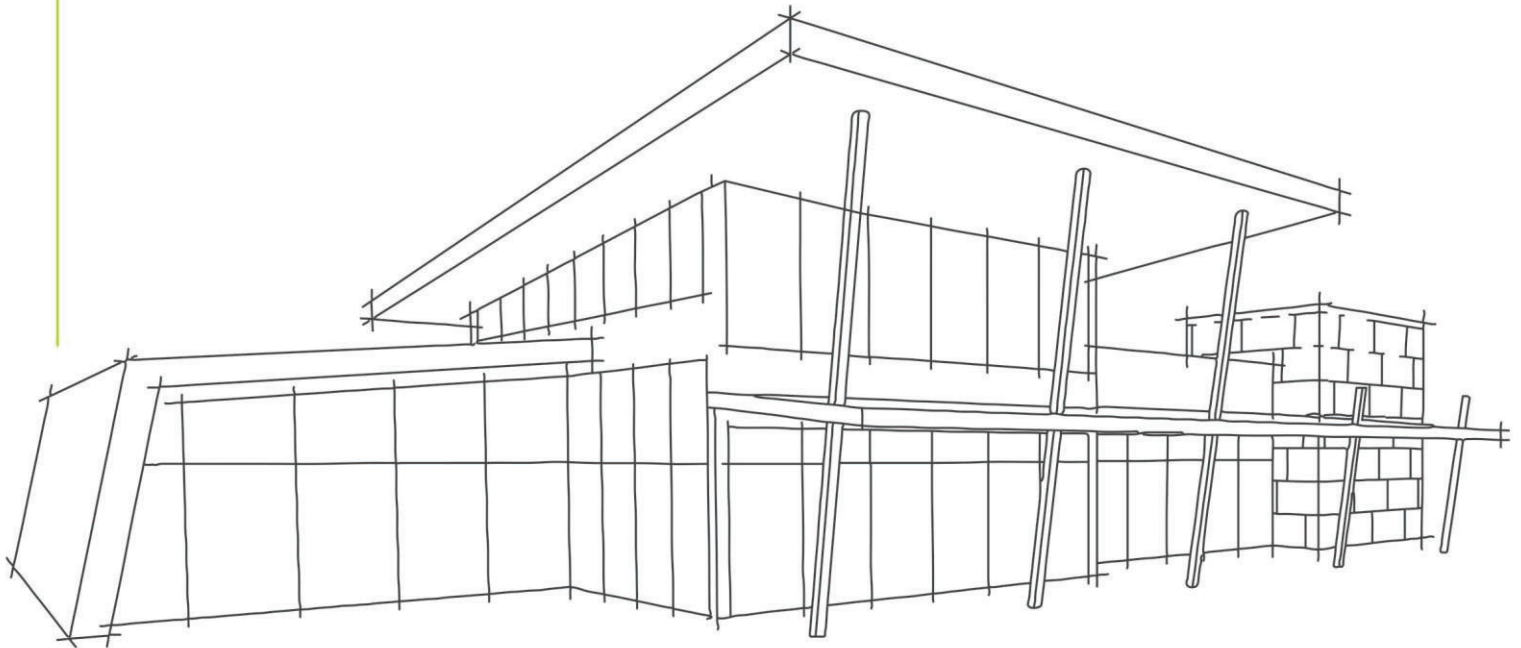


SITE BASED STORMWATER MANAGEMENT PLAN

AMPOL - YARRABILBA

CNR YARRABILBA DRIVE & MILL STREET, YARRABILBA QLD 4207



CREATE • PLAN • DELIVER

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2022/1347

Date: 16 February 2023



PROJECT MANAGERS | PLANNERS | DESIGNERS | ENGINEERS

SITE BASED STORMWATER MANAGEMENT PLAN

Ampol - Yarrabilba

Cnr Yarrabilba Drive & Mill Street, Yarrabilba QLD 4207

CLIENT: Ampol Australia Petroleum Pty Ltd (Ampol)

ADDRESS: Cnr Yarrabilba Drive & Mill Street, Yarrabilba QLD 4207

TFA REFERENCE: 22177

TFA CONTACT: Juan Avella

Document Control

REVISION	DATE	PREPARED BY	REVIEWED BY	COMMENTS
A	17 August 2022	R. Figueiredo	J. Avella	For Review
B	20 October 2022	R. Figueiredo	J. Avella	Site Layout Updated
C	03 February 2023	B. Masuku	J. Avella	Stormwater Drainage Layout Updated

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1.0 INTRODUCTION

This Site Based Stormwater Management Plan (SBSMP) has been prepared by TFA Group on behalf of Ampol Australia Petroleum Pty Ltd (the applicant). The purpose of this document is to verify that stormwater quality and quantity have been considered as part of this development and do not have any adverse impact on the downstream environment as outlined in the State Planning Policy July 2017, Yarrabilba Stormwater Infrastructure Master Plan (Designflow, 2012), Yarrabilba Total Water Cycle Management Strategy (Designflow, 2012) and Queensland Urban Drainage Manual 2016.

The proposed development will be implemented in two Stages. Stage 1 consisting of a service station comprising a car canopy over fuel dispensing areas, a pay point building, car parking areas with associated driveways, walkways and landscape areas and Stage 2 comprising a Fast Food building with drive thru facilities.

The SBSMP is part of the Development Approval process and addresses both the construction and operational phases of the development of stage 2. Table 1 below shows additional details of the proposed development. The proposed site layout plan is shown in **Appendix A**.

Table 1: Details of proposed development

Developer	Ampol Australia Petroleum Pty Ltd
Address	Cnr Yarrabilba Drive & Mill Street, Yarrabilba QLD 4207
Property Description	Lot 12 on SP304357
Area of Development	Overall area: 10,040 m ² Development area: 4,737 m ²
Stormwater Risk Classification	Low risk
Existing Land Use	Vacant land

2.0 THE SITE

2.1 Site Description

The overall site, formally referenced as Lot 12 on SP304357, comprises 10,040 m² in area. The site is currently vacant land and relatively level.

The subject area (approved Lot 2 under DEV2022/1259) of the overall site which will accommodate the proposed fast-food premises, has a lease area size of 4,737m². The site has two street frontages, to Yarrabilba Drive and Mill Street.

The site includes available stormwater, sewer, water and electrical / communications utilities and service points to connect into. Refer Figure 1 below and Figure 2 overleaf, which provides an aerial view of the overall site and indicates the subject site (approved Lot 2 under DEV2022/1259).



Figure 1: Site Overview (Source: Qld Globe)

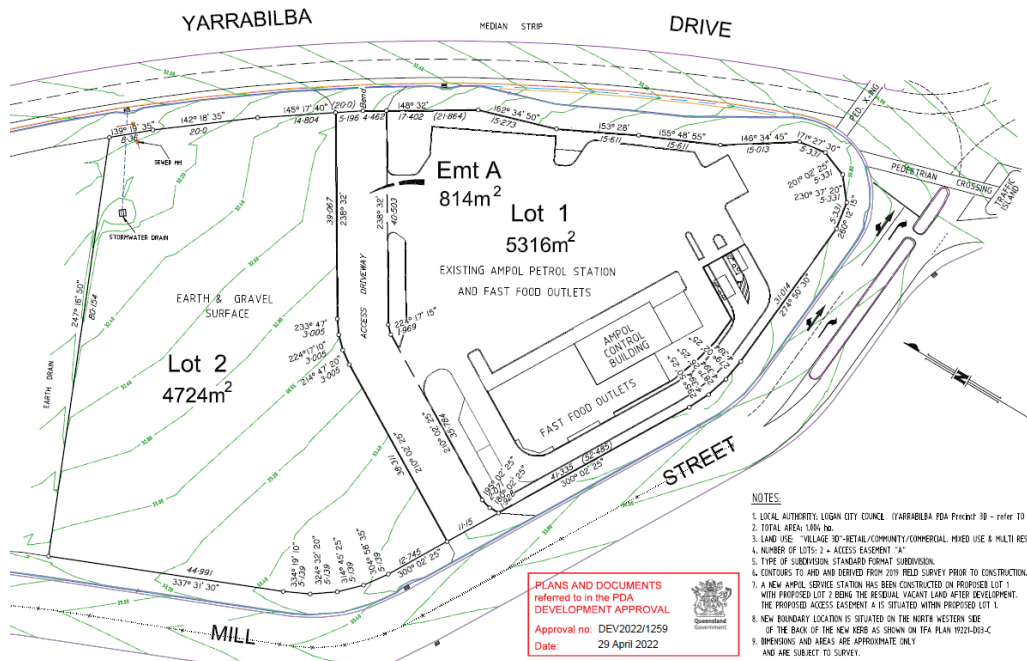


Figure 2: Approved Lot 2 under DEV2022/1259 (Source: Qld Planning & Survey)

3.0 SITE TOPOGRAPHY AND EXISTING DRAINAGE

3.1 Description of the site current condition

Refer to **Appendix B** for the survey plans provided by Queensland Planning & Survey Pty Ltd. dated the 19 December 2019, which show the condition of the site.

The development site has existing surface levels approximately between RL 34.27m AHD to RL 31.87m AHD. The ground falls from south-east to north-west. Stormwater runoff generated from the lot is captured by 1x1200 sq. gully pits, which convey flows to an existing gully pit located on Yarrabilba Drive via Ø375 pipe. Refer to section 6.1 for the site's pre-development catchment analysis.

4.0 FLOODING

4.1 Flooding information

Based on Logan City Council Planning Scheme 2015 v8.1 Overlay Map OM-05 'Flood hazard overlay', the site is not within any flood and storm tide hazard. An extract of this overlay map is shown in Figure 2 which indicates the extension of flood events near the site. Therefore, it is anticipated that flooding will not affect the proposed buildings on this development.



Figure 3: Development Flooding Information (Source: Overlay Map OM-05 'Flood Hazard Overlay')

5.0 PROPOSED DRAINAGE LAYOUT

5.1 Proposed drainage

Overall, the existing catchment boundary has been generally maintained in the post development scenario. The proposed drainage will capture and convey stormwater runoff generated to a SPEL Vault with SPEL filters for hydrocarbon and nutrients removal. Treated flows will then be discharged to the council's stormwater network. Refer to Section 7 for the site's stormwater quality assessment.

The SPEL filters will be installed within the SPEL Vault and a licensed contractor will perform maintenance as specified by the manufacturer. For details of the SPEL Filters refer **Appendix E**.

Each individual SPEL filter cartridge can treat flows up to 2.83 L/s, therefore the runoff generated from the site will be conveyed and directed to the SPEL Vault with a concrete weir where flows above the constructed SPEL filter system will be diverted, bypassing treatment.

Treated stormwater flows from the SPEL Vault will be discharged into a manhole and directed to the lawful point of discharge. The proposed lawful point of discharge will be a new manhole constructed over the existing pipe discharge located North of the site. Refer section 6 for the detention system calculations and **Appendix C** for the proposed Conceptual Stormwater Management Plan.

6.0 WATER QUANTITY ASSESSMENT

The purpose of this part of the assessment is to investigate whether there is a need to attenuate stormwater flows to negate any adverse impacts on upstream or downstream environments.

6.1 Catchment Analysis

The proposed development area (0.47 ha) is located between sub-catchments X_N16 and X_N4B as per Yarrabilba's Precinct 3 Flood Study of 2016, displayed in Figure 4 and Figure 5 below. Modelling undertaken to size the precinct's detention basins assumed both catchments will incorporate impervious areas in the order of 37% and 33% respectively.

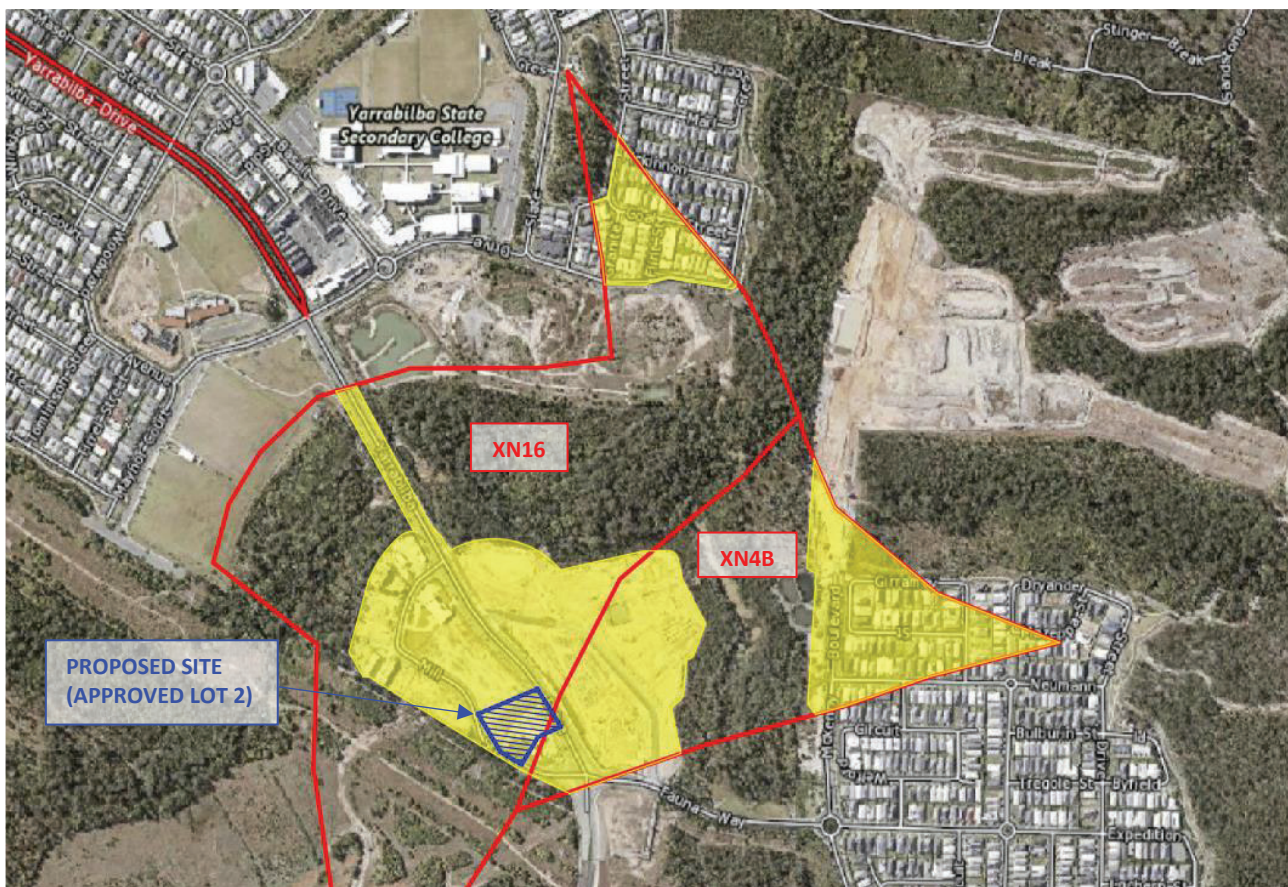


Figure 4: Sub-Catchment impervious to pervious boundary areas (Queensland Globe)

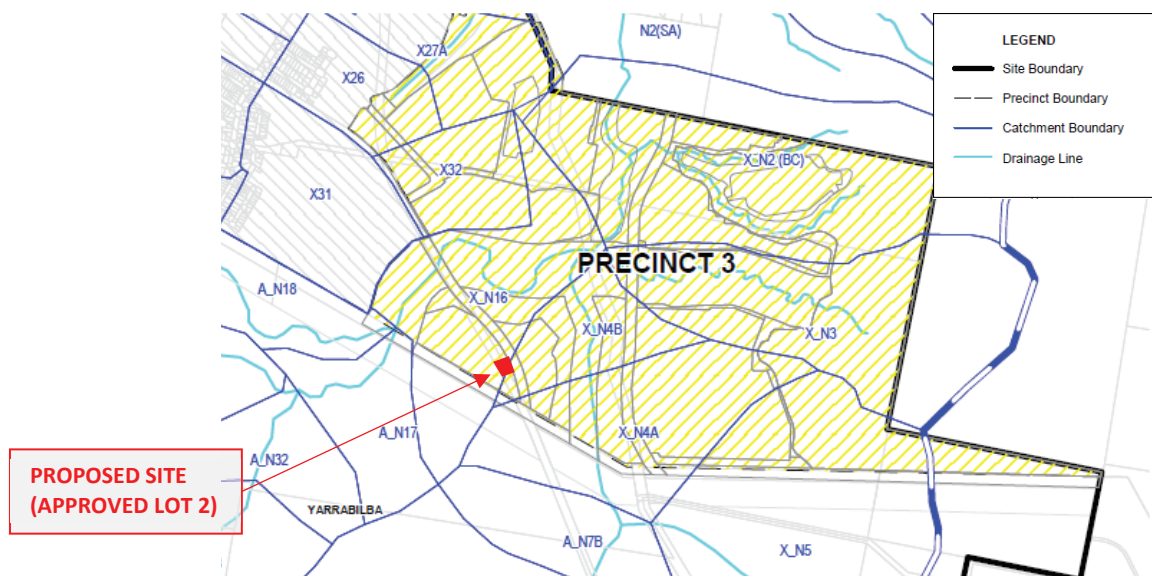


Figure 5: Sub-Catchment Plan (Yarrabilba Precinct 3 Flood Study)

Overlaying recent aerial photographs of the precinct with the approximate extent of the abovementioned sub-catchments, it can be seen that the extent of the impervious/developed areas (highlighted yellow in Figure 4 above) are approximately in line with the assumptions made in the flood modelling study. Therefore, it has been assumed that the runoff from the proposed development has already been allowed for in the overall Yarrabilba Precinct 3 stormwater quantity management and flood mitigation measures (detention basins).

7.0 WATER QUALITY ASSESSMENT

7.1 Construction Phase

Impacts on receiving waters and surrounding areas will be minimised during the construction phase with measures as outlined in this SBSMP and the Erosion and Sediment Control Plan to be developed for the Operational works.

7.1.1 Pollutants

Typical pollutants generated during the construction phase of the development are shown below in Table 15.

Table 2: Pollutant typically generated during the construction phase

Pollutant	Sources
Litter	Paper, construction packaging, food packaging, cement bags, off-cuts
Sediment	Unprotected exposed soils and stockpiles during earthworks and building
Hydrocarbons	Fuel and oil spills, leaks from construction equipment
Toxic materials	Cement slurry, asphalt prime, solvents, cleaning agents, wash-waters
pH altering substances	Acid sulphate soils, cement slurry and wash-waters

7.1.2 Performance objectives

The objectives are:

- Minimise the amount of sediment entering waterways and stormwater drains;
- Minimise or prevent environmental harm to waterways and associated ecosystems;
- Minimise localised flooding caused by sediment runoff;
- Minimise exposure of soils.

Table 3: Construction phase performance criteria

Indicator	Water Quality Objectives
pH	6.5 – 8.5
Suspended Solids	Annual Mean < 10mg/L
Oils and Grease	No visible films or odour
Litter/ Gross pollutants	No anthropogenic (man-made) materials greater than 5mm in any dimension
Dissolved oxygen	80-100% saturation

7.1.3 Monitoring and maintenance

The general requirement of monitoring during the construction phase will be:

- Work activities are restricted to designated construction areas;
- Earthworks and site clearing are undertaken in accordance with an Erosion and Sediment Control Plan;
- Erosion and sediment control devices are to be constructed/installed in accordance with an Erosion and Sediment Control Plan;

- Inspection of sediment fences, erosion and sediment control structures/devices on a weekly basis as well as after any rain event exceeding 25mm in 24hrs (major storm event);
- Stormwater discharges from the site are not having any adverse effect on the downstream environment;
- Monitoring and recording of the performance of the drainage control devices including water quality testing where required;
- Any failure in the stormwater system shall be immediately rectified to prevent uncontrolled discharge from the site;
- Any failure to the stormwater system causing damage to surroundings should implement immediate remedial work to the damaged area.

7.1.4 Responsibility and reporting

- The contractor shall be responsible for monitoring the performance of all drainage control and erosion and sediment control devices;
- Records of any failures to devices should be kept and reported to the Construction Manager;
- Regular inspections of the devices shall be reported to the Construction Manager;
- Inspections of the devices after heavy rainfall shall be reported to the Construction Manager;

7.2 Operational Phase

7.2.1 Pollutants

The key pollutants typically generated during this phase for the entire catchment are shown in Table 17.

Table 4: Pollutant typically generated during the operational phase

Pollutant	Potential Source
Litter / Gross Pollutants	Waste materials, food, food packaging etc.
Hydrocarbons	Fuel and oil spills, dispensing areas, car park
Nutrients (N & P)	Nitrogen, Phosphorus
Sediments	Aggregates bins, wind deposits and car trails
Surfactants	Detergents, cleaning agents

7.2.2 Water Quality Objectives

Based on Yarrabilba – Stormwater Infrastructure Master Plan (Designflow, 2012), which are consistent with the State Planning Policy (2017), the development is required to achieve the TN, TP and TSS pollutant reductions outlined in Table 18.

Table 5: Operational Phase water quality objectives

Pollutant	Reduction*
Total Suspended Solids	80%
Total Phosphorus	60%
Total Nitrogen	45%
Gross Pollutants >5mm	90%

**These values represent the minimum required reductions in the average annual pollutant loads generated from an unmitigated development.*

7.3 Proposed Stormwater Treatment

7.3.1 Stormwater treatment philosophy

Waterways and other aquatic environments are valued by the community for their social, cultural, economic and environmental benefits. Urban runoff, contaminated with nutrients, sediment and other pollutants adversely impacts these valued resources. Water Sensitive Urban Design (WSUD) is a holistic approach to the planning and design of urban landscapes that minimises these negative impacts. This approach is used on this project to select the treatment options that considers the civil, landscape and ecological aspects of the site.

7.3.2 Source Controls

Rubbish bins can be an effective source control for litter and are appropriate for most developments. Bins will be placed in appropriate areas (such as buildings and staff amenity) to encourage thoughtful waste disposal.

7.3.3 In Ground Proprietary Treatment Devices

In ground proprietary stormwater treatment devices are useful for treatment of stormwater on sites that are constrained by available area for stormwater treatment. These devices are installed underground and can remove a full range of pollutants from stormwater, including TSS, soluble heavy metals, oil, grease and nutrients.

7.3.3.1 Stormwater Treatment Device:

All runoff will discharge into a combined SPEL detention tank and filtration system for treatment. The SPEL SF.45-EMC-M filter system has the capacity to treat flows and achieve reduction of gross pollutants with a 2.83L/s treatment capacity (per filter) and achieves reduction of gross pollutants (GP) 91%, suspended solids (TSS) 91%, total phosphorus (TP) 75%, total nitrogen (TN) 58%. Refer to section 7.5 for the proposed development MUSIC modelling assessment. Refer to App

7.4 MUSIC Modelling

7.4.1 Introduction

The Model for Urban Stormwater Improvement Conceptualisation (MUSIC - Version 6.3) was used to assess the performance of the proposed stormwater treatment measures required to achieve statutory pollutant reduction targets for the operational phase of the project.

7.4.2 Music Model Setup

The input parameters for source node, soil behaviour and pollutant generation characteristics are based on Table A1.2 and 3.9 of MUSIC Modelling Guidelines Version 3.0 - 2018, WaterByDesign (2018). The following inputs were used:

- MUSIC Modelling Guidelines Version 3.0 - 2018, WaterbyDesign
- Queensland Urban Drainage Manual (QUDM), Second Edition 2016
- Ormeau Station No: 40863

The details of the catchments/source nodes used in the MUSIC model and the proposed treatment train modelled are shown in Table 19 below.

Table 6: MUSIC catchment parameters

Catchment	Total Area (m ²)	Split Catchment Area (m ²)	Land Use	% Impervious	Proposed treatment train
Proposed Development	4,737	516	Roof areas	100	SPEL SF.45-EMC-M filters SPEL Stormsacks
		3,258	Paved areas	100	
		963	Landscaped areas	0	

The proposed stormwater treatment train modelled in MUSIC consists of a combined system of SPEL stormsacks and SPEL filters for the site. Figure 8 below shows a schematic representation of the models analysed and Table 21 demonstrates that the pollutant load reduction objectives for the site have been achieved, i.e. the treatment methods proposed are adequate.

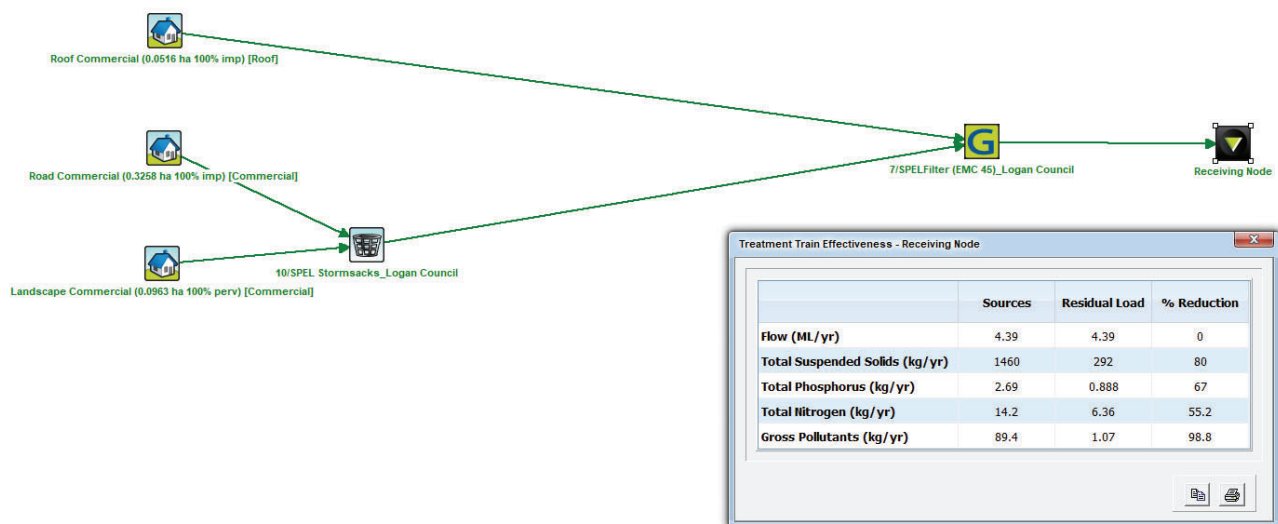


Figure 6: MUSIC model schematic Cnr Yarrabilba Drive & Mill Street, Yarrabilba QLD 4207

7.4.3 Music Modelling Results

The proposed stormwater treatment measures were modelled in MUSIC as a treatment train consisting of an SPEL SF.45-EMC-M filter system for the post-development catchment. Table 20 below show details of proprietary products modelled in MUSIC.

Table 7: Details of proprietary treatment systems as modelled in MUSIC

Catchment	System Used	Number of Units
Post-Dev.	SPEL SF.45-EMC-M filter	7
	SPEL Stormsacks	10

Table 21 below, demonstrates that the pollutant load reduction objectives for the site have been achieved, i.e. the treatment methods proposed are adequate.

Table 8: MUSIC model treatment effectiveness

Parameter	Required Load Reduction	Music Results	Objective Achieved
Total Suspended Solids	80.0%	80.0%	Yes
Total Phosphorus	60.0%	67.0%	Yes
Total Nitrogen	45.0%	55.2%	Yes
Gross Pollutants	90.0%	98.8%	Yes

8.0 SITE MAINTENANCE AND MANAGEMENT PROCEDURES

A regular cleaning, maintenance program/contract is to be established by the site operator for emptying of rubbish bins located around the site, removal of general litter from the site, inspection of stormwater gully pits and removal of any captured litter from the pit grates.

The maintenance program will address the following:

- Inspection frequency;
- Maintenance frequency;
- Data collection/storage requirements;
- Detailed cleanout procedures.

The plan will include inspection procedures covering aspects such as equipment needs, maintenance techniques, occupational health and safety, public safety, environmental management considerations, disposal requirements of pollutants collected and access issues.

8.1 Maintenance Plans for Stormwater treatment devices

All stormwater quality improvement systems require regular maintenance in order to function adequately. Table 22 details the basic maintenance requirements for each type of stormwater quality improvements systems. A detailed maintenance schedule will be developed as part of the detailed design of the site.

Table 9: Maintenance Requirements

Control	Maintenance Requirement	Maintenance Period
Spel Filters	Inspect for any damage to filter cartridge or chamber. Remove sediment accumulated on the vault floor.	4 Months (inspect after major storm)
SPEL Stormsacks	Remove sediment and captured litter	4 Months (inspect after major storm)

For operational and maintenance guidelines refer to **Appendix E** and relevant manufacturer's documentation.

9.0 LIFECYCLE COSTS

A lifecycle cost analysis is not part of the scope of this report. All the recommended water quality treatment infrastructure lies within the development site and it shall be maintained and serviced by the owners of the development at no cost to Council.

10.0 CONCLUSION

A Site Based Stormwater Management Plan has been prepared with respect to the proposed service station and food & drink premises. The location of the site is shown on Figure 1 and the proposed development site layout is shown in **Appendix A**.

- **Stormwater Quantity**
The required “no worsening” of stormwater conditions external to the site is maintained as per the Yarrabilba Flood Study of 2016, since the proposed impervious fraction of the site is already incorporated in the impervious areas of the order of 37% and 33% for the corresponding sub-catchments. Therefore, on-site detention is NOT required.
- **Stormwater Quality- Construction Phase**
An Erosion and Sediment Control Plan aimed at minimising unacceptable impacts during the construction phase will be developed at the Operational Works stage, in accordance with Council Guidelines and Standards aiming to minimise unacceptable impacts to occur during the construction phase.
- **Stormwater Quality- Operational Phase**
Conceptual MUSIC models for the site indicated that the proposed treatment measures will achieve the statutory water quality objectives for the site. Refer section 7.4 of this report for details. The proposed treatment is shown in **Appendix C**.

This Site Based Stormwater Management Plan has demonstrated that adequate stormwater quantity and quality management principles and techniques will be employed during the construction and operational of this development to comply with the Queensland State Planning Policy 2017, Yarrabilba Stormwater Infrastructure Master Plan (DesignFlow, 2012), Yarrabilba Total Water Cycle Management Strategy (Designflow, 2012) and Queensland Urban Drainage Manual 2016. The methods proposed are considered current best management practice for a development of this type, on this site.

Yours faithfully



Butholezwe Masuku
BEng (Hons), MIEAust
Civil Engineer

For and on behalf of TfA Group

Reviewed by



Juan Avella (RPEQ 11899)
BEng, MIEAust, CPEng, RPEQ, NER
Director Civil/Structural Engineering

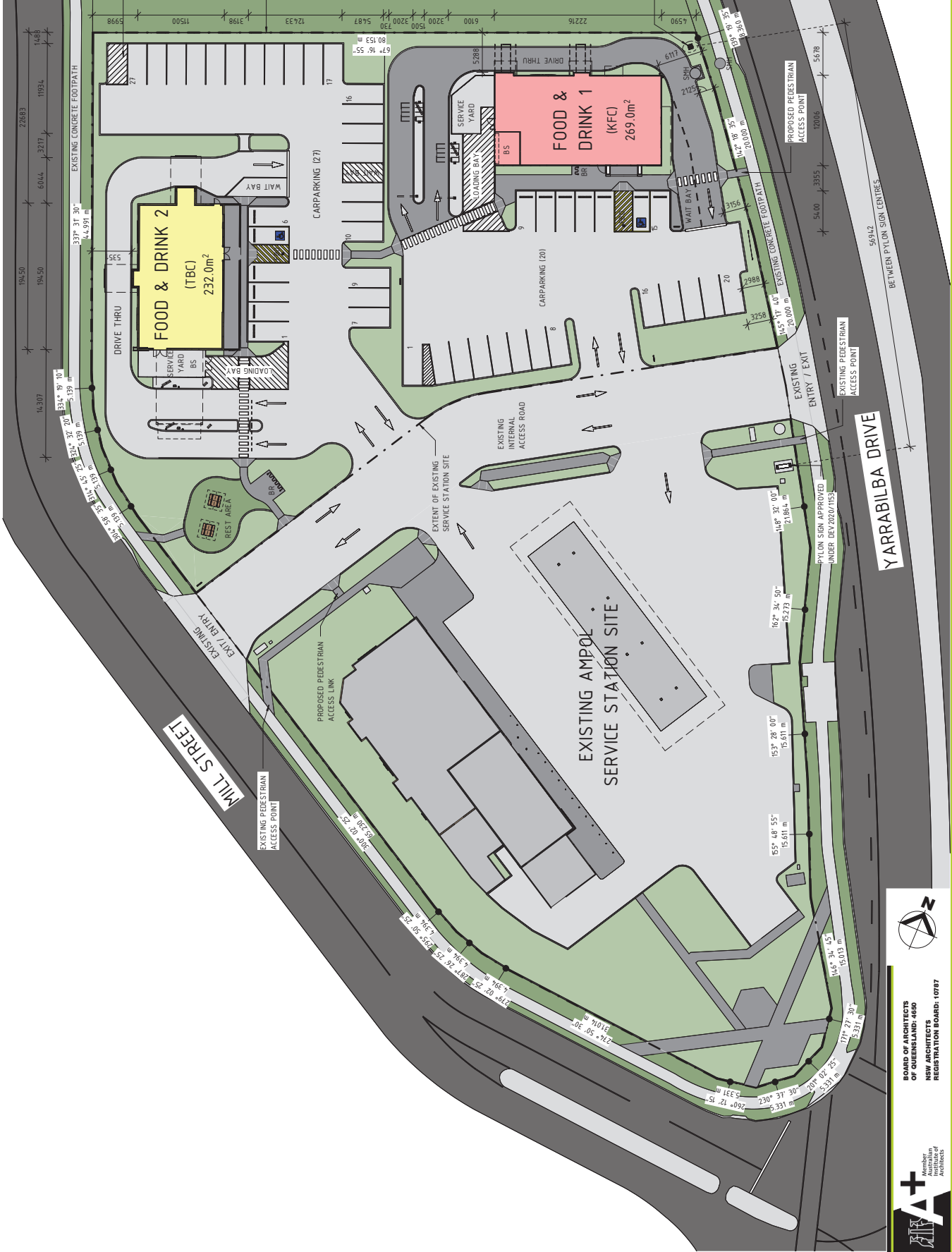
For and on behalf of TfA Group

APPENDIX A – PROPOSED SITE LAYOUT PLAN

RPD

LOT 12 on SP304.357

AREA: 10,04.0 m²
(DEVELOP. AREA 4,737 m²)
LGA: LOGAN CITY COUNCIL

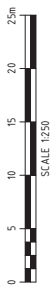


DEVELOPMENT AREA SITE COVERAGE	
BUILDINGS	501m ² 10.6%
HARDSTAND	3,051m ² 64.4%
LANDSCAPING	989m ² 20.9%
WALKWAYS	196m ² 4.1%
TOTAL	4,737m ² 100%

LEGEND	
BR	BIKE BACK
BS	BIN STORE
FBO	FLEXIBLE BOLLARD
SPH	SEWER MAN HOLE (EXISTING)
---	BOUNDARY

NOTES:

- CARPARKING & ROAD AISLES TO BE IN ACCORDANCE WITH AS2890.1 & AS2890.6
- STANDARD PARKING BAYS PROVIDED AT 5.4m x 2.6m WITH MIN. 6.6m AISLES
- DISABLE PARKING BAYS TO BE 5.4m x 2.4m WITH 5.4m x 2.4m SHARED BAY.
- LINE MARKING SHOWN INDICATIVE ONLY, SUBJECT TO CHANGE AT DETAIL DESIGN BY TRAFFIC ENGINEER
- PRELIMINARY ONLY - NOT FOR TENDER OR CONSTRUCTION



PROPOSED OVERALL SITE LAYOUT

PROPOSED FOOD & DRINK OUTLETS

for: AMPOL AUSTRALIA PETROLEUM PTY LTD

CNR YARRABILBA DRIVE & MILL STREET, YARRABILBA, QLD, 4207

PROJECT DETAILS

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APPENDIX B – SITE SURVEY PLAN

APPENDIX C – CONCEPTUAL STORMWATER MANAGEMENT PLAN

APPENDIX D – STORMWATER & OILY WATER TREATMENT SYSTEMS



**Operation &
Maintenance Manual**

Spel Filter[®]

Cartridge Filter For Tertiary Stormwater Treatment



spel.com.au

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Introduction

Understanding how to correctly and safely maintain the SPELFilter is essential for the preservation of the filter's condition and its operational effectiveness. The SPELFilter is a highly engineered stormwater filtration device designed to remove sediments, heavy metals, nitrogen and phosphorus from stormwater runoff.

The filters can be housed in either a concrete or fibreglass structure that evenly distributes the flow between cartridges.

Flow through the filter cartridges is gravity driven and self-regulating, which makes the SPELFilter system a low maintenance, high performance stormwater treatment device.

This Guide will provide the necessary steps that are to be taken to correctly and efficiently ensure the life of the SPELFilter product



Figure 1 - SPELFilters in a concrete chamber / vault

Features

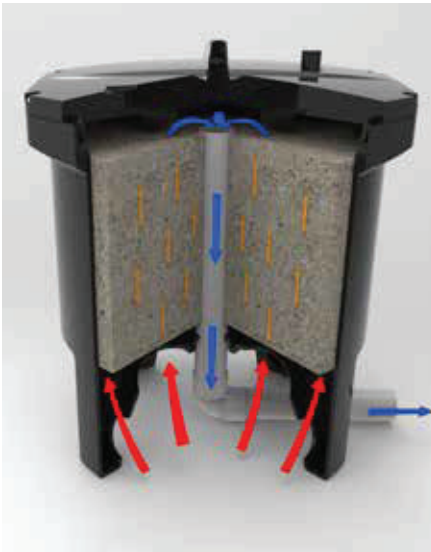


Figure 2 - Diagram of water flow through SPELFilter

The SPELFilter has a patented design that facilitates influent flow over the entire surface area of the media, providing consistent pollutant removal within a small footprint.

The SPELFilter provides highly effective media filtration using gravity flow conditions, without the need for moving parts or floating valves. This eliminates the risk of mechanical failure, such as stuck valves and seizing components during its service life. This provides highly robust treatment performance.

Hydraulic head provided by a suitably sized weir in the filter vault forces stormwater through the filter media via the inlet ports underneath the filter cartridge. Refer to the table below for minimum head required for the SPELFilter cartridges to assist in sizing the weir.

The water to be treated enters the SPELFilter cartridge via an upwards direction as the water level builds up around the SPELFilter. This 'up flow' reduces the amount of sediment that could enter the media cartridge, as the sediment is allowed to drop to the vault floor under gravity. Any remaining sediment in the water is introduced through the filter media under hydraulic pressure and is filtered.

Water is filtered through the media, where dissolved and particulate Total Nitrogen and Total Phosphorus are removed via reaction with the media, in addition to the removal of Total Suspended Solids / sediment.

SPELFilter Media Self-Backwash feature

A one-way air release valve located at the top of the filter cartridge allows air to escape as the cartridge fills up with water. This creates a siphonic flow condition as the air is completely evacuated from inside the SPELFilter cartridge. Siphonic flow conditions are maintained until such time the water level outside of the cartridge falls beneath the inlet ports underneath the filter. At this moment, the water level inside the SPELFilter cartridge is higher than the surrounding water level. The water inside the SPELFilter cartridge is then expelled upon the break of the siphon, and the water flows down and out of the inlet ports under gravity, onto the vault floor.

This is a highly effective backwash of the media and allows the expulsion of a high proportion of sediment out from the SPELFilter media. The expelled sediment can be removed either manually or with a vacuum from the vault floor.

This backwash effect allows the media to remain highly conductive and is the key to the industry leading longevity of the SPELFilter cartridge system, which does not need replacement for at least 5 years, and typically will achieve up to 6-8 years of service, subject to the SPELFilter being regularly maintained in accordance with this guideline and in accordance with the specific needs of the catchment.



Figure 3 - Typical Outlet Weir Wall

Features

Self Supporting Feet

Each SPELFilter cartridge stands on 4 feet, which negates the need for the construction of a false floor in the vault. The feet are bolted to the vault floor with the supplied stainless steel angles and M10 bolts. The feet allow a clear height from the vault floor up to the inlet ports of 240mm. The absence of a false floor allows plenty of room for backwashed sediment to evacuate from underneath the cartridges and thereby avoid blocking the inlet ports to the SPELFilter from sediment buildup. It is for this reason that SPEL recommended the sediment buildup not exceed 150mm above the vault floor, so as to avoid blocking the inlet ports of the SPELFilter. Blockage of the inlet ports due to sediment accumulation in the vault floor will cause the SPELFilter to go into bypass and be ineffective. Hence it is important to keep up to date with monitoring and maintaining the SPELFilter vault.



Figure 4 - Bolting the feet

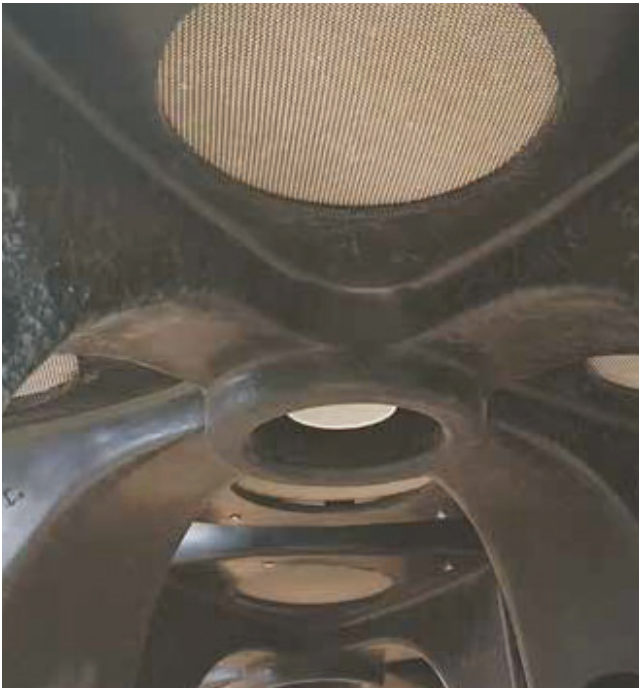


Figure 5 - Underside of the SPELFilter showing the screened inlet ports and the connection for the outlet pipe in the middle



Figure 6 - the top of the SPELFilter showing the location of the one way air valve

Sizes

SPEL Stormwater manufactures two height cartridges for varying site constraints as shown below. Each cartridge is designed to treat stormwater at a flow rate of 1.47 Litres per second and 2.83 Litres per second for the half-height cartridge (model No. SF.15-EMC-M) and full-height cartridge (model No. SF.30-EMC-M) respectively.

	Full Height SF.30-EMC -M	Half height SF.15-EMC-M
SPELFilter total height	874mm	560mm
SPELFilter Diameter	726mm	726mm
Minimum Head required	850mm	550mm
Treatment flow rate	3 L/s	1.5 L/s
Height of inlet ports above vault floor	250mm	250mm
Filtered water collection pipe diameter	50mm	50mm

SPELFilter Full Height- SF.30-EMC-M



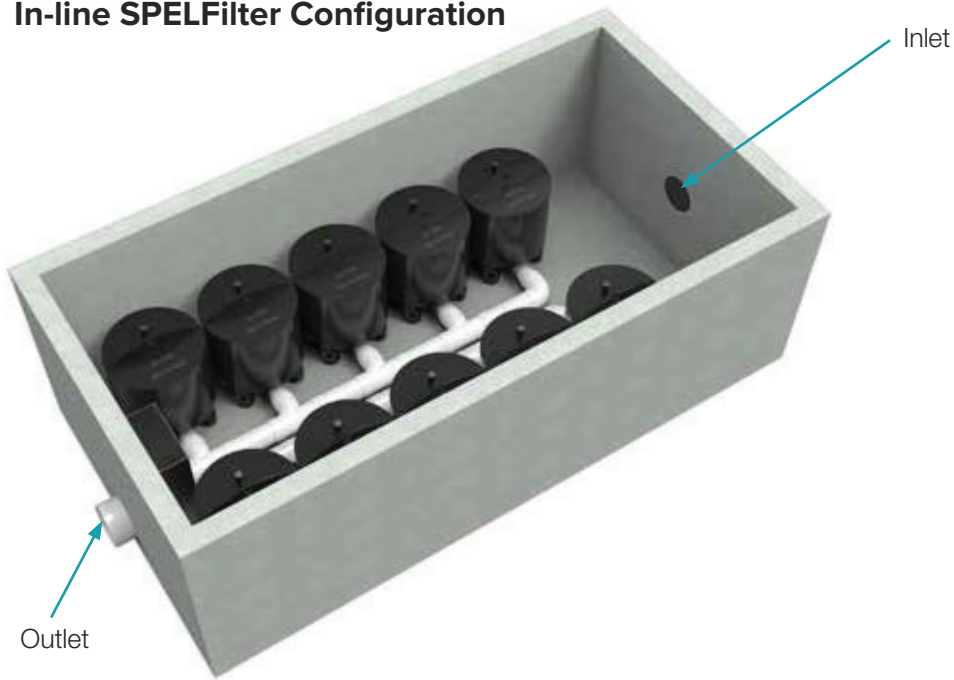
SPELFilter Half Height - SF.15-EMC-M



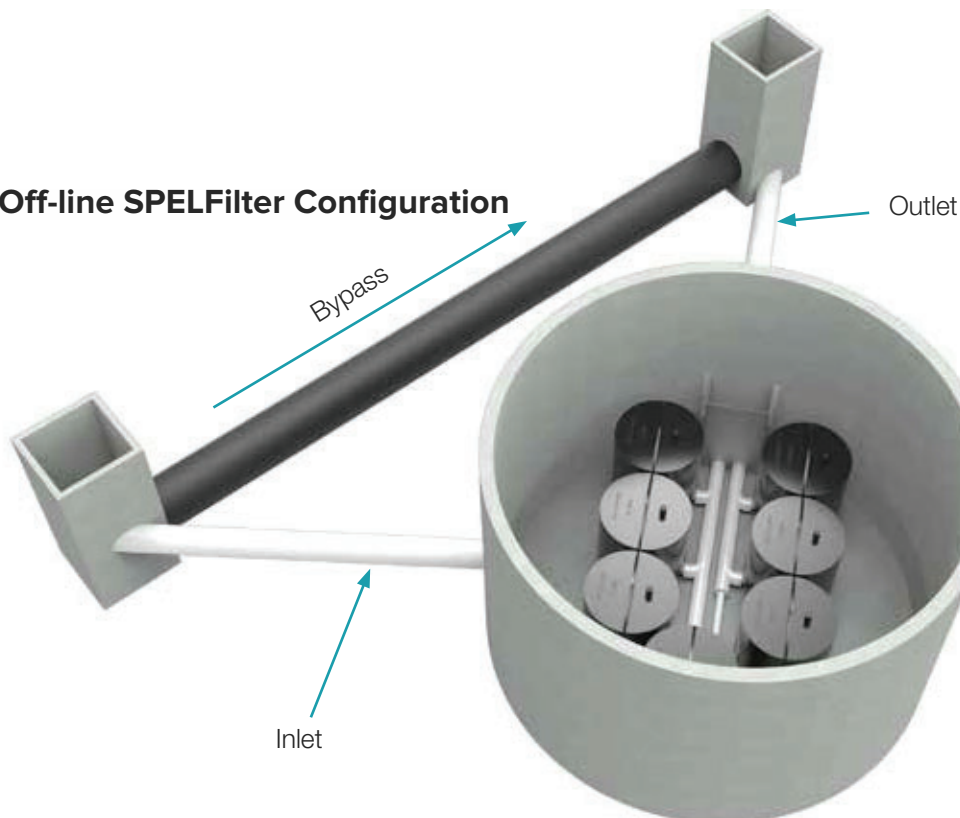
System Configuration

SPELFilter cartridges are installed in concrete or fibreglass tanks commonly referred to as 'vaults'. The vault selection and configuration are based on site characteristics and/or constraints; computational stormwater quality modelling; and selected SPELFilter models. Typical SPELFilter system configurations are shown below.

In-line SPELFilter Configuration



Off-line SPELFilter Configuration



Health and Safety

A. Personal Health & Safety

When carrying out the necessary installation operations of the SPEL Filter all contractors and staff personnel must comply with all current workplace health and safety legislation.

The below measures should be adhered to as practically as possible.

- Comply with all applicable laws, regulations and standards
- All those involved are informed and understand their obligations in respect of the workplace health and safety legislation.
- Ensure responsibility is accepted by all employees to practice and promote a safe and healthy work environment.

B. Personal Protective Equipment / Safety equipment

When carrying out the necessary installation operations of the SPEL Filter, wearing the appropriate personal protective equipment and utilising the adequate safety equipment is vital to reducing potential hazards.

Personal protective equipment / safety equipment in this application includes:

- Eye protection
- Safety apron
- Fluorescent safety vest
- Form of skin protection
- Puncture resistant gloves
- Steel capped safety boots
- Ear muffs
- Hard hat/s
- Sunscreen

C. Confined space

In the event access is required into the vault, confined space permits will be required which is not covered in this Guide. Typical equipment required for confined space entry include:

- Harness
- Gas detector
- Tripod
- Spotter

D. Traffic Control

It is not uncommon for SPEL Filter cartridges to be installed underneath trafficable areas. Minimum traffic control measures will need to be put in place in accordance with traffic control plans set out by respective local and state road authorities.



Vaults are to be treated as confined space. Entry by permit only.



Monitor weather conditions prior to operation maintenance. Do not enter a vault during an episode of heavy rain as this can create a risk of drowning.





Maintenance Frequency

The SPELFilter's design allows for a greater life span when frequently maintained. Maintenance is broken up into three categories which include: standard inspection; general cleaning; and cartridge replacement.

Standard inspection

Standard inspections are conducted at regular four-month intervals. At this time, an approved trained maintenance officer or SPEL representative shall undertake all measures outlined in Maintenance Procedure, Standard Inspection.

General Cleaning

At the end of each standard inspection, trigger measures will identify if general cleaning is required. General cleaning will need to be executed immediately during standard inspections if the following triggers are satisfied:

- Build-up of debris/pollutants within the vault greater than 150mm;
- Accumulation of debris/pollutants on the outlet chamber of the SPELFilter vault;
- After large storm events, tidal or flooding impacts at the request of the owner;

Cartridge Replacement

Stormwater treatment is dependent on the effectiveness of the SPELFilter cartridge system. As the SPELFilter ages, pollutants will inundate the cartridge and ultimately reduce the treatment flow rate. At this point, a SPELFilter flow test apparatus will be used to determine if replacement cartridges are required.

Based on the [site] concept modelling (MUSIC) and previous industry experience, we estimate the life of the SPELFilter to be between 6 - 8 years. As a minimum requirement, each SPELFilter cartridge should be replaced within 10 years.

The life cycle of the SPELFilter can be impacted if standard inspections and general maintenance is not undertaken in accordance with this operation and maintenance Guide. Other factors that will affect the above life cycle of the SPELFilter include:

- Installation of cartridge system during construction phase and impacted by construction sediment loads;
- Neglecting to install pre-treatment using an industry approved GPT or a surface inlet pit trash bag such as the SPEL StormSack.
- Unforeseen environmental hazards affecting the SPELFilter functionality.

Maintenance Procedures

Stormwater pollutants captured and retained by the SPELFilter system need to be periodically removed to ensure environmental values are upheld. All associated maintenance works is heavily dependent on the site's operational activities and generated stormwater pollutants. To ensure the longevity of the installed SPELFilter treatment system, it is imperative that the procedures detailed in this Guide are followed and all appropriate measures are actioned immediately.

Standard inspection

The standard inspection requires personal experience of SPEL products to visual inspection the vault and filter conditions.

Confined space requirements may not be required if a full inspection and assessment of each SPELFilter can be achieved at surface level without being deemed a confined space entry.

The standard inspection requires personal experience of SPEL products to visual inspection the vault and filter conditions.

Confined space requirements may not be required if a full inspection and assessment of each SPELFilter can be achieved at surface level without being deemed a confined space entry.

Site Inspection Procedures

1. Implement Pre-start safety measures.

Ensure that the area in which operational works are to be carried out is cordoned off, to prevent unauthorised access. Adequate safety barriers must be erected. Area in which work is to be carried out must be clean, safe and hazard free. (Refer to figure 4.)

2. Set-up Gantry Tri-pod above Manhole.

Assemble and position the gantry above the manhole safely and as practically as possible. Attach the winch or chain block to the gantry for lifting the SPEL Filters. Perform safety procedures ie. Attach harnesses etc. (if confined space).

3. Open manhole lid.

Once you have sent up the Gantry and ensured that the area is safe to operate in, you can proceed to open the manhole lid, using lid lifters.

4. Conduct Gas tests.

(If tank is classed confined space)

Once the lids have been removed to a safe distance to prevent tripping, you must then proceed to conduct gas tests. Perform necessary gas tests according to the confined space regulations.

5. Once confined space has been deemed safe to operate in, enter tank safely.

Once you have carried out the required gas test and the work area is deemed safe, you may then enter the pit via a ladder or winch system to assess the work area you will be operating in. Ensure all confined space

6. SPELFilter system assessment.

Perform a review of the SPELFilter system using the SPELFilter assessment report/checklist. Sign off and forward a copy of the report to property manager and SPEL representative.

7. Reinstate SPELFilter system and disposal.

At the completion of the site inspection, ensure the site is reinstated back to its initial state and all pollutants are removed from the site in line with pollutant disposal procedures.

8. Sign off and forward a copy of the report to property manager and SPEL representative.

General Cleaning

Vacuum out of Filter tank, removal, and disposal of pollutants at the completion of a standard inspection, general cleaning may be deemed necessary immediately or scheduled for a future date. Steps undertaken for general cleaning should be in general accordance with the procedure outlined below but not limited.

1. Implement Pre-start safety measures.

Ensure that the area in which operational works are to be carried out is cordoned off, to prevent unauthorised access. Adequate safety barriers must be erected. Area in which work is to be carried out must be clean, safe and hazard free. (Refer to figure 4.)

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6. SPELFilter system assessment.

Perform a review of the SPELFilter system using the SPELFilter assessment report/checklist.

7. Pollutant removal from tank.

Perform clean-up using a licenced vacuum truck contractor or wet/dry vacuum, depending on level of sediment built up and/or tank size.

8. Reinstate SPELFilter system and disposal.

At the completion of the site inspection, ensure the site is reinstated back to its initial state and all pollutants are removed from the site in line with pollutant disposal procedures.

9. Sign off and forward a copy of the report to property manager and SPEL representative.

Cartridge Recycling and Replacement

SPELFilter cartridges can be swapped out for new cartridges. The spent SPELFilter cartridges can be collected from site and sent to SPEL Stormwater's facilities – where the spent media will be removed from the cartridge in factory conditions and disposed of in accordance with environmental regulations.

The SPELFilter cartridge will be recharged with new media – thereby recycling and repurposing the cartridge.

SPEL Filter replacement procedures may vary depending on the configuration of the SPEL Filters, the type of vault and engineers' specs. Replacement instructions for manhole SPEL Filter systems and precast vault SPEL Filter systems are contained in this section.

At the completion of a standard inspection, SPEL Filter replacement may be deemed necessary immediately or scheduled for a future date. Steps undertaken for cartridge replacement should be in general accordance with the procedure outlined below but not limited.

1. Implement Pre-start safety measures.

Ensure that the area in which operational works are to be carried out is cordoned off, to prevent unauthorised access. Adequate safety barriers must be erected. Area in which work is to be carried out must be clean, safe and hazard free.

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5. Once confined space has been deemed safe to operate in, enter tank safely.

Once you have carried out the required gas test and the work area is deemed safe, you may then enter the pit via a ladder or winch system to assess the work area you will be operating in. Ensure all confined space procedures are followed.

6. Remove exhausted cartridges.

Disconnect all internal pipe work from inside the vault. Un-bolt anti-floatation measures and remove cartridges from the vault using Gantry Tri-pod method.

7. Pollutant removal.

Using a wet/dry vacuum or sucker truck, suck out all the residual pollutant from the vault.

8. Install pipework and SPEL Filters.

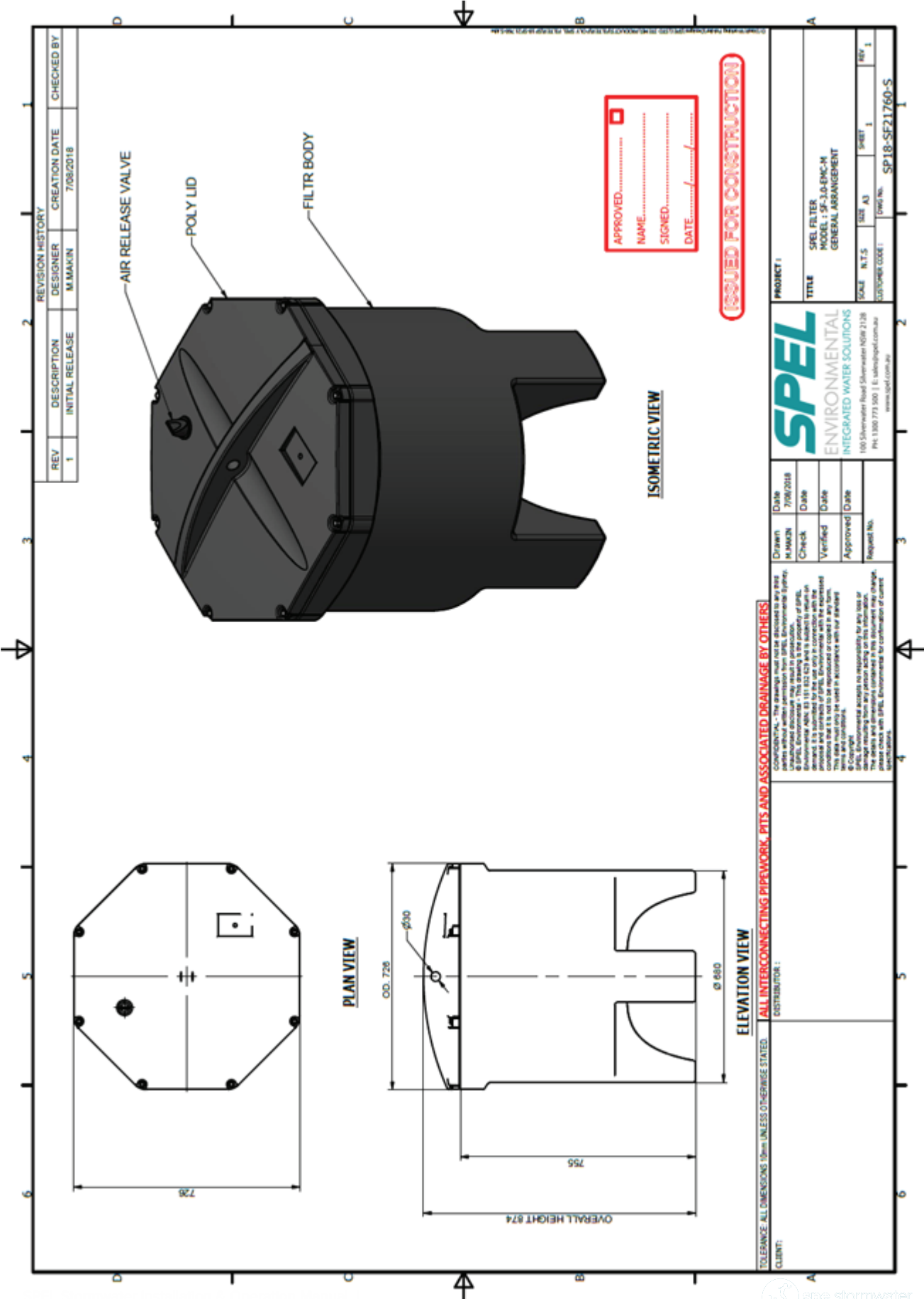
Please refer to the below standard install diagrams for the SPEL Filters. Then refer to your site specific drawings, as site requirements may require something different to the standard layout. Lower filters into tank, position into place, connect filter outlet pipework with the supplied fittings.

9. Install anti-floatation system.

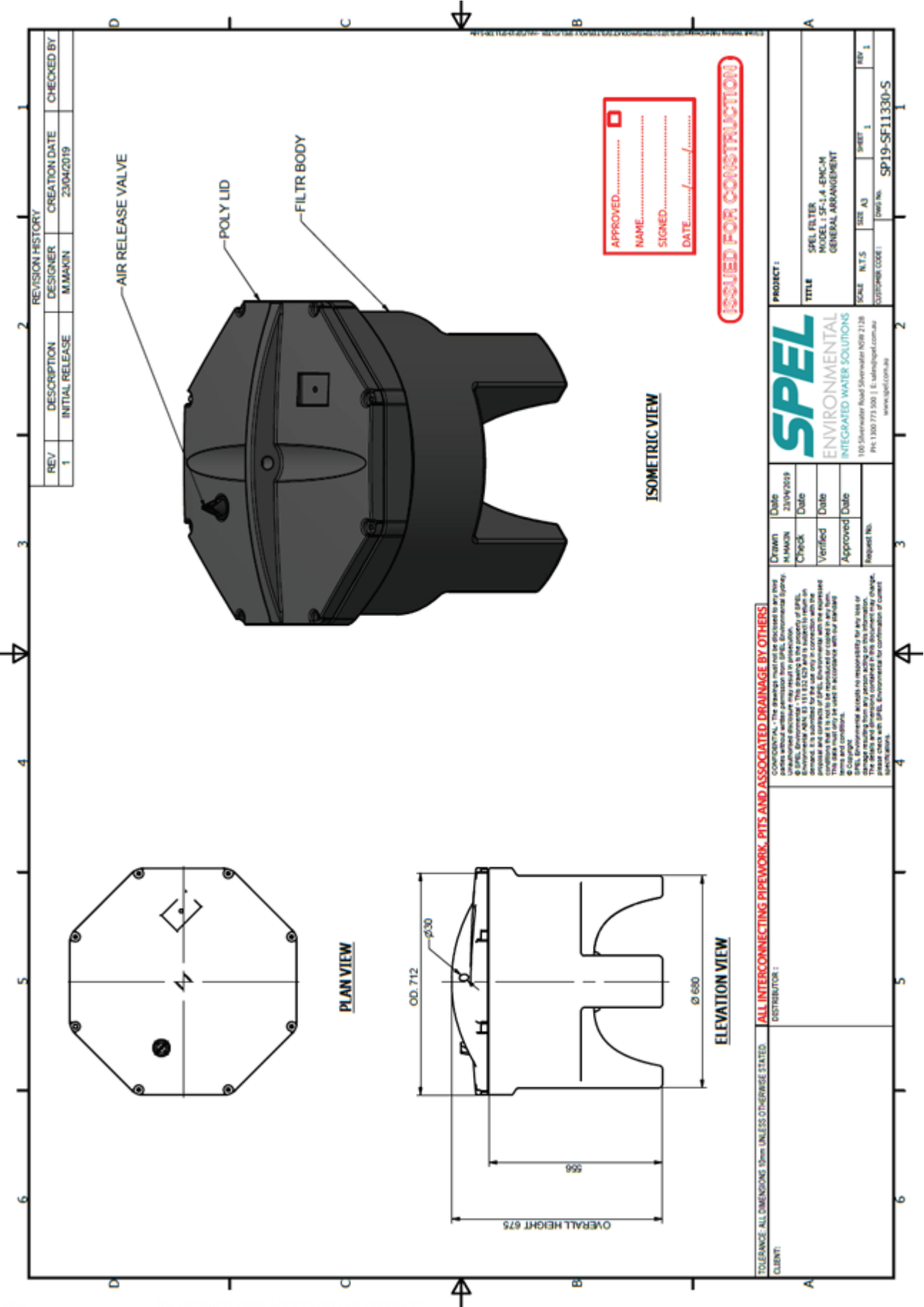
Please refer to the detailed drawings showing how the Anti – Floatation (Anchor) bars are to be installed.

10. Sign off and forward a copy of the report to property manager and SPEL representative.

Standard Drawings - Full Height



Standard Drawings - Half Height



Site Exit & Clean Up

At the end of the scheduled maintenance, approved contractors or SPEL maintenance crew are required to reinstate the site to pre-existing conditions. Steps included but limited to are:

- Ensure all access covers are securely inserted back into their frames;
- Remove and dispose collected pollutants from the site in accordance with local regulator authorities;
- Retrieve all traffic control measures and maintenance tools; and
- Return all exhausted and/or damaged SPEL products to SPEL Stormwater to begin recycling program.





spelstormwater
joy in water

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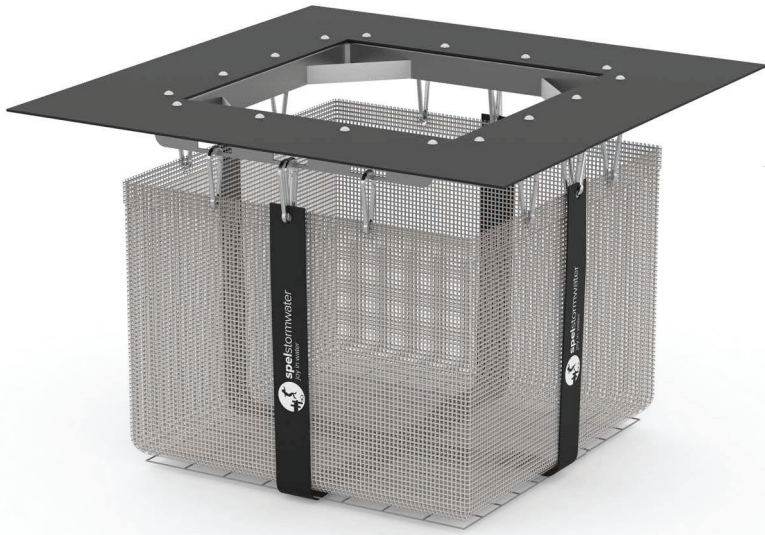
SPEL Stormsack

At Source Gross Pollutant Trap



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APPLICATIONS

- Council storm drain retrofits
- Commercial / retail / residential
- Litter prone urban areas
- Scrap metal / solid waste / oil storage
- Part of treatment train
- Construction sediment / erosion



BENEFITS

- Can be modelled in MUSIC in conjunction with bio-retention
- Low cost gross pollutant capture
- Quick & easy installation
- Simple maintenance
- At source capture
- Adjusts to custom pit sizes

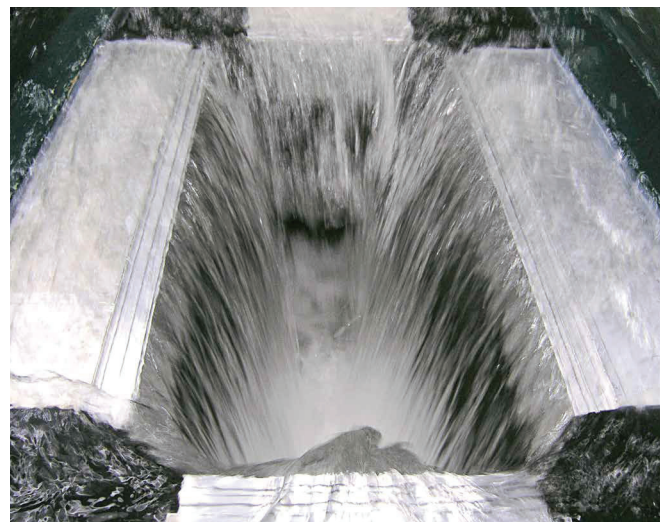
The SPEL Stormsack is specifically designed for the capture of gross pollutants: sediment, litter, and oil and grease. Ideally suited for storm drain retrofits, the SPEL Stormsack's unique design allows maintenance to be performed using conventional vacuum suction equipment.

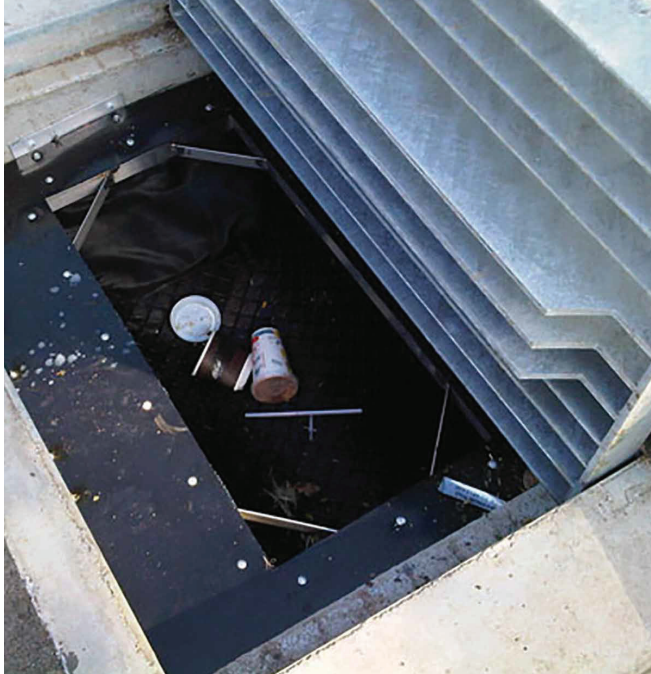
SPEL Stormsack filtration solutions are highly engineered water quality devices that are deployed directly in the stormwater system to capture contaminants close the surface for ease of maintenance. Easily retrofitted into new or existing structures, SPEL Stormsack filtration technology is a decentralized approach to stormwater treatment that essentially repurposes traditional site infrastructure and customizes it to meet specific site water quality goals. In this way, it satisfies important objectives of today's LID (Low Impact Development) criteria.

From an operations perspective, catch basins with SPEL Stormsack filters are also easier and quicker to clean out because pollutants are trapped just under the grate.

The SPEL Stormsack was introduced to the Australian market in 2012 and field testing is underway at several locations in South-east Queensland. Laboratory testing has shown capture of 99.99% of gross pollutants up to the bypass flow rate.* Further results will be provided as they become available.

Recommended minimum clearance from bottom of SPEL Stormsack to inside bottom of vault is 50mm. Typical frame adjustability range of 127mm in each direction.





HOW IT WORKS

This technology is a post developed stormwater treatment system. The SPEL Stormsack provides effective filtration of solid pollutants and debris typical of urban runoff, while utilising the existing or new storm drain infrastructure. The Stormsack is designed to rest on the flanges of conventional catch basin frames and is engineered for most hydraulic and cold climate conditions.

Installation procedures shall include removing the storm grate, cleaning the ledge of debris and solids, measuring catch basin clear opening and adjusting flanges to rest on grate support ledge. Install SPEL Stormsack with splash guard under curb opening so the adjustable flanges are resting on the grate support ledge. Install corner filler pieces. Reinstall storm grate directly on support flanges rise shall be no more than 3mm.

Maintenance: Typically the SPEL Stormsack is serviceable from the street level, and therefore maintenance does not require confined space entry into the catch basin structure. The unit is designed to be maintained in place with a vacuum hose attached to a sweeper or a vactor truck. Use only SPEL replaceable parts.

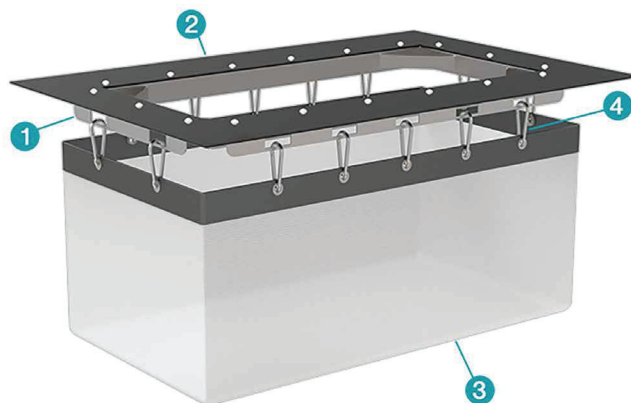
FEATURES

Pollutant	Efficiency
Gross Pollutants (GP)	100%
Total Suspended Solids (TSS)	61%
Total Phosphorus (TP)	28%
Total Nitrogen (TN)	45%

*Contact Spel to confirm approved performance for the project LGA

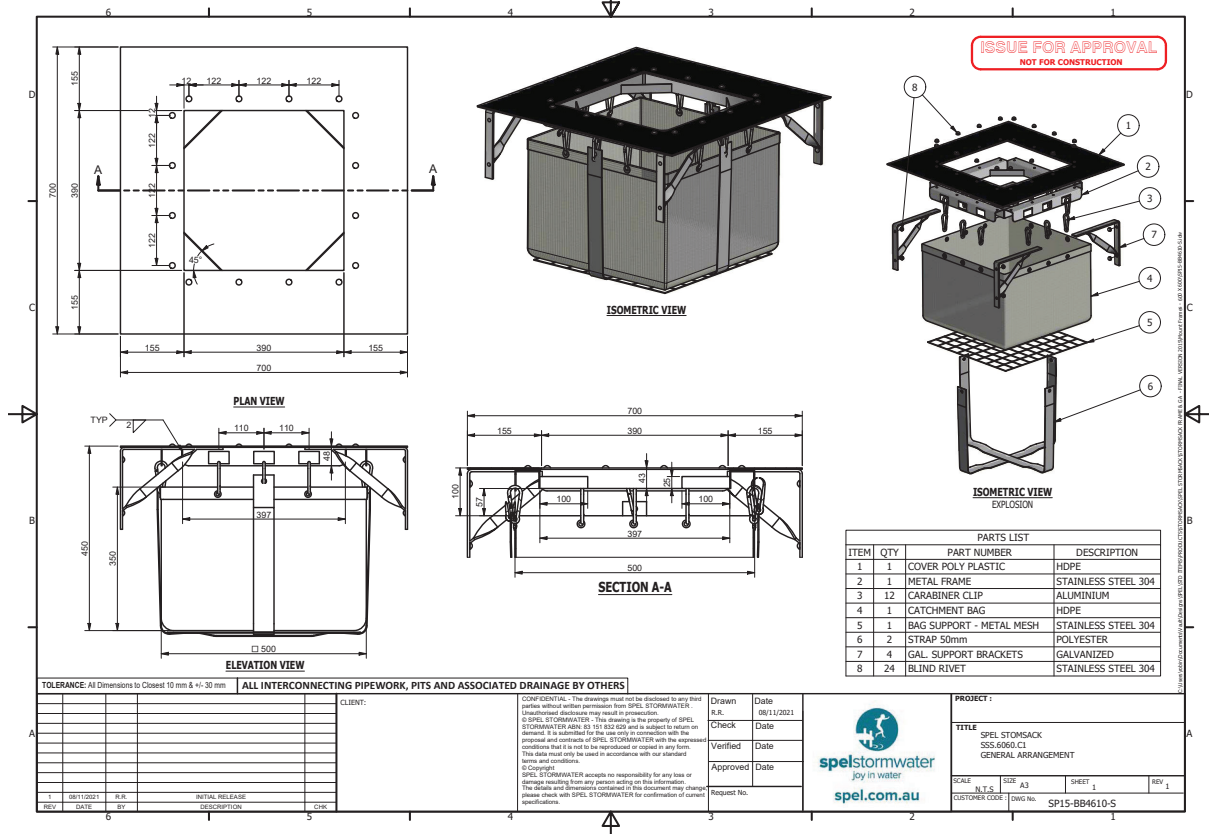
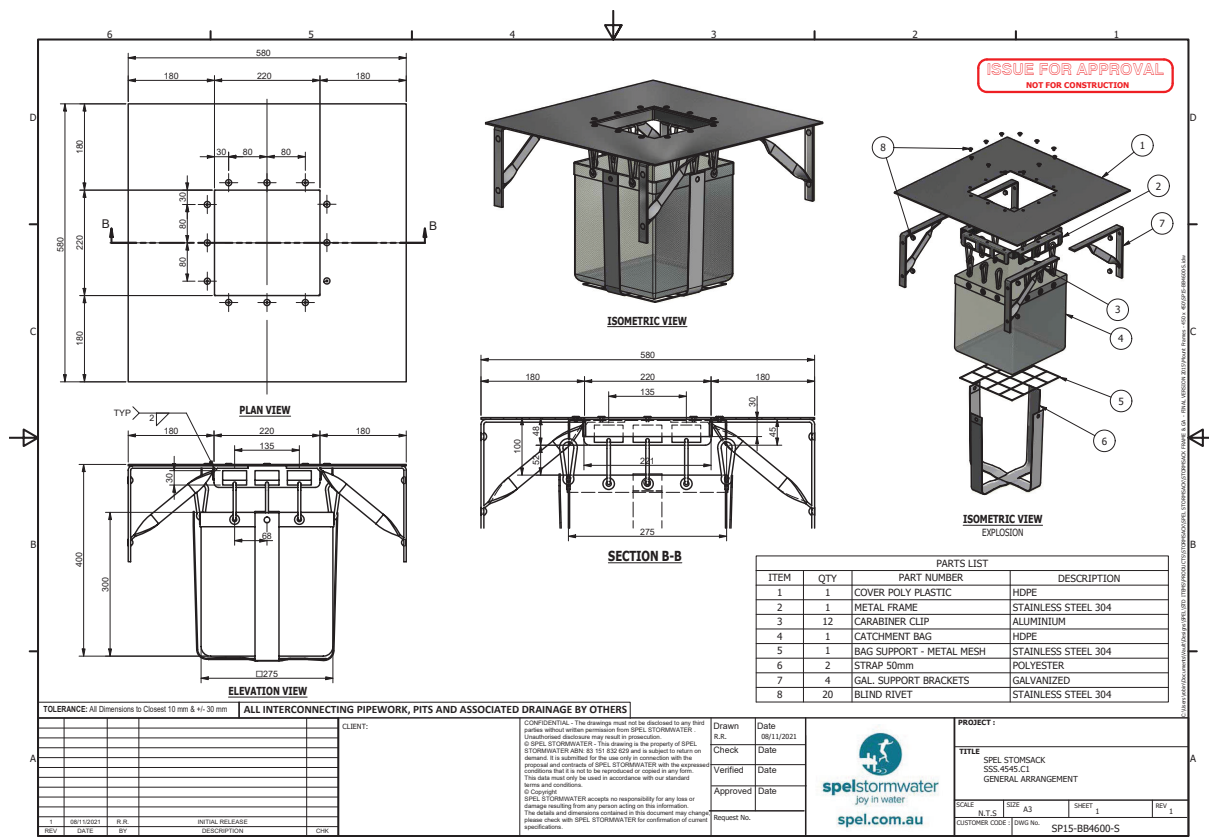
Application	Regulatory Issue	Target Pollutants
Council Storm Drain Retrofits	At-source litter capture	Sediment, Litter, O&G
Commercial/Retail/Residential	Stormwater Compliance	Sediment, Litter, O&G
Litter Prone Urban Areas	Cost effective litter control	Litter $\geq$ 5 mm
Scrap Metal/Solid Waste/Oil Storage/Etc	Industrial Multi-Sector General Permit	Gross Pollutants, O&G
Part of Treatment Train	Council Stormwater Quality Improvement Targets	Sediment, Litter, O&G
Construction Sediment/Erosion	Sediment Control Plan	Sediment/Erosion Control

Features	
1.	1. Ultra-Durable Aluminium Frame - Available in 450x450mm, 600x600mm, 600x900mm and 900x900mm sizes - Custom pit arrangements upon request
2.	Black Poly Surround riveted to Frame Can be cut to suit on site
3.	Reinforced Stormsack Bag - Bag has sewed eyelets - Square bottom design for even distribution
4.	Karabiners attach Bag to Frame for easy service & replacement
5.	5. Aluminium Support Angles & Fixings

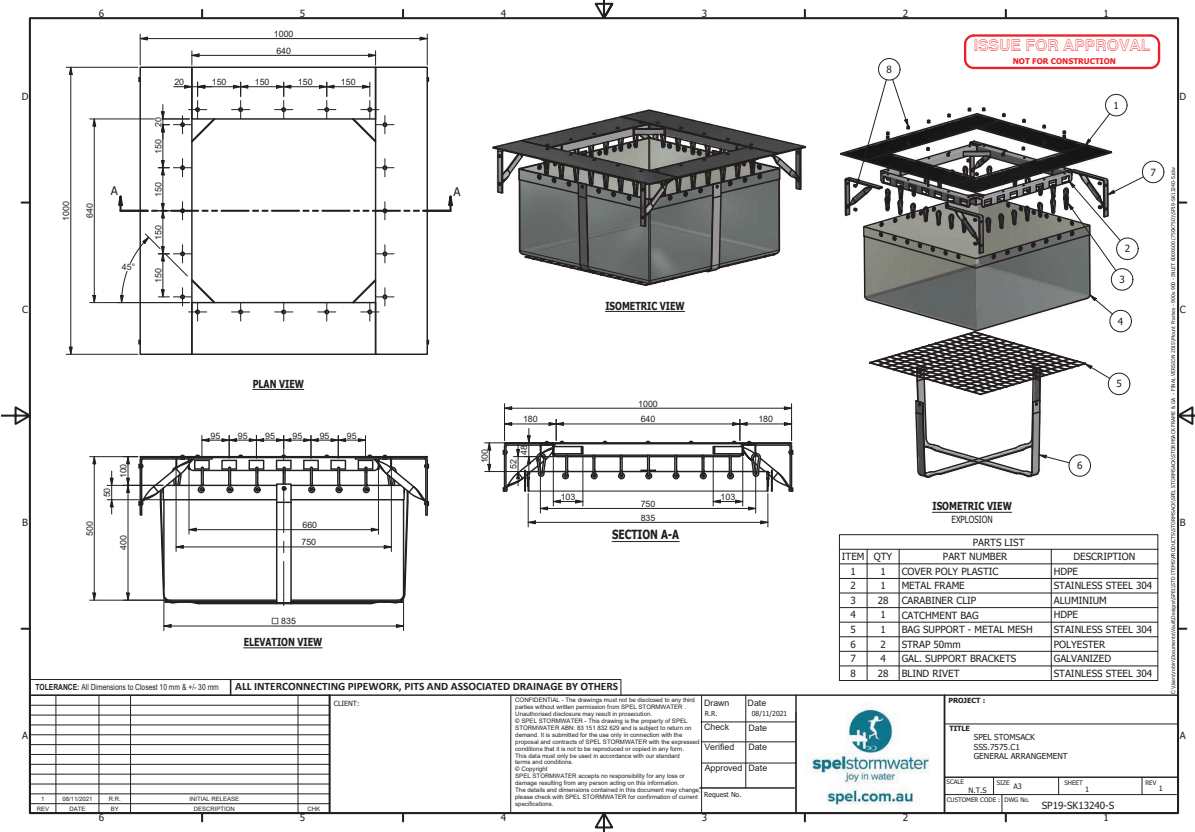
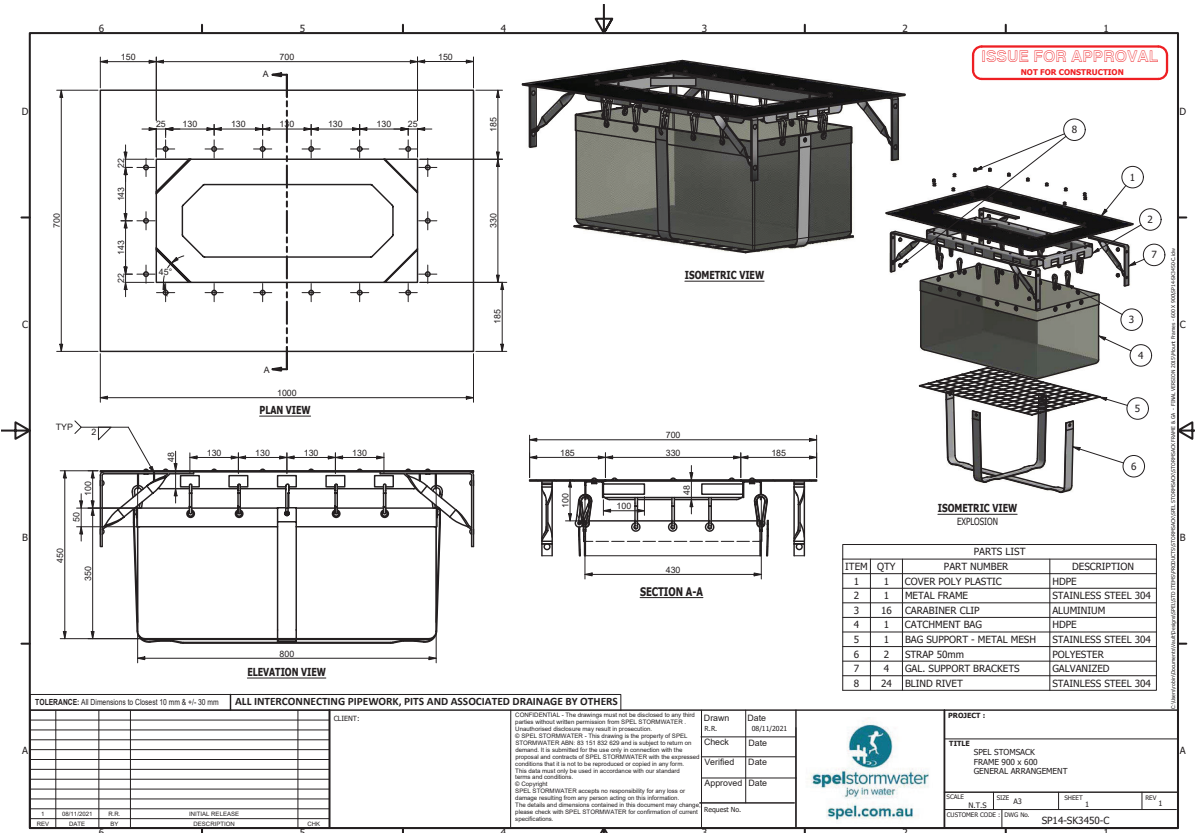


Standard SPEL Stormsack to suit Pit Sizes
450x450mm
600x600mm
900x600mm
900x900mm

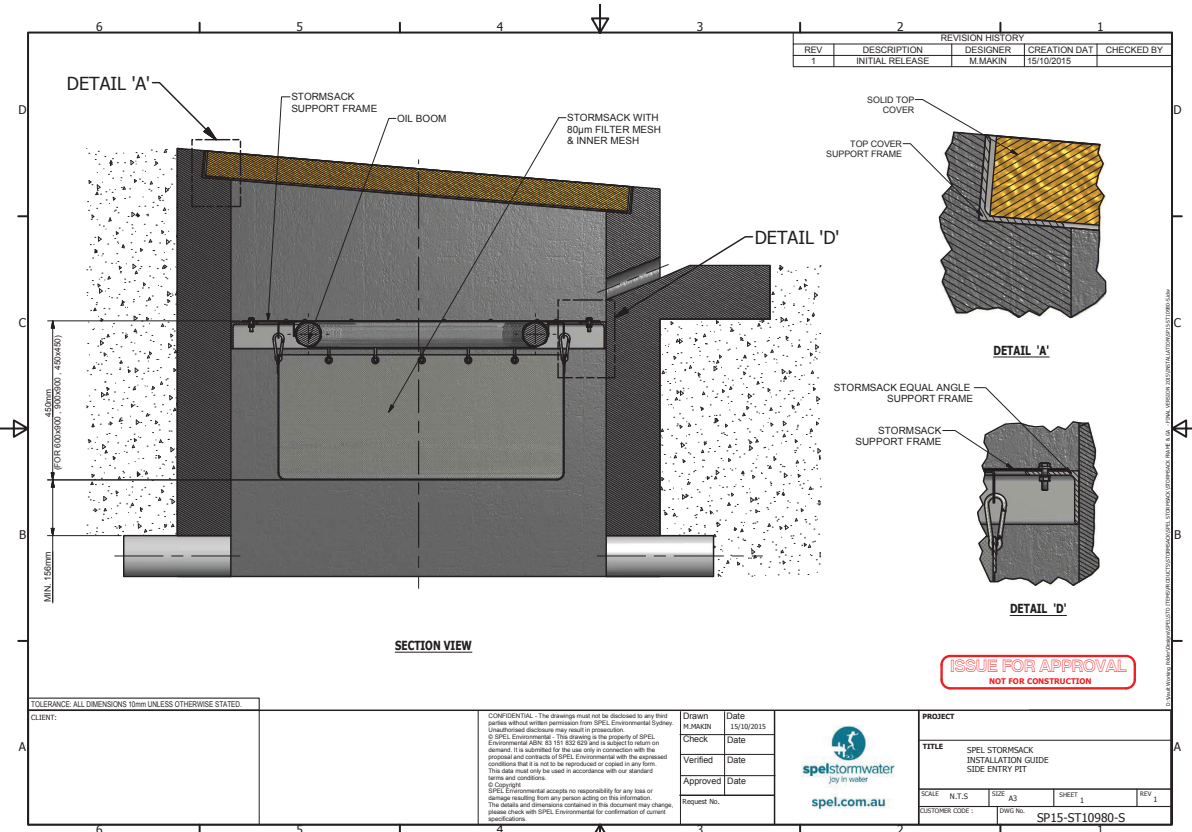
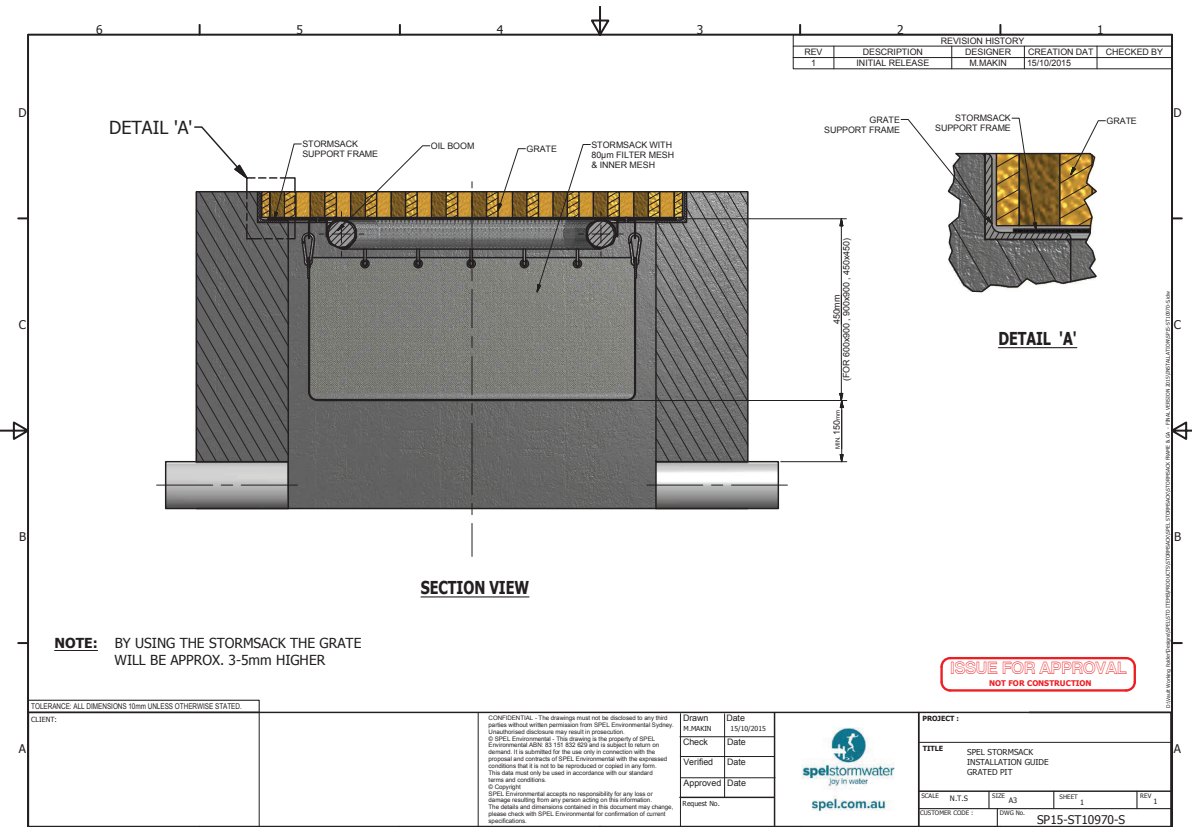
Custom sizes (i.e. 1200x900mm) can be manufactured on short lead times



TECHNICAL DRAWINGS



INSTALLATION DETAILS

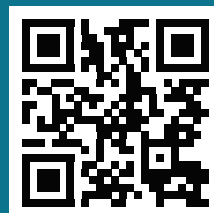


SPEL Stormsack

At Source Gross Pollutant Trap

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We believe clean water is a right not a privilege and we work to ensure a joy in water experience for you with your children and grandchildren.



spelstormwater
joy in water

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SPELVault

Modular precast detention system





APPLICATIONS

- Residential
- Commercial
- Industrial
- Retail sites
- Subdivisions
- Urban infrastructure

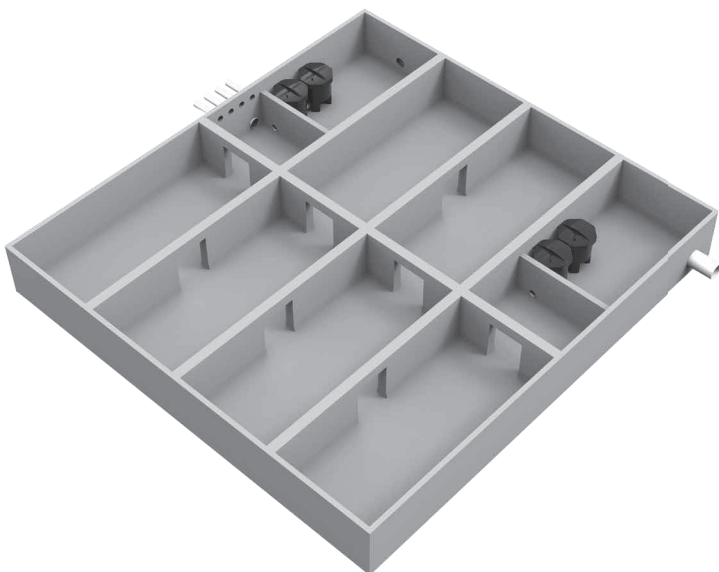
FEATURES

A modular precast detention system that has the proven strength & durability of concrete, is simple & fast to install, and easily accessible for maintenance.

The SPEL Vault can be arranged in a modular configuration to achieve small to very large onsite detention (OSD) requirements with flexibility in footprint design.

It is a robust solution for SW detention typically installed under carparks in commercial premises, or the common driveways in multi-unit developments. The SPEL Vault is selected for its easy access for maintenance, strong traffic rating, simple installation protocol and ability for large volumes to be installed in a single day and truck trafficable immediately.

- Flexibility in footprint design for optimum layouts
- Flexible heights to suit site levels
- Truck trafficable. Delivered to site cured to 50MPa. The tanks can be installed, backfilled and trafficable immediately, maintaining sites accessibility.
- Modules do not rely on stone backfill for stormwater storage or support, so there are smaller excavations and less spoil to dispose of compared to other systems.
- Units are delivered to site to meet clients cranes and are generally installed immediately. This is no onsite storage of modules required so on-site space is optimised.
- SPEL Filter cartridges can be design into this system so water quality outcomes can be achieved without additional separate tanks.



COMPARISON

Stormwater Detention Tanks Comparison: SPEL Vault/Megavault Vs Block & Slab

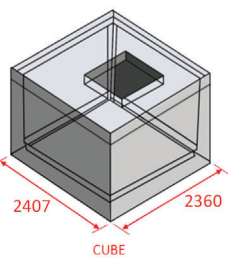


OSD SYSTEMS	SPEL VAULT / MEGAVAULT	BLOCK & SLAB
STRUCTURALLY SOUND	Yes. Engineer Certified. Truck trafficable. Form 15 provided at no cost.	Yes. Engineering design may still have to be completed and may be an additional cost with time implications.
SPEED OF INSTALL FOR THE BUILDER & DEVELOPER	Quick. 100-150kL achievable in a day. Only really needs 1-2 persons to install not including the crane operator and dogman.	Slower. As the build involves more trades (base concreter, blockworker, bondek installation, tanking, FSL pour) there is a greater chance of blow-outs on the build schedule. The increased construction time compared to a fast precast install also increases the exposure to delays from poor weather.
ONSITE EFFICIENCY GAINS	As the tank is manufactured off-site in a quick to install modular system, onsite efficiencies are gained as there is not an open excavation for extended periods and project management of multiple trades over an extended period is not required.	No benefit. Project management of multiple trades over an extended period is required. Increased safety risk management and increased risk to delays to construction. Spatial impacts of a large excavation also impeded productivity negatively especially critical on tight sites.
SAFETY	Less trades, less people involved onsite with the build and less time with an open excavation. Capacities up to 240kL have the potential to be achieved in a day = increased safety benefits.	Increased time with an open excavation with more sub-contractors involved, more time on safety plans and inductions and increased project manager involvement and supervision required. Reo bars sticking up. Increased construction waste to deal with. Greater risk exposure and increased cost to manage.
ENVIRONMENTAL IMPACT	Minimal construction waste onsite. Decreased open excavation time, decreased risk of silt release.	Increased construction waste onsite to deal with. Pallets from blocks. Pallets from steel. Increased risk of silt release with extended open excavation times. Concrete truck wash-outs.
QUALITY	Tanks constructed in a factory. Quality assured practices ensure tanks delivered to site meet rigorous quality standards.	Tanks constructed onsite = increased risk of defects and quality issues.



SIZES & CAPACITIES

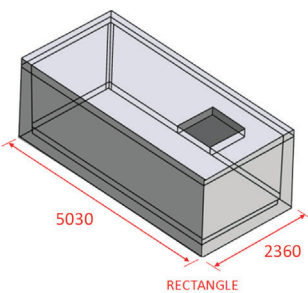
NOTE: Internal heights only provided as tank lid thickness is dependant on traffic rating & soil/slab cover. Visit our website to download plans and drawings.



CUBE

2407mm long x 2360mm wide

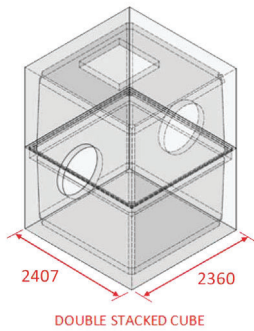
INTERNAL HEIGHT	CAPACITY kL
900	4.085
950	4.371
1000	4.550
1100	5.018
1150	5.252
1200	5.488
1250	5.723
1300	5.959
1350	6.196
1464	6.737



RECTANGLE

5030mm long x 2360mm wide

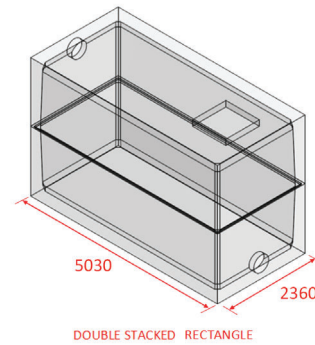
INTERNAL HEIGHT	CAPACITY kL
900	9.064
950	9.577
1000	10.090
1100	11.119
1150	11.635
1200	12.152
1250	12.669
1300	13.187
1350	13.706
1464	14.892



DOUBLE STACKED CUBE

2407mm long x 2360mm wide

BASE SECTION INTERNAL HEIGHT	TOP SECTION INTERNAL HEIGHT	INTERNAL HEIGH	CAPACITY kL
884	916	1800	8.170
934	916	1850	8.456
984	916	1900	8.635
984	966	1950	8.921
984	1016	2000	9.100
1134	916	2050	9.337
1184	916	2100	9.573
1184	966	2150	9.859
1184	1016	2200	10.038
1334	916	2250	10.281
1334	966	2300	10.567
1439	916	2355	10.703
1439	966	2405	10.989
1438	1016	2455	11.168
1334	1166	2500	11.448
1439	1116	2555	11.636
1439	1166	2605	11.870
1439	1216	2655	12.106
1439	1266	2705	12.341
1439	1316	2755	12.577
1439	1366	2805	12.814
1439	1471	2910	13.388



DOUBLE STACKED RECTANGLE

5030mm long x 2360mm wide

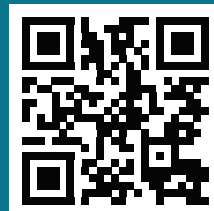
BASE SECTION INTERNAL HEIGHT	TOP SECTION INTERNAL HEIGHT	INTERNAL HEIGH	CAPACITY kL
884	916	1800	18.128
934	916	1850	18.640
984	916	1900	19.154
984	966	1950	19.666
984	1016	2000	20.180
1134	916	2050	20.699
1184	916	2100	21.215
1184	966	2150	21.728
1184	1016	2200	22.241
1334	916	2250	22.770
1334	966	2300	23.283
1439	916	2355	23.858
1439	966	2405	24.372
1438	1016	2455	24.885
1334	1166	2500	25.341
1439	1116	2555	25.915
1439	1166	2605	26.431
1439	1216	2655	26.915
1439	1266	2705	27.466
1439	1316	2755	27.984
1439	1366	2805	28.493
1439	1471	2910	29.596

SPELVault

Modular precast detention system

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We believe clean water is a right not a privilege and we work to ensure a joy in water experience for you with your children and grandchildren.



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joy in water

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