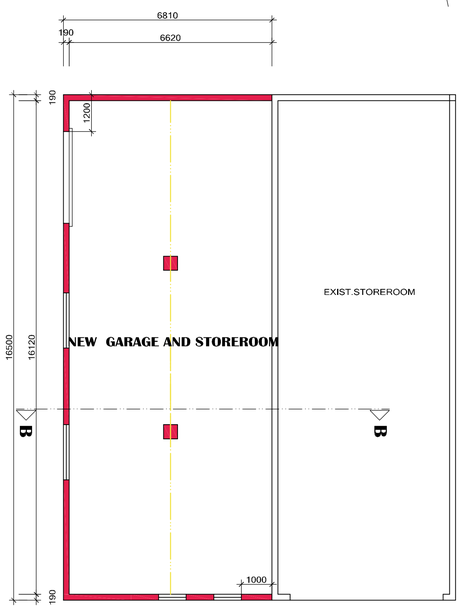
Prepared by	:	Product Safety Adviser Health, Safety, Environment and Quality Department Engen Petroleum Limited P.O.Box 35, Cape Town, 8000
Telephone	:	(021) 403 4805 / 4911 (Office Hours) (021) 403 4099 (After Hours) 083 628 4415 (Cellular)

15.3. Drawings

15 April 2023

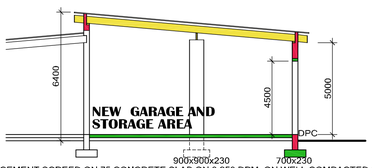
Ref: ALLFUELZOUT001





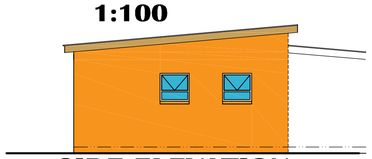
GROUNDFLOOR PLAN
1:100

CORRUGATED METALSHEETS AT 15 PITCH ON 76x50 PURLINS AT 1000 CENTRES ON 228x50 RAFTERS AT 1000 CENTRES TIED DOWN TO BRICKWORK WITH GMS. STRAPS AT LEAST 600 DEEP. 6.4mm. RHINOBOARD CEILING ON 38x38 BRANDERING AT 400 CENTRES. 75mm. COVED CORNICES.
102x76 PVC.RAINWATERGOODS.225x15 AC.NUTEC FASCIAS.
114x38 CROSSBRACING.

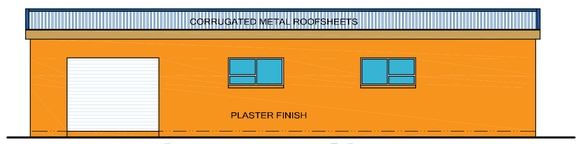


25 CEMENT SCREED ON 75 CONCRETE SLAB ON 0.250 DPM. ON WELL COMPACTED FILL IN LAYERS OF 150mm. MAX.IN DEPTH.

SECTION B-B
1:100

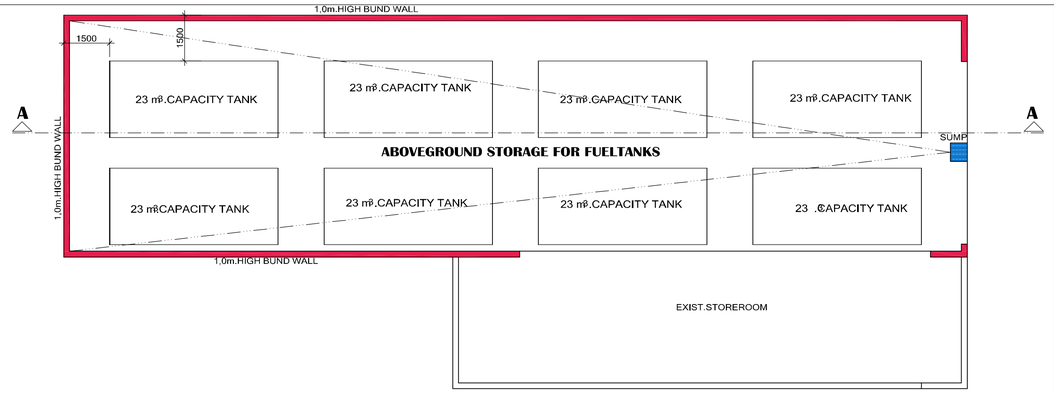


SIDE ELEVATION
1:100



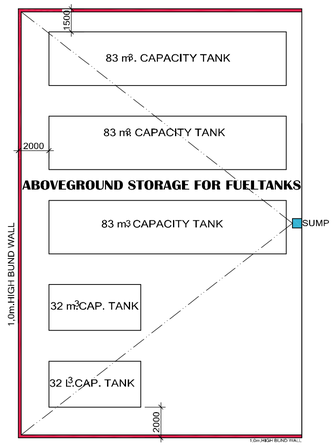
FRONT ELEVATION
1:100

SECTION A-A
1:100



GROUNDFLOOR PLAN
1:100 (184 m³.)

SITE PLAN
1:1000



GROUNDFLOOR PLAN
1:200 (313m³.)

NOTES AND SPECIFICATIONS

A: GENERAL.

1.ALL LEVELS AND DIMENSIONS TO BE CHECKED ON SITE PRIOR TO COMMENCEMENT OF ANY WORK.
2.ONLY WRITTEN DIMENSIONS TO BE USED.
3.WINDOWS AS PER WINSTERS-CATALOGUE.
4.GLAZING IN EXCESS OF 1,0sq/m. OR LESS THAN 500mm. AFFL,TO SAFETY GLAZED.
5.BRICKWORK TO BE HIGH QUALITY ROKS AND MAXIS AS PER OWNER
6.ALL CONCRETE USED TO HAVE MIN.10MPa.COMPRESSIV STRENGHT AFTER 28 DAYS.
7.NO CAVITIES IN CONSTRUCTION OF EXTERNAL WALLS. ALL WALLS TO BE PLASTERED AND PAINTED.
8.LINTOLS TO BE LAID TO MANUFACTURERS SPECS.
9.DPC. TO BE LAID MIN.150mm.ABOVE NGL.
10.NO FOUNDATIONS TO BE PROJECTED BEYOUND ANY BOUNDARY.
11.FINISHED FLOOR LEVEL OF DWELLING TO BE MIN.230mm.ABOVE BACK OF FOOTWAY LEVEL AT SEWER CONNECTION.
12.FINISHED FLOOR LEVEL OF GARAGE TO BE MIN. 150mm.ABOVE BACK OF FOOTWAY LEVEL AT DRIVEWAY ENTRANCE.
13.TIMBER BUILT INTO WALLS TO BE CREOSOTED OR WRAPPED INTO DPC.
14 STEPS/STAIRS:
a)MIN.TREADS- 250mm.
b)MAX.RISERS- 200mm.

COVERAGE CALCULATIONS

SITE AREA=10.0006m²(10 HECTARES)

DANFOUR DESIGNS
ADDRESS:
6 RUITERBOS COURT
ATLANTIS INDUSTRIAL PARK
ATLANTIS
CELL 083 4291 272

REV. AMDT'S.

PROJECT:
PROPOSED ADDITIONS FOR:
TANGO INVESTMENT PROPERTIES
KLEIN DASSENBERG
PRT.64 OF FARM ZOUTERIV.22
PHILADELPHIA

DESIGNER:

OWNER:

SCALE	DATE
	04/05/2022
DWG.NO.	SACAP.REG.NO.
A.S/22/04-28	T 0535

15.4. Frequency Analysis

Flammble Installations

PROJECT: **Alliance Fuel Zoutrivier April 2023**

Vessels and Tanks (BEVI)

Equipment Description	Scenario	Base Frequency	Reasons for Adjustment	Adjustment	Final Frequency	Domino Effects
Tank Farm 1 Diesel Tank 1	Atmos Tank A/G Instant Release	5,00E-06	Typical Average System 1	1	5,00E-06	1,00E-05
	Atmos Tank A/G 10 Minute Release	5,00E-06	Typical Average System 1	1	5,00E-06	
	Atmos Tank A/G 10mm Leak	1,00E-04	Typical Average System 1	1	1,00E-04	
		#N/A		#N/A	#N/A	
Tank Farm 1 Diesel Tank 2-8	Atmos Tank A/G Instant Release	5,00E-06	Typical Average System 1	1	5,00E-06	
	Atmos Tank A/G 10 Minute Release	5,00E-06	Typical Average System 1	1	5,00E-06	
	Atmos Tank A/G 10mm Leak	1,00E-04	Typical Average System 1	1	1,00E-04	
		#N/A		#N/A	#N/A	
Tank Farm 2 32m3 Diesel Tank 1	Atmos Tank A/G Instant Release	5,00E-06	Typical Average System 1	1	5,00E-06	
	Atmos Tank A/G 10 Minute Release	5,00E-06	Typical Average System 1	1	5,00E-06	
	Atmos Tank A/G 10mm Leak	1,00E-04	Typical Average System 1	1	1,00E-04	
		#N/A		#N/A	#N/A	
Tank Farm 2 83m3 Diesel Tank 1	Atmos Tank A/G Instant Release	5,00E-06	Typical Average System 1	1	5,00E-06	1,00E-05
	Atmos Tank A/G 10 Minute Release	5,00E-06	Typical Average System 1	1	5,00E-06	
	Atmos Tank A/G 10mm Leak	1,00E-04	Typical Average System 1	1	1,00E-04	
		#N/A		#N/A	#N/A	
Tank Farm 2 83m3 Diesel Tank 2-3	Atmos Tank A/G Instant Release	5,00E-06	Typical Average System 1	1	5,00E-06	
	Atmos Tank A/G 10 Minute Release	5,00E-06	Typical Average System 1	1	5,00E-06	
	Atmos Tank A/G 10mm Leak	1,00E-04	Typical Average System 1	1	1,00E-04	
		#N/A		#N/A	#N/A	

Loading (BEVI)

	Frequency of Use Per Annum		Scenario	Base Frequency	Conversion from /hr to /pa	Reasons for A	Adjustment	Final Frequency
Diesel Road Tanker		104	Rupture Loading/ Unloadi	4,00E-06	4,16E-04	Typical Avera	1	4,16E-04
		104	Leak in Loading / Unloadi	4,00E-05	4,16E-03	Typical Avera	1	4,16E-03
		104	Road Tank Pressure Vesse	5,80E-10	6,03E-08	Typical Avera	1	6,03E-08
				#N/A	#N/A	#N/A	#N/A	#N/A

15.5. On-site Emergency Plan Requirements as per the MHI Regulations

On-site Emergency Plan Requirements as per the MHI Regulations

(1) An employer, self-employed person and user shall after submission of the information contemplated in regulation 3(4) –
   (a) establish an on-site emergency plan to be followed inside the premises of the installation or part of the installation classified as a major hazard installation in consultation with the relevant health and safety representative or the relevant health and safety committee;
   (b) discuss the emergency plan with the relevant local government, taking into consideration any comment on the risk related to the health and safety of the public;
   (c) review the on-site emergency plan and, where necessary, update the plan, in consultation with the relevant local government, at least once every three years;
   (d) sign a copy of the on-site emergency plan in the presence of two witnesses, who shall attest the signature;
   (e) ensure that the on-site emergency plan is readily available at all times for implementation and use;
   (f) ensure that all employees are conversant with the on-site emergency plan;
   (g) cause the on-site emergency plan to be tested in practice at least once year and keep a record of such test.

(2) Any employer, self-employed person and user owning in control of a pipeline that could pose a threat to the general public shall inform the relevant local government and shall be jointly responsible with the relevant government for the establishment and implementation of an on-site emergency plan.

(3) Subregulation (1) shall not apply to rolling stock in transit: Provided that the operator of a railway shall –
   (a) establish an emergency plan for each route traversed within 12 months of the coming into operation of these regulations;
   (b) draw up the plan contemplated in paragraph (a) in consultation with the local government through whose jurisdiction that rolling stock is being transported;
   (c) sign a copy of the on-site emergency plan in the presence of two witnesses, who shall attest the signature;
   (d) ensure that the plan is readily available at all times for implementation and use;
   (a) cause that plan to be tested when reasonably practicable and keep a record of such test.

15.6. Major Hazard Installation Notification

4. Notification of establishment

(1) A duty holder must notify the chief inspector, the relevant chief director: provincial operations and the local government on Form A, 90 days–

(a) before the erection of an establishment; or

(b) when there is an anticipated change to an existing establishment.

(2) A duty holder, after the entry into force of these Regulations, must update the notification of an existing establishment and send it to the chief inspector, the relevant chief director: provincial operations and the local government on a prescribed form A, within 24 months.

(3) The notification referred to in subregulation (1) or (2) must be accompanied by–

(a) proof of permission or approval from the relevant local government on land use indicating the exact location of the site;

(b) a letter of designation contemplated in regulation 3(2) and the responsible person's competency profile;

(c) an inventory list and safety data sheets of all the dangerous substances that resulted in the installation being classified as an establishment;

(d) a statement containing the envisaged maximum quantity of all the substances that may be present at the establishment at any one time;

(e) the most recent risk assessment report contemplated in regulation 10;

(f) a site map showing the establishment location and indicating developments around the vicinity of the establishment;

(g) a substance location plan drawn to a scale of not less than 1 to 2 500 which identifies the area on the site where the dangerous substances will be stored, handled, used or processed, showing the location of the major items of plant used in such activities;

(h) information regarding the neighbours or other establishments within the impact zone, including–

(i) sites that are likely to be affected by a major incident and their exact distances from the establishment;

(ii) known future development that might increase the risk or consequences of a major incident; and

(iii) other establishments and their exact distances;

(i) proof of the publication of the advertisement contemplated in subregulation (4); and

(j) where applicable, the latest version of the major incident prevention policy.

(4) A duty holder who erects an establishment or updates a risk assessment or converts an existing installation into an establishment must–

(a) place an advertisement, in English and the predominant language in the area, in at least one newspaper serving the communities in the vicinity of the establishment; and

(b) post notices within those communities, containing at least the–

(i) name and location of the establishment;

(ii) name, title and telephone number of the contact person from whom further information can be obtained;

(iii) nature of the dangerous substances and the major incidents that may occur; and

(iv) time and place where a risk assessment report will be explained and may be viewed.

(5) Any affected or interested party may make representations, in writing, to the relevant local government and the chief inspector, within 60 days after the publication of an advertisement referred to in subregulation (4), if the establishment is not acceptable and poses a risk to that party.

15.7. HSE Development Sensitivity Tables

Table 1 Development type: People at work, parking
DT1.1 – Workplaces
DT1.2 – Parking area

Development type	Examples	Development detail and size	Justification
DT1.1 – Workplaces	Offices, factories, warehouses, haulage depots, farm buildings, non-retail markets, builder's yards	Workplaces (predominantly non-retail), providing for less than 100 occupants in each building **and** less than 3 occupied storeys – **Level 1**	Places where the occupants will be fit and healthy, and could be organised easily for emergency action. Members of the public will not be present or will be present in very small numbers and for a short time
	Exclusions		
		DT1.1 x1 Workplaces (predominantly non-retail) providing for 100 or more occupants in any building **or** 3 or more occupied storeys in height – **Level 2** (except where the development is at the major hazard site itself, where it remains **Level 1**)	Substantial increase in numbers at risk with no direct benefit from exposure to the risk
	Sheltered workshops, Remploy	**DT1.1 x2** Workplaces (predominantly non-retail) specifically for people with disabilities – Level 3	Those at risk may be especially vulnerable to injury from hazardous events and/or they may not be able to be organised easily for emergency action
DT1.2 – Parking areas	Car parks, truck parks, lock-up garages	Parking areas with no other associated facilities (other than toilets) – **Level 1**	
	Exclusions		
	Car parks with picnic areas, or at a retail or leisure development, or serving a park and ride interchange	**DT1.2 x1** Where parking areas are associated with other facilities and developments the sensitivity level and the decision will be based on the facility or development	

Table 2 Development type: Developments for use by the general public
DT2.1 – Housing
DT2.2 – Hotel/hostel/holiday accommodation
DT2.3 – Transport links
DT2.4 – Indoor use by public
DT2.5 – Outdoor use by public

Development type	Examples	Development detail and size	Justification
DT2.1 – Housing	Houses, flats, retirement flats/ bungalows, residential caravans, mobile homes	Developments up to and including 30 dwelling units **and** at a density of no more than 40 per hectare – **Level 2**	Development where people live or are temporarily resident. It may be difficult to organise people in the event of an emergency
	Exclusions		
	Infill, backland development	**DT2.1 x1** Developments of 1 or 2 dwelling units – **Level 1**	Minimal increase in numbers at risk
	Larger housing developments	**DT2.1 x2** Larger developments for more than 30 dwelling units – **Level 3**	Substantial increase in numbers at risk
		DT2.1 x3 Any developments (for more than 2 dwelling units) at a density of more than 40 dwelling units per hectare – **Level 3**	High-density developments
DT2.2 – Hotel/ hostel/holiday accommodation	Hotels, motels, guest houses, hostels, youth hostels, holiday camps, holiday homes, halls of residence, dormitories, accommodation centres, holiday caravan sites, camping sites	Accommodation up to 100 beds or 33 caravan/ tent pitches – **Level 2**	Development where people are temporarily resident. It may be difficult to organise people in the event of an emergency

Table 2 Development type: Developments for use by the general public (continued)

DT2.2 – Hotel/ hostel/holiday accommodation	**Exclusions**		
	Smaller – guest houses, hostels, youth hostels, holiday homes, halls of residence, dormitories, holiday caravan sites, camping sites	**DT2.2 x1** Accommodation of less than 10 beds or 3 caravan/tent pitches – **Level 1**	Minimal increase in numbers at risk
	Larger – hotels, motels, hostels youth hostels, holiday camps, holiday homes, halls of residence, dormitories, holiday caravan sites, camping sites	**DT2.2 x2** Accommodation of more than 100 beds or 33 caravan/tent pitches – **Level 3**	Substantial increase in numbers at risk
DT2.3 – Transport links	Motorway, dual carriageway	Major transport links in their own right, ie not as an integral part of other developments – **Level 2**	Prime purpose is as a transport link. Potentially large numbers exposed to risk, but exposure of an individual is only for a short period
	Exclusions		
	Estate roads, access roads	**DT2.3 x1** Single carriageway roads – **Level 1**	Minimal numbers present and mostly a small period of time exposed to risk. Associated with other development
	Any railway or tram track	**DT2.3 x2** Railways – **Level 1**	Transient population, small period of time exposed to risk. Periods of time with no population present

Table 2 Development type: Developments for use by the general public (continued)

DT2.4 – Indoor use by public	**Food & drink:** Restaurants, cafes, drive-through fast food, pubs **Retail:** Shops, petrol filling station (total floor space based on shop area not forecourt), vehicle dealers (total floor space based on showroom/sales building not outside display areas), retail warehouses, super-stores, small shopping centres, markets, financial and professional services to the public **Community & adult education:** Libraries, art galleries, museums, exhibition halls, day surgeries, health centres, religious buildings, community centres. Adult education, 6th-form college, college of FE **Assembly & leisure:** Coach/bus/railway stations, ferry terminals, airports. Cinemas, concert/ bingo/dance halls. Conference centres. Sports/leisure centres, sports halls. Facilities associated with golf courses, flying clubs (eg changing rooms, club house), indoor go-kart tracks	Developments for use by the general public where total floor space is from 250 m^2 up to 5000 m^2 – **Level 2**	Developments where members of the public will be present (but not resident). Emergency action may be difficult to co-ordinate

Table 2 Development type: Developments for use by the general public (continued)

DT2.4 – Indoor use by public	**Exclusions**		
		DT2.4 x1 Development with less than 250 m^2 total floor space – **Level 1**	Minimal increase in numbers at risk
		DT2.4 x2 Development with more than 5000 m^2 total floor space – **Level 3**	Substantial increase in numbers at risk
DT2.5 – Outdoor use by public	**Food & drink:** Food festivals, picnic areas **Retail:** Outdoor markets, car boot sales **Community & adult education:** Open-air theatres and exhibitions **Assembly & leisure:** Coach/bus/railway stations, park & ride interchange, ferry terminals. Sports stadia, sports fields/ pitches, funfairs, theme parks, viewing stands. Marinas, playing fields, children's play areas, BMX/go-kart tracks. Country parks, nature reserves, picnic sites, marquees	Principally an outdoor development for use by the general public, ie developments where people will predominantly be outdoors and not more than 100 people will gather at the facility at any one time – **Level 2**	Developments where members of the public will be present (but not resident) either indoors or outdoors. Emergency action may be difficult to co-ordinate
	Exclusions		
	Outdoor markets, car boot sales, funfairs. Picnic area, park & ride interchange, viewing stands, marquees	**DT2.5 x1** Predominantly open-air developments likely to attract the general public in numbers greater than 100 people but up to 1000 at any one time – **Level 3**	Substantial increase in numbers at risk and more vulnerable due to being outside

	Exclusions (continued)		
DT2.5 – Outdoor use by public	Theme parks, funfairs, large sports stadia and events, open-air markets, outdoor concerts, pop festivals	**DT2.5 x2** Predominantly open-air developments likely to attract the general public in numbers greater than 1000 people at any one time – **Level 4**	Very substantial increase in numbers at risk, more vulnerable due to being outside and emergency action may be difficult to co-ordinate

Table 3 Development type: Developments for use by vulnerable people
DT3.1 – Institutional accommodation and education
DT3.2 – Prisons

Development type	**Examples**	**Development detail and size**	**Justification**
DT3.1 – Institutional accommodation and education	Hospitals, convalescent homes, nursing homes. Old people's homes with warden on site or 'on call', sheltered housing. Nurseries, crèches. Schools and academies for children up to school leaving age	Institutional, educational and special accommodation for vulnerable people, or that provides a protective environment – **Level 3**	Places providing an element of care or protection. Because of age, infirmity or state of health the occupants may be especially vulnerable to injury from hazardous events. Emergency action and evacuation may be very difficult
	Exclusions		
	Hospitals, convalescent homes, nursing homes, old people's homes, sheltered housing	**DT3.1 x1** 24-hour care where the site on the planning application being developed is larger than 0.25 hectares – **Level 4**	Substantial increase in numbers of vulnerable people at risk
	Nurseries, crèches, schools for children up to school leaving age	**DT3.1 x2** Day care where the site on the planning application being developed is larger than 1.4 hectares – **Level 4**	Substantial increase in numbers of vulnerable people at risk
DT3.2 – Prisons	Prisons, remand centres	Secure accommodation for those sentenced by court, or awaiting trial etc – **Level 3**	Places providing detention. Emergency action and evacuation may be very difficult

Table 4 Development type: Very large and sensitive developments
DT4.1 – Institutional accommodation
DT4.2 – Very large outdoor use by public

(Note: All Level 4 developments are by exception from Level 2 or 3. They are reproduced in this table for convenient reference)

Development type	Examples	Development detail and size	Justification
DT4.1 – Institutional accommodation	Hospitals, convalescent homes, nursing homes, old people's homes, sheltered housing	Large developments of institutional and special accommodation for vulnerable people (or that provide a protective environment) where 24-hour care is provided and where the site on the planning application being developed is larger than 0.25 hectare – **Level 4**	Places providing an element of care or protection. Because of age or state of health, occupants may be especially vulnerable to injury from hazardous events. Emergency action and evacuation may be very difficult. The risk to an individual may be small but there is a larger societal concern
	Nurseries, crèches. Schools for children up to school leaving age	Large developments of institutional and special accommodation for vulnerable people (or that provide a protective environment) where day care (not 24-hour care) is provided and where the site on the planning application being developed is larger than 1.4 hectare – **Level 4**	Places providing an element of care or protection. Because of age the occupants may be especially vulnerable to injury from hazardous events. Emergency action and evacuation may be very difficult. The risk to an individual may be small but there is a larger societal concern
DT4.2 – Very large outdoor use by public	Theme parks, large sports stadia and events, open air markets, outdoor concerts, and pop festivals	Predominantly open air developments where there could be more than 1000 people present at any one time – **Level 4**	People in the open air may be more exposed to toxic fumes and thermal radiation than if they were in buildings. Large numbers make emergency action and evacuation difficult. The risk to an individual may be small but there is a larger societal concern

Decision matrix

47 Having determined which zone the development falls into and also the sensitivity level of the development, the following matrix is used to decide the type of advice.

Level of sensitivity	Development in inner zone	Development in middle zone	Development in outer zone
1	DAA	DAA	DAA
2	AA	DAA	DAA
3	AA	AA	DAA
4	AA	AA	AA

DAA = Don't Advise Against development
AA = Advise Against development

48 If all developments result in DAA then DAA is the final HSE advice.

49 If any one development gives an AA result then the interim result for the consultation is AA. Each AA result is always subjected to an additional rule check (Rule 4) to determine if it will remain AA or change to a DAA. If any one development is still AA after application of this rule then the final advice will be AA.

How the rules are applied

Overview of the rules

50 The rules have been developed to allow consideration of the more complex planning consultations. More detail on each of the rules is given after this overview.

51 There are five main rules to consider for each development:

- **Rule 1 – Straddling developments.** When the site area of the proposed development lies across a zone boundary you need to use this rule to decide which zone will be used in the decision matrix. The CD is considered a zone boundary in this context.
- **Rule 2 – Multiple major hazards.** For each major hazard, you need to determine which zone the development is in, after applying the straddling rule if necessary. The final advice is decided on the basis of the most onerous of the zones that the development is in.
- **Rule 3 – Multiple-use developments.** You need to use this rule when the planning consultation is for a multiple use development (eg a mix of housing, indoor use by the public and a workplace). You need to identify the separate parts of the proposal according to the development types. You then need to group together all facilities of the same development type before proceeding (for example before going on to use the straddling rule – Rule 1).
- **Rule 4 – Developments which involve a small extension to an existing facility.** This rule is concerned with Advise Against responses and taking any

existing development on the site into account, if the proposed development is a **small** extension to the existing development, before deciding on the final advice. It is only concerned with 'extensions' to existing developments, not to new developments, or change of use, on sites which may have an existing use.

- **Rule 5 – Temporary/time-limited planning permissions.**

The rules in detail

Rule 1 – Straddling developments

52 Use this rule set (1a, then 1b if applicable) when the site area of the proposed development lies across a zone boundary.

53 Rule 1a: Developments that 'straddle' zone boundaries will normally be considered as being in the innermost zone to the major hazard unless either of the two following conditions applies. The development is in the **outermost** of the zones if:

- less than 10% of the site area marked on the application for that development type is inside that boundary; or
- it is only car parking, landscaping (including gardens of housing), parks and open spaces, golf greens and fairways, or access roads etc, associated with the development that are in the inner of the zones.

54 Rule 1b: For the special case where the development straddles the CD boundary, follow the rule above, then:

- If, after using the rules, the development is 'considered' to be outside the CD, then there is no need to categorise further; a DAA response is appropriate.
- If, after using the rules, the development is 'considered' to be within the CD then look at all the facilities that make up the development proposal. Any that are **entirely outside** the CD should be discounted when coming to a decision about the sensitivity level. All the facilities that are **completely and/or partly inside** the CD are then considered together for the purpose of determining the sensitivity level. (If appropriate, apply the 'multiple-use developments' rule – Rule 3.)

(NB: Rules 1a and 1b do not apply where the development type is a [sensitivity level 2] transport link. Even though this type of development is likely to 'straddle' zone boundaries, it must always be considered as being in the innermost of the zones to the major hazard that it straddles.)

Rule 2 – Multiple major hazards

55 Where the development is in the CD of more than one hazardous installation and/or pipeline, it is necessary to determine which zone the development is in for each major hazard (after applying the straddling rule (Rule 1) if necessary). The overall advice is decided on the basis of the most onerous of any of the zones the development is in (inner zone more onerous than middle zone, middle zone more onerous than outer zone).

56 In some cases HSE has provided a composite three-zone map for complexes of adjacent major hazards and has merged the zones. In this case the assessment is simplified, as only the one three-zone map needs to be considered.

Rule 3 – Multiple-use developments

57 This rule set is used when the planning consultation is for multiple-use developments (eg a mix of housing, indoor use by the public and a workplace).

- First identify the separate parts of the proposal according to the development types, as in column 1 of Tables 1–4. Group together all facilities of the same development type and determine the sensitivity level of each of the groups. The only exception, where facilities are not grouped together, are sensitivity level 4 examples of 'Outdoor use by the public' and 'Institutional accommodation and education' development types. These should be considered separately to other (sensitivity level 3 and below) facilities of the same development type, but as part of the same consultation record.
- Determine which zone each development is in, if necessary using the straddling rule (Rule 1) for each development type.
- Determine the appropriate AA or DAA response from the decision matrix for each development.
- Apply Rule 4a.

Rule 4 – Developments which involve a small extension to an existing facility

58 Many proposed developments are not on 'green field' sites. They may involve extension to an existing development.

59 Rule 4a. First **consider the development in the application on its own merit** according to the normal procedure and rules. There are two outcome options:

- a DAA outcome, in which case there is no need to apply Rule 4b. (For 'multiple-use developments', if the application of Rule 3 results in all outcomes from the matrix being DAA, then that is the final advice. In which case there is no need to apply Rule 4b); or
- an AA outcome, then Rule 4b should be applied if appropriate. (For 'multiple-use developments', if the application of Rule 3 results in one or more AA outcomes from the matrix, then apply Rule 4b individually to every one of the development type groups resulting in these AA outcomes.)

NB only the details supplied with the planning application or pre-planning enquiry are used to determine if, and how, Rule 4b applies.

56 Rule 4b. Extensions **(including minor modifications, alterations, or additions)**:

If…	**Then…**
the proposal is for an extension to an existing development, and the proposed extension is of the same development type as the existing development that is going to be extended. **And** the population at the development will not increase by more than 10% (or, if the population data is not readily available, the total floor area will not increase by more than 10%).	the consultation should be treated as though the proposed extension had a sensitivity level one less than the sensitivity level of the existing (ie not that of the proposed) development. If this reduced sensitivity level, combined with the zone that the extension is in, produces a DAA response, then this will replace the initial AA response.
For 'multiple-use developments', if the application of Rule 4b changes ALL of the AA outcomes to DAA.	this will replace the initial AA response. If at least one outcome remains AA, then an AA response is the final advice. Any remaining AA from 4b dominates for 'multiple-use developments' and an AA response is the final advice.

Rule 5 – Temporary/time-limited planning permissions

57 HSE treats proposals for these the same way as any other planning permission consultations; no allowance is given for the time restriction. Existing temporary/time limited permissions are not taken into account when applying Rule 4, however.

Glossary

beds the number of residents/visits for which sleeping accommodation is provided.

consultation the enquiry that comes to HSE (normally from a PA) for HSE's comment on a proposed change to land usage within a CD. The consultation will consist of at least one 'development'.

development to consider any planning proposal using the PADHI system, all proposed new buildings (or extension, change of use of land etc) need to be categorised into a PADHI 'development type'. A proportion of planning proposals will consist of more than one development type. Having identified all development types, each is subsequently assessed using the decision matrix. An Advise Against decision for any single development will dominate the final PADHI advice for the proposal.

development type (see the first column in the development type tables) term used to group together developments (and/or facilities) that are considered to be of the same sensitivity level.

DPZ development proximity zone.

dwelling units mean the smallest individual unit of accommodation, eg house, apartment, caravan.

extension clarification on what constitutes an extension is provided on the relevant PADHI+ Help screen, which can be accessed by clicking on the 'Help' button on the screen which asks if the proposed development is an extension to an existing development. If you do not have access to PADHI+, then contact the PA or HSE if you need further information.

facilities buildings and other provisions (eg picnic area, children's play area, park-and-ride bus stop) where people may congregate.

'green field' site site to be developed where the current use generally involves minimal buildings and also does not attract people to it in significant numbers. Typically agricultural land, but can also be parkland or other open spaces of a similar nature.

hectare unit of area equal to 10 000 square metres (m^2) in any shape (eg rectangles 10 m x 1000 m or 25 m x 400 m; square 100 m x 100 m; or other regular and irregular shapes).

LUP land use planning.

multiple-use development see 'development'.

PA planning authority.

PADHI planning advice for developments near hazardous installations.

pre-planning enquiry (PPE) an informal, non-statutory LUP consultation made by a developer (or a PA) to determine what HSE's advice is likely to be before submitting a formal planning permission application to the PA.

protective environment there is provision of some element of supervision or care, eg by a warden being available on site or on call.

school leaving age the minimum age at which a young person can leave school – currently 16.

sensitivity level the scale used in the PADHI system to define the vulnerability of a development population to major accident hazards. It is based on pragmatic criteria; the type of development, likely numbers present and whether any vulnerable people will be present. The scale ascends from Level 1 to Level 4: the more vulnerable the population, the higher the sensitivity level.

total floor space – the area of buildings enclosed by the exterior walls multiplied by the number of floors (units are m^2).

use class – the way different types of development are described by planners. They are not identical to HSE's development types or sensitivity levels.

vulnerable people – people who by virtue of age (children and elderly) and/or ill health may be particularly susceptible to the effects of a major accident.

Annex 1

HSE's land use planning advice provision

1 HSE's land use planning (LUP) advice is based on the recommendations of the Advisory Committee on Major Hazards (ACMH) enshrined in Government-agreed principles and framework; see for example Planning Circular 04/2000. These principles remain valid today. A failure to adopt them can only lead to non-compliance with Article 12 of the Seveso Directive. Indeed the principles and objectives HSE uses in giving its advice received strong support in a public consultation in 2007 (CD211 *Proposals for revised policies for HSE advice on development control around large-scale petrol storage sites*).

2 It is currently delivered promptly and transparently through the PADHI (planning advice for developments near hazardous installations) scheme, which is a codification of that given by HSE over the last 30 years or more. Pre-PADHI, HSE staff in local offices used a codified matrix from which the majority of consultations could be quickly turned around with either an 'allow' or 'refuse' decision. However, the system still required a significant number of consultations to be forwarded to a central HSE team of specialist risk assessors. The need for this risk assessment work resulted in a lengthy turnaround time on these consultations and was extremely resource intensive for HSE. Following a review of its position on land use planning around hazardous installations HSE developed a comprehensive, codified methodology, PADHI, which allowed all consultations to be dealt with at a local level, significantly speeding up the provision of advice to PAs.

3 Under Section 16 of the Town and Country Planning (Development Management Procedure) (England) Order 2010 (the 'DMPO'), Article 10 of the Town and Country Planning (General Development Procedure) Order 1995 as

amended (the 'GDPO') in Wales, and section 25 of the Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2008, decision-makers are required to consult HSE on certain planning proposals around major hazard establishments and major hazard pipelines and to take into account HSE's representations when determining associated applications. This is to ensure that the UK complies with Article 12 of the Seveso II Directive which has the specific objective of controlling certain new development to maintain adequate separation, including residential areas, buildings and areas of public use around major hazards when the development is such as to increase the risk or consequences of a major accident. In essence, decision-makers should ensure that new development does not significantly worsen the situation should a major accident occur.

4 In some instances there may already be existing development which is closer to a potentially hazardous installation. In these cases HSE has recognised the views of the ACMH as expressed in paragraphs 108 and 109 of their Second Report which read as follows:

> *'108... The HSE is also frequently asked to comment on proposals to develop or to redevelop land in the neighbourhood of an existing hazardous undertaking where there may already be other land users which are closer and possibly incompatible. In these cases, HSE tells us that it takes the view, which we fully endorse, that the existence of intervening developments should not in any way affect the advice that it gives about the possible effects of that activity on proposed developments which may appear to be less at risk than the existing ones.*
>
> *'109... The overall objective should always be to reduce the number of people at risk, and in the case of people who unavoidably remain at risk, to reduce the likelihood and the extent of harm if loss of containment occurs…'*

5 HSE's approach balances the principle of stabilising and not increasing the numbers at risk with a pragmatic awareness of the limited land available for development in the UK. An HSE discussion document in 1989 *(Risk criteria for land-use planning in the vicinity of major industrial hazards* ISBN 978 0 1188 5491 7, available from HSE Books) sets out the basis of HSE's approach at that time.

6 The Government committee of experts, ACMH, which originally proposed HSE's role in the LUP system, did recognise *'the remote possibility that in some instances a local planning authority may not feel inclined, for a variety of reasons, to follow the advice of the Executive on particular applications for potentially hazardous developments or other developments in their vicinity.'* As a consequence, arrangements were set up so that in this rare circumstance, a planning authority is required by Planning Circular 04/2000 (England and Wales) or Circular 3/2009 (Scotland) to formally notify HSE of its intention to grant against HSE's advice. This is so that HSE can decide whether or not to request the Secretary of State to call-in the application for his own determination. There have been recent changes to procedures in Scotland. Part 3 of the Planning etc. (Scotland) Act 2006 introduced changes to the way in which the planning system will operate in Scotland. See Scottish planning circular 6/2009 *Planning Appeals*, and planning circular 7/2009 *Schemes of Delegation and Local Reviews*. These circulars accompany the Town and Country Planning (Schemes of Delegation and Local Review Procedure) (Scotland) Regulations 2008.

7 HSE's consideration of call-in should not be confused with its LUP advice delivered through PADHI; it is the latter which is provided to enable LUP decision-makers to comply with the objectives of Seveso II, Article 12. In line with Government policy, HSE normally requests call-in only in cases of exceptional concern (there have been only four such requests over the last 30 years in England

and Wales). However if HSE decides not to make such a request this does not mean that it has withdrawn its advice against permission, which remains on file and is likely to be published on the HSE website. **A decision not to request call-in does not disregard HSE's LUP advice**.

8 HSE's role in the LUP process is to provide independent advice on the residual risks from major accidents to people at certain proposed new developments. This is delivered through PADHI+ and planning authorities must 'seriously consider' it in accordance with Planning Circular 04/2000, which advises decision-makers that:

> *'A5. In view of their acknowledged expertise in assessing the off-site risks presented by the use of hazardous substances, any advice from HSE that planning permission should be refused for development for, at or near a hazardous installation or pipeline, ..., should not be overridden without the most careful consideration.'*

Furthermore the Courts (Regina v Tandridge District Council, Ex parte Al Fayed, Times Law Report 28 January 1999) have decided that on technical issues, local authorities, while not bound to follow the advice of statutory bodies such as HSE, *'should nevertheless give great weight to their advice'* when determining planning applications.

A published external review, *Analysis of planning appeal decision reports CRR262/2000, concluded 'It is clear the HSE's risk policies have largely been upheld at planning appeals. It is viewed as a competent and expert body, and its advice provides considerable support to PA decisions.'*

Annex 2

Types of development on which to consult HSE under the Town and Country Planning (Development Management Procedure) (England) Order 2010, the Town and Country Planning (General Development Procedure) Order 1995 (as amended) in Wales, and the Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2008

The following circulars provide further guidance on when HSE is a statutory consultee:

DCLG Circular 04/2000
SOEnD Circular 5/1993 (This document is not available on the internet)
National Assembly for Wales Circular 20/01

They identify the following developments:

1 Within the Consultation Distance (CD) of major hazard installations/complexes and pipelines, HSE should only be consulted on developments involving:

- residential accommodation;
- more than 250 square metres of retail floor space;
- more than 500 square metres of office floor space;
- more than 750 square metres of floor space to be used for an industrial process;
- transport links (railways, major roads etc);
- a material increase in the number of persons working within, or visiting, a CD;
- and then only if the development is within the CD.

2 For licensed explosive sites the criteria are the same as above, but only if within the explosive site's safeguarding zone.

3 The Office for Nuclear Regulation (ONR) is a non-statutory consultee for certain developments near licensed nuclear sites. The criteria are:

- any development involving more than 50 people (or 20 people if previously advised of this figure by ONR) within the detailed emergency planning zone;
- any development of more than 500 people within the outer zone (only applies on sites which have an outer zone).

4 HSE will also:

- advise hazardous substances authorities prior to them determining a hazardous substances consent application;
- comment on planning developments involving quarries.

5 HSE does not give retrospective advice on planning applications where the decision has already been made by the planning authority.

Annex 3

Information needed when using PADHI

To properly apply the PADHI methodology to a planning proposal you will require the following information:

1 Sufficient details of the location of the proposed development to relate it to the consultation distance and the zones of all the relevant hazardous installations, complexes and pipelines.

2 Sufficient details of the proposed development, and those people likely to be there, to enable you to categorise the development within its 'sensitivity levels'. (If the proposal involves the extension of an existing facility then, to be able to take account of that when formulating the final advice, it is necessary to have similar information for that existing use.) These details should include:

- Principal purpose of the proposed development.
- The area (hectare or m^2) of the development site.
- Certain building sizes:

Development type	**Indication**
predominantly workplaces (ie not retail, community, leisure, accommodation etc) – the number of normally occupied storeys. Or at the very least an indication that:	■ all buildings have less than 3 occupied storeys; or ■ at least one building has at least 3 occupied storeys.
for **retail, community, assembly or leisure** etc use – the total floor area (m^2). Or at the very least an indication if this total is:	■ less than 250 m^2; or ■ between 250 m^2 and 5000 m^2; or ■ more than 5000 m^2.

Development type	Indication
institutional accommodation and educational facilities where day-care is provided – the total site area (hectares). Or at the very least an indication if this is:	■ 1.4 hectares or less; or ■ more than 1.4 hectares.
institutional accommodation and educational facilities where 24-hour care is provided – the total site area (hectares). Or at the very least an indication if this is:	■ 0.25 hectares or less; or ■ more than 0.25 hectares.

- For certain developments it is essential that there is an indication of the maximum number of people likely to be at the development at any one time. These may be actual numbers or best estimates/guesses. This can be in the form of:

Development type	Indication
predominantly workplaces (ie not retail, community, leisure, accommodation etc) – the number of people and the number of normally occupied buildings. Or at the very least an indication:	■ that no building is likely to contain more than 100 people; or ■ if any building is likely to contain more than 100 people.
for **houses, flats, residential caravans** etc – the actual number of 'dwelling units'. Or at the very least an indication if it is for:	■ less than 3 dwelling units; or ■ between 3 and 30 dwelling units; or ■ more than 30 dwelling units.
for **hotels, hostels, campsites, caravan sites** etc – the actual number of beds. Or at the very least an indication if it is for:	■ less than 10 beds, or less than 3 caravan/tent pitches; or ■ between 10 and 100 beds, or between 3 and 33 caravan/tent pitches; or ■ more than 100 beds, or more than 33 caravan/tent pitches.
for **predominantly outdoor events** and outdoor facilities – the number of people anticipated. Or at the very least an indication if the event will attract a peak attendance of:	■ less than 100 people; or ■ between 100 and 1000 people; or ■ more than 1000 people.

Development type	Indication
institutional accommodation and educational facilities where day-care is provided – the total site area (hectares). Or at the very least an indication if this is:	■ 1.4 hectares or less; or ■ more than 1.4 hectares.
institutional accommodation and educational facilities where 24-hour care is provided – the total site area (hectares). Or at the very least an indication if this is:	■ 0.25 hectares or less; or ■ more than 0.25 hectares.

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predominantly workplaces (ie not retail, community, leisure, accommodation etc) – the number of people and the number of normally occupied buildings. Or at the very least an indication:	■ that no building is likely to contain more than 100 people; or ■ if any building is likely to contain more than 100 people.
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for **predominantly outdoor events** and outdoor facilities – the number of people anticipated. Or at the very least an indication if the event will attract a peak attendance of:	■ less than 100 people; or ■ between 100 and 1000 people; or ■ more than 1000 people.

Annex 4

HSE office addresses

Only HSE offices that deal with land-use planning are listed. Please address any correspondence to Health and Safety Executive, Hazardous Installations Directorate, Chemical Industries Division at the addresses below.

Offices	**Geographical coverage**
SCOTLAND AND NORTH EAST	
Belford House 59 Belford Road Edinburgh EH4 3UE	Scotland
BP6301 Benton Park View Newcastle-upon-Tyne NE98 1YX	Cleveland, Durham, Tyne & Wear, Northumberland, North Yorkshire (except Selby District Council)
Marshall House Ringway Preston PR1 2HS	Cumbria, Greater Manchester, Lancashire
WALES & WESTERN ENGLAND	
Redgrave Court (HID CI2) Merton Road Bootle Merseyside L20 7HS	Merseyside, Conwy, Gwynedd, Isle of Anglesey, Denbighshire, Flintshire, Wrexham, Shropshire, Staffordshire, Cheshire
1 Hagley Road Birmingham B16 8HS	West Midlands, Powys, Worcestershire, Gloucestershire, South Gloucestershire, Bristol
Government Buildings Ty Glas Llanishen Cardiff CF14 5SH	Cardiganshire, Pembrokeshire, Carmarthenshire, Swansea, Neath and Port Talbot, Bridgend, Rhondda Cynon, Taff, Blaeunau Gwent, Merthyr Tydfil, Vale of Glamorgan, Cardiff, Caerphilly, Torfaen, Newport, Monmouthshire, North West Somerset, Bath and North East Somerset, Somerset, Devon, Cornwall, Isle of Scilly

SOUTH & EAST ENGLAND	
Foundry House 3 Millsands Riverside Exchange Sheffield S3 8NH	South Yorkshire, Humberside, Derbyshire, Nottinghamshire, Lincolnshire
The Lateral 8 City Walk Leeds LS11 9AT	West Yorkshire, Selby District Council
Wren House Hedgerows Business Park Colchester Road Springfield Chelmsford Essex CM2 5PF	Essex, Norfolk, Suffolk
900 Pavilion Drive Northampton Business Park Northampton NN4 7RG	Leicestershire, Northamptonshire, Oxfordshire, Bedfordshire, Buckinghamshire, Cambridgeshire, Warwickshire, Hertfordshire, London boroughs north of the Thames
Priestley House Priestley Road Basingstoke RG24 9NS	Berkshire, Dorset, Hampshire, Wiltshire, Isle of Wight, East & West Sussex, London boroughs south of the Thames, Surrey
Phoenix House 23–25 Cantelupe Road East Grinstead West Sussex RH19 3BE	Kent

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