TOPPING ENGINEERS
CONSULTING CIVIL & STRUCTURAL ENGINEERS

Flood Risk Report

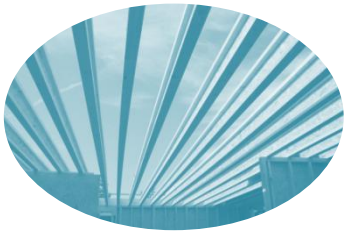
Newchurch Road

V H Land Partnerships

18523

August 2019



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1.0 INTRODUCTION

1.1 This Flood Risk Assessment (FRA) is compliant with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance. The FRA has been produced on behalf of V H Land Partnerships, in respect of a planning application for the proposed residential development at Newchurch Road, Rossendale.

Table 1.1 - Site Summary

Site Name	Newchurch Road
Location	Newchurch Road, Newchurch-in-Pendle, Rawtenstall, BB4 7TN
NGR (approx.)	382734, 422788
Application Site Area (ha)	6.01ha (3.51ha developable area)
Development Type	Residential
NPPF Vulnerability	Low
EA Flood Zone	Flood Zone 1
EA Office	Lancashire
Local Planning Authority	Rossendale Borough Council

Sources of Data

1.2 The report is based on the following information:

(i) Masterplan by STEN Architecture **(Appendix A)**
(ii) Site Location Plan by Vernon & Co **(Appendix B)**
(iii) Environment Agency information
(iv) Lancashire Strategic Flood Risk Assessment

Existing Site

1.3 The site in question is located near the Lancashire settlement of Rawtenstall. The site lies to the east of the town and is approximately 6.01ha in size. The developable area lies 2.55km away from Rawtenstall and approximately 700m away from the centre of Newchurch. The south of the site is bounded by Newchurch road and residential areas.

1.4 Upon inspection it can be seen the site does have a significant change in existing ground level. It is clear that the site slopes up and away from Newchurch road, with the high point of the site being at the far north.

1.5 There are two watercourses within 1km of the site. Firstly, to the south lies a watercourse 500m away from the proposed site entrances. Secondly, 800m to the east of the entrances lies another watercourse. Both flow away from the site in an easterly direction.

Figure 1.1 - Site Location

Proposed Development

1.6 The proposed development is set to consist of a new residential scheme designed with access roads, driveways and landscaped areas. The site will also have three proposed entrances. Two of these will come off Newchurch road with the third access being from Johnny Barn Close. The development will also comprise of relevant infrastructure to help drain the site.

Flood Risk Planning Policy

National Planning Policy Framework

1.7 The NPPF[1] sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. Planning Practice Guidance is also available online[2].

1.8 The Planning Practice Guidance sets out the vulnerability to flooding of different land uses. It encourages development to be located in areas of lower flood risk where possible, and stresses the importance of preventing increases in flood risk off site to the wider catchment area.

1.9 The Planning Practice Guidance also states that alternative sources of flooding, other than fluvial (river flooding), should also be considered when preparing a Flood Risk Assessment.

1.10 This Flood Risk Assessment is written in accordance with the NPPF and the Planning Practice Guidance.

Flood Zones

1.11 The Flood Zone Map for Planning has been prepared by the Environment Agency. This identifies areas potentially at risk of flooding from fluvial or tidal sources. An extract from the mapping is included as **Figure 1.2**.

Figure 1.2 - Environment Agency Flood Zone Mapping

[1] National Planning Policy Framework, CLG, July 2018
[2] Planning Practice Guidance. http://planningguidance.planningportal.gov.uk/.

1.12 The site is shown to be located entirely within Flood Zone 1 (Low Probability) therefore the site is considered to be low risk of flooding. Flood Zone 1 is defined as land assessed as having less than a 0.1% annual probability of flooding from fluvial and tidal sources.

1.13 Table 2 of the Planning Practice Guidance classifies land use. Under these classifications the proposed residential development is considered to be 'More Vulnerable' to the potential impacts of flooding.

1.14 Table 3 of the Planning Practice Guidance identifies that any development is considered appropriate within Flood Zone 1.

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone 1	✓	✓	✓	✓	✓
Flood Zone 2	✓	✓	Exception test required	✓	✓
Flood Zone 3a	Exception test required	✓	**x**	Exception test required	✓
Flood Zone 3b	Exception test required	✓	**x**	**x**	**x**

Other Relevant Policy and Guidance

Strategic Flood Risk Assessment

1.15 The Lancashire Strategic Flood Risk Assessment[3] (SFRA) was prepared to review flood risks on a much wider scale to assess the potential for new development within the study area. The SFRA was used as an evidence base for Local Development Frameworks for each Local Planning Authority.

1.16 The SFRA therefore aims to bring together all available flood risk information for a variety of sources to provide a robust assessment. The SFRA therefore is useful for this site-specific FRA by highlighting available data and instances of known flooding in the area. Although written under the guidance of Planning Policy Statement 25, the SFRA is still considered to include relevant information.

2.0 POTENTIAL SOURCES OF FLOOD RISK

2.1 The table below identifies the potential sources of flood risk to the site, and the impacts which the development could have in the wider catchment prior to mitigation. These are discussed in greater detail in the forthcoming section. The mitigation measures proposed to address flood risk issues and ensure the development is appropriate for its location are discussed within **Section 3.0**.

Table 2.1 - Pre-Mitigation Sources of Flood Risk

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
Fluvial			X		The site is located in flood zone 1.
Tidal				X	There are no tidal influences effecting the site.
Canals				X	None present.
Groundwater			X		Ground conditions are not conducive to fluctuating groundwater levels.
Reservoirs and waterbodies				X	The site is shown to fall outside of the catchment for reservoir and waterbodies flooding.
Sewers			X		The site in question is higher than the surrounding sewers therefore there is a very low risk.
Pluvial runoff			X		At the southern boundary of the site there is an area of low risk.
Effect of Development on Wider Catchment			X		The impermeable area of the site is being increased however the surface water will be attenuated at greenfield.

Fluvial Flood Risk

2.2 As previously mentioned, the site is shown to be within Flood Zone 1 and therefore poses a low risk to the proposed development.

2.3 The risk of flooding posed to the proposed development is low. This is because there is only two watercourses near the site that can pose a threat. However, the watercourses are at low points compared to the site and therefore pose a minimal risk.

2.4 Mitigation measures to address the residual risk posed by the watercourses surrounding the site are discussed within **Section 3.0** of this report.

Groundwater Flood Risk

2.5 Subject to completion of site investigation to confirm we would assume that natural ground water level is located well below the site surface and the nature of the strata means it is unlikely that there will be perched water above this level.

2.6 We therefore do not consider there is a risk of groundwater flooding affecting the development subject to final confirmation upon completion of suitable site investigation.

Flood Risk from Reservoirs & Large Waterbodies

2.7 Reservoir failure flood risk mapping has been prepared by the Environment Agency, this shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. The map displays a worst-case scenario and is only intended as a guide. An extract from the mapping is included as **Figure 2.1**.

Figure 2.1 - Environment Agency Reservoir Failure Flood Risk Map

2.8 Mapping demonstrates the site and possible access routes are far removed from the flood extent associated with flooding from large reservoirs. A review of Ordnance Survey mapping shows that no areas or reservoir flooding encroach the site.

2.9 As such, there is considered to be no risk from reservoir flooding.

Flood Risk from Sewers

2.10 The site in question lies above any main roads which is potentially where any United Utilities sewers will lie.

2.11 As such, it is considered that there is no risk of flooding from sewers.

Pluvial Flood Risk

2.12 Risk of flooding from surface water mapping has been prepared by the Environment Agency, this shows the potential flooding which could occur when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead. An extract from the mapping is included as **Figure 2.**

Figure 2.2 - Risk of Flooding from Surface Water Mapping

2.13 The mapping produced by the Environment Agency shows that there are several small areas of the site that are at risk of surface water flooding. These areas will be attenuated and therefore be drained correctly.

2.14 Therefore, the risk posed by this threat is considered negligible.

Effect of Development on Wider Catchment

Development Drainage

2.15 The current site is considered to be greenfield. Therefore, the amount of impermeable area that is going to be introduced onto the site will cause a large-scale change. Furthermore, this will increase the amount of potential surface water run-off coming from the site. However, this increase will pose a minimal risk to the wider catchment as the surface water will be attenuated and all surface water will be drained into suitable systems at greenfield run off rates.

3.0 FLOOD RISK MITIGATION

3.1 **Section 2.0** has identified the sources of flooding which could potentially pose a risk to the site and the proposed development. This section of the FRA sets out the mitigation measures which are to be considered within the proposed development detail design to address and reduce the risk of flooding to within acceptable levels.

Site Arrangements

Sequential Arrangement

3.2 The Flood Zone mapping shows the site to be located within flood zone 1

Finished Levels

3.3 Given the site's location within Flood Zone 1, there are no specific requirements for finished floor levels with regard to flood risk. These levels may be set in accordance with wider design requirements.

3.4 Nevertheless, it is recommended that a nominal elevation above immediately surrounding ground levels should be provided to deter any potential overland flows from entering the proposed buildings.

Surface Water Drainage

3.5 The site is currently greenfield and the impermeable area on the site is being increased and therefore a suitable drainage strategy will be designed for the site.

- Usual drainage hierarchy applies. The method of infiltration must be assessed first however, Geological maps show that the site is based on sandstone which commonly has poor infiltration rates. Therefore, it is assumed that discharging surface water via infiltration is not viable for this site, subject to site testing.
- Secondly, there are no watercourses near the site that can be discharged into. Consequently, the surface water from the site will discharge into the assumed surface water United Utilities sewer in Newchurch Road, subject to a S106 agreement with United Utilities.
- By using the IH124 method for 3.51ha of the site, which is being developed, the discharge rate has been calculated at 37.4l/s.
- By assuming 50% of the developable area will be impermeable the amount of storage required for the site is 854.1$m^{3.}$ This will cater for the 1 in 100-year storm + 30% climate change.
- A suitable flow control device will be used to restrict the site to the previously mentioned discharge rate.

Foul Water Drainage

3.6 Like the surface water drainage, the foul water from the site will discharge unrestricted into the assumed United Utilities foul sewer in Newchurch Road, subject to a S106 agreement with United Utilities.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 This Flood Risk Assessment (FRA) is compliant with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance. The FRA has been produced on behalf of V H Land Partnerships.

4.2 This report demonstrates that the proposed development is not at significant flood risk, and simple mitigation measures have been recommended to address any residual risks that may remain. The identified risks and mitigation measures are summarised within **Table 4.1**.

Table 4.1 - Summary of Flood Risk Assessment

Flood Source	Proposed Mitigation Measure
Fluvial	Site is shown to be in Flood Zone 1.
Impact of the Development	Strategic surface water drainage strategy prepared for wider development will ensure a sustainable approach to surface water management.

4.3 In compliance with the requirements of National Planning Policy Framework, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk. Moreover, the development will not increase flood risk to the wider catchment area as a result of suitable management of surface water runoff discharging from the site.

PREPARED BY

Tom Andrews

On Behalf of Topping Engineers

Appendix A

Masterplan Layout

All retaining walls to be subject to Structural Engineers design

NEWCHURCH ROAD

7 trees

KEY:

- PRIMARY VEHICLE ROUTES
- SECONDARY VEHICLE ROUTES
- PRIVATE DRIVES
- PROPOSED RESIDENTIAL DEVELOPMENT
- REAR BOUNDARIES TO DWELLINGS
- PROPOSED TREES & HEDGEROWS
- EXISTING HEDGEROWS / TREES TO BE RETAINED
- KEY NODAL SPACES WITHIN DEVELOPMENT
- KEY DWELLINGS IN PROMINENT POSITIONS
- PROPOSED PEDESTRIAN ROUTES
- EXISTING PUBLIC RIGHT OF WAY

1. PRIMARY VEHICLE ACCESS POINT
2. JOHNNY BARN PLANNING LAYOUT
3. SLOPING LAND
4. PROPOSED EMERGENCY VEHICLE ACCESS ROUTE / PEDESTRIAN AND CYCLE CONNECTION
5. PROPOSED DEVELOPMENT SET BACK TO RESPECT AMENITY OF EXISTING DWELLINGS
6. LANDSCAPE BUFFER RETAINED WHERE POSSIBLE
7. DWELINGS FRONTING OVER JOHNNY BARNS LAYOUT REPLICATING THE CHARACTER OF THE DEVELOPMENT AND PRINCIPLE FRONTAGE OVER THE PUBLIC RIGHT OF WAY.

DEVELOPMENT SUMMARY:

GROSS SITE AREA: 14.86 AC / 6.01 HA

NETT DEVELOPABLE AREA: 8.67 AC / 3.51 HA

DWELLINGS ACHIEVABLE @ 30 - 35DPH: 105 - 123

STEN ARCHITECTURE

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Benton Office Park
Bennett Avenue
Horbury
WF4 5RA
Tel: 01924 669424
www.sten-architecture.co.uk

0 20 40 60 80 100

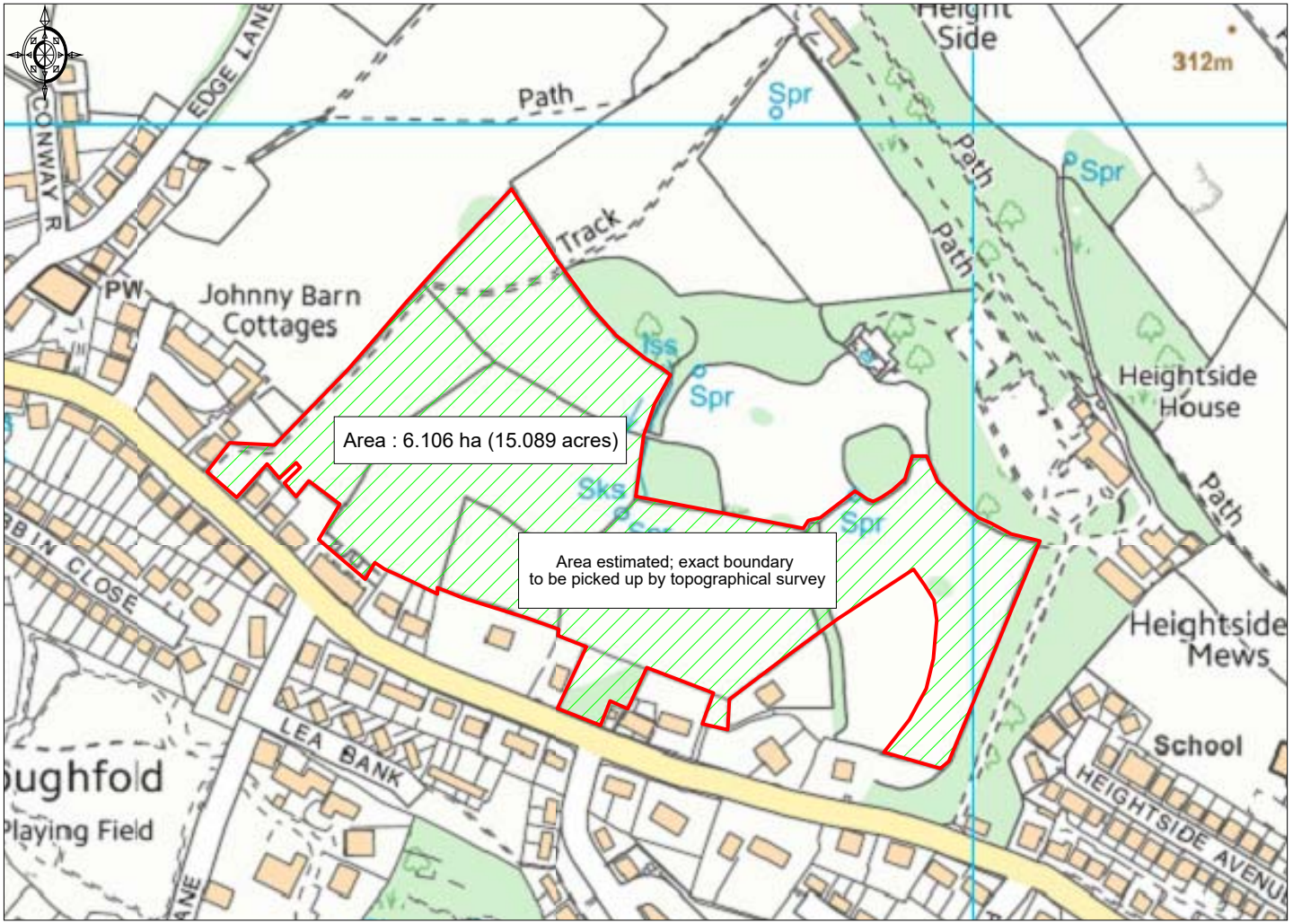
ILLUSTRATIVE MASTERPLAN | DECEMBER 2018 | 1:1000 @ A1

NEWCHURCH ROAD, ROSSENDALE

Appendix B

Site Location Plan

Land to the north of Newchurch Road, Newchurch in Rossendale



VERNON & CO.

Appendix C

IH124 Calculation

IH 124 Mean Annual Flood

Input

Return Period (years)	100	Soil	0.500
Area (ha)	50.000	Urban	0.000
SAAR (mm)	1229	Region Number	Region 10

Results	**l/s**
QBAR Rural	533.4
QBAR Urban	533.4
Q100 years	1109.5
Q1 year	464.1
Q2 years	496.8
Q5 years	634.7
Q10 years	736.1
Q20 years	838.6
Q25 years	874.8
Q30 years	904.3
Q50 years	986.8
Q100 years	1109.5
Q200 years	1258.8
Q250 years	1306.8
Q1000 years	1621.5

Appendix D

Storage Check

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 192 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	98.357	0.357	0.0	37.1	37.1	305.0	O K
30 min Summer	98.500	0.500	0.0	37.3	37.3	427.4	O K
60 min Summer	98.659	0.659	0.0	37.3	37.3	563.3	O K
120 min Summer	98.804	0.804	0.0	37.3	37.3	687.8	O K
180 min Summer	98.850	0.850	0.0	37.3	37.3	726.5	O K
240 min Summer	98.870	0.870	0.0	37.3	37.3	743.7	O K
360 min Summer	98.884	0.884	0.0	37.3	37.3	755.4	O K
480 min Summer	98.877	0.877	0.0	37.3	37.3	749.6	O K
600 min Summer	98.859	0.859	0.0	37.3	37.3	734.8	O K
720 min Summer	98.836	0.836	0.0	37.3	37.3	714.8	O K
960 min Summer	98.780	0.780	0.0	37.3	37.3	666.6	O K
1440 min Summer	98.643	0.643	0.0	37.3	37.3	550.0	O K
2160 min Summer	98.474	0.474	0.0	37.3	37.3	405.1	O K
2880 min Summer	98.359	0.359	0.0	37.1	37.1	306.9	O K
4320 min Summer	98.250	0.250	0.0	35.0	35.0	213.7	O K
5760 min Summer	98.216	0.216	0.0	29.6	29.6	184.6	O K
7200 min Summer	98.195	0.195	0.0	25.7	25.7	166.5	O K
8640 min Summer	98.180	0.180	0.0	22.8	22.8	153.6	O K
10080 min Summer	98.168	0.168	0.0	20.5	20.5	143.9	O K
15 min Winter	98.402	0.402	0.0	37.3	37.3	343.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	102.866	0.0	329.2	27
30 min Summer	73.221	0.0	472.1	40
60 min Summer	49.937	0.0	652.5	68
120 min Summer	32.721	0.0	856.3	124
180 min Summer	24.983	0.0	981.3	168
240 min Summer	20.537	0.0	1075.9	198
360 min Summer	15.556	0.0	1222.9	264
480 min Summer	12.742	0.0	1336.0	334
600 min Summer	10.901	0.0	1428.8	404
720 min Summer	9.587	0.0	1508.0	474
960 min Summer	7.817	0.0	1639.5	614
1440 min Summer	5.843	0.0	1837.5	868
2160 min Summer	4.351	0.0	2058.5	1220
2880 min Summer	3.532	0.0	2227.2	1564
4320 min Summer	2.636	0.0	2490.0	2216
5760 min Summer	2.144	0.0	2707.1	2944
7200 min Summer	1.829	0.0	2886.7	3672
8640 min Summer	1.609	0.0	3046.0	4408
10080 min Summer	1.446	0.0	3189.4	5136
15 min Winter	102.866	0.0	369.7	27

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	98.566	0.566	0.0	37.3	37.3	483.7	O K
60 min Winter	98.750	0.750	0.0	37.3	37.3	641.0	O K
120 min Winter	98.914	0.914	0.0	37.3	37.3	781.7	O K
180 min Winter	98.969	0.969	0.0	37.3	37.3	828.9	O K
240 min Winter	98.986	0.986	0.0	37.3	37.3	843.1	O K
360 min Winter	98.995	0.995	0.0	37.3	37.3	851.1	O K
480 min Winter	98.978	0.978	0.0	37.3	37.3	836.1	O K
600 min Winter	98.946	0.946	0.0	37.3	37.3	809.0	O K
720 min Winter	98.907	0.907	0.0	37.3	37.3	775.4	O K
960 min Winter	98.816	0.816	0.0	37.3	37.3	697.3	O K
1440 min Winter	98.594	0.594	0.0	37.3	37.3	507.7	O K
2160 min Winter	98.357	0.357	0.0	37.1	37.1	305.4	O K
2880 min Winter	98.252	0.252	0.0	35.3	35.3	215.1	O K
4320 min Winter	98.201	0.201	0.0	27.0	27.0	172.0	O K
5760 min Winter	98.176	0.176	0.0	22.1	22.1	150.5	O K
7200 min Winter	98.160	0.160	0.0	18.9	18.9	136.4	O K
8640 min Winter	98.148	0.148	0.0	16.6	16.6	126.4	O K
10080 min Winter	98.139	0.139	0.0	14.9	14.9	118.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	73.221	0.0	529.7	41
60 min Winter	49.937	0.0	731.3	68
120 min Winter	32.721	0.0	959.6	122
180 min Winter	24.983	0.0	1099.6	176
240 min Winter	20.537	0.0	1205.6	220
360 min Winter	15.556	0.0	1370.2	282
480 min Winter	12.742	0.0	1496.8	360
600 min Winter	10.901	0.0	1600.8	438
720 min Winter	9.587	0.0	1689.6	512
960 min Winter	7.817	0.0	1836.8	662
1440 min Winter	5.843	0.0	2059.1	918
2160 min Winter	4.351	0.0	2305.9	1244
2880 min Winter	3.532	0.0	2495.0	1528
4320 min Winter	2.636	0.0	2790.0	2220
5760 min Winter	2.144	0.0	3032.2	2944
7200 min Winter	1.829	0.0	3233.5	3672
8640 min Winter	1.609	0.0	3412.1	4408
10080 min Winter	1.446	0.0	3573.6	5144

Model Details

Storage is Online Cover Level (m) 100.000

Cellular Storage Structure

Invert Level (m) 98.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	900.0	900.0	1.100	0.0	1025.0
1.000	900.0	1025.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0260-3740-1000-3740
Design Head (m)	1.000
Design Flow (l/s)	37.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	260
Invert Level (m)	98.000
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	37.4
Flush-Flo™	0.407	37.3
Kick-Flo®	0.759	32.8
Mean Flow over Head Range	-	30.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.3	1.200	40.8	3.000	63.5	7.000	95.9
0.200	26.7	1.400	43.9	3.500	68.4	7.500	99.2
0.300	36.6	1.600	46.9	4.000	73.0	8.000	102.4
0.400	37.2	1.800	49.6	4.500	77.3	8.500	105.4
0.500	36.9	2.000	52.2	5.000	81.4	9.000	108.4
0.600	36.1	2.200	54.7	5.500	85.3	9.500	111.3
0.800	33.6	2.400	57.0	6.000	89.0		
1.000	37.4	2.600	59.3	6.500	92.5		