Underground Petroleum Storage Systems

Best practice guide for environmental incident prevention and management

- How can you prevent leaks and spills?
- What if there is an accident?
- How should you prepare?

You should use this guide if you own or operate underground fuel tanks.

NSW EPA

NSW GOVERNMENT

Glossary

ARA – Appropriate Regulatory Authority – this is the authority that regulates certain activities and will be identified in the relevant legislation. For activities associated with UPSS, the ARA is usually either the EPA or council.

EIT – Equipment Integrity Test – must be conducted by a suitably qualified person and be accompanied by a certificate and test results.

Interstitial monitoring – A type of leak monitoring used for detecting leaks in the annular/interstitial space of a double wall underground tank.

Loss detection – Procedures and processes able to identify the cause of a discrepancy (loss) from any part of a UPSS (i.e. a leak from tanks and/or pipework).

Loss monitoring procedure – One or more procedures for undertaking inventory control (reconciliation) of the petroleum in a system to identify a discrepancy in the volume of petrol (either loss or gain) and the means to record the results and trigger the need for any further action.

NATA – National Association of Testing Authorities. NATA is the authority responsible for the accreditation of laboratories throughout Australia.

POEO Act – Protection of the *Environment Operations Act 1997*.

SIRA – Statistical Inventory Reconciliation Analysis – A third party statistical assessment of inventory (volumetric) data (i.e. delivery, dispensing and retention volumes), which may be compensated (adjusted), as appropriate, to determine if a discrepancy in inventory control can be identified.

Suitably qualified person – A person who has the relevant academic/technical qualification and practical experience to undertake work in a safe and effective manner, such as a contaminated land consultant (who will need appropriate tertiary qualifications and field experience). The consultant ideally would be a certified environmental practitioner under a contaminated land practitioner's scheme.

UPSS – Underground Petroleum Storage Systems.

UPSS Regulation – Protection of the Environment (Underground Petroleum Storage Systems) Regulation 2014.

WHS Regulation – The Work Health and Safety Regulation 2011.

The EPA provides further guidance on Underground Petroleum Storage Systems

Contacts

Hazardous chemical and tank removal and abandonment advice

Safe Work NSW | **131 050** | safework.nsw.gov.au

Underground Petroleum Storage System (UPSS) regulation information

NSW EPA | **131 555** | epa.nsw.gov.au/clm/upss.htm

Hazardous chemicals manifest advice

Fire and Rescue NSW | fire.nsw.gov.au | firesafety@fire.nsw.gov.au

General advice on spill prevention

Your local council Environmental Health Section

Phone: _____

Spill kit suppliers

Search 'chemical spill kits' or 'fuel spill kits'

Assistance for UPSS operators

Search 'NSW Petroleum associations' or contact EPA on **131 555**

Incident response contact information:

- **Fire and Rescue 000**
- **EPA 131 555**
- **SafeWork NSW 131 050**
- **Local Council**

  Phone: _____
- **Local NSW Health District**

  Phone: _____

Where a leak or spill is causing or likely to cause material harm to the environment or human health, the person responsible must notify the relevant authorities as soon as practicable. Failure to report such pollution incidents is an offence under Part 5.7 of the POEO Act.

Relevant authorities include EPA, Council, SafeWork NSW, Fire, Rescue NSW and NSW Health.

This project is in partnership with SafeWork NSW and has been assisted by the New South Wales Government through its Environmental Trust.

Fuel handling areas

Good design and management of fuel dispensing areas will reduce the incidence and impact of spills, saving you money in clean-up cost and minimising harm to the environment.

All fuel dispensing areas should have:

① Sealed surfaces to stop spills seeping into the ground.

② Perimeter drains, bunding or grading which extends around the drip line of the canopy to contain spills. It is possible to isolate the forecourt area by retrofitting concrete or sealed rubber bunding. Search for 'bunding' to find suppliers and installers.

③ Canopies which extend to the maximum reach of nozzles and have a 10 degree from vertical overhang to stop rainwater entering dispensing areas.

④ Storage and waste bins to keep the area free from hazards.

⑤ Accessible spill kit/s for quick clean-up of small spills (see spill kits).

⑥ Bunded storage of hazardous chemicals away from fuel dispensers and traffic impact zones.

⑦ A sump to contain liquids from the collection pits for treatment and/or removal.

⑧ Stormwater drains protected from spills.

⑨ Collection pit/s to capture spills from under the canopy controlled area.

⑩ Bunding that encloses the UPSS fill points to contain fuel discharges from tankers.

Small spills can be contained and removed using a spill kit. Follow Minor Spill actions (overleaf).

Large spills cannot be contained by a spill kit and may be in danger of moving offsite. Follow Major Spill actions (overleaf).

Spill kits can still be employed to help contain spills before emergency services arrive.

Spill Actions

Always shutdown all pumps and assess the situation

MAJOR SPILL

- **Fuel source cannot be stopped**
- **Greater than your spill kit can contain**
- **Spill may enter storm water drains/leave site**
- **Any leak/spill from a tanker**

RACE – Rescue, Alarm, Contain, Evacuate. → **CONTAIN** → **EVACUATE**

- **Rescue –** Rescue any people in immediate danger if safe to do so.
- **Alarm –** Notify relevant authorities:
  Fire brigade 000
  SafeWork NSW 131050
  EPA 131555
  Council _____
- Block main driveway to site. If driveway cannot be blocked safely, divert traffic away from fuel spill area.

If safe, use spill-kit to stop spill from:
- Entering storm water drains
- Leaving site
- Spreading

If situation unsafe go to assembly area and await emergency services.

- Evacuate customers and staff away from danger to the assembly area.
- Ensure all possible ignition sources are removed from spill area.
- Provide relevant authority with Safety Data Sheets and hazardous chemical manifest site plan (see example site plans).

MINOR SPILL

- **Can be contained by your spill kit** **and**
- **Fuel source is stopped** **and**
- **Will not enter storm water drains or leave site**

- Assess for hazards.
- Block off spill area with cones/tape.
- If safe, use spill-kit to stop spill from:
  – Entering storm water drains – Leaving site – Spreading

AFTER ALL SPILLS

- Dispose of liquid waste and spill clean up materials to an approved waste facility.
- Restock spill-kit.
- Review and implement measures to prevent spill from reoccurring
- Following a major spill, resume trading only after authorisation by Fire and Rescue/council/EPA representative.

Where a leak or spill is causing or is likely to cause material harm to the environment or human health, you must notify each relevant authority as soon as practicable. Failure to report such pollution incidents is an offence under Part 5.7 of the POEO Act. Relevant authorities include EPA, Council, SafeWork NSW, Fire and Rescue NSW and NSW Health (see contact list).

Disposal of Waste

Waste associated with fuel sites can be hazardous and requires special consideration.

You are legally required to ensure your waste is stored, transported and disposed of safely and lawfully.

Planet Ark's Business Recycling website lists local waste collection services, waste facilities, recyclers and transporters.

Spill kit materials used to contain and clean up fuel and other volatile substance spills should be classified before disposal using the EPA's Waste Classification Guidelines. Check with your spill kit supplier and waste transporter for disposal options.

Rags and oil-absorbent materials that only contain non-volatile petroleum hydrocarbons and do not contain free liquids can be disposed of as general solid waste (non-putrescible).

Soil contaminated following a leak or spill may need to be investigated and potentially removed as waste. If the soil needs to be removed, it must be classified before it is transported. More information on waste classification is available on the EPA website.

Lead acid batteries (car batteries) contain a variety of hazardous chemicals as well as valuable metals. Approximately 96% of a car battery can be recycled. There are regulations relating to the safe transport and disposal of lead acid batteries. For more information on waste lead acid batteries visit the EPA website.

Tyres that are used, rejected or unwanted are classified as 'waste tyres' and need to be managed responsibly. This includes casings, seconds, shredded tyres or tyre pieces.

Tracking must be used for loads of more than 20 waste tyres (or 200 kilograms). You must be able to provide information about the lawful transport and disposal of waste tyres at any time. More information on waste tyres is available on the EPA website.

Tyres can also be reused for land application purposes under the general resource recovery order and resource recovery exemption for tyres. For more information, please refer to the current EPA resource recovery orders and exemptions.

Waste oil can cause significant harm if released into the environment. One litre of oil can contaminate one million litres of water. Used oil is a valuable resource which can be recovered and reused. Many council and waste management facilities will accept used oil for recycling and disposal purposes. You may search for liquid waste treatment facilities that are licensed by the EPA using the EPAs Public Registers.

It is dangerous to store used oil in containers for long periods of time. Many materials can degrade when in contact with used oil, increasing the risk of a spill. For more information on waste mineral oil visit the EPA website.

For details on the legislative requirements related to these and other waste types visit EPA Waste and Recycling web pages.

Spill kits and clean up equipment

Spill kits are designed to be used on specific groups of chemicals to contain and clean up small scale spills. They must be readily accessible on the forecourt.

Suppliers will state the liquids, application and absorbent capacity of their kits.

Basic tools such as the following should be available:

- shovel
- broom
- rake
- absorbent booms or socks and pads
- contaminant resistant gloves
- disposable coveralls
- warning sign
- contaminated waste container
- a respirator with an organic cartridge.

Check that you have spill kits available and that they are right for all the different chemicals that you use.

Spill kits you need to consider include:

- Oil and fuel – specifically designed for oil and fuel.
- AdBlue – required for sites with AdBlue as oil and fuel kits are unsuitable.
- Hazardous Chemicals – for use on chemicals used in workshops.
- Marine – designed for use on oil and fuel spills on water.

If you have used your spill kit, ensure you dispose of the waste appropriately (see waste, previous page) and restock spill kit.

Check your forecourt spill kit regularly. Where spill kits are stored in a container that may be mistaken for a rubbish bin, a cover or quick release lock will secure the contents whilst still making the contents accessible.

Employees should be aware of who to contact in event of a spill (see spill actions) and trained in spill clean up procedures.

Leak prevention and monitoring

The UPSS Regulation sets out three levels of protection to prevent and detect leaks:

System design – Integrity tested, non corrodible, double walled tanks and lines and overfill protection devices are mandatory for all new and significantly modified systems.

Operational Management – Procedures for loss detection, maintenance, modification, repair, commissioning and incident management are mandatory if your tanks contain fuel.

System backup – Secondary leak detection system (groundwater monitoring wells or alternative) must be installed.

Monitoring the fuel in your tanks will detect leaks early. This will save you money in lost stock and clean up bills, reduce your legal liabilities, protect property values and your local community.

Loss monitoring

Most operations use SIRA to check for losses. SIRA identifies discrepancies by analysing a series daily records, logged by someone trained to use the equipment and analysed by an independent third party.

Leak detection

Groundwater monitoring wells are installed and inspected every six months as a back up to loss monitoring. Where groundwater wells are not suitable, an alternative system can be used, providing it is designed and installed by a suitably qualified person.

Loss investigation

Whenever a discrepancy in loss monitoring is identified, SIRA records a 'fail' or 'inconclusive' result or a leak is detected, an investigation must be conducted immediately.

Carry out loss detection investigation checks (over leaf)

Identify source of discrepancy or leak.

Where the source is not related to a leak, record the results of the investigation, including any actions to stop future discrepancies.

When a leak is identified.

Engage a suitably qualified person to repair or replace tank infrastructure or replace piping or lines.

Engage a suitably qualified person to carry out an equipment integrity test (EIT) before recommissioning.

Check requirements to notify ARA using leak notification form within 30 days of the leak being detected.

If remediation is required, check council development application requirements for remedial work. Engage a suitably qualified person to remediate and submit report/s to council.

Continue with loss monitoring, loss detection and maintenance activities.

In addition, whenever groundwater contamination is identified you must:

Undertake sampling and analysis of groundwater using NATA accredited laboratory.

If there is evidence of petroleum (odours, high concentrations, free phase), engage a suitably qualified person to investigate and determine the nature and extent of the contamination. Notify ARA using leak notification form within 30 days of leak being detected.

Where a leak or spill at a UPSS is causing or likely to cause material harm to the environment or human health, the person responsible must notify the relevant authorities as soon as practicable. Failure to report such pollution incidents is an offence under Part 5.7 of the POEO Act.

Leak investigations

Loss detection investigation checks

To assist in determining the cause of a discrepancy identified during loss monitoring, the following system checks may be initiated (where appropriate) by the person responsible for a UPSS.

Suspected issue to investigate	Loss/ Gain?	Example system checks. To be conducted by a suitably qualified person.
Inventory records	Loss or gain	Check the inventory control records of the preceding three months (or to a point when records are deemed satisfactory) to ensure the discrepancy has not been caused by a record-keeping error.
Security/pilfering	Loss	Check the following: • for sites that do not operate continuously (non-24 hour sites), that all tank openings (e.g. dip and fill points) are secured, in particular after hours • on self-serve sites, that controlled authorisation of dispensers is operating • where available, CCTV or similar security system.
Dip stick	Loss or gain	Check the following: • dip stick for wear/damage and replace if necessary • each tank has the correct dip stick • if using automatic tank gauging, that the system is operating to the manufacturer's specifications.
Water	Gain	Check each tank for the presence of water by: • use of a water-finding paste on a dipstick. Identify entry point(s) (e.g. if tank has a hole or water is entering via open valve, fill point, etc.).
Fill points, spill boxes, pumps and piping manifolds	Loss or gain	For a dispenser with a pump located inside the dispenser unit, remove covers and check valves and pipework for leaks, both during operation and when switched off. For submersible pumps, lift the pump cover and check wells for leaks. For piping manifolds, lift the pit cover and check for leaks. Check fill point seals and covers for damage.
Tank pit observation wells and groundwater monitoring wells	Loss	Check: • for any evidence of petroleum in the tank pit observation and groundwater monitoring wells. Engage suitably qualified person to investigate and identify the source of the leak.
Vents	Loss	Check: • vent caps for any visible blockages • vents for evidence of petroleum blow-out at either vent outlet or below vents on ground or buildings.

Continued overleaf

Leak investigations *continued*

Suspected issue to investigate	Loss/ Gain?	Example system checks. To be conducted by a suitably qualified person.
Dispenser pumps are over or under dispensing	Loss or gain	Check: • that dispenser totals and console totals are recorded and operating within their accepted tolerances and that the records produced by each, for the same period, correlate within acceptable limits • the maintenance schedule and calibration of dispensers • inspect under sump pump (if present).
Sales test	Loss or gain	Determine tank and dispenser relationships by identifying single stock systems. Establish opening stock datum and do not alter the single stock systems for the duration of the sales test. During the sales test the operator should satisfy the requirements of the delivery procedures and run the test for five days unless significant loss or gain variations can be determined in a shorter period. The final stock reconciliation should be performed by the person responsible.
Interstitial monitoring (for appropriately designed UPSS only)	Loss	Check: • the system is active • leak detection measurements (e.g. liquid levels or pressure levels) are within the manufacturer's tolerances • leak detection measurements have been recorded for the system. Where any previous losses outside the manufacturer's leak detection tolerances have been reported in the last six months, undertake further investigation of the system to identify the source of leak.
Human error	Loss or gain	Check: • UPSS installation records – was the installer accredited/certified? • for inaccurate measuring/recording • delivery losses/tank filling activities • for inadequate system management • failure to complete physical system checks.
Recent repairs undertaken on UPSS	Loss or gain	Check: • maintenance of records • if repair and reuse was performed, whether compatible materials were used.
Equipment integrity test	Loss or gain	If none of the above investigations reveals a reason for the discrepancy in the reconciliation records, an EIT may be considered and performed in accordance with the UPSS Guidelines.

Obligations

The Protection of the *Environment Operations Act 1997* (the 'POEO Act') is the primary legislation used to prevent and regulate pollution in NSW. Under the Act, it is an offence to pollute land and waters, including groundwater.

The UPSS Regulation has been made under the POEO Act to ensure that all underground petroleum storage systems are managed adequately.

It is a legal requirement to report pollution incidents, in an emergency, call 000, or Environment Line 13 15 55

Operational UPSS sites are obliged to have the following information available:

- Environmental Protection Plan (EPP) or equivalent documents. The UPSS Regulation requires that the EPP or equivalent documents must be kept up to date, be accessible to all operational personnel involved with fuel management and dispensing.
- Loss monitoring procedure.
- Leak detection procedure.
- Incident management procedure.
- Site plan, including drainage and services (overleaf).
- Hazardous Chemicals Manifest – for use by emergency services during incidents.
- Spill kits for all chemicals stored onsite including fuel.

Significant system modifications, replacement, decommisioning and validation results must be reported to council. You must engage a suitably qualified person to carry out these works. Contact your local council for information on development applications, reporting, contaminated land policy and remediation notification requirements.

Other relevant legislation and Australian Standards include:

Contaminated Land Management Act 1997
Work Health and Safety Regulation 2011
The Design Installation and Operation of Underground Petroleum Storage Systems AS 4897 – 2008
Pipelines – Gas and Liquid Petroleum – General Requirements AS 2885.0 – 2008
Pipelines – Gas and Liquid Petroleum – Design and Construction AS 2885.1 – 2012
Pipelines – Gas and Liquid Petroleum – Operation and Maintenance AS 2885.2 – 2012
The Control of Undesirable Static Electricity AS /NZS 1020 – 1995
The Storage and Handling of Flammable Combustible Liquids AS 1940 – 2004
Steel Tanks for Flammable and Combustible Liquids AS 1692 – 2006
The Removal and Disposal of Underground Petroleum Storage Tanks AS 4976 – 2008
Petroleum Products – Pipeline, Road, Tanker Compartment and Underground Tank Identification AS 4977 – 2008
Explosive Atmospheres – Classification of areas – Explosive gas atmospheres AS/NZS 60079.10.1:2009

Site plans

Workplaces with hazardous chemicals, such as fuel, must have site plans which meet the WHS and UPSS Regulation requirements. These plans are used by emergency services in an emergency and provide the location of above and below ground infrastructure for use by operators.

The following documents provide details of legislative site plan requirements:

- The UPSS Guidelines contain a list of what must be included on a site plan under the UPSS Regulation.
- The Hazardous chemical manifest technical note from Fire and Rescue NSW (FRNSW) has a list of site plan requirements which forms part of your hazardous chemicals manifest.
- The SafeWork NSW Guidance material – Notifications for Schedule 11 hazardous chemicals and abandoned tanks contains an example manifest site plan.

All operational sites with fuel storage must meet all of these requirements.

This is an example site plan. For large and complex sites, the plans can be split into above and below ground infrastructure (see overleaf).

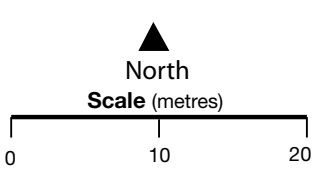
Name of premises: XYZ Fuels
Address: 1 Main St, Town, NSW 2900
Lot: 1 DP: 12345
Date of this plan drawing: 1 Jan 2015
Date of last revision: 1 Jan 2016

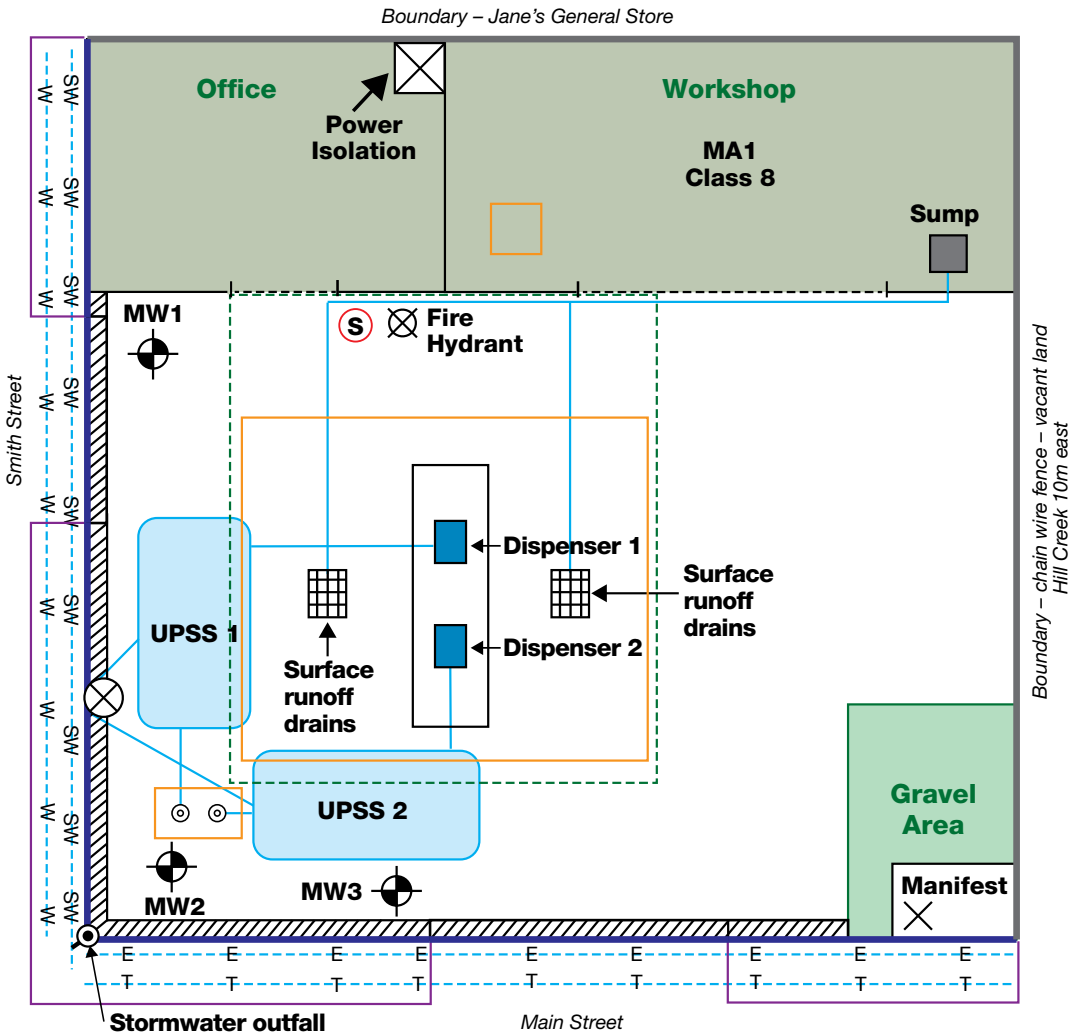
LEGEND

- -E- Electrical
- ⊙ Fill points
- Groundwater monitoring wells
- Stormwater grates
- -SW- Stormwater
- -T- Telstra
- -W- Water
- (Blue) Underground lines
- Canopy
- Vent pipes
- Bunded area
- (S) Spill kit

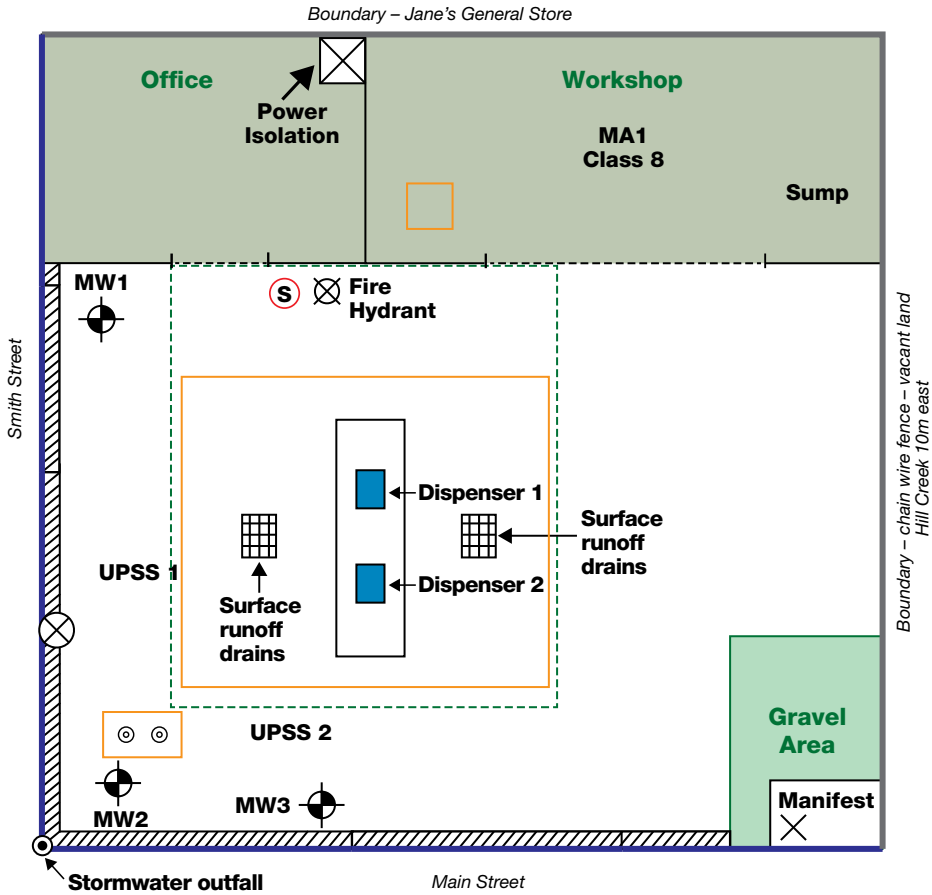
UPSS1 Diesel – Class C1 – Capacity 20,000 L

UPSS2 Petrol – Class 3 – Capacity 30,000 L

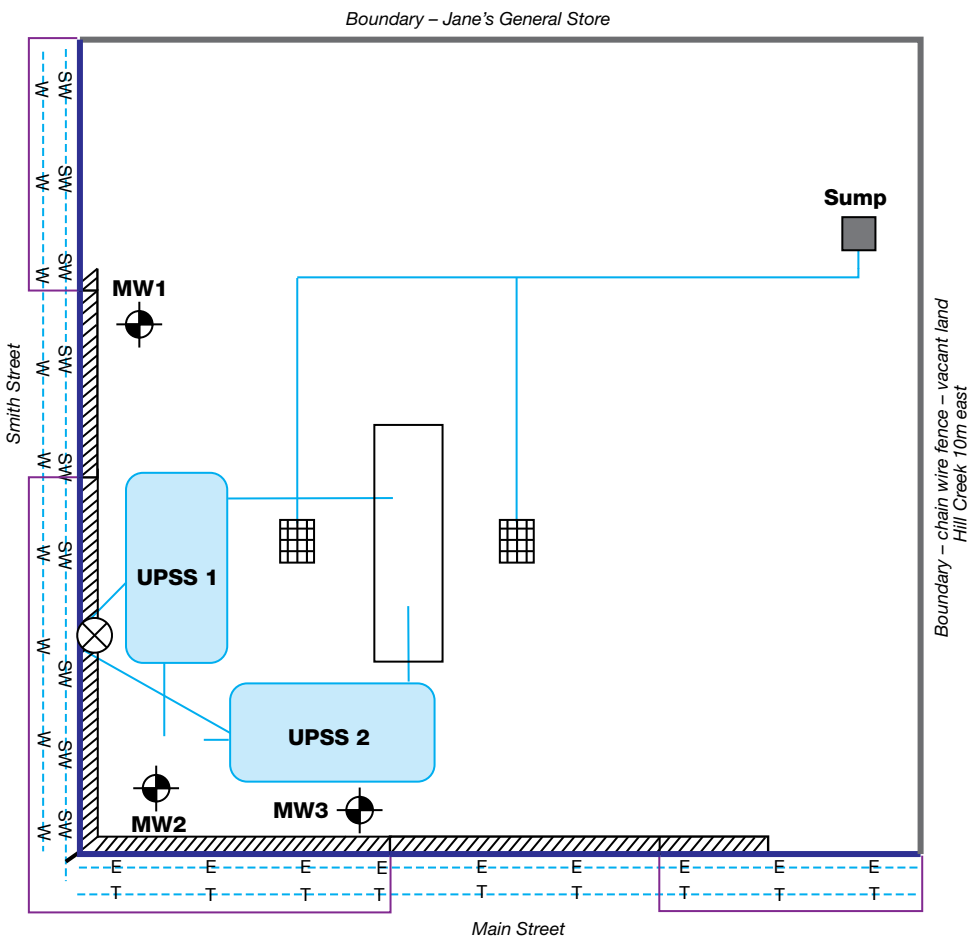




Site plans can also be separated into above and below ground components for clarity.



Site plan – above ground infrastructure.



Site plan – underground infrastructure.

Maintenance and system checks

Regularly checking and maintaining your system will help you prevent and detect leaks and spills.

Examples of some scheduled maintenance and system checks are provided below. These actions may vary from site to site depending on company and manufacturer specifications.

Daily actions:

- Dip tanks and record measurements.
- Dip E10 (bio-blend) tanks for water and all tanks after heavy rain.
- Check fill/dip points for damage.
- Check drains and remove blockages.
- Remove forecourt traffic hazards.
- Check spill kit contents, remove litter.
- Check collection pits and sump levels.
- Check hoses and nozzles for damage.

Weekly actions:

- Check dip stick for wear.
- Dip tanks for water and remove water if present (non E10 and bio-blends).
- Check vent points and remove blockages.
- Check tank pit observation wells and immediately investigate leaks.
- Check under sump pumps.

Monthly actions:

- Check SIRA report and immediately investigate all discrepancies including fail and inconclusive results.

Pre delivery actions:

- Check fill point spill containment area for product/water. Remove liquid prior to delivery and store for appropriate waste disposal.

Six monthly actions:

- Sample groundwater monitoring wells and immediately investigate leaks.

Annual Actions:

- Service leak detection equipment.
- Service cathodic protection systems.

Actions for new and modified systems:

- Ensure suitably qualified person tests the system (including pipework) for leaks before and after burial in accordance with AS4897-2008 and UPSS Regulation.
- Check requirements to install Vapour recovery at service stations section of the EPA website.

Maintenance activities must be recorded. The UPSS Guidelines provide further information on your responsibilities.

Operational UPSS requirements checklist

Requirements for all operational UPSS

Under the UPSS Regulation, all operational UPSS sites are required to have the following procedures and documents in place. They must be available onsite as either hard or electronic copies.

Use this checklist to confirm that you have met the requirements and to record where the information is kept.

Requirement	In place (tick)	Document location
Loss monitoring procedure		
Incident management procedure		
Maintenance Schedule and records		
Current 'as-built' drawings for the system		
Site plan to scale including: ☐ All tanks, fill points, pipelines ☐ All buildings and infrastructure ☐ All groundwater monitoring wells ☐ Any unsealed ground surfaces, fences and gates, drainage and services ☐ Adjacent land uses		
Name, address and 24 hour contact number of the person responsible for the system and the site owner, if they are not the same person		
Site street address and Lot and DP		
Access to, and the security of, the system, including details of any locks, gates, fences and the like and the means of opening them		
List of industry standards relevant to the system and secondary leak detection system		
Installation specifications for the UPSS and secondary leak detection systems		
Record of any significant modifications to the system and design specifications for the modification		
Incident log including leak detection reports and investigations		
Record of all integrity testing		
Secondary leak detection installation report (groundwater monitoring wells or alternative)		
Sampling and analysis reports from groundwater monitoring or secondary leak detection system testing		

Staff training

This guide should form part of your employee incident prevention and management training. It will inform and remind them of the procedures you have in place to reduce the likelihood of leaks and spills and tell them what to do if there is an incident.

Record training sessions on this page and make a note of any comments that arise from training.

Staff training schedule		
Date:	Attendees:	Comments:
Date:	Attendees:	Comments:
Date:	Attendees:	Comments:
Date:	Attendees:	Comments:
Date:	Attendees:	Comments:
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