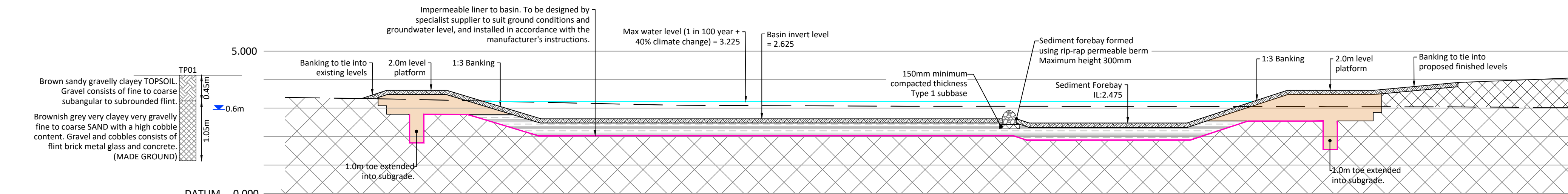


SUDS Features - Designers Risk Assessment

Risk Item	Severity	Likelihood	Control Measures / Mitigation	Residual Risk
Drowning	Extreme	Rare	- All residents living within the development are to be informed of the location and purpose of the detention basins and swales. - The basin is situated close to the public highway and dwellings to ensure a high degree of natural surveillance. SUDS features are to be sited away from LEAPS / NEAPS / Schools etc. - Edges of the detention basin are to be clearly visible. A 2.0m level strip around the basin has been provided for maintenance access. Vegetation shall be planted around to discourage access but will not obstruct visibility of the water level. - The depth of basin and swales have been designed to be as shallow as possible. Basins and swales have no permanent water, and will only be wet in the event of a storm event. - Banking on the basin is limited to 1 in 3 to allow for safe maintenance, access & egress and unaided movement in either direction. Swales are to have a maximum banking of 1 to 2. - SUDS features are to be regularly maintained to ensure that the perimeter does not become obscured and that the area around the basin/swales does not deteriorate. - Appropriate "nag" warning signs posted where applicable (No unaccompanied children, danger deep water etc). - Safety grills are to be fitted to all headwalls, with pipes larger the 350mm to prevent unauthorised access to the underground drainage network. - Slip / tripping hazards have been minimised around the edge of the SUDS features: rip-rap berm/sediment forebay are located within the detention basins, planting and other visible obstructions near the rip-rap berms are to be avoided.	Low
Slips, trips or falls	Major	Unlikely	- All headwalls with a vertical drop are to be provided with a guard rail to the rear and sides. Guard rails is to be a minimum of 1.1m high, with a further railing around 0.5-0.6m suitable for children. - SUDS features are to be regularly maintained to ensure that surfaces do not deteriorate or become obscured. Silt should be removed periodically to avoid increased slip risk. - SUDS features are to be mostly dry, except for storm events. This minimises the risk of contracting waterborne diseases, such as Weil's disease and blue-green algae. Without stagnant or standing the likelihood of disease-carrying or nuisance insects is also minimised. - Maintenance operative, working around and within the SUDS features are to be informed of safe working practices. Workers should check for open cuts/ounds, and where applicable use nitrite gloves, waterproof dressings or skin coverings. Where appropriate, maintenance operatives should be provided with PPE and a worker's card that can be present to doctors if symptoms that relate to water body exposure appear. - Litter removal is to be undertaken at regularly. Removal of litter, especially food is essential. The removal of litter reduces the risk of rodents frequenting the area, and therefore minimises the risk of waterborne diseases.	Low
Disease or Ill Health	Moderate	Rare	- Maintenance operative, working around and within the SUDS features are to be informed of safe working practices. Workers should check for open cuts/ounds, and where applicable use nitrite gloves, waterproof dressings or skin coverings. Where appropriate, maintenance operatives should be provided with PPE and a worker's card that can be present to doctors if symptoms that relate to water body exposure appear. - Litter removal is to be undertaken at regularly. Removal of litter, especially food is essential. The removal of litter reduces the risk of rodents frequenting the area, and therefore minimises the risk of waterborne diseases.	Low

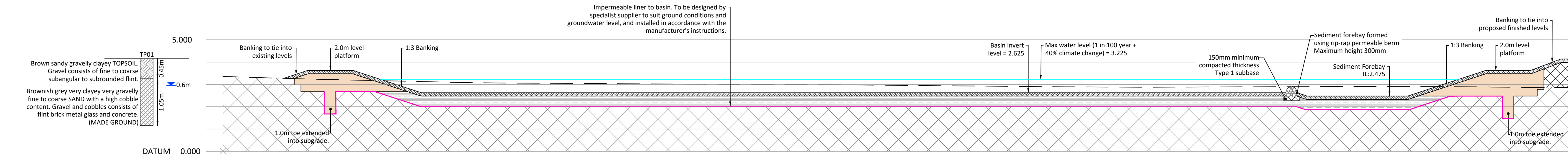
SUDS Features - Maintenance Schedule

Maintenance schedule	Required action	Recommended Frequency
Regular maintenance	Remove litter, debris and trash	Monthly
	Cut grass - for landscaped areas and access routes	Monthly (during growing season) or as required
	Cut grass - meadow grass in and around basin	Half yearly: Spring (before nesting season) and Autumn
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
Occasional maintenance	Reseed areas of poor vegetation	As required
	Prune and trim trees and remove cuttings	As required
	Remove sediment from pre-treatment system when 50% full	As required
Remedial actions	Repair erosion or other damage by reseeded or returfing	As required
	Repair or rehabilitate inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect bank/sides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and pre-treatment systems for silt accumulation; establish appropriate silt removal frequency	Half yearly
	Inspect infiltration surfaces for compaction and ponding	Monthly



CHAINAGE	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	44.518
BASIN LEVEL	3.372	3.336	3.635	3.635	3.635	3.635	3.635	3.635	3.635	3.635
EXISTING GROUND LEVEL	3.372	3.336	3.635	3.635	3.635	3.635	3.635	3.635	3.635	3.635

Detention Basin Section A-A
(Scale H-1:100 , V-1:100)



CHAINAGE	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	55.000	60.000	60.335
BASIN LEVEL	3.372	3.635	3.635	3.635	3.635	3.635	3.635	3.635	3.635	3.635	3.635	3.635	3.635	3.635
EXISTING GROUND LEVEL	3.372	3.635	3.635	3.635	3.635	3.635	3.635	3.635	3.635	3.635	3.635	3.635	3.635	3.635

Detention Basin Section B-B
(Scale H-1:100 , V-1:100)

High Groundwater and Trench Instability

Deep Made Ground present within area of proposed detention basin and plots 18-22 (exact extents of Made Ground unknown). Constant inflow of groundwater and excavation collapse encountered in this area during ground investigations. There is also the risk of trench instability and high groundwater across the site. Excavations have been limited where possible by raising site levels.

Geogrid required - design to be undertaken by a specialist. Allowance to also be made for removal of Made Ground.

Prior to commencing works the Contractor is to familiarise themselves with the ground conditions detailed within the Elemental GI Ltd Phase II Geo-Environmental Investigation Report (Jan 2022, Ref: E21427271) and the findings of JPP geotechnical additional ground investigations undertaken in February 2023. The Contractor is to ensure suitable safe working practices are followed in accordance with current best practice. The Contractor is to ensure the excavations are suitably managed with supports or braced to prevent collapse, and de-watering / pump equipment in place where required. Excavations are not to be left open for long periods

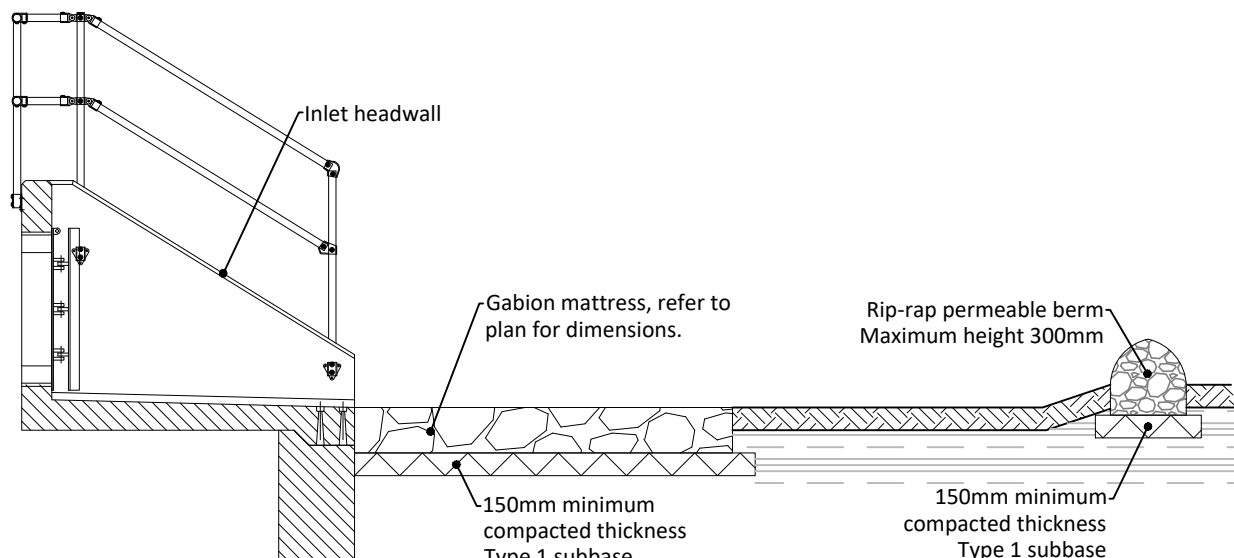
Site Wide Build-Up

Levels across the site have been lifted significantly above existing ground levels to allow for the following:

- To allow surface water drainage to drain to the existing ditch at the southern side of the site by gravity.
- To avoid deep foul drainage required to allow the site to drain to the existing AW manhole by gravity (alternative solution is to pump foul flows via a rising main)
- To limit excavations required for drainage and services in the unstable ground and Made Ground, where high groundwater is present.

A geogrid will be required under all road, footway, parking areas and patios due to low strength soils (CBR values have been shown to range from 5.2% to 0.3%) and deep Made Ground. Geogrid to be designed by a specialist.

Allowance to be made for Geogrid to extend below all manholes and inspection chambers, and also to cover FDS and garden areas where there is a risk of future settlement. Fill material specification also to be advised by Geotechnical Engineer to reduce risk of settlement allowance to be made for removal of Made Ground material.



Rip-rap permeable berm detail
(Scale 1:50)

General Notes

- All dimensions are in metres unless otherwise stated.
- All levels are in metres.
- This drawing is to be read in conjunction with all relevant Engineers and Architect's drawings, Specifications, Reports and Engineering Details.
- Do not scale from this drawing.

Detention Basin

- All residents living within the development are to be informed of the location and purpose of the detention basin
- Signs must be provided to warn pedestrians of detention basin, and further "nag" signs must be provided to alert pedestrians further
- Banking on the basin limited to 1 to 3 to allow for safe maintenance access/egress and unaided movement in either direction
- Grills will be provided at headwalls
- The basin is situated close to the public highway and dwellings to ensure a high degree of natural surveillance
- Vegetation shall be planted around to discourage access but will not obstruct visibility of the water level

Gabions Baskets / Mattresses

Meshes

- Gabion meshes shall be a welded mesh design, with a nominal 75x75mm opening.
- Gabion meshes shall be manufactured from wire complying with BS 1052 having a minimum core diameter of 2.0mm.
- All wire shall be galvanized in compliance with BS EN 10244-2 and be coated with a minimum thickness of 0.05 mm of PVC for extruded coatings and 0.25 mm of PVC for bonded coatings. The PVC shall be capable of resisting the effects of immersion in sea water, exposure to ultra violet light and abrasion, when tested for a period not less than 3000 hours in accordance with BS 2782 Part 5 Method 540B (ISO 4892).

Assembly

- Gabion units shall be assembled in accordance with the manufacturer's instructions and shall be sufficiently filled with Class 65 material complying with Table 6/1 and any other requirements in Appendix A/2, with an allowance for consolidation of fill, so as to minimise distortion during construction.
- Gabion units shall, where appropriate, be maintained square and with vertical sides during filling. Internal tie wires shall be inserted and units shall be tensioned in accordance with the manufacturer's instructions.
- Construction of gabions shall at all times be carried out in accordance with the manufacturer's instructions. All gabions shall be wired together with wire complying with BS1052 having a minimum core diameter of 2.0 mm. Horizontal bearing wires at 1.0 height increments are to be fixed and tightened by "Spanish" windlass to prevent bulging.

Filling

- Fill generally shall be a clean regular rock of 100-200mm size.
- The maximum size of fill material shall not exceed two thirds of the minimum dimension of the gabion compartment or 200 mm, whichever is smaller.
- Minimum size of fill shall be not less than the size of the mesh opening.
- The material shall have a Los Angeles coefficient not greater than 50.
- Fill to the front face of the gabion shall be hand placed to give a high quality tightly finished dry stone wall appearance.
- Mechanical equipment may only be used for filling gabion units provided that the results are equivalent to filling by hand
- Gabions will be filled with material sufficient to have a density as laid of not less than 1700kg/m³ (granite and basalt fills have been known to demonstrate the necessary mass, but it shall remain the responsibility of the contractor to ensure the necessary unit weight is met).



Site Context Plan
Scale 1:250

Section Key

- Top soil and vegetated side slopes
- Class 7A selected cohesive material in accordance with Specification for Highway Works, Volume 1, Series 600.
- Impermeable clay used to form bund.
- Existing subgrade
- Existing levels
- Top of water level for 1 in 100 year event + 40% climate change
- Impermeable liner (to be designed by specialist)

Drawing key

- Site boundary (Taken from reference site layout)
- Adoptable Section 104 Surface Water Sewer with pipe diameter, gradient and manhole
- Trapped S88 Road Gully
- Adoptable Headwall
- Banking Works
- Extent of SUDS features (Swale and Detention Basins)
- Extent of detention basin micropool
- Section Markers
- TP01 (Trial pit logs taken from JPP reports: 22590 TP Logs MI.pdf)
- Hazard sign to warn pedestrians of detention basin

Rev	C	Swale 2 removed. Sediment forebay amended in basin sections and plan views.	By	SH	Checked	LC	12.09.2023
Rev	B	Amended to AD. Detention basin maintenance schedule amended to SUDS features maintenance schedule. SUDS features risk assessment added. Hazard warning signs added. Rip-rap berm/gabion mattress detail and notes added.	By	SH	Checked	LC	19.07.2023
Rev	A	Maintenance schedule added	By	AD	Checked	LC	13.04.2023
Drawn By:	SH	Client	Burnor Construction				
Chkd By:	LC	Project	Land East of Surfleet Road Pinchbeck				
Scale @ AD:	As Shown	Title	Detention Basin Cross Sections				
Date:	March 2023						
Status:	FOR PLANNING						
Project No.:	26043	Drawing No:	122	Rev:	C		

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