



Drainage & SUDs Strategy In support of Agricultural Development at

New Green Farm
Lower Road
Shorne
Gravesend
Kent
DA12 3HR

Luke Shaw AMIHE
September 2025
Revision [0]
Job No: 6209



Drainage & SUDS Strategy
At
New Green Farm, Lower Road, Gravesend

Contents

Amendments.....	2
References	2
Introduction	3
Document Author.....	3
Development Description and Location	3
Existing Drainage	4
Site Geology	4
Topography	4
Ground Water	4
Design Objective.....	4
Development Proposals	5
Surface Water Drainage Considerations.....	5
Priority Selection	6
Surface Water Drainage	6
Water Quality	7
Residual Flood Risk	8
Future Maintenance.....	9
Soakaway Crate System.....	9
Appendices.....	10



Drainage & SUDS Strategy
At
New Green Farm, Lower Road, Gravesend

Amendments

Revision	Date	Description
0	2 nd September 2025	First Issue

References

Reference	Title
A	CIRIA Publication 753 – The SUDS Manual (2015)
B	Sewers for Adoption 7 th Edition (Wrc 2012)
C	Part H of the Building Regulations (2015)
D	The Soakaway Design Guide (KCC 2000)
E	Planning Practice Guidance (2016)
F	The Kent Design Guide – Making it Happen SUDS (2007)



Drainage & SUDS Strategy At New Green Farm, Lower Road, Gravesend

Introduction

This Drainage & SUDS Strategy has been developed in support of a planning application, in respect of a proposed agricultural development at New Green Farm, Lower Road, Shorne, Gravesend, Kent, DA12 3HR.

A location plan and layout of the proposed scheme can be found in the appendices of this document.

The aim of the Drainage Strategy is to incorporate and adopt Best Management Practices (BMP's) for Sustainable Urban Drainage Systems (SUD's) in accordance with Site Specific Technical Reports and Published Documents referenced in Page (ii). This document also aims to identify the methods of drainage available for the foul and Surface Water Drainage.

Document Author

This Drainage Strategy Report and Design has been carried out by Mr Luke Shaw AMIHE, a qualified professional to HNC in Civil Engineering with over seven years of experience in the construction industry, including three years in an engineering role specialising in Highways, Urban Drainage Design and Flood Risk Assessments.

Throughout his career, he has built a solid foundation in Civil Engineering principles, with a specialisation in the design, analysis, and implementation of urban drainage systems and highway infrastructure.

This document has been checked and verified by Mr Jamie Finch FCIHT, FIHE.

Development Description and Location

The development proposal is for the erection of 1 new CA Store, situated on New Green Farm, Lower Road, Shorne, Gravesend, Kent, DA12 3HR.

The location of the proposed site is at grid reference 570116, 172336 as shown in the location plans in the appendices.



Drainage & SUDS Strategy At New Green Farm, Lower Road, Gravesend

Existing Drainage

It should be noted that there are no foul facilities within the proposed cold store, and therefore existing drainage around the development is not required as a point of connection.

Site Geology

The site is underlain by the Seaford Chalk Formation, which is typically described by the British Geological Survey as firm white chalk with conspicuous semi-continuous nodular and tabular flint seams. Hardgrounds and thin marls are known from the lowest beds. Some flint nodules are large to very large.

Topography

A topographical survey of the site has not yet been undertaken. Prior to commencing the detailed design stage, a full topographical survey will need to be completed and provided to the Engineer to enable drainage design to be developed using accurate local site levels.

Ground Water

Local borehole records indicate that the resting groundwater level for the area is approximately 22.5m below ground level.

Design Objective

The objective of the design will be to;

- a) Retain/reduce the quantity of surface water runoff leaving the development area, to equal or less than the greenfield runoff rate for all storms, up to and including the 1 in 100-year return period + 45% climate change.
- b) Improve the quality of surface water runoff by infiltration methods and open SUD's wherever possible.



Drainage & SUDS Strategy At New Green Farm, Lower Road, Gravesend

Development Proposals

The development proposals are for the construction of a new CA Store building, located at New Green Farm, Lower Road, Gravesend, DA12 3HR.

Surface Water Drainage Considerations

When making selections in respect of the final discharge point of the surface water drainage, the hierarchy of SUDS must be considered in the decision-making process and shall be implemented in the development of the drainage strategy where this is reasonably achievable.

For surface water drainage runoff destinations, the hierarchy of SUDS now states the following, in priority order as follows:

- Priority 1: collected for non-potable use
- Priority 2: infiltrated to ground
- Priority 3: discharged to an above ground surface water body
- Priority 4: discharged to a surface water sewer, or another piped surface water drainage system
- Priority 5: discharged to a combined sewer

Where it is not possible to implement the higher priority choices in the hierarchy, evidence may need to be submitted to demonstrate how and why these elements cannot be complied with.

Whilst the SUDS National Standards set out the criteria for prioritising these choices, there may also be circumstances where a departure from these standards can be agreed at a local level if the reasons given are able to demonstrate that the implementation of higher priority selections are not reasonably practicable.

It should also be noted that that there may be scenarios where more than one of these priority selections are made, to present a hybrid strategy for surface water management.

For this proposed development, the hierarchy of SUDS has been given due consideration, which can be reviewed in other sections in this document, such as Site Geology, Existing Drainage.



Drainage & SUDS Strategy At New Green Farm, Lower Road, Gravesend

The following discharge priorities have been selected in the table below:

Priority Selection

Priority Rating	Description	
1	Collected for non-potable use	☒
2	Infiltrated to ground	☒
3	Discharged to an above ground surface water body	☐
4	Discharged to a surface water sewer, or another piped surface water drainage system	☐
5	Discharged to a combined sewer	☐

Surface Water Drainage

It is not intended that the proposed development drainage will be offered for adoption to any of the statutory authorities, however, the surface water calculations for the proposed development will be in accordance with the requirements set out in the Kent County Council SuDs policy document. The calculations have been included within the appendices at the end of this document.

The total area of impermeable surfaces across the new development has been calculated at 3333m² for the design.

The standard annual average rainfall for the area is 579mm.

$579 \times 3333 = 1,930\text{m}^3$ per year collected from the roof area. The storage tank is being specified by the client, but will be fitted with a high-level overflow, so the tank can fill and then discharge to a soakaway. Calculations for the climate change adjusted critical storm assumes the rainwater harvesting tank is already full and caters for all storms.

Calculations, for a comprehensive range of storms has been undertaken with Causeway Flow Software, up to and including the 1 in 100-year event + 45% climate change. The results showed there was no flooding anywhere in the systems and the proposed methods would be suitable for retaining and discharging the storm water to ground on New Green Farm.



Drainage & SUDS Strategy At New Green Farm, Lower Road, Gravesend

Water Quality

Part of the design process is to consider all aspects of water quality to ensure the appropriate levels of treatment are being implemented and that there are no adverse effects occurring to off-site areas.

When considering potential sources of pollution and their respective methods of treatment and mitigation, the CIRIA SuDS Manual 2015 (C753) provides guidance on how this can be assessed and mitigated appropriately.

Drainage & SUDS Strategy At New Green Farm, Lower Road, Gravesend

The following tables are provided to ensure and check that the design methodology and treatment systems have been considered to adequately mitigate against the pollution hazard.

Total SuDS Mitigation Index (for each contamination type)	≥ #	Pollution Hazard Index (for each contaminant type)
---	--------	---

TABLE 26.2 Pollution hazard indices for different land use classifications					
Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons	
Residential roofs	Very low	0.2	0.2	0.05	
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05	
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4	
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7	
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²	

For the site at New Green Farm, the consideration will be for the roof areas. The roof areas of the CA Store building is considered a 'low hazard'.

Residual Flood Risk

This development sits within Environment Agency Flood Zone 1, an area with a low probability of flooding.



Drainage & SUDS Strategy At New Green Farm, Lower Road, Gravesend

Future Maintenance

Maintenance regimes of the various drainage methods will vary, depending on the development proposals and surroundings. However, a general guide to the maintenance of the various methods of drainage have been provided below.

Soakaway Crate System

A crate soakaway system requires regular maintenance to ensure it functions effectively and prevents blockages. The most important task is to keep gutters, downpipes, and any filter chambers free from leaves, silt, and debris that could enter the system. Inspection chambers should be checked periodically to confirm that water is flowing freely into the soakaway, and any build-up of sediment should be removed promptly. Surrounding ground should also be monitored for signs of waterlogging, which could indicate a blockage or reduced infiltration capacity. With routine cleaning and inspection, a crate soakaway system can provide long-lasting, reliable drainage.

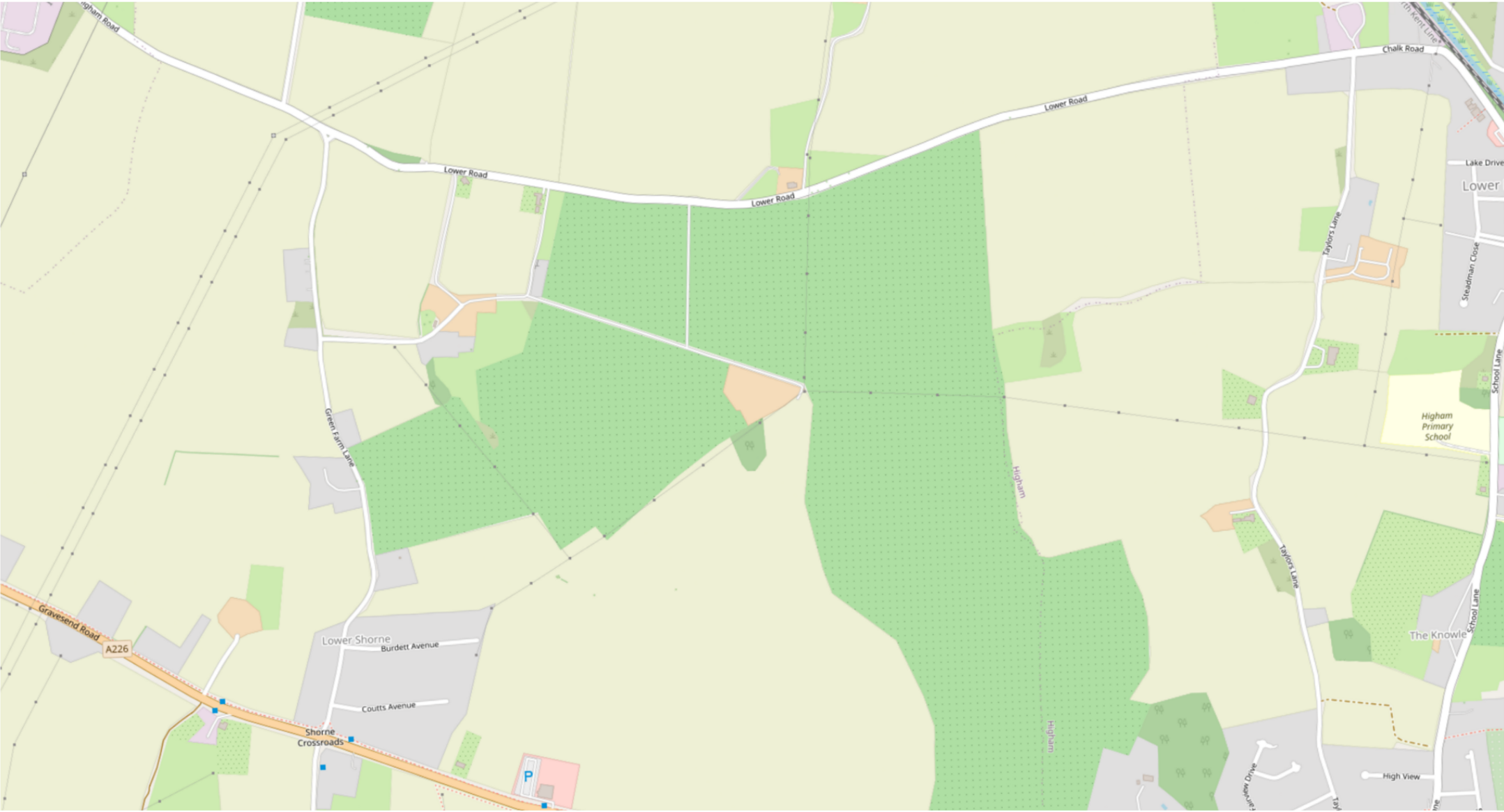


Drainage & SUDS Strategy At New Green Farm, Lower Road, Gravesend

Appendices

- Site Location Plan
- Flood Maps for Planning
- GeoIndex Report
- Block Plan (Proposed)
- RSPD 6209-01 Drainage Strategy
- RSPD FLOW Calculations
- Even Products Rainwater Storage Tank Data Sheet

New Green Farm



Flood map for planning

Your reference
Unspecified

Location (easting/northing)
570116/172346

Created
28 August 2025 11:07

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- in an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2025 AC0000807064. <https://flood-map-for-planning.service.gov.uk/os-terms>



Flood map for planning

Your reference

Unspecified

Location (easting/northing)

570116/172346

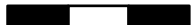
Scale

1:2,500

Created

28 Aug 2025 11:07

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area

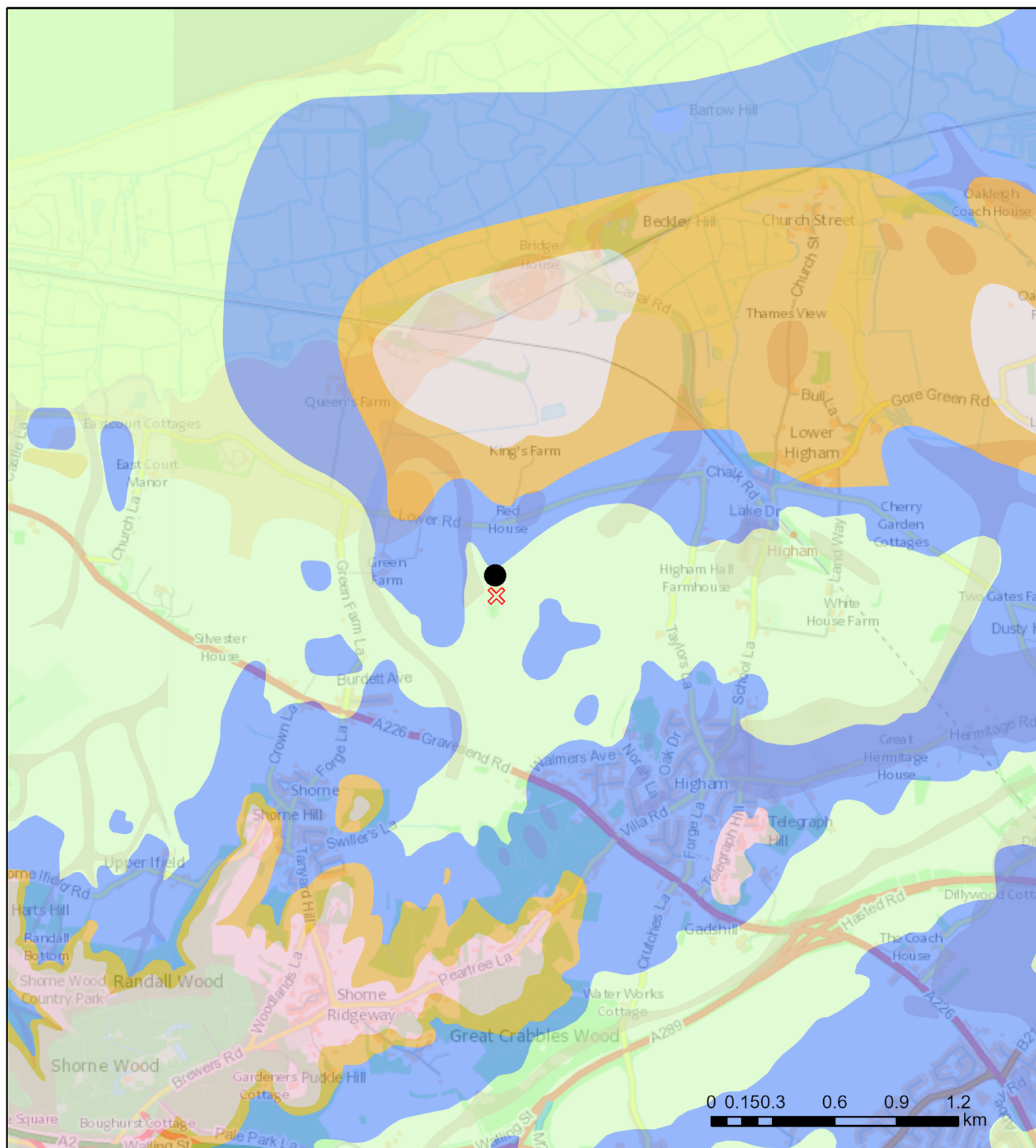


0 20 40 60m

GeoIndex Report



British
Geological
Survey



Contains OS data © Crown Copyright and database right 2020

GeoIndex Onshore Data Sources: NERC, Natural England, English Heritage and Ordnance Survey

Map Key

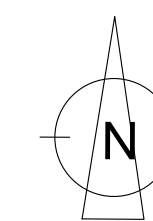
Superficial deposits 1:50,000 scale

	<u>ALLUVIUM - CLAY, SILT, SAND AND PEAT</u>
	<u>TIDAL RIVER OR CREEK DEPOSITS - CLAY AND SILT</u>
	<u>TAPLOW GRAVEL MEMBER - SAND AND GRAVEL</u>
	<u>HEAD - CLAY AND SILT</u>
	<u>HEAD - CLAY, SILT, SAND AND GRAVEL</u>
	<u>HEAD - GRAVEL, SAND, SILT AND CLAY</u>
	<u>RIVER TERRACE DEPOSITS, 1 - SAND AND GRAVEL</u>
	<u>RIVER TERRACE DEPOSITS, 2 - SAND AND GRAVEL</u>
	<u>RIVER TERRACE DEPOSITS, 3 - SAND AND GRAVEL</u>
	<u>RIVER TERRACE DEPOSITS, 4 - SAND AND GRAVEL</u>
	<u>BEACH AND TIDAL FLAT DEPOSITS (UNDIFFERENTIATED) - CLAY, SILT AND SAND</u>
	<u>PEAT - PEAT</u>
	<u>LYNCH HILL GRAVEL MEMBER - SAND AND GRAVEL</u>

Bedrock geology 1:50,000 scale

	<u>THANET FORMATION - SAND</u>
	<u>THANET FORMATION - SAND, SILT AND CLAY</u>
	<u>HARWICH FORMATION - SAND AND GRAVEL</u>
	<u>LONDON CLAY FORMATION - CLAY AND SILT</u>
	<u>SEAFORD CHALK FORMATION - CHALK</u>
	<u>LEWES NODULAR CHALK FORMATION, SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED) - CHALK</u>
	<u>LEWES NODULAR CHALK FORMATION - CHALK</u>
	<u>LAMBETH GROUP - SAND, SILT AND CLAY</u>

Selection Results



New Green Farm

Track

Agricultural
Barn

Tank
Track

Workings
(dis)

Proposed
CA Store
Building
14,145 Bins

Track



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National Map Centre. Purchased 24/10/2024 1 year licence.

D	May 25	Issued for planning application
REV	DATE	ISSUE

SITE
A.C. GOATHAM & Son
New Green Farm
Lower Shorne, Gravesend
Kent DA12 3HL

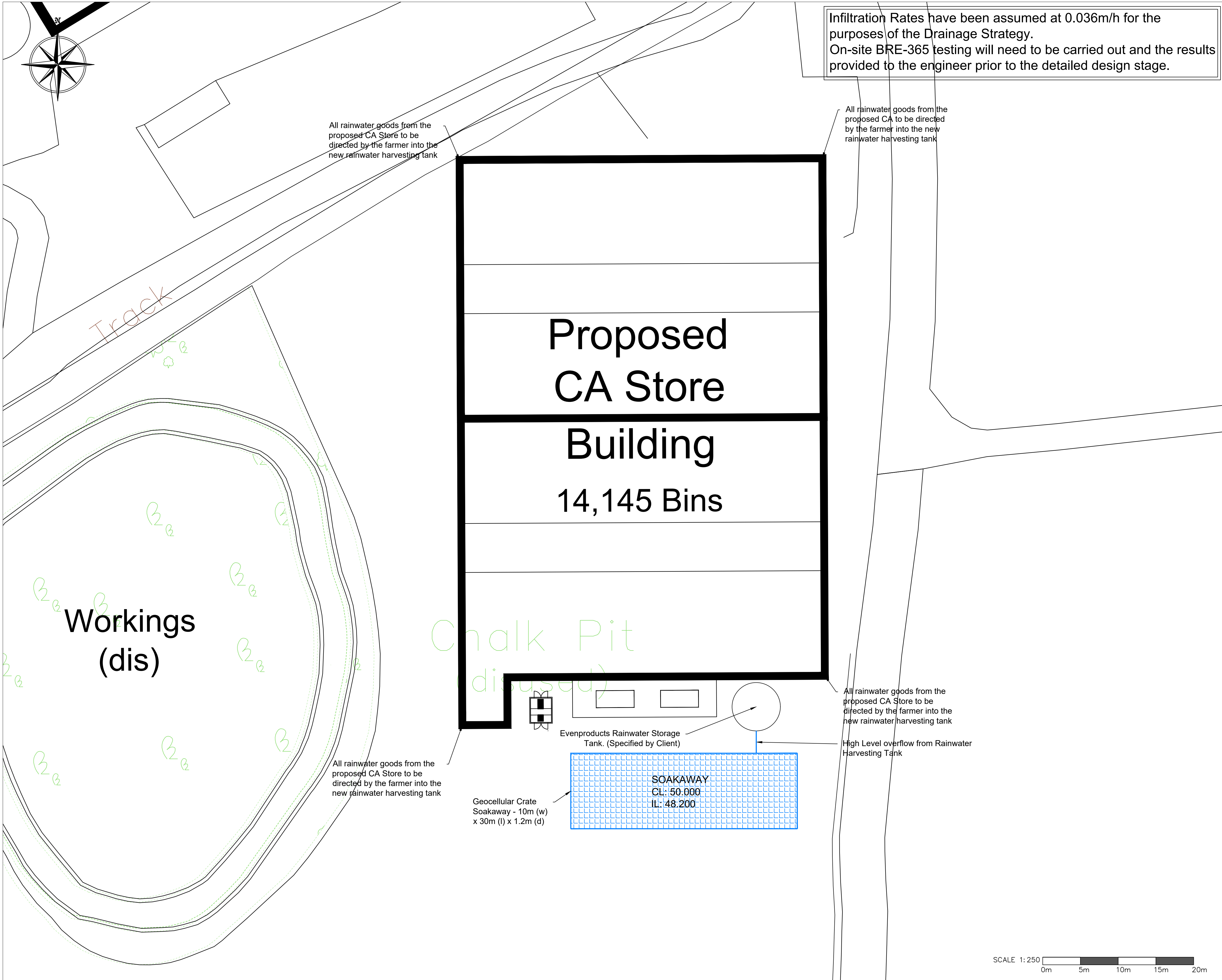
DRAWING TITLE
Proposed Block Plan

SCALE	DRAWN	DATE
1:500@A1	LFB	Nov 2024

Ac GOATHAM & Son
OUR FUTURE IS GROWING

AC Goatham & Son
Flanders Farm,
Ratcliffe Highway,
Rochester,
Kent
ME3 8QE
01634 253424

DRAWING No. **ACG&S-NGF-902**



General Notes

KEY:

- Application Site Boundary
- Surface Water Drain
- Foul Water Drain
- Linear Drainage
- Pipe Protection
- SW Rising Main
- FW Rising Main
- French Drain/Perforated Pipe
- Surface Catch Pit/Manhole
- Foul Water Manhole
- Surface Water Soakaway
- Gully & Lead
- Waste Water Package Treatment Plant
- Retaining Wall
- Spot Levels
- Direction of Flow
- Embankment
- Brick Headwall

FOR PLANNING

No.	Revision/Issue	Date

RSPD
Roads & Sewers for Planning & Design Ltd
www.roadandsewers.co.uk 07876 573377

Project Name and Address
**NEW GREEN FARM,
LOWER ROAD,
SHORNE, DA12 3HR.**

Description
DRAINAGE STRATEGY

Project 6209	Sheet 01
Date 02/09/2025	
Scale 1:250 @ A1	

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	0.350
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	0.75	Enforce best practice design rules	✓
CV	0.750	Connection Type	Level Soffits		
Time of Entry (mins)	5.00	Minimum Backdrop Height (m)	0.200		

Nodes

Name	Area (ha)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SOAKAWAY	0.333	50.000	1200	570140.870	172290.810	1.800

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	0	0	0
30	0	0	0	100	45	0	0
30	35	0	0				

Node SOAKAWAY Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Safety Factor	2.0	Invert Level (m)	48.200
Side Inf Coefficient (m/hr)	0.03600	Porosity	0.95	Time to half empty (mins)	1988

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	300.0	300.0	1.200	300.0	396.0	1.201	0.0	396.0

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Approval Settings

Node Size	✓	Maximum Cover Depth (m)	3.000	Surcharged Depth	✓
Node Losses	✓	Backdrops	✓	Return Period (years)	
Link Size	✓	Minimum Backdrop Height (m)		Maximum Surcharged Depth (m)	0.100
Minimum Diameter (mm)	150	Maximum Backdrop Height (m)	1.500	Flooding	✓
Link Length	✓	Full Bore Velocity	✓	Return Period (years)	30
Maximum Length (m)	100.000	Minimum Full Bore Velocity (m/s)		Time to Half Empty	x
Coordinates	✓	Maximum Full Bore Velocity (m/s)	3.000	Discharge Rates	✓
Accuracy (m)	1.000	Proportional Velocity	✓	Discharge Volume	✓
Crossings	✓	Return Period (years)		100 year 360 minute (m ³)	
Cover Depth	✓	Minimum Proportional Velocity (m/s)	0.750		
Minimum Cover Depth (m)		Maximum Proportional Velocity (m/s)	3.000		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	101.001	28.580	2 year 180 minute winter	15.781	6.248
2 year 15 minute winter	70.878	28.580	2 year 240 minute summer	19.706	5.208
2 year 30 minute summer	64.199	18.166	2 year 240 minute winter	13.093	5.208
2 year 30 minute winter	45.052	18.166	2 year 360 minute summer	15.366	3.954
2 year 60 minute summer	42.695	11.283	2 year 360 minute winter	9.988	3.954
2 year 60 minute winter	28.366	11.283	2 year 480 minute summer	12.157	3.213
2 year 120 minute summer	29.998	7.928	2 year 480 minute winter	8.077	3.213
2 year 120 minute winter	19.930	7.928	2 year 600 minute summer	9.948	2.721
2 year 180 minute summer	24.278	6.248	2 year 600 minute winter	6.797	2.721

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 720 minute summer	8.840	2.369	30 year +35% CC 30 minute summer	229.661	64.986
2 year 720 minute winter	5.941	2.369	30 year +35% CC 30 minute winter	161.166	64.986
2 year 960 minute summer	7.202	1.896	30 year +35% CC 60 minute summer	151.840	40.127
2 year 960 minute winter	4.771	1.896	30 year +35% CC 60 minute winter	100.879	40.127
2 year 1440 minute summer	5.157	1.382	30 year +35% CC 120 minute summer	93.596	24.735
2 year 1440 minute winter	3.466	1.382	30 year +35% CC 120 minute winter	62.183	24.735
30 year 15 minute summer	262.104	74.166	30 year +35% CC 180 minute summer	71.949	18.515
30 year 15 minute winter	183.932	74.166	30 year +35% CC 180 minute winter	46.769	18.515
30 year 30 minute summer	170.119	48.138	30 year +35% CC 240 minute summer	56.872	15.030
30 year 30 minute winter	119.382	48.138	30 year +35% CC 240 minute winter	37.784	15.030
30 year 60 minute summer	112.474	29.724	30 year +35% CC 360 minute summer	43.319	11.147
30 year 60 minute winter	74.725	29.724	30 year +35% CC 360 minute winter	28.158	11.147
30 year 120 minute summer	69.330	18.322	30 year +35% CC 480 minute summer	34.038	8.995
30 year 120 minute winter	46.061	18.322	30 year +35% CC 480 minute winter	22.614	8.995
30 year 180 minute summer	53.295	13.715	30 year +35% CC 600 minute summer	27.824	7.610
30 year 180 minute winter	34.643	13.715	30 year +35% CC 600 minute winter	19.011	7.610
30 year 240 minute summer	42.127	11.133	30 year +35% CC 720 minute summer	24.762	6.636
30 year 240 minute winter	27.988	11.133	30 year +35% CC 720 minute winter	16.642	6.636
30 year 360 minute summer	32.088	8.257	30 year +35% CC 960 minute summer	20.309	5.348
30 year 360 minute winter	20.858	8.257	30 year +35% CC 960 minute winter	13.453	5.348
30 year 480 minute summer	25.214	6.663	30 year +35% CC 1440 minute summer	14.683	3.935
30 year 480 minute winter	16.751	6.663	30 year +35% CC 1440 minute winter	9.868	3.935
30 year 600 minute summer	20.610	5.637	100 year 15 minute summer	334.927	94.773
30 year 600 minute winter	14.082	5.637	100 year 15 minute winter	235.037	94.773
30 year 720 minute summer	18.342	4.916	100 year 30 minute summer	219.330	62.063
30 year 720 minute winter	12.327	4.916	100 year 30 minute winter	153.916	62.063
30 year 960 minute summer	15.044	3.961	100 year 60 minute summer	145.713	38.508
30 year 960 minute winter	9.965	3.961	100 year 60 minute winter	96.808	38.508
30 year 1440 minute summer	10.876	2.915	100 year 120 minute summer	88.809	23.470
30 year 1440 minute winter	7.310	2.915	100 year 120 minute winter	59.002	23.470
30 year +35% CC 15 minute summer	353.840	100.125	100 year 180 minute summer	68.378	17.596
30 year +35% CC 15 minute winter	248.309	100.125	100 year 180 minute winter	44.448	17.596

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year 240 minute summer	54.367	14.368	100 year +45% CC 60 minute winter	140.372	55.836
100 year 240 minute winter	36.120	14.368	100 year +45% CC 120 minute summer	128.773	34.031
100 year 360 minute summer	42.115	10.838	100 year +45% CC 120 minute winter	85.553	34.031
100 year 360 minute winter	27.376	10.838	100 year +45% CC 180 minute summer	99.148	25.514
100 year 480 minute summer	33.684	8.902	100 year +45% CC 180 minute winter	64.449	25.514
100 year 480 minute winter	22.379	8.902	100 year +45% CC 240 minute summer	78.832	20.833
100 year 600 minute summer	27.943	7.643	100 year +45% CC 240 minute winter	52.374	20.833
100 year 600 minute winter	19.092	7.643	100 year +45% CC 360 minute summer	61.066	15.714
100 year 720 minute summer	25.168	6.745	100 year +45% CC 360 minute winter	39.695	15.714
100 year 720 minute winter	16.915	6.745	100 year +45% CC 480 minute summer	48.842	12.908
100 year 960 minute summer	20.990	5.527	100 year +45% CC 480 minute winter	32.450	12.908
100 year 960 minute winter	13.904	5.527	100 year +45% CC 600 minute summer	40.517	11.082
100 year 1440 minute summer	15.344	4.112	100 year +45% CC 600 minute winter	27.684	11.082
100 year 1440 minute winter	10.312	4.112	100 year +45% CC 720 minute summer	36.494	9.781
100 year +45% CC 15 minute summer	485.644	137.421	100 year +45% CC 720 minute winter	24.526	9.781
100 year +45% CC 15 minute winter	340.803	137.421	100 year +45% CC 960 minute summer	30.436	8.014
100 year +45% CC 30 minute summer	318.028	89.991	100 year +45% CC 960 minute winter	20.161	8.014
100 year +45% CC 30 minute winter	223.178	89.991	100 year +45% CC 1440 minute summer	22.249	5.963
100 year +45% CC 60 minute summer	211.284	55.836	100 year +45% CC 1440 minute winter	14.953	5.963



Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	SOAKAWAY	288	48.351	0.151	7.8	43.8923	0.0000	OK
Link Event (Upstream Depth)		US Node	Link	Outflow (l/s)				
360 minute winter		SOAKAWAY	Infiltration	1.5				



Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	SOAKAWAY	464	48.587	0.387	13.0	112.0482	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
480 minute winter	SOAKAWAY	Infiltration	1.6



Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	SOAKAWAY	690	48.763	0.563	12.9	163.2194	0.0000	OK
Link Event (Upstream Depth)		US Node	Link	Outflow (l/s)				
720 minute winter		SOAKAWAY	Infiltration	1.7				



Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	SOAKAWAY	900	48.779	0.579	10.8	167.8596	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)					
960 minute winter	SOAKAWAY	Infiltration	1.7					



Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	SOAKAWAY	930	49.137	0.936	15.7	271.4263	0.0000	OK
Link Event (Upstream Depth)		US Node		Link	Outflow (l/s)			
960 minute winter		SOAKAWAY		Infiltration	1.9			

STORAGE TANK

INSTALLATION GUIDE



EVENPRODUCTS

water for life

CONTENTS

SECTION A: Product Introduction & Pre Start Information		Page
1.	Tank structure build strengths	3
2.	Tank base requirements	3
3.	Tank erection safety advice	3
4.	White Rust Prevention	3
5.	Risks to consider	4
6.	Suggested safety equipment	4
7.	Options for cushioning liner	5
8.	Tank base specification	6-7
SECTION B: Tank Kit Contents & Tooling Requirements		
1.	Tank kit contents	8
2.	Optional items	8
3.	Tooling requirements	8
SECTION C: Installation Instructions (Written)		
1.	Marking out the base	9
2.	Unbanding the panels	9
3.	Fixings	10
4.	Erecting the steel walls	10
5.	Erecting the upper ring	11
6.	Final checking and fixing	11
7.	Fit the capping	12
8.	Preparation for fitting side wall assembly	12
9.	Installation and fitting of the Liner Cushioning	13
10.	Unfolding and fitting the liner	13-15
SECTION D: Optional Items (with installation advice)		
1	Galvanised outlets	16
2.	Tank side outlet assembly (Flanged), checking and filling and checking and filling	17-19
3.	Tank base outlet arrangement – Pipe	20
4.	EPDM liner repair kit	21
5.	FPP liner repair kit	22
6.	Fleece Example	23
SECTION F: Tank maintenance and winterisation.		24-25

SECTION A.

PRODUCT INTRODUCTION and PRE-START INFORMATION.

1. The Tank Structure Build Strengths

Comprehensive stress calculations for our entire range of tanks have been carried out by chartered external consultants to provide builds which comply with both British BS 5950 and European BSEN 1993 structural, wind and (where an Evenproducts steel cover is fitted,) snow loading requirements.

The specified panel thicknesses, the bolt sizes, the use of double washers, the fitting of base anchor brackets and the liner support and protection within the tank are all integral to the safety calculations for our tanks.

2. The Tank Base Requirements

Tank base supplied by others (See Page 6)

In order to comply with U.K and E.C agricultural directives, it is necessary to erect the tank on a level concrete base with a minimum thickness of 100mm depending on local soil conditions. It may also be necessary to add reinforcement into the concrete.

The base slab (round / square / hexagonal, etc), should measure 600mm in excess of the diameter of the tank to ensure there is a minimum of 300mm of base beyond the outer tank wall. The base should be level over its entire surface and should be free from any sharp projections.

There should also be a further one metre minimum of clear ground, to allow unrestricted access for installing the tank. If platforms or mechanical lifting devices are used, a larger, clear, firm ground area may be required.

The base should be constructed of pre-mix concrete to a strength of not less than 35 N/mm. sq (C35 Mix). Once poured and levelled, the base should be left to cure for a minimum of 96 hours prior to installation of the tank.

3. Tank Erection Guidance and Safety Advice

(provided by Evenproducts Limited for guidance only)

Safety Information.

Evenproducts tanks have been designed to be installed using basic industry standard methods this will involve the “safe” use of ladders and step ladders. Installers should therefore take note and abide wherever possible, to the recommended installation methods. They should also familiarise themselves with the latest local and national ‘health and safety’ published advice regarding the safe use of the equipment and tooling they are using.

4. White Rust

If your tank is not being erected immediately please remove the outer polythene packaging and store in a dry environment. Ensure the tank is kept on the pallet to keep it from direct contact with the ground. Where possible do not leave an uncovered tank lying in the open, but store undercover and away from open doorways. This will reduce the risk of white rust forming on the panels of the tank.

Risks to Consider

Provide Sufficient Labour

Most tanks can be erected in the standard build method by two experienced operatives, however when erecting the taller tanks additional trained labour would be recommended.

Windy Conditions

It is advised that tank erection should not be attempted in excessively windy conditions, as handling the tank panels or attempting to install the liner could result in personal injury or damage to components or property.

Lacerations

Be aware that tank panels and galvanised cover panels may have sharp edges. Protective gloves should be used at all times.

Wet Conditions

Although tank erection can be done in wet conditions, be fully aware that steel panels become slippery when wet and that it would be extremely dangerous to be working on panel surfaces when wet.

Lifting Heavy Panels

Most panels can be lifted and handled safely by one person. However the thickest panels (1.6mm @ approx 34kg) should be a two man lift, especially if lifting above the waist.

Use of Podgers

Take care when pushing podgers through the wall of the tank, there may be people on the other side that you cannot see.

Falling from Height

When working from ladders or when cladding the steel covers, precautions should be taken such as securing ladders against the structure, supporting ladders on ground boards and using a harness if working on the cover surface. Additional care should also be taken to ensure tools or components are not dropped on to persons below.

Power Tools

Installers should be aware of the risks when using power tools on site. Power tools should be inspected and approved for safe use as required.

Packing

If the packed tank pallet is not immediately installed and you have ordered an anti-algae cover, we would recommend that the centre supporting pole is removed to protect it from very hot direct sunlight.

Suggested Safety Equipment

Good quality ladders and step ladders (various lengths), with foam protection at the base, for when working inside the tank on the installed liner.

Heavy duty plywood boards for stabilising ladders etc. on uneven ground outside the tanks (do not hang ladders from the top of tank walls, this could possibly bend the top ring of the tank).

Safety harness (for when working on galvanised steel covers).

Suitable eye protection for when using hand and power tools.

Leather safety gloves, safety boots (with soft soles for working on the liner) and hard hats.

Ear defenders for when mechanically tightening fixings or drilling outlet holes in panels.

Safety straps to secure ladders to the tank structure when working at height erecting the tank walls.



Note

For tanks with walls in excess of 3.10 metres (10ft / 4 panels high), it is recommended that platforms or mechanical lifting equipment be deployed.

In this instance, it will be necessary to ensure that the surface for approximately 2 metres all around the tank base and a suitable route to the tank base, is of sufficient quality and firmness to allow safe use of such equipment.

Options for Cushioning of the Tank Liner on the Tank Base

Option A. (Not Supplied)

To provide a 50mm layer of soft “stone free” sand to be spread evenly across the entire base within the tank structure.

To provide a 5:1 sand and cement powder “dry mix” haunch shaped to approximately 45 degrees between the inner panel wall and the concrete base floor.

Note: When providing sand, ensure it is protected from the possibility of becoming saturated by rainfall prior to its required use.

Option B. (Not Supplied)

To provide 0.80 to 1.00m wide strips of HD polythene sheeting which is taped to the tank wall and allowed to fall down on to the concrete base (e.g. half on the wall half to the base).

The 50mm layer of soft “stone free” sand is then spread over the entire concrete base and polythene sheet and shaped at 45 degrees up to the tank wall at the base of the panels.

Option C. (Supplied on Request)

Supply a quality, geotextile fleece material, layers of which would be laid at 90 degrees to each other (to eliminate gaps) on top of the sand base. Then approximately 50cm up on to the tank panels, where it would be secured to the panels with adhesive (Duck) tape.

When using EPDM liners, a double layer of fleece can be used which eliminates the use of a sand base. However the smooth concrete base must be checked for any protrusions that could potentially puncture the liner.

Wall Fleece Option

Fleece can also be provided as an option if additional protection for the liner on the internal tank wall is required, or if a small amount of insulation is required.

The use of fleece to the internal tank walls is recommended for when thinner liner materials are specified (e.g. 0.50mm and 0.60mm).

The fleece is delivered in widths of 5.25m and lengths to suit the height of the ordered tank. Lay out the pieces of fleece on the top of the tank. Work around the tank, overlapping the pieces of fleece by 25cm, until the steelwork is completely covered. Make sure that the protective fleece is straight without any creases. If you have ordered the additional protective fleece to cover the ground finally cover the floor with the protective fleece.

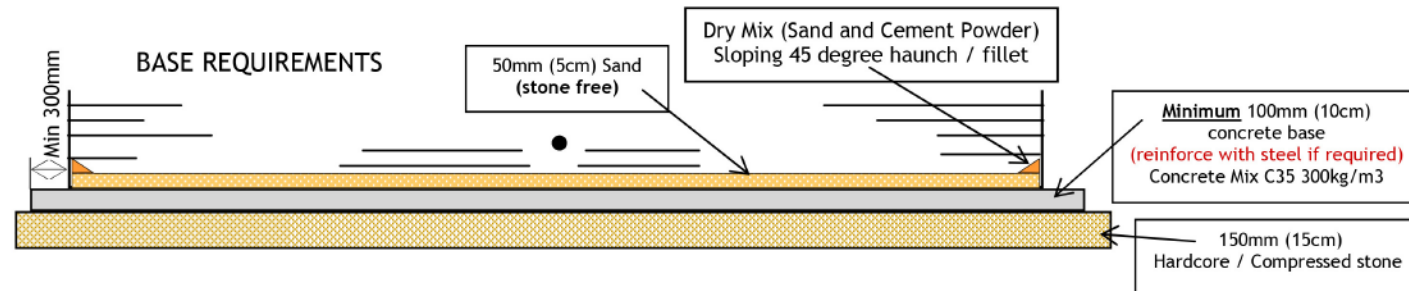
TANK BASE SPECIFICATION (UK full concrete base requirement)

Concrete Base can be square, octagonal or round.

The base must be a minimum of 600mm larger than the tank diameter.

The surface should be level over it's entire surface and be reasonably flat (smoothing not necessary).

The finished surface must be free from any sharp protrusions, crevasses or cracks, which over time could cause damage to the installed Tank liner.



The drawing above shows the traditional method for cushioning of the liner.

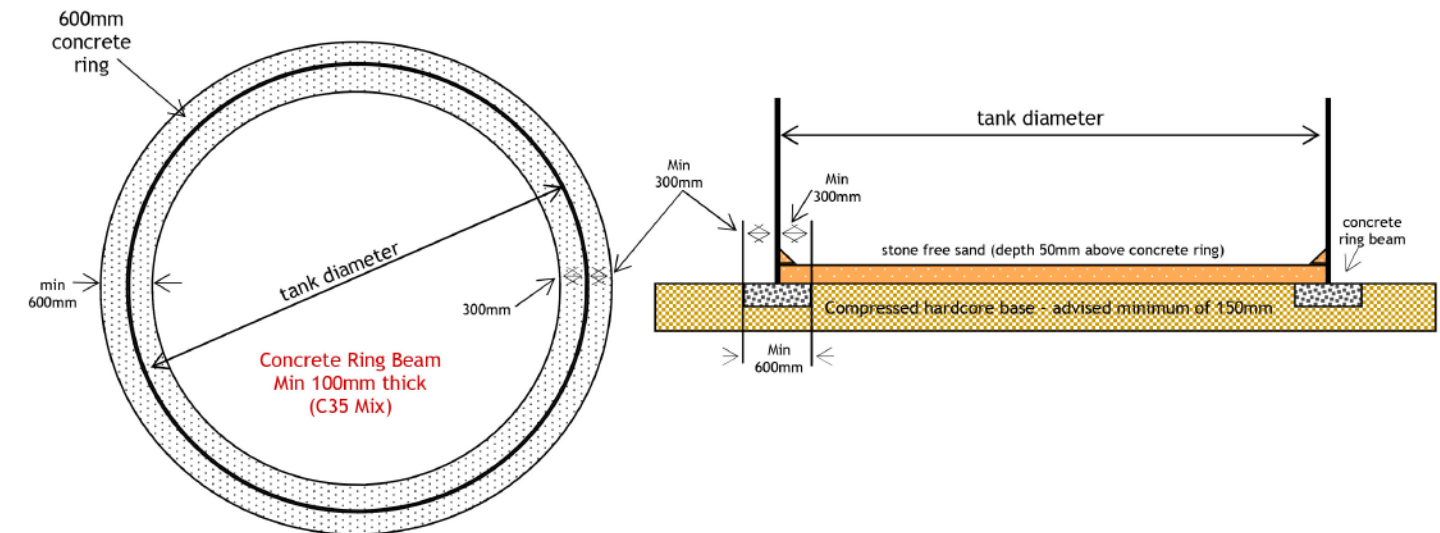
Other methods of cushioning the liner can be deployed, as advised in the storage tank installation manual.

(eg. HD polythene sheet from the tank wall on to the base, with the sand on to the polythene sheet or the fitting of an overlapping layer of geotextile fleece, down from the tank wall across the entire tank base).

TANK BASE REQUIREMENTS			
Tank	Diameter	Minimum Base Size	Stone Free Sand Required
Metres	Feet	Metres Square/ Round/ Octagonal	Cubic Metres
2.74	9'	3.34	0.30m3
3.65	12'	4.25	0.53m3
4.57	15'	5.17	0.82m3
5.48	18'	6.08	1.18m3
6.40	21'	7.00	1.61m3
7.32	24'	7.91	2.10m3
8.23	27'	8.83	2.66m3
9.14	30'	9.74	3.28m3
10.06	33'	10.66	3.97m3
10.97	36'	11.57	4.73m3
11.89	39'	12.49	5.55m3
12.80	42'	13.40	6.44m3
13.71	45'	14.31	7.39m3
14.63	48'	15.23	8.41m3

TANK BASE REQUIREMENTS			
Tank	Diameter	Minimum Base Size	Stone Free Sand Required
Metres	Feet	Metres Square/ Round/ Octagonal	Cubic Metres
15.54	51'	16.14	9.48m3
16.46	54'	17.06	10.64m3
17.37	57'	17.97	11.86m3
18.29	60'	18.89	13.15m3
19.20	63'	19.80	14.48m3
20.12	66'	20.72	15.89m3
21.03	69'	21.63	17.35m3
21.94	72'	22.54	18.90m3
22.86	75'	23.46	20.52m3
23.77	78'	24.37	22.19m3
24.69	81'	25.29	23.94m3
25.60	84'	26.20	25.74m3
26.52	87'	27.12	25.78m3
27.43	90'	28.03	29.55m3

Tank Ring Base (concrete ring beam—min 100mm thickness)
(for installation on firm (stable) ground)



Note. For tanks to be installed where ground conditions are soft or unstable.
The concrete ring beam should be expanded to a minimum of 1000mm in width and 150mm in depth.
The hardcore infill may also require an increase in depth to 200mm.

SECTION B.

TANK KIT CONTENTS and TOOLING REQUIREMENTS

1: Tank Kit Contents

The tank kit contents are usually delivered strapped to a pallet and covered where possible. If the supplied kit is not to be installed immediately on arrival to site, the palletised kit should be stored undercover in a dry location, to prevent superficial deterioration of the materials and packaging.

If the supplied equipment is offloaded from the pallet on delivery, it is important that the tank panels are stored for future use in the same order as they were originally stacked on the delivery pallet. (i.e. pre-drilled panels on top followed by the thickest panels down to the thinnest panels at the bottom).

Product on the Pallet

Tank Panels – will be banded together (pre-drilled on the top followed by the thickest (base) panels down to the thinnest (top) panels at the bottom.

Note. Not all tanks have varying thicknesses of panels, some may have one thickness of panel only.

Carton / Buckets containing: Tank Fixings (M10 or M12 and M10) Tank Bolts x 20mm & 40mm, Hexagonal Nuts and Flat Washers).

Tank Erection Manual.

2: Optional items as ordered

Tank Capping

Straining Wire (coiled) + Wire Strainer

Base Anchor Brackets + Anchor Bolts

Tank Liner

(to the required size in the specified material).

Liner Repair Kit

(with EPDM liners)

Tank Outlet Assemblies

(for outlets, overflows etc)

Gate Valves

(or alternatives for the outlet assembly)

High Level Fill Valve

(Float fill valve, Float, Drop Arm).

Fill Valve Support Bracket

(for use when fitting Soft Covers)

Tank Outlet Filter Pipe

Soft Cover & Fittings Kit + PVC Support Post

Steel Pipe Work Enclosure

Protective Fleece

3: Tooling Requirement (not supplied)

Electric / Pneumatic Torque Wrench (or ratchet spanner)

Sockets (for M8 – M10 and M12 fixings) (for Torque Wrench)

Long Reach Socket (17mm) (for base bracket anchor bolts)

17mm Ring Spanner (for manual tightening)

Tape Measure (For measuring)

Large Flat Bladed Screw Driver (for holding bolt heads while tightening)

12mm Masonry drill bit (drilling for the anchor bolts)

Stilsons / Pipe Wrench x 2 (for tightening outlet assemblies etc)

H D Pliers (for cutting and winding straining wire)

Stanley Knife (Sharp – for cutting capping and possibly the liner)

17mm Podger Spanners x 2 (for hole alignment and holding panels in place)

Rubber Mallet (for tapping the capping into place)

Waterproof Adhesive (Duck) Tape 50mm (for holding capping in place etc)

Tin Snips or Hacksaw (for cutting pallet banding)

M10 Eyenut Fixings (for fitting to installed bolts to secure ladder safety straps. Supplied with Soft Covers, available as an option on other builds)

Access and Safety Equipment (as previously advised in section A.)

SECTION C.

INSTALLATION INSTRUCTIONS

1. Marking out the Base

Find the centre of the tank base then with chalk, mark out a precise circle to the advised diameter of the supplied tank. Use the marked out circle for the positioning of the tank panels.



Move the liner and liner cushioning materials into the centre of the tank (i.e sand, cement, polythene sheet, fleece etc) and protect from rainfall.

2: Un-banding the Panels

Any pre-drilled panels should be on top of the pallet. Panels drilled with outlets for the base ring should be placed in the location where the outlet is required. (Note. Any overflow drilled panels should be put to one side for later in the build).

The panels should then come off the pallet in the required numbers and thicknesses for each ring of panels, with the thickest panels at the top of the pallet being used for the bottom of the build to the thinnest at the bottom of the pallet being used for the top ring.

Each panel has an identification label which advises the steel thickness (eg 1.2) and the diameter (eg 21). The label (which is positioned in one corner of the inside of the panel) should be located on the same top edge of each panel when installing.

NOTE. Not all tanks have multiple thickness panels. Many smaller tanks are made with a single thickness of tank panel.

NOTE. On larger tank builds, some panels may have triple sets of vertical holes as opposed to the standard double sets of vertical holes. In this instance, the triple holed panels will always be installed below any double holed panels.

On standard build tanks, to confirm the number of panels per ring, take the tank diameter (in feet) and divide by 3 (e.g. 21ft tank divided by 3 = 7 panels to the ring).

3: Fixings

Washers. All fixing sets M12 or M10 are provided with 2 washers.

One washer directly against the bolt head and the second between the panel and the hex nut to the outside of the tank. The use of double washers is integral to the tank strength calculations. Not fitting double washers would invalidate the warranty. Please ensure all bolt heads are on the inside of the tank.

VERTICAL (Double or triple) seam joints (with the exception of the M10 x 40 Bolts in the Tank Base Bracket Holes), will be fitted with either M12 or M10 Fixings.

Any M12 Fixings provided should be fitted into the triple sets of VERTICAL HOLES from the base panel and panels immediately above, until the supplied amount has been used in full panel rings.

All vertical holes in remaining upper rings of panels will be fitted with the remaining M10 fixings

HORIZONTAL All horizontal holes on the ring seam joints are to be fitted with M10 fixings.

Note. Many tank builds will only require M10 fixings throughout.

4. Erecting the Steel Walls

The Base Ring Firstly select the panel / panels which have been pre-drilled to accept outlets and position as required. Then working in a clockwise direction and following the chalked circumference line, place each consecutive panel on the inside of the preceding one.

Once in position and using a podger / screwdriver to line up the holes and hold the panels in place, loosely bolt the bottom ring of panels together.

Use M12 or M10 fixings after referring to the information provided in the previous “supplied fixings” section.



Except for the single hole at the vertical seams, NO fixings are required in the bottom holes of the base panels, NOR in the top holes of the top ring. (If preferred, at the end of the panel build, any spare fixings can be installed into the redundant base holes).

The longer (M10 x 40) bolts should be used to fit the base anchor brackets (if supplied) at each seam between the base panels.

NOTE. DO NOT FIX THE BRACKETS TO THE CONCRETE AT THIS STAGE)

Once the base ring is complete and in position. Check for ovality and adjust accordingly to provide a true circle of the correct diameter (use a tape measure to double check).

Tighten a small but evenly placed number of bolts to hold the panels securely, but do not tighten all of the bolts until the tank is fully erected.



5: Erecting the upper rings

Proceed with installing the other rings of panels on top of the fitted base ring. (Check to ensure that the same or the next thickest panels are selected and used).

The exact centre of the panel for the ring above should be located directly over the vertical seam of the two adjoining panels on the ring below. (i.e. similar to a brickwork effect)

The panels should be bolted together using only the **M10 Fixings** with the panel above overlapping the panel below on the outside, thus enabling rainwater to run off the tank walls.

Always checking that the correct thickness of panel is selected, continue to add the remaining rings of panels but do not tighten all of the bolts until the build is completed and the tank is re-checked for ovality and re-adjusted if required.

Note. Once it becomes necessary to work from ladders and step ladders, it is important that they are made stable and fixed securely as per the H&S guidelines.



6: Final Checking and Fixing

Once all of the panel rings have been installed to the required height, double check the structure for ovality and adjust as required. (An oval tank may not accept a liner or fitted cover correctly and may result in a complete re-build of the structure)

If the circle is correct. Proceed to tighten all of the fixings on the tank and fix the Base Anchor Brackets to the concrete base.

Note. Drill and fit the bracket anchor bolt towards the front of the bracket slot and when fitting the anchor bolt, **DO NOT FULLY TIGHTEN!**

(This will allow for an amount of movement for the bracket when the water is added to the tank and any expansion has taken place).



- A. Check that there are fixings in all seam joint holes, M10 fixings on all horizontal joints and M12 or M10 on all vertical joints.
- B. Check that all bolt heads are on the inside of the tank and that any burred edges are removed
- C. Check that each ring of panels is of the correct thickness
- D. Check the fitted tank panels for any damaged or bent corners or edges. If found these must be carefully straightened back to their original profiles, to prevent puncture damage to the liner.

7: Fit the Capping

If supplied in coils, uncoil the bottom capping and straighten if possible (note. capping will be easier to fit if warmed). The capping should be fitted over the top panel edge around the entire circumference of the tank.

If supplied in lengths, capping should be fitted over the top panel edge around the entire tank.

When fitting, bend the capping back so as to open the slot. Working around the tank one person opens and applies the capping, while the other pushes or taps into place with the mallet and secures in place with adhesive (duck) tape as necessary.

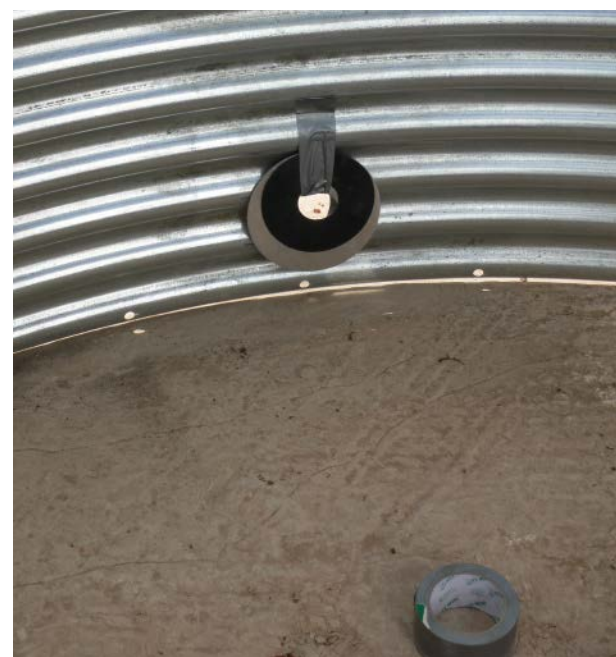


8: Preparation for fitting the Side Wall Outlet Assembly

Locate the pre-drilled outlet hole in the base panel on the inside of the tank and taking one of the aluminium discs and one of the rubber gaskets supplied with the outlet assembly, proceed as follows :

Align and hold the aluminium disc over the prepared hole and secure to the panel with a tape. Then hold the rubber gasket over the aluminium disc and hold in place with small pieces of tape

(This will enable the outlet assembly to be fitted after the liner has been installed, without the need to drop the liner to fit the disc and gasket)



9: Installation and Fitting of the Liner Cushioning

Install the chosen method for cushioning of the liner on the base using one of the three methods as described on Page 5 of this manual.

- A. 50mm layer of soft “stone free” sand with a 5.1 dry mix haunch at the outer edge.



- C. A layer of geotextile fleece, taped to the tank wall.



- B. Polythene sheet from the walls to the base, with a 50mm layer of soft “stone free” sand, shaped at the edge on to the sheet. Note. Any spare fixings can be fitted into the redundant holes at the bottom of the base panels if required.



Once installed, check for evenness and to ensure there are no protrusions which could damage the liner, then move the packed liner to the centre of the tank base.

10: Unfolding and fitting the liner

Fitting the liner will require people to work inside the tank on the fitted liner surface using ladders or step ladders. It is imperative that all equipment used within the tank has been adapted to protect against damage to the liner.

This will require that ladder or step ladder feet and tops be covered with a protective cushioning material.

In addition attention should be given to the type of footwear worn when working on the liner to ensure no damaged is caused to the liner. Also ensure that carried tooling etc, cannot fall and damage the liner.

Step 1. Place the liner package centrally on the base, double check that the liner cushioning system (sand or fleece) is free from any stones or sharp object and is evenly spread across the base, finally check that footwear is clean and appropriate.



Step 2. Unwrap and roll out the centrally located liner over the prepared base. The unfurled liner ends should reach the bases of opposite walls. Unwrap the remainder of the liner carefully pulling the circular base into place, so as the base to vertical wall seam is touching the steelwork all around. When done the vertical side will then be lying flat on the base.



Step 3. Ensure that all wall seams on the liner are lifted perfectly vertically (not twisted or at an angle). The person/s within the tank should then lift the liner offering its top edge to the person on the ladder to the outside of the tank.

Lift the liner to a height when there are no folds remaining at the base ensuring that the liner remains firmly in contact with the base floor.

An all around even length of liner of approximately 12–16 inches (30–40cm) should be lifted over the tank edge and temporarily secured in place with either short pieces of the top capping or adhesive tape.

Caution: If an even all round overlap cannot be achieved, this would indicate that the tank is oval and not round! This will need to be rectified before proceeding.

Once the liner is in place, check that the overlap is even all around the tank. Then the person/s within the tank should check and adjust as required to ensure that the liner wall seams are vertical, that the liner fits closely at the base and that any remaining creases are evened out.



Note. Liner Warranty

Excessive creasing of the liner can result in early deterioration and failure of the liner. In such proven cases liner warranties become invalid.

Step 4. If supplied, straining wire and strainer should be fixed within one of the panel corrugations towards the centre of the overlapping liner and tensioned, to secure the liner to the tank.

Once the straining wire has been tensioned any excess wire should be removed.

(Note. Some types of liner may have an integral ratchet strap arrangement to secure the liner to the tank, in this case the strained wire is not required).

Step 5. If supplied, the top (1.00") split capping should be fitted securely over the liner edge around the entire circumference of the top of the tank.

To do this, bend back the capping to open the slot, fit over the liner and panel edge and tap down using a rubber mallet and secure in place with adhesive tape as required.



SECTION D.

Galvanised Outlets 2-4"

Once the installation of the liner is completed and checked the outlet/s can be installed into the tank.



1. If the outlet includes the option of an isolation valve (e.g. gate valve, lever valve etc), then it is advised that the valve is fitted to the outlet assembly, before fitting to the tank (on steel outlets on to the short thread).
2. With the valve on the outlet tube, take one of the supplied back nuts and screw down to the base of the long thread. (Tip. If tight, tap the sides of the nuts when on the thread this should help free the nut and enable it to run more easily down the thread). Next slide one of the supplied aluminium discs down to the fitted back nut.
3. From the outside of the tank, offer up the long thread with fitted nut and disc, through the pre-drilled outlet hole and carefully through the pre-fitted aluminium disc and rubber gasket, which was previously taped in place between the inner tank wall and the liner.
4. Whilst the person outside the tank holds the outlet assembly upright and very firmly, (taking care not to dislodge the internal disc and gasket) the person on the inside of the tank (after ensuring that the liner is correctly positioned,) carefully uses the face of the rubber mallet to gently tap out a neat circle of liner material using the end of the outlet tube as a cutter. (Note. If knives are used to cut outlet holes, extreme care should be taken, as any damage caused may invalidate the liner warranty).
5. Once the outlet tube is cleanly through the liner wall, firmly push the second rubber gasket down on to the liner followed by the final aluminium disc and finally thread the second back nut to tighten against the aluminium disc (hand tight only).
6. Finally after checking that the liner is free from creases between the discs and gaskets, with one person holding the inside back nut firmly with stilsons, a second pair of stilsons is used to carefully tighten the outside back nut, ensuring that the outlet thread does not rotate as this may cause the liner to distort and tear.

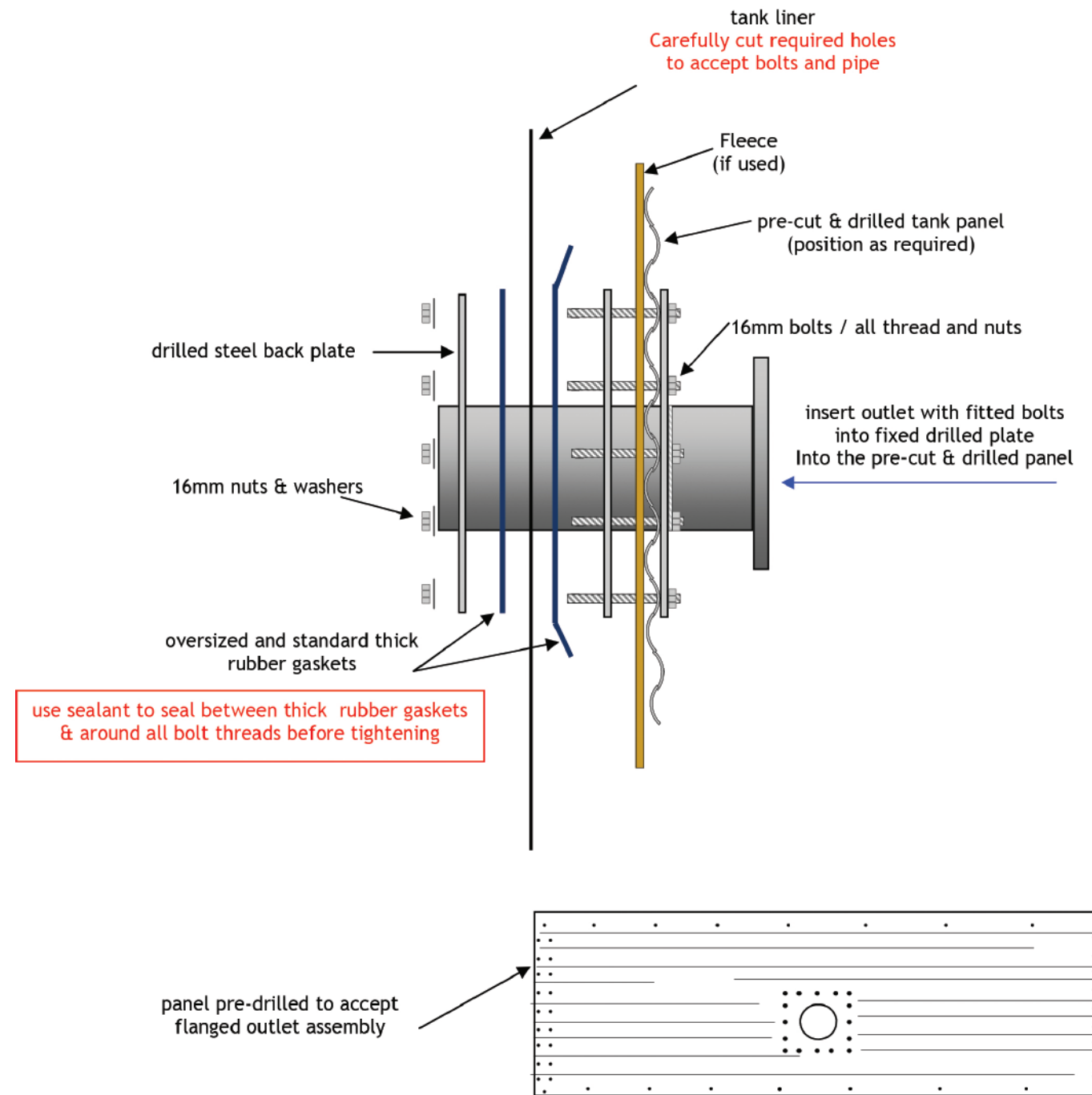
(Tip. If an outlet assembly should require tightening, this should always be done from the inside of the tank, so as to ensure that the liner does not get twisted or torn)

This should now complete the installation of the liner.

Tank Outlets & Overflows

Side Tank Outlet Assembly- Flanged for tanks 21ft / 6.40m diameter and larger

(available in galvanised or uncoated steel in sizes 5"/125mm, 6"/150mm, 8"/200mm, 10"/250mm and 12"/300mm - imperial or metric flanges)



Note. Due to the curve of the panels, the flanged outlet assembly is not available for diameter tank sizes below 21ft / 6.40mts.

Installation of Flanged Tank Outlets

TO15GFL (125mm) TO16GFL (150mm)
TO18GFL (200mm) TO20GFL (250mm)

A) Preparing the liner

1. Pre-hang the liner ensuring the seams are vertical and that the liner around the outlet hole is free of creases
2. Offer the outlet pipe through the hole in the panel up to the liner, ensuring it is held at right angles to the panels.
3. Mark the position of the tube end on the liner before carefully cutting a hole in the liner approximately 1" smaller than the tube end.
4. Fit the long threads and nuts to the first (welded) plate on the outlet, offer the pipe up to the panel locating and inserting the long threads through the small holes.
5. When held in position carefully push the liner over the tube to a point where the long threads are against the liner, carefully mark and cut out the holes for the bolts in the liner.
6. When all of the holes have been cut, the outlet is ready to install.

B) Installing the Outlet

1. Drop the liner away from the tank wall and lift the outlet into position, placing the tube and the long threads through their appropriate holes.
2. With the outlet being supported on the outside of the tank, the assembly of the outlet is now done from the inside of the tank.
3. Add the first of the steel plates (pre-threaded) over the tube and screw in the long threads, followed by the larger of the rubber gaskets.
4. Apply mastic to the rubber gasket around each of the threads and in a circle around the large hole (approximately 1"/ 2.5cm)
5. Carefully fit the liner over the tube and the long threads ensuring it is free from creases.
6. Add mastic in a ring around the long tube onto the surface of the liner and also around all of the long threads.
7. Fit the smaller of the rubber gaskets and press to fit against the liner.
8. Add the final steel plate, the hexagonal nuts and tighten with a spanner. As tightening takes place, remove excess mastic with a damp cloth as it is squeezed from the seals.
9. Continue to tighten the bolts until all of the components are pressed together as tight as possible (this may require the tightening of each bolt several times)
10. Finish fitting and securing the liner in the standard way. **Please note: With these larger flanged outlets they may need supporting from the outside to avoid any damage to the tank panels because of their increased weight.**

C) Checking and Filling

Checking

Before adding water to the tank, it is essential to make the following checks:

Check that the liner is positioned correctly and that the base seam has not moved away from the wall. Re-adjust as required, to ensure "bridging" will not occur when water is added.

Check that all tooling etc has been removed from the tank.

Inspect the liner base and the walls for any possible damage caused by ladder feet or dropped tooling etc.

If damage is found, make the appropriate repairs with the provided emergency repair kits, following the manufacturers provided instructions.

Note. EPDM (rubber) or PVC materials require a glued patch repair. FPP (polypropylene) material requires a specialist applied heated patch method. (Details on request).

Filling

Add 50 to 75mm of clean water to the tank then re-check the liner fit around the entire circumference.

Flood the tank to an approximate 150mm depth of water

(Note. This is the minimum amount of water required to ballast the liner, if the tank is not due to be filled immediately).

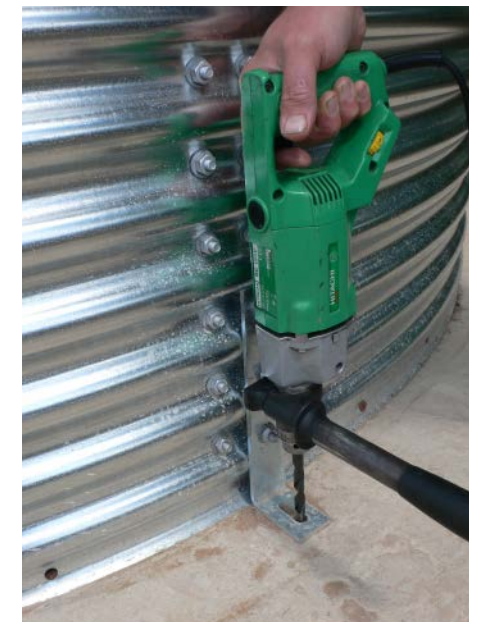
Check that the anchor brackets bolts are not fully tightened down to the concrete base, so as to allow the bracket to release so it is able to slide out if needed. (Once the tank has been filled, the anchor bracket bolt can be fully tightened if required).

Check for leaks at the outlet. If leaking, re-check the liner position to the internal rubber gaskets to ensure there is no twisting or pinching of the liner and from the inside, tighten a little more if required

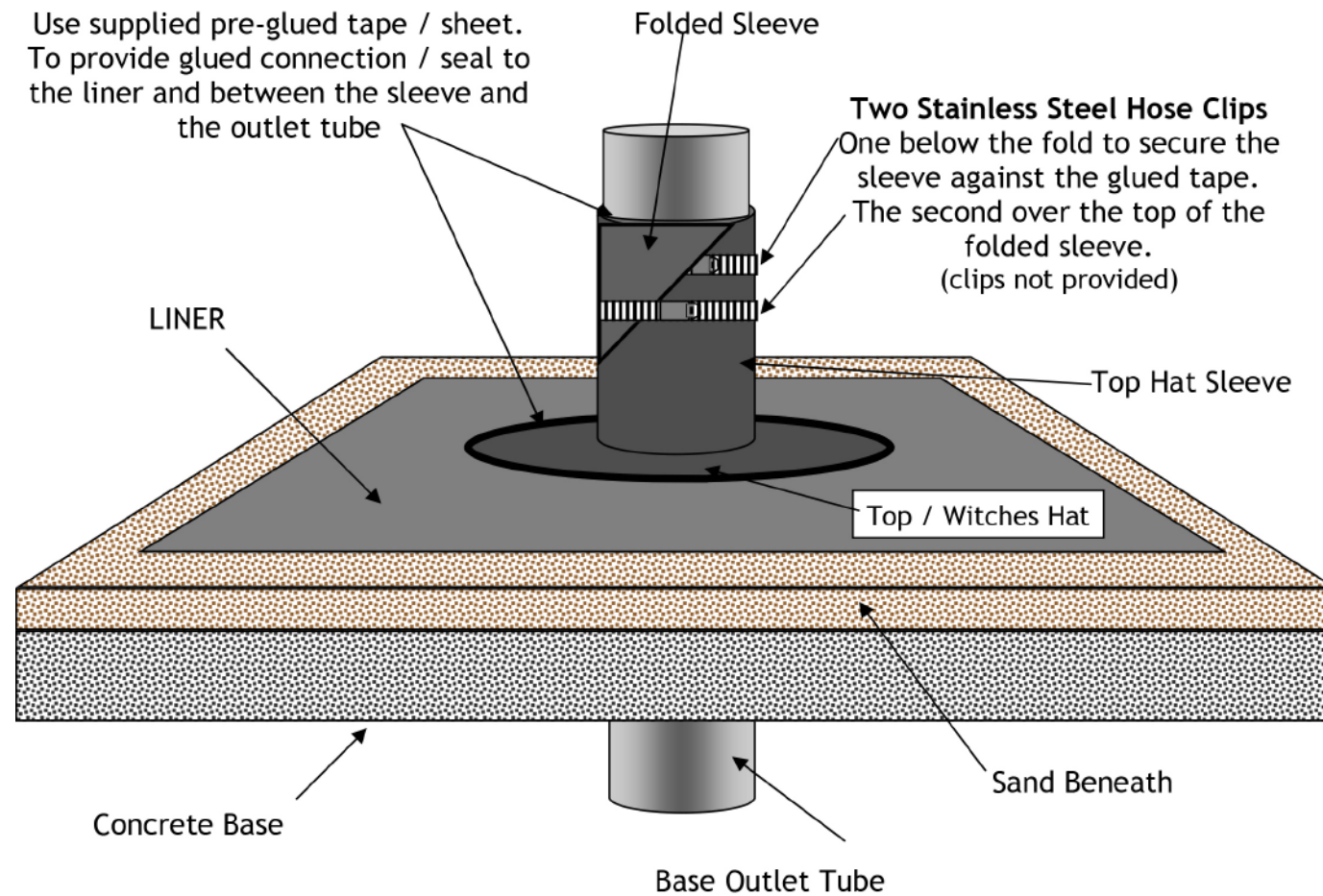
Note. Water on the base does not necessarily indicate a leaking tank!

If using sand beneath the liner, the weight of water in the filled tank will squeeze any moisture out of the sand. This will show on the outer concrete base for a week or two before the sand dries completely.

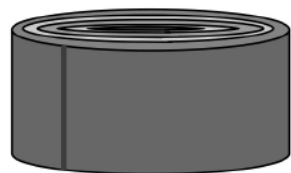
Finally, ensure that care is taken when removing ladders, equipment and personnel from the inside of the tank, to avoid causing damage to the liner or tank wall structure.



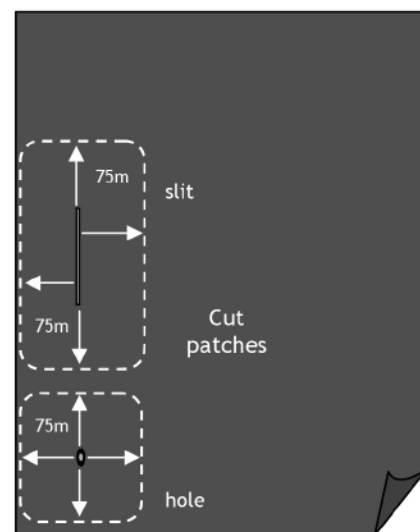
2 Top Hat / Witches Hat - Base Outlet System (sealed to the liner and outlet pipe)



Liner Repair Product

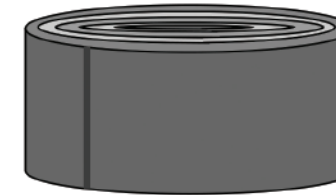


Double Sided, Glued Repair Tape or patch sheet

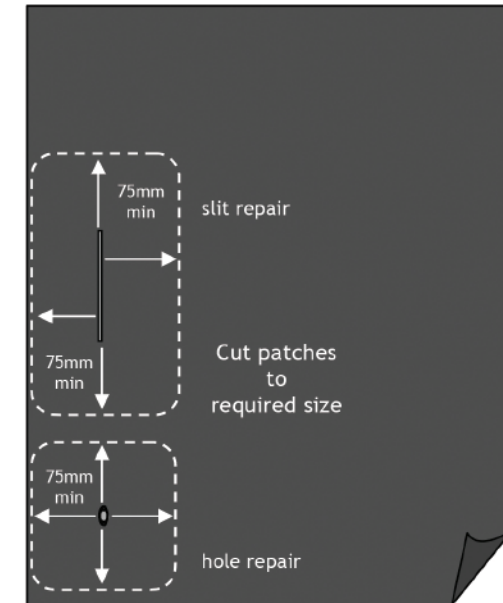


Stainless Hose Clips Not Supplied

3 EPDM (SCGT) LINER REPAIR KIT



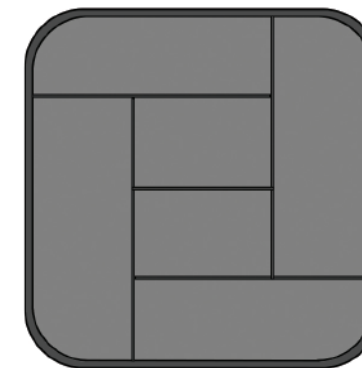
Contents:
Double Sided, Glued Repair Tape and Patch Repair Sheet



IMPORTANT !

This repair system is only suitable for the patching of small holes or splits and which are not found on the welded liner seams.

Liner Repair Method



A. After locating and marking the position of the hole or cut in the liner. Firstly ensure that the surface immediately around the damaged area of liner, is clean, dry and free from grease or slime etc.

B. Prepare the required size of repair patch from the provided sheet, then fix the repair tape over the entire surface of the patch.

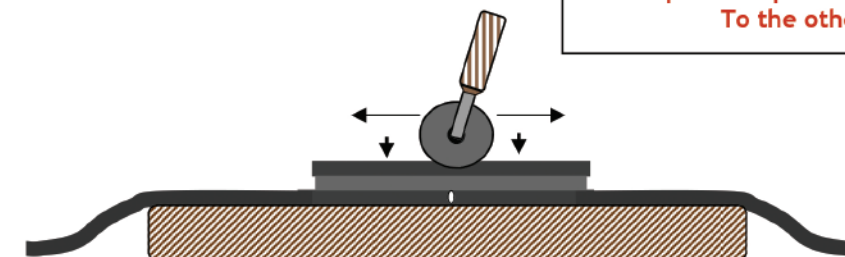
Round off the corners of the prepared patch, to help prevent the patch corners from peeling.

Tip. If making repairs to a new, unused liner, prepare two patches and fix one to each side of the damaged liner.

C. On a firm, flat surface. Apply the repair patch to the prepared area of liner, ensuring that the patch fully covers the located hole or split in the liner.

D. Using a hard surfaced roller. Rolling back and forth, apply a firm downward pressure over the taped patch, to compress the whole of the repair patch firmly on to the liner.

Repeat the process if fitting a second patch, To the other side of the liner.

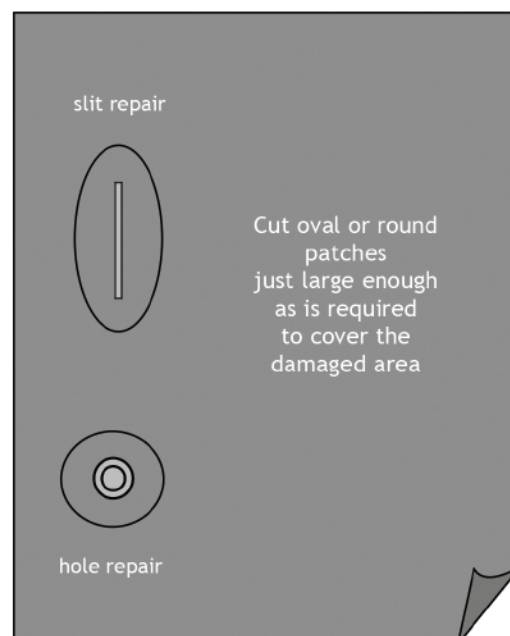


TLREPD repair

4 ENPEX FPP LINER REPAIR KIT

Contents:
Heat Gun, Hand Roller, Scissors
And Repair Sheet

Liner Repair Method



A. After locating and marking the position of the hole or cut in the liner. Firstly ensure that the surface immediately around the damaged area of liner, is clean, dry and free from grease or slime etc.

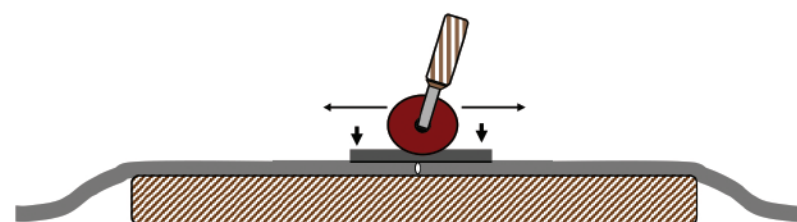
B. Prepare the required round or oval size of repair patch from the provided sheet.

With the liner supported on a firm flat surface, position the repair patch over the damaged area and hold in position with the hand roller.

When the heat gun has reached the required temperature, carefully slide the flat nozzle on the heat gun under one edge of the patch for a few seconds and remove, before firmly applying pressure with the roller to weld the two surfaces together, then repeat the same action to the other edges of the patch.

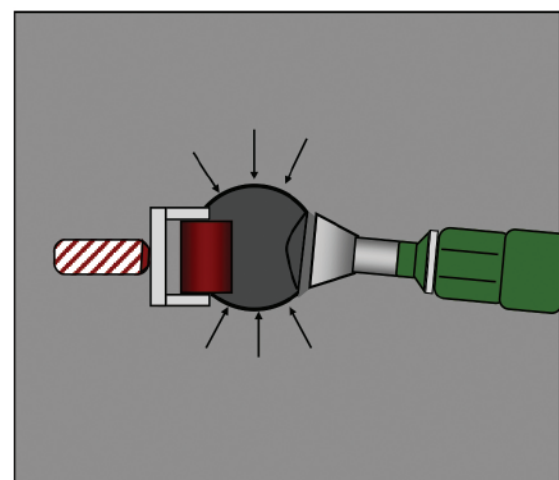
Finally, with a finger nail, check that all edges are welded down and if any lift, apply a little more heat and hand roll to complete the sealing.

Caution. Do not overheat the liner material

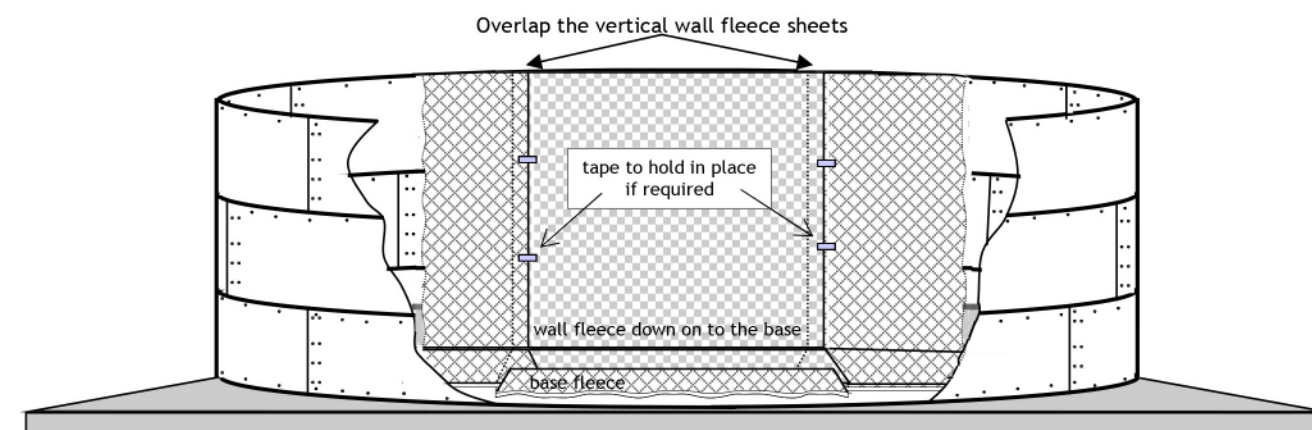


Tip. Searching for and locating leaks in liners
One person to be behind the liner (in the dark !), with a second person shining a torch at the suspect area of damaged liner.

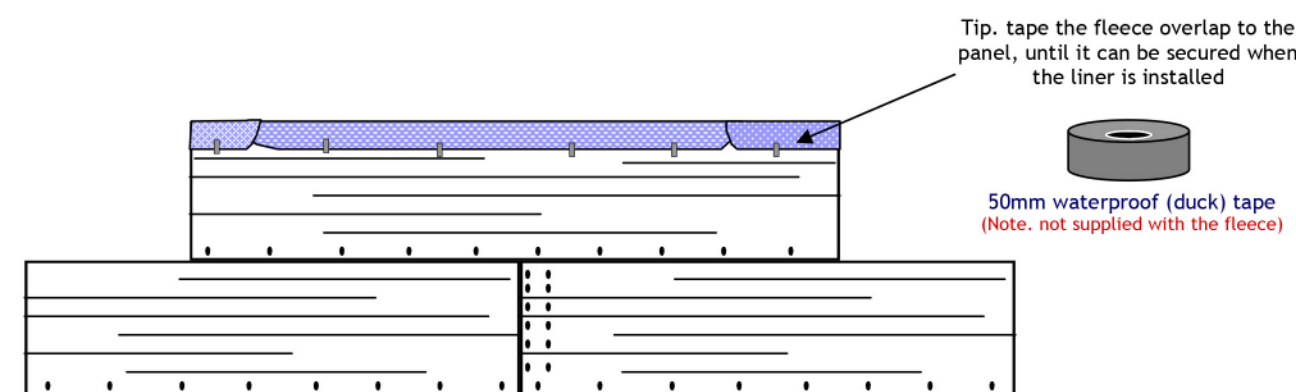
The person in the dark should be able to identify and chalk mark the exact damage location from the pinprick of torch light showing through the liner material.



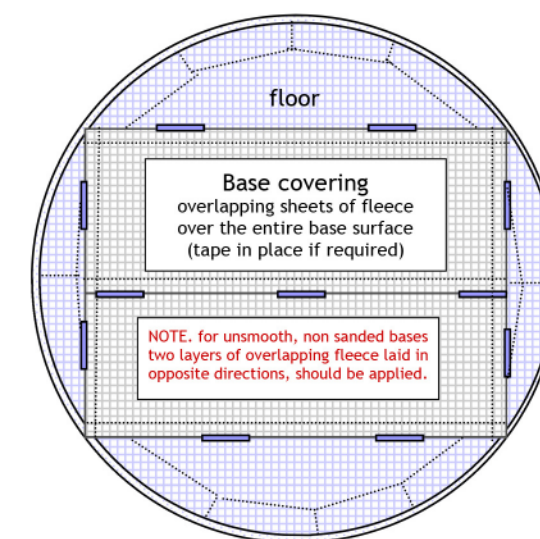
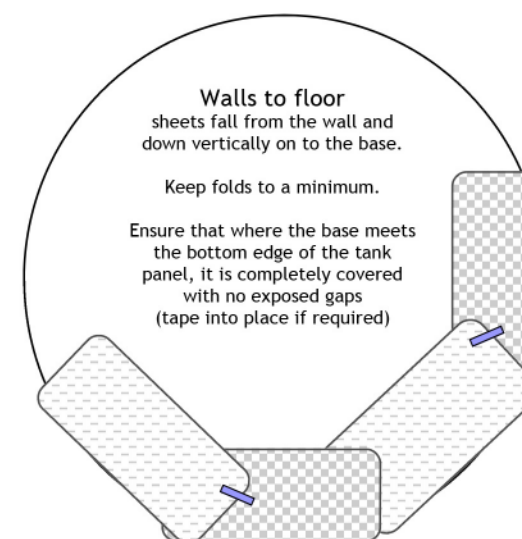
FLEECE EXAMPLE IN STORAGE TANKS 24/4 AND 24/6



Keep the number of folds in the fleece to minimum



The tank base surface should be level and flat with a reasonably smooth finish and no exposed sharp protrusions



Note. If fitting base fleece only.
Ensure that the fleece is taken from the tank wall and down on to the base, ensuring there are no exposed areas where the panels meet the base.
(tape in place as required)
(If possible, add a cushioning bank of sand all around the panel to base corner, beneath the fleece)

F: Storage Tank Maintenance

Tank Base and Surrounds

Make regular inspections to ensure that the concrete base has not been damaged or is suffering from concrete degradation, also maintain clean and clear access all around the tank to allow for any future maintenance of the structure.

Tank Steel Structure

Avoid damage to the galvanised steel structure and any attached pipe work by ensuring that vehicles or mechanical lifting equipment cannot come in direct contact with the tank (fork lift trucks and pallets etc). Regularly check the outlets and isolating valves to ensure they remain in good working order.

Tank Cover and Internal Fill valves etc. (if supplied)

Check annually, the tension of the steel tie down straps and tighten if required.

Remove the appropriate access hatch cover and make regular checks of any installed water feed valves to ensure that the valve is opening and closing correctly at the right water fill levels.

Any debris or pooled water should be removed from the tank cover as soon as possible, failure to do so could put substantial pressure on the cover support structure and cause damage to the top ring of the tank. Check the centre support pole on a regular basis to ensure this has not moved. During periods of high wind activity we strongly advise that Anti Algae and PVC covers are removed and the tank is kept full to its maximum volume. This will avoid any damage to the top ring of the tank

When using a Floating Cover, especially in windy conditions, the liner should be inspected at regular intervals for wear and tear. Dropping the water level may be a good precaution in certain conditions.

Important! Ensure that when working at high level, hatch covers and tools etc, are secured so as to prevent possible damage and injuries from falling objects.

Working Within the Storage Tank

For safety reasons, if it is necessary to enter the tank, always ensure that a responsible person supervises from outside the tank until such times as the tank has been vacated. Note: the tank will constitute a Confined Space and appropriate precautions should be taken.

Warning! Do not enter the tank until the water has been emptied to a safe working level.

Drain the tank via the installed tank outlet (utilise the pump system if possible). Then if required, remove the remaining water with a submersible (sump) pump and attached hose, either out through an open outlet or over the rim of the tank.

Important! If working inside the tank. To prevent damage to the lining material, ensure that ladder/step ladder feet are cushioned, that only soft soled shoes are worn and that components or tools etc, are held securely and cannot fall and pierce the liner.

The covered tank, if filled with mains water or filtered re-cycled water, should not accumulate debris or silt on the liner base. Should the tank be filled from other sources (bore-hole, well, stream etc), it is possible that silt etc, may eventually settle and build up on the liner.

Important! Do NOT attempt to remove any accumulated silt or debris the bottom of the tank with manual tools (rakes, shovels etc), as this will almost certainly pierce the lining, resulting in an expensive re-fit and possible damage to the surrounding areas from water spillage.

Remove silt etc, by suction or with a submersible pump.

Winterisation

Generally, water within a covered storage tank with an automated fill arrangement, and which is in regular use, will not freeze sufficiently to cause damage to the structure.

For tanks with no winter usage, the tank can be drained to a low level.

For tanks with no winter usage, likely to experience temperatures below -10 Celsius, the tank can be completely drained and the liner weighted with sandbags every 1.5m2.

Important! An empty tank structure is considerably less stable, especially if exposed to strong winds.

For special tanks which have to remain full for emergency use (fire tanks etc), it is advised that internal immersion heating is installed in the location of the fill valve. This is to ensure icing does not occur under the fill inlet.

Where temperatures may fall below -10 Celsius, electronic or mechanical accessories (e.g. depth gauge, emersion heater) should be removed and stored.

Feed pipe work, external valves and delivery hoses to pump rooms etc, should be lagged to protect from possible freezing wherever possible.

As a minimum, an annual inspection of all tank components should be undertaken to validate the warranty.



EVENPRODUCTS

water for life