WAAFER HOMES LTD

WARNINGLID PRIMARY SCHOOL, SLAUGHAM LANE,
WARNINGLID, WEST SUSSEX RH17 5TJ

Drainage Design Strategy – Surface and Foul

December 2025

EAS ltd
Environmental Assessment Services Ltd

REPORT DATA SHEET

Requirement	**Data**
Report Reference	862/GB/WaaferHomes/WarninglidSchool/DDS
Date	December 2025
Client	Waafer Homes Ltd
Report type	Drainage Design Strategy – Surface and Foul
Purpose	Planning
Revisions	-
Prepared by	Daniel Milford BSc (Hons)  Signed
Approved by	Eur Ing Malcolm McKemey BSc (Hons), CEng, CEnv, MICE, MIEAust, MCIWEM, MIEnvSc  Signed

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Drainage Design Strategy – Surface and Foul

December 2025

1. INTRODUCTION

1.1 Environmental Assessment Services (EAS) Limited was instructed to prepare a Drainage Design Strategy – Surface and Foul for the proposed redevelopment of Warninglid Primary School into 2No. residential dwellings, as well as development of another 2No. residential dwellings on site.

2. EXISTING SITE & PROPOSED DEVELOPMENT

2.1 The site comprises of the existing school building (closed 2021), surrounding asphalt and synthetic playgrounds and grass field. The site area is approximately 0.55 ha. The Ordnance Survey (OS) map reference for the site is TQ 2526 0595. The site elevation is approximately +88 m OD. See Appendix A, Figure 1: Site Location Plan and Figure 2: Topographic Survey.

2.2 According to the British Geological Survey (available online), the site lies on a bedrock of Cretaceous Weald Clay – Mudstone. Online Environment Agency (EA) groundwater mapping identifies the site to lie on unproductive strata. The site does not lie within a groundwater source protection zone.

2.3 The proposed development comprises converting the existing school building into 2No. 4-bedroom residential dwellings with associated garages and developing 2No. additional 2-storey, 4-bedroom residential dwellings on the grass field with associated 2No. car garages. This will also include driveway access tracks connecting to Slaugham Road. Permeable surfacing will be utilised including block paving for patio areas and gravel for driveways.

2.4 The northern half of the site consists of the existing school building and surrounding playgrounds; the northern and southern playground surfaced with asphalt and the eastern playground consisting of a synthetic surface. The southern half of the site comprises entirely of the grass playing field. An oak tree stands at the centre of the site with a few saplings growing around it. A bench surrounded by a ring of young thorn bushes lies close to the southeastern corner of the site. An earthen bund runs from the midpoint of the western border to the southwestern corner with fully developed trees planted along it and continuing along the southern border.

2.5 The site is in a rural location, approximately 900 m north of Warninglid, predominantly surrounded by fields with few residences north of site. The site lies on/is accessed from Slaugham Lane, which lies west of the site boundary.

2.6 There are no nearby drainage ditches or watercourses. The site has a slight camber with the highest point at the northeastern corner of the site and lowest point in the southeastern corner.

3. FLOOD RISK ASSESSMENT

3.1 According to the EA online Flood Map for Planning, the site lies within Flood Zone 1, at low risk of flooding from rivers and the sea. The nearest area within Flood Zones 2 and 3 are located some 400 m north of the site. The EA online Risk of Flooding from Surface Water map shows that the site is not at risk of surface water flooding.

3.2 As the site is less than 1 ha in area and lies within Flood Zone 1, there is no requirement for a flood risk assessment under the National Planning Policy Framework (NPPF) and associated guidance documents.

4. EXISTING DRAINAGE

4.1 The site was visited on 28 November 2025 in order to examine the existing drainage (and carry out percolation testing). See Appendix B: Site Photographs.

4.2 Formal surface water drainage on the site, as existing, comprises rainwater piping along the existing schoolhouse and two surface water gullies along the perimeter of the southern playground that drain into an existing surface water sewer. There is a private sewer that runs from the eastern side of the building and southwards off site into public foul sewer 0801.

4.3 As a general rule, the flow permitted to leave the developed site should not exceed the 1 in 1 year Greenfield flow rate. The Greenfield runoff rate for the site has therefore been estimated using the UK Sustainable Drainage (UKSUDS) Greenfield Runoff Estimation Tool. The runoff rates are given for scenarios up to (and including) the 1 in 200-year storm event, as summarised in Table 4.1 below and provided in Appendix D.

TABLE 4.1
GREENFIELD RUNOFF RATES

Return period	Actual rates (l/s)
Qbar	3.2
1 in 1 year	2.8
1 in 2 years	2.9
1 in 10 years	5.3
1 in 30 years	7.5
1 in 100 years	10.3
1 in 200 years	12.1

4.4 The maximum discharge permitted to leave the whole site post development should not exceed the 2.8 l/s.

4.5 The foul sewage should also be allowed for in the permitted discharge flow rate. The peak foul sewage design flow has been calculated for the proposed site as 0.2 l/s (see Section 6 below) therefore the surface water discharge should not exceed 2.6 l/s.

5. PROPOSED DRAINAGE

5.1 The proposed residential development may increase the impermeable area of the site compared to its former use, which could increase the peak flow following a rainfall event. It has been estimated that following development 0.11 ha of the site will comprise hardstanding, and the rest (0.44 ha) will comprise permeable surfacing and soft landscaping. The permeable surfacing and soft landscaping will still discharge informally as Greenfield (as existing) and only the controlled drainage from the impermeable areas will be subject to SuDS measures.

5.2 The drainage design of the developed site should retain onsite flows up to the 1 in 100 year return period event, including an allowance for climate change. The ways in which this can be achieved are discussed in 5.3 and 5.4 below.

5.3 Drainage to Soakaway

5.3.1 Drainage to soakaway (infiltration) is the preferred Sustainable Drainage System (SUDS) solution. The underlying Weald Clay is not considered a suitable medium for soakaway. Percolation testing was undertaken at the site on 28 November 2025, in order to investigate the practicality of soakaway as a method of disposal of surface water.

5.3.2 Percolation testing comprised the excavation of three trial pits to 1 m below ground level to examine the geology at different locations across the site. Trial pits were located near the eastern border of the site, one below the synthetic playground, one near the southeastern corner of the site and one in between. No groundwater was encountered during the excavation of the trial pits however there was a small level of water in the trial pits due to recent heavy rainfall. The geology appeared to comprise of a thin layer of topsoil over Weald Clay with a shallow layer of made ground present at the northernmost trial pit.

5.3.3 Percolation testing was undertaken in all the trial pits. The holes were filled with water, and the water level drop relative to the time was recorded. An infiltration rate could not be gained as no drop in water level was observed. Drainage to soakaway is therefore not considered to be a feasible option for the site.

5.4 Attenuation Storage

5.4.1 The alternative to soakaway drainage would be attenuation storage onsite, with discharge limited to the 1 in 1 year Greenfield flow rate for the impermeable areas (in this case 2.6 l/s).

5.4.2 This would require a discharge point, in this case the existing surface water sewer. The invert levels for these chambers are unknown and have been estimated for drainage calculations. These levels will need to be determined at a later date.

5.4.3 The total storage volume required for the site, for the 1 in 100 year plus climate change scenario, has been calculated as 37.6 m^3 for the converted school and 21.1 m^3 for the proposed residences. See Appendix E.

5.4.4 Attenuation storage could be provided in the form of ponds, swales, a detention basin or an underground geocellular/modular system wrapped in a geomembrane. Due to the layout and slope of the site 2 separate underground geocellular/modular systems are considered to be the most appropriate for the site.

5.4.5 Suitable locations for the geocellular/modular systems would be the southwestern corner of the school and southwestern corner of the site. This would allow for the outlet pipes for the storage system to discharge into the existing surface water sewer.

5.4.6 Due to the slope of the site, it is considered most practicable that the underground geocellular/modular system is no more than 0.8 m in depth, allowing for 0.6 m of topsoil to lay above in order to provide suitable planting depth. In order to provide the required storage volume for the site, and with a depth of 0.8 m, the dimensions of the geocellular/modular system would need to be 13.2 m x 3.6 m for the converted school and 13.2 m x 2 m for the proposed residences. See Appendix A, Figure 4: Proposed Drainage Design.

5.5 Other Sustainable Urban Drainage System (SUDS) Options

5.5.1 Additional SUDS options could include the use of permeable paving in the driveway and any patio areas. Permeable paving will permit surface water to infiltrate into the underlying structure, delay discharge and reduce peak flows following a rainfall event. It is recommended that the permeable paving be underlain by a shallow drainage blanket connected to the surface water drainage system.

5.5.2 Rainwater harvesting could also be practised. Rainwater could be used for irrigation purposes within the garden, via water butts connected to roof downpipes.

5.5.3 It may be possible to incorporate a green roof into the proposed design. Green roofs reduce the volume and rate of runoff and can be low maintenance, generally requiring bi-annual maintenance visits.

6. SURFACE WATER DRAINAGE DESIGN

6.1 Design Philosophy

6.1.1 The drainage strategy is for surface water to be drained into attenuation storage, comprising a geocellular/modular system, before being discharged into the public surface water sewer system, with discharge limited to the 1 in 1 year flow rate for the site (in this case 2.6 l/s). The converted school residences and newly proposed dwellings will have separate storage units. See Figure 4 in Appendix A for the proposed drainage arrangement.

6.2 Design Storm

6.2.1 The surface water drainage system has been designed for the 30-year return period event plus a 40% allowance for climate change and tested for surcharge for the 1 in 100-year return period event (1% Annual Exceedance Probability) plus a 45% allowance for climate change. See Appendix A, Figure 4 for the proposed drainage design and Appendix E for pipe and chamber layout and sizing of the attenuation storage from the MasterDrain model.

6.3 Drainage Design Model

6.3.1 The attenuation storage has been designed to accommodate the 1 in 100-year return period storm event plus a 45% allowance for climate change using the MasterDrain network model.

6.3.2 An appropriate attenuation storage size has been calculated as 13.2 m long, 3.6 m wide and 0.8 m depth for the converted school residences and 13.2 m long, 2 m wide and 0.8 m depth for the southernmost dwellings.

6.4 Hydrogeological Data

6.4.1 Hydrological data for the site as used in the MasterDrain model is given in Appendix E. The chamber details, pipe sizes and levels are shown in Appendix E and summarised in Table 6.1 below:

TABLE 6.1
SURFACE WATER DRAINAGE

Ref.	Dia (mm)	Cover level (mAOD)	Invert level (mAOD)	Pipe dia in (mm)	Pipe dia out (mm)
SW1	450	89.96	89.46	-	100
SW2	450	89.80	89.28	100	100
SW3	450	89.30	88.80	100	100
SW4	600	89.00	88.50	100	100
SW5	450	88.85	88.35	100	150
SW6	450	88.62	88.12	150	150
SW7	450	89.55	89.05	-	100
SW8	600	89.20	88.00	150 + 100	150
SW9	450	89.81	89.31	-	100
SW10	450	89.94	89.21	100	100
SW11	450	89.74	89.09	100	100
SW12	450	89.50	88.95	100	150
SW13	450	89.00	88.50	150	150
Storage	-	89.00	87.88	150 + 150	225
SW14	450	88.85	87.83	225	225
Sewer	-	88.50	87.79	225	-
SW15	450	87.85	87.35	-	100
SW16	450	87.84	87.17	100	100
SW17	450	88.50	88.00	-	100
SW18	450	88.15	87.03	100 + 100	150
SW19	450	88.00	86.92	150	150
SW20	450	87.80	87.30	-	100
SW21	450	87.20	86.70	100	100
SW22	600	87.40	86.56	100 + 150	150
Storage	-	88.20	86.40	150	150
SW23	450	86.71	86.21	150	150
Sewer	-	86.00	85.50	150	-

6.5 **Extreme event**

6.5.1 If an extreme storm event overwhelmed the surface water drainage system at the site and/or if the drainage system were to fail, ground levels would indicate that surface water would discharge along the western site boundary as existing and into the south adjacent field as per the present situation.

7. PROPOSED FOUL SEWERAGE

7.1 There is existing foul sewerage at the site. A private sewer runs from the north adjacent Old School House dwelling, through the site (two chambers on site) and connects to an existing demarcation chamber at the southern boundary. This then discharges to the public foul sewer by chamber 0801 in the south adjacent field. The invert levels for the private sewer chambers and public foul sewer

chambers are unknown and have been estimated for drainage calculations. These levels will need to be determined at a later date.

7.2 The preferred foul sewerage disposal option comprises adding two chambers to the existing sewer (one for each proposed residence in the converted school) and connecting a chamber for each of the proposed houses to the existing chambers. See Appendix C: Southern Water Sewer Plans.

7.3 The proposed development will comprise of four dwellings. According to the WRc publication "Sewers for Adoption" (8th Edition), the design (peak) flow from a proposed residential development should be based on water use of 4000 l/dwelling/day. This gives the overall (peak) foul sewage design flow for the site as 0.2 l/s.

7.4 The flow of sewage is calculated by the MasterDrain Foul model based on “drainage units”; the number of facilities (basins, baths, showers, WCs, washing machines, dishwashers, etc.).

7.5 The results of the sewerage design from the MasterDrain Foul analysis given in Appendix E and illustrated in Figure 4 are summarised in Table 7.1 below:

TABLE 7.1
FOUL SEWERAGE

Ref.	Dia (mm)	Cover level (mAOD)	Invert level (mAOD)	Pipe dia in (mm)	Pipe dia out (mm)
PC1	450	90.00	89.50	-	100
FW1	450	89.77	89.21	100	100
FW2	450	89.17	88.67	100	100
PC2	450	88.96	88.46	100	100
FW3	450	88.28	87.78	-	100
PC3	450	88.54	87.64	100 + 100	100
FW4	450	87.40	86.90	-	100
EDC	450	87.40	86.71	100 + 100	-

PC – Private Chamber EDC – Existing Demarcation Chamber

7.6 It is advised that the peak foul sewage design flow (0.2 l/s) should be deducted from the maximum permitted discharge from the surface water attenuation storage.

8. CONCLUSIONS

8.1 The site currently comprises of the existing school building (closed 2021), surrounding asphalt and synthetic playgrounds and grass field located to the west of Slaugham Lane, Warninglid. It is proposed to redevelop the existing school building into 2No. 4-bedroom residential dwellings with associated garages and driveway as well as develop a further 2 No. 4-bedroom dwellings with garages and driveways where the existing grass field lies.

8.2 All runoff for the 1 in 100 year flood event, plus allowance for climate change, will be managed on site, and the discharge from the proposed development will be restricted to 1 in 1 year run-off rate, including peak foul drainage (2.6 l/s).

8.3 The site lies within Flood Zone 1, at low risk of tidal and fluvial flooding, and is also shown to not be at risk of surface water flooding.

8.4 Formal surface water drainage on site comprises rainwater piping along the existing schoolhouse and two surface water gullies along the perimeter of the southern playground that drain into the surface water sewer.

8.5 The total storage volume required to retain the 1 in 100 year plus climate change flood event on site has been calculated as 37.6 m^3 for the school and 21.1 m^3 for the new builds, based on the HR Wallingford UK SUDS Model.

8.6 The underlying Weald Clay showed poor infiltration during percolation testing and as such drainage to soakaway would not be a practicable option for the site. The alternative SuDS preferred method of draining surface water is drainage to attenuation storage with outflow limited to 1 in 1-year greenfield flow rate (2.6 l/s). This would require a discharge point, of which the only option would be the existing surface water sewer. The most feasible attenuation storage option for the proposed site layout would be a geocellular/modular system, wrapped in a geomembrane.

8.7 Due to the layout and slope of the site 2No. separate underground geocellular/modular systems are considered to be the most appropriate for the site. Suitable locations for the geocellular/modular systems would be the southwestern corner of the school and southwestern corner of the site. This would allow for the outlet pipes for the storage system to discharge into the existing surface water sewer. Suggested dimensions would be 13.2 m x 3.6 m x 0.8 m for the converted school and 13.2 m x 2 m x 0.8 m for the new builds. It is recommended that the maximum flow should be limited to 2.6 l/s using a vortex valve.

8.8 Permeable surfacing is to be utilised for the driveway and patio areas. Additional SUDS options which could be incorporated into the development include rainwater harvesting for garden irrigation purposes via the provision of water butts, and a green roof on the dwelling.

8.9 Existing foul sewerage on site consists of a private sewer that runs through the site, past the eastern side of the school and southwards off site into public foul sewer 0801. Proposed foul sewerage would comprise utilising the existing sewer.

9. RECOMMENDATIONS

9.1 The invert levels for the surface water sewer along Slaugham Lane, private sewer on site and public foul sewer south of site will need to be determined prior to further development.

9.2 The drainage system will generally require minimal operational input once construction has been completed. However, it will require some regular maintenance.

9.3 The geocellular/modular system and all chambers are to be kept clear of debris and build ups of silt to ensure working order and prevent loss of maximum capacity.

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APPENDIX A

Figures

Figure 1: Site Location
Figure 2: Site as Existing
Figure 3: Proposed Development
Figure 4: Suggested Drainage Design

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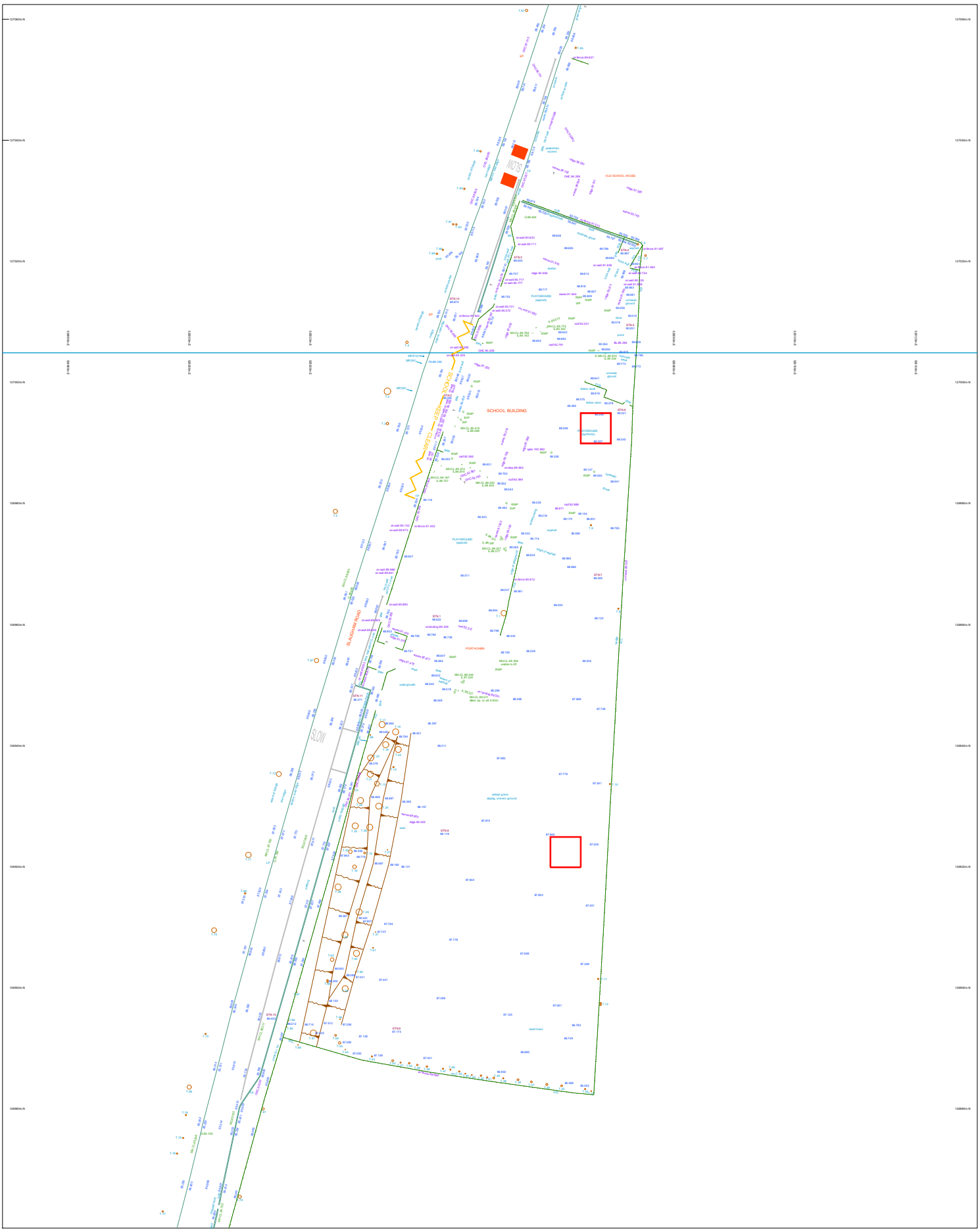
Scale as shown

WARNINGLID PRIMARY SCHOOL, SLAUGHAM LANE,
WARNINGLID, WEST SUSSEX RH17 5TJ

Figure 1: Site Location

December 2025



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Scale as shown

WARNINGLID PRIMARY SCHOOL, SLAUGHAM LANE,
WARNINGLID, WEST SUSSEX RH17 5TJ

Figure 2: Site as Existing

December 2025

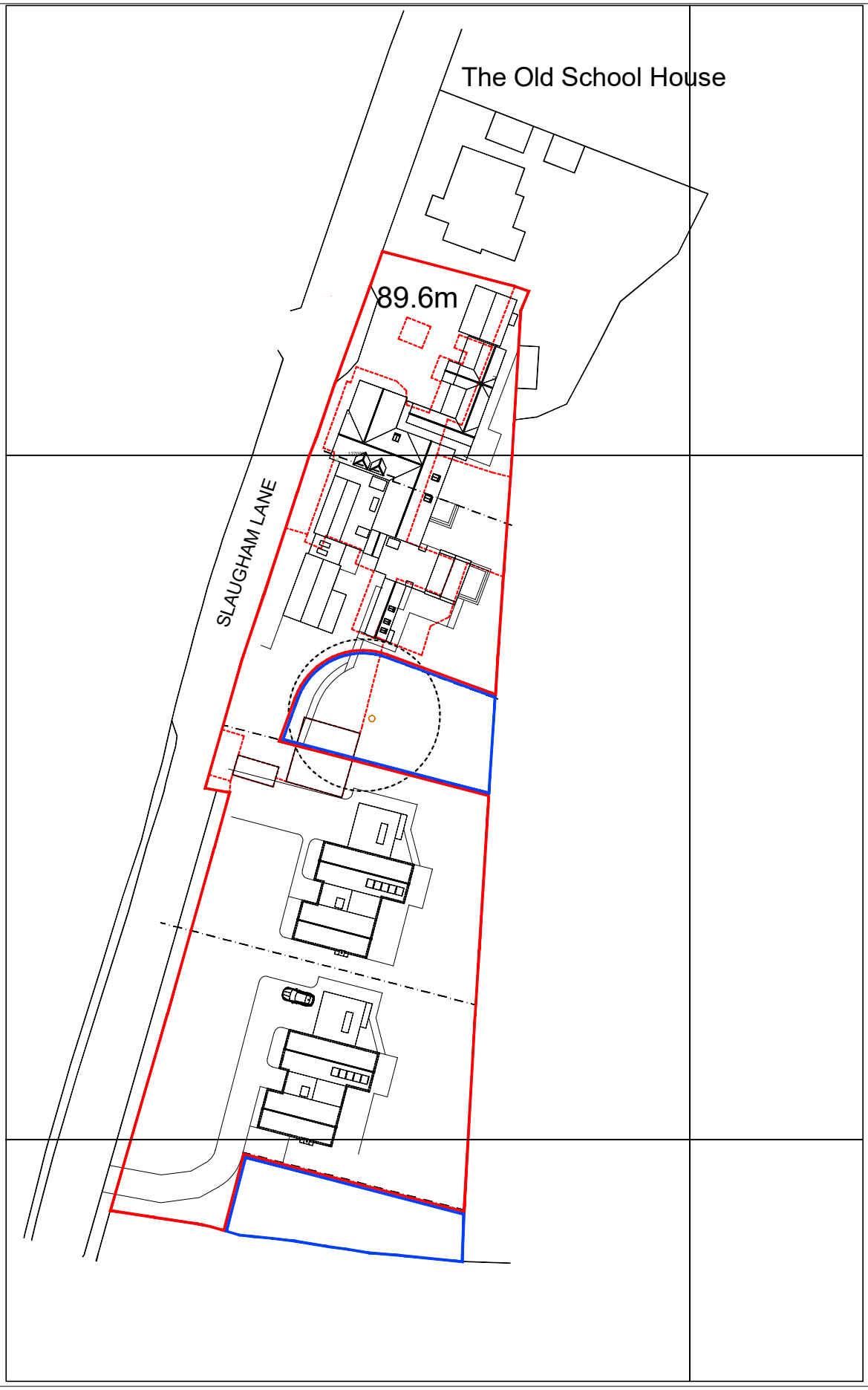

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Figure 3: Proposed Development

December 2025

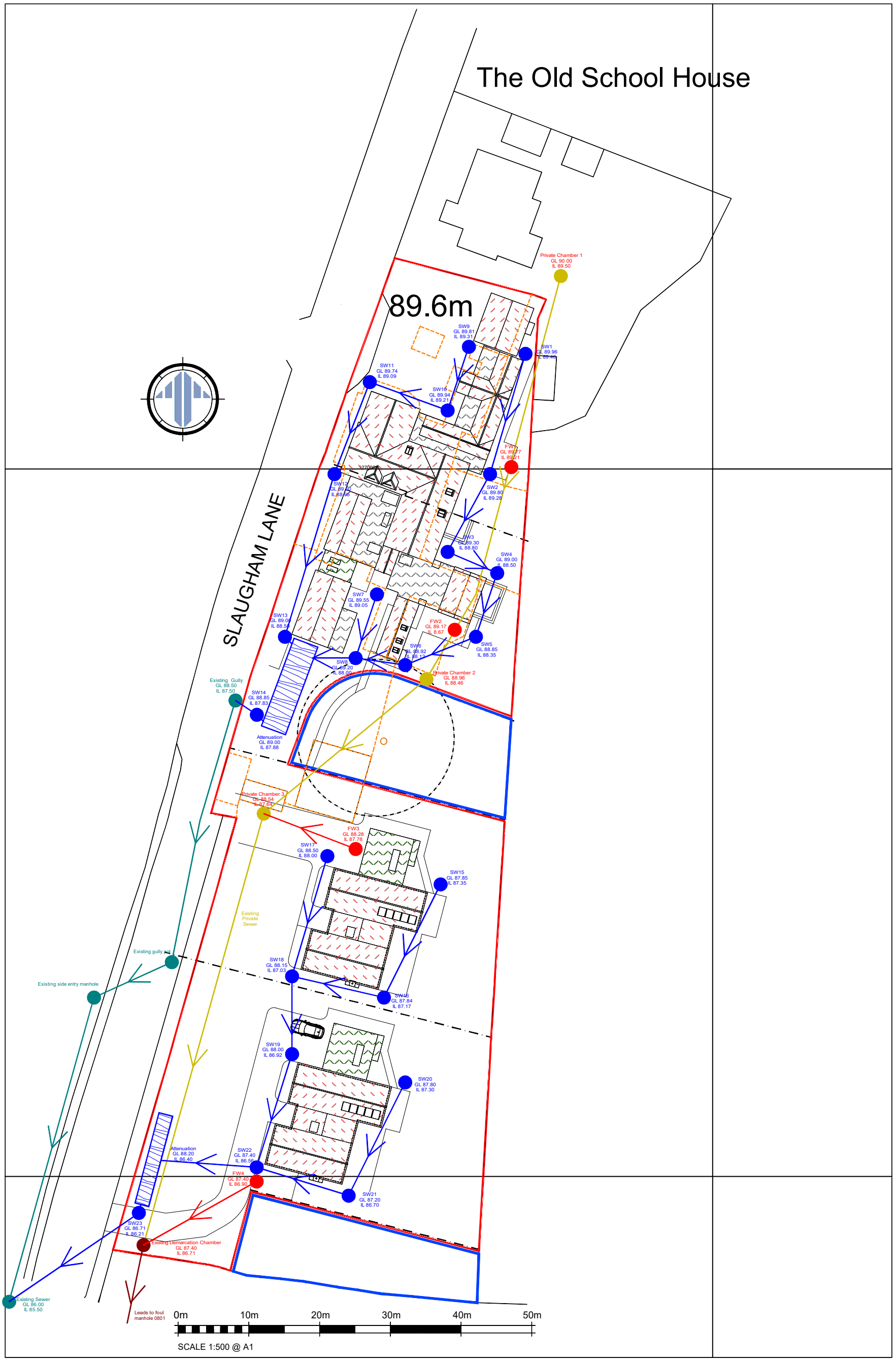

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Figure 4: Drainage Design

December 2025

APPENDIX B

Site Photographs

Percolation test pit 1

Percolation test pit 2

Percolation test pit 3

Eastern playground

Southwestern playground

Existing school

Grass field

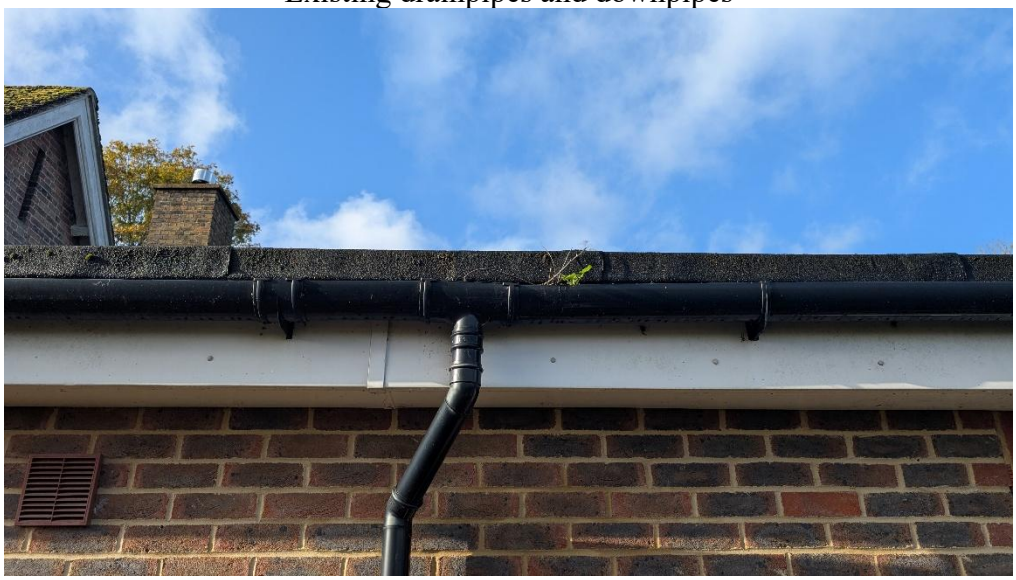
Southern site boundary and adjacent field

Playground drains leading to road gully pots

Existing sewer gully pot

Side access manholes south of site

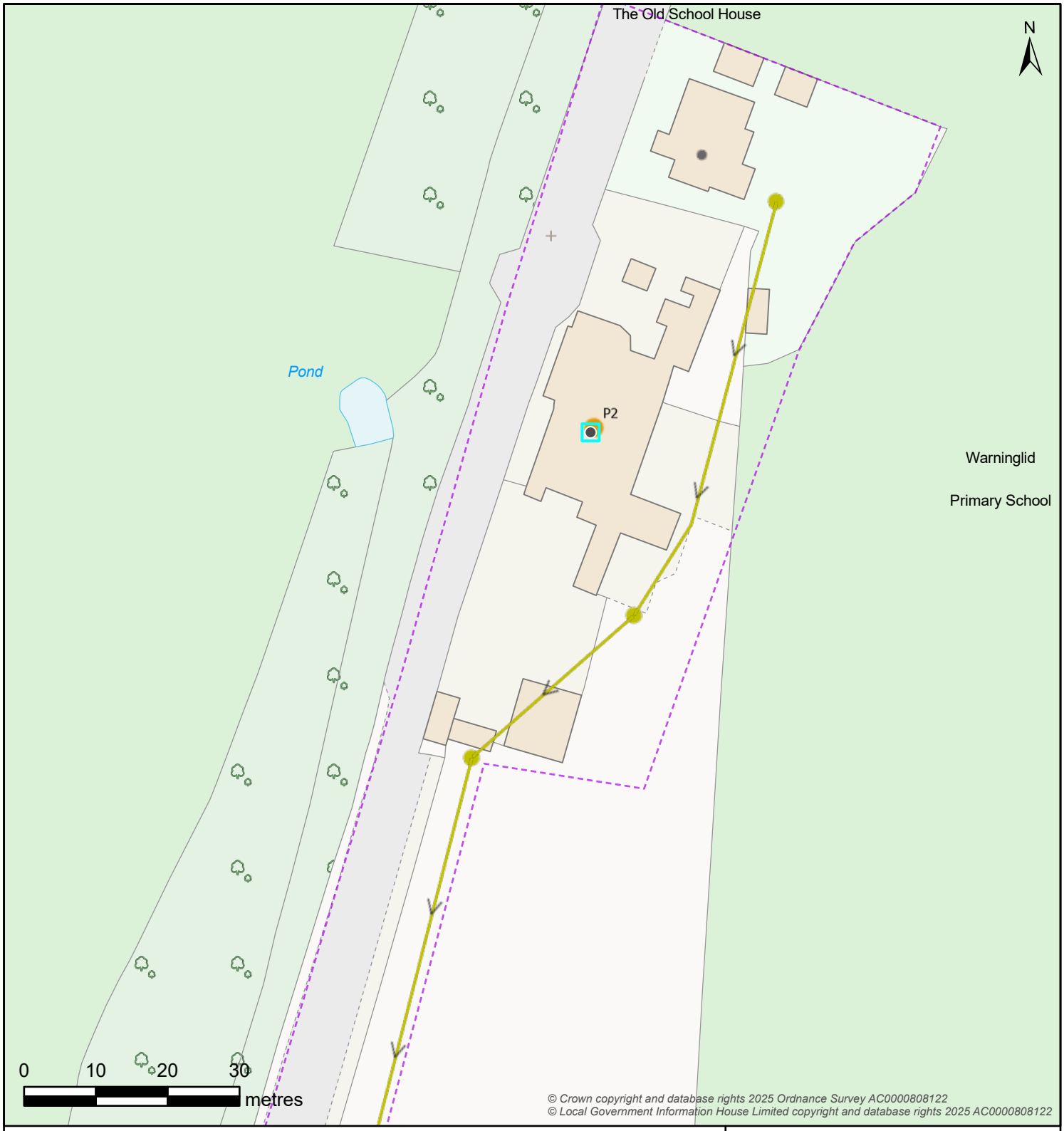
Existing drainpipes and downpipes



Private sewer manhole

APPENDIX C

Southern Water Sewer Plans



Controllable Valve			Flow Control			Inlet-Outfall	
Damboards	Penstock	Valve	Anti Flood Device	Pumped Anti Flood Device	Reflux Valve	Inlet	Outfall

Manhole											
BIF Bifurcation	Cascade	CP Catchpit	Head Of Public Sewer	IC Interceptor Chamber	Manhole	S Soakaway	WO Washout

Outfall Headworks	Overflow Chamber		Pipe Bridge	Pumping Station	
Outfall Headworks	CSO Combined Sewer Overflow	EMO Emergency Overflow	Pipe Bridge	Micro Pumping Station	Pumping Station

Sewer Level Monitor	Storage		Treatment Works	Weir	Wastewater Site
Sewer Level Monitor	Storm Tank	Tidal Storage Tank	Treatment Works	Weir	Wastewater Site

Wastewater Pipe		Wastewater Use	Developer Services	
Culverted Water Course	Syphon	Foul	Build Over Agreement	Section 104
Drain	Tank Sewer	Combined	Wastewater Area	
Outfall	Trunk Sewer	Sludge	Catchment	
Overflow	Vacuum Main	Treated Effluent	Sub-Catchment	
Rising Main	Decommissioned Pipe	Surface Water		
Sewer		Private		

Map Title: SW Print

Printed By: Anne.McFarlane2

Date Printed: 28/10/2025

Map Scale: 750

The information provided is believed to be correct but is provided on an 'as is' basis and without any warranty or condition express or implied, statutory or otherwise as to its quality or fitness for purpose. Actual positions of assets should always be determined on site.

WATER for LIFE from Southern Water

Scale: 1:1250

Date: 10/12/25

Wastewater Plan A4

Data updated: 24/11/25

Map Centre: 525041,126952

Our Ref: 1966518 - 1

Powered by digdat

Foul Gravity Sewer
Combined Gravity Sewer
Culverted Water Course or Treated Effluent
Surface Water Gravity Sewer
Rising Main, Vacuum or Syphon
Combined Outfall
Surface Water Outfall
Foul Outfall
Surface Water Inlet
Combined Pumping Station
Surface Water Pumping Station
Foul Pumping Station
WWTW
Water Treatment Works
Section 104 Area
Building Over Agreement Area
Foul Manhole
Combined Manhole
Surface Water Manhole
Side Entry Manhole, Demarcation Chamber, Dummy Manhole or Surface Water Soakaway

malcolm@easltd.co.uk

Warninglid Primary

WATER for LIFE

from Southern Water

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0801	F	0.00	0.00	

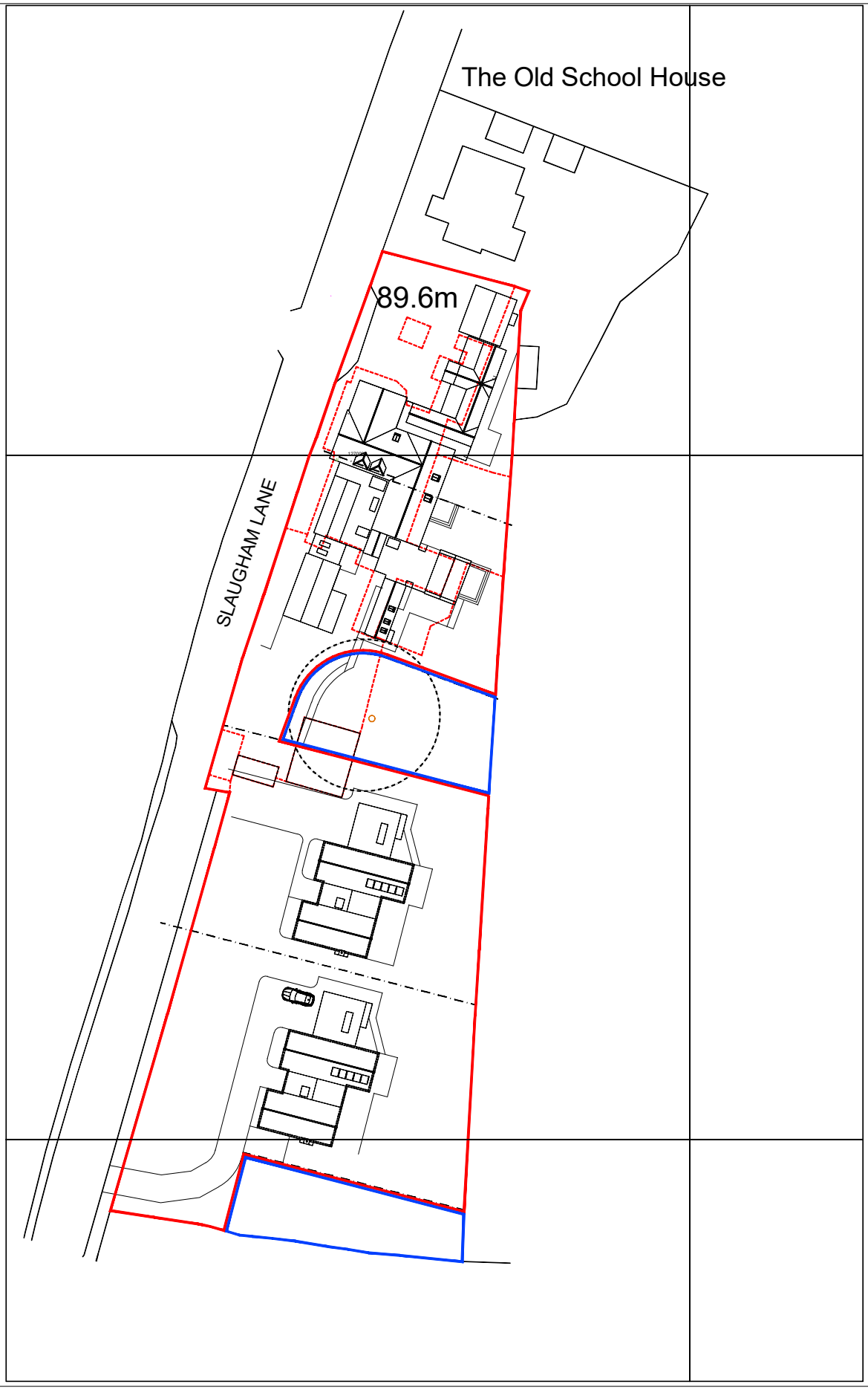


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Figure 3: Proposed Development

December 2025

APPENDIX D

UK Sustainable Drainage Calculations (Greenfield Runoff Rate)

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

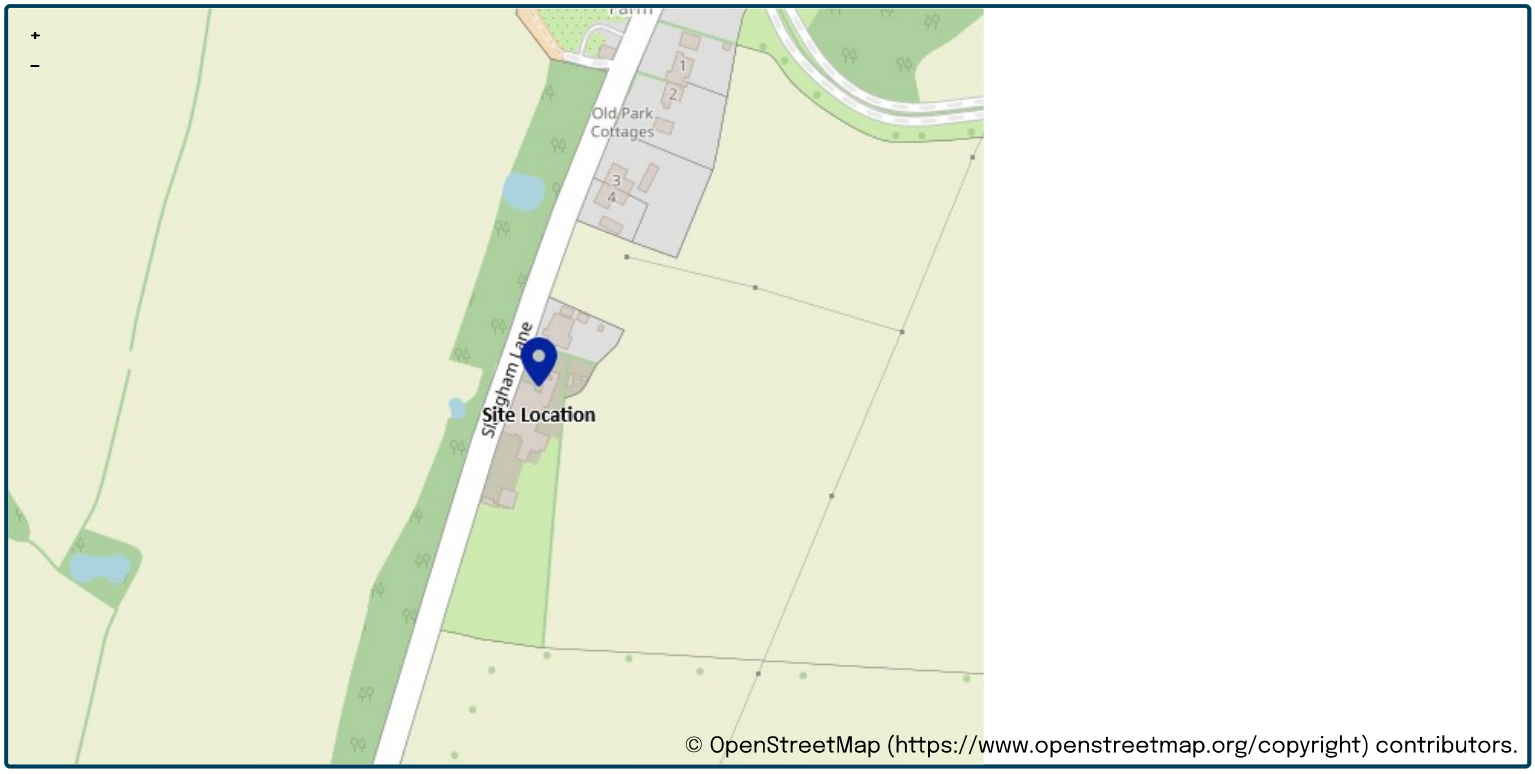
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	18/11/2025
Calculated by	DM
Reference	862
Model version	2.2.2

Location

Site name	Warninglid Primary School
Site location	Warninglid



Site easting (British National Grid)	525063
Site northing (British National Grid)	126998

Site details

Total site area (ha)	.55 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	830 mm		830
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4
SPR	0.47		
QBar (IH124) (l/s)	3.2 l/s		

Growth curve factors

	My value		Map value
Hydrological region	7		7
1 year growth factor	0.85		
2 year growth factor	0.88		
10 year growth factor	1.62		
30 year growth factor	2.3		
100 year growth factor	3.19		
200 year growth factor	3.74		

Results

Method	IH124
Flow rate 1 year (l/s)	2.8 l/s
Flow rate 2 year (l/s)	2.9 l/s
Flow rate 10 years (l/s)	5.3 l/s
Flow rate 30 years (l/s)	7.5 l/s
Flow rate 100 years (l/s)	10.3 l/s
Flow rate 200 years (l/s)	12.1 l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

APPENDIX E

Output From Drainage Design Software and Attenuation Storage Calculations

MasterDrain SW

Environmental Assessment Services Ltd
http://www.easltd.co.uk

London Rd, Hickstead
Haywards Heath,
West Sussex, RH17 5LZ
Tel: 01444 882552
email: info@easltd.co.uk

Job No.	862		
Sheet no.	1		
Date	15/12/25		
Project	Warninglid School School Building	By	Checked	Reviewed
Title	Hydrograph storage analysis (Winter profile) for School Building			

Data:-

Location = WARNINGLID
M5-60 (mm) = 19.8
Soil index = 0.45
Return period = 100
UCWI = 0.0

Grid reference = TQ2526
r = 0.34
SAAR (mm/yr) = 825
WRAP = 4
Climate change = +45%

Clayey, or loamy over clayey soils with an impermeable layer at shallow depth.

Percentage runoff = 95.0% (manual setting)

Imperv. area = 682 m²
Total area = 682 m²
Total runoff = 52.2 m³

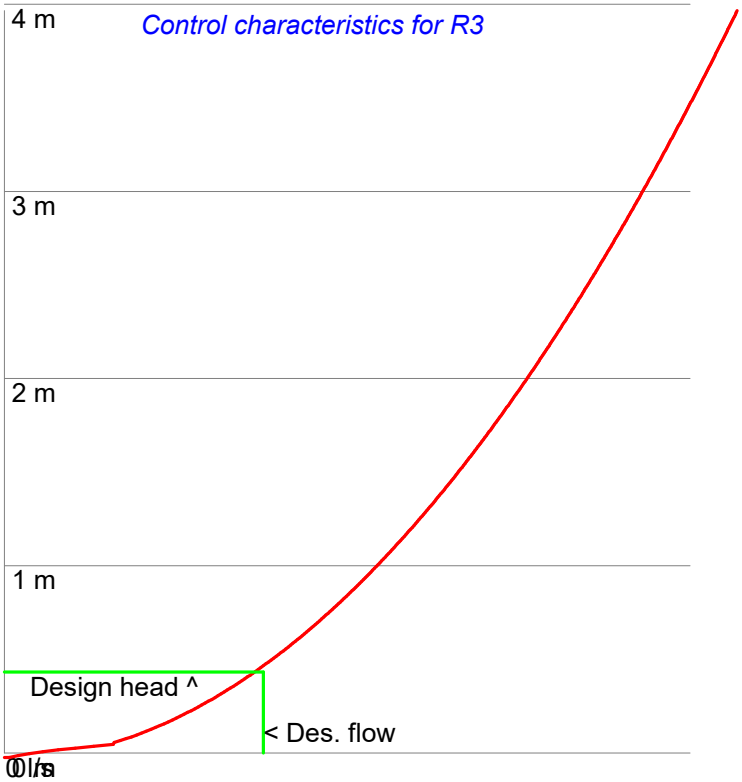
Pervious area = 0 m²
Equiv area = 648 m² (Tot. area x % runoff).
Discharge rate = 2.800 l/s

Design Head = 0.5m
Control device = R3
Max. calc. depth = 0.5 m
Mean discharge = 1.71 l/s

Peak flow = 2.80 l/s
Orifice diam = 55.6 mm
Available depth = 0.0 m³

Available system storage = 0.00 m³ under a system plane at the design head level.
Offline storage = 0.0 m³
Total storage = 37.6 m³

Peak input flow =12.08 l/s



Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
0.01	0.05	2.01	5.61
0.05	0.58	2.05	5.67
0.10	1.25	2.10	5.74
0.15	1.53	2.15	5.81
0.20	1.77	2.20	5.87
0.25	1.98	2.25	5.94
0.30	2.17	2.30	6.01
0.35	2.34	2.35	6.07
0.40	2.50	2.40	6.13
0.45	2.66	2.45	6.20
0.50	2.80	2.50	6.26
0.55	2.94	2.55	6.32
0.60	3.07	2.60	6.38
0.65	3.19	2.65	6.45
0.70	3.31	2.70	6.51
0.75	3.43	2.75	6.57
0.80	3.54	2.80	6.63
0.85	3.65	2.85	6.68
0.90	3.76	2.90	6.74
0.95	3.86	2.95	6.80
1.00	3.96	3.00	6.86
1.05	4.06	3.05	6.92
1.10	4.15	3.10	6.97
1.15	4.25	3.15	7.03
1.20	4.34	3.20	7.08
1.25	4.43	3.25	7.14
1.30	4.51	3.30	7.19
1.35	4.60	3.35	7.25
1.40	4.69	3.40	7.30
1.45	4.77	3.45	7.35
1.50	4.85	3.50	7.41
1.55	4.93	3.55	7.46
1.60	5.01	3.60	7.51
1.65	5.09	3.65	7.57
1.70	5.16	3.70	7.62
1.75	5.24	3.75	7.67
1.80	5.31	3.80	7.72
1.85	5.39	3.85	7.77
1.90	5.46	3.90	7.82
1.95	5.53	3.95	7.87
2.00	5.60	4.00	7.92

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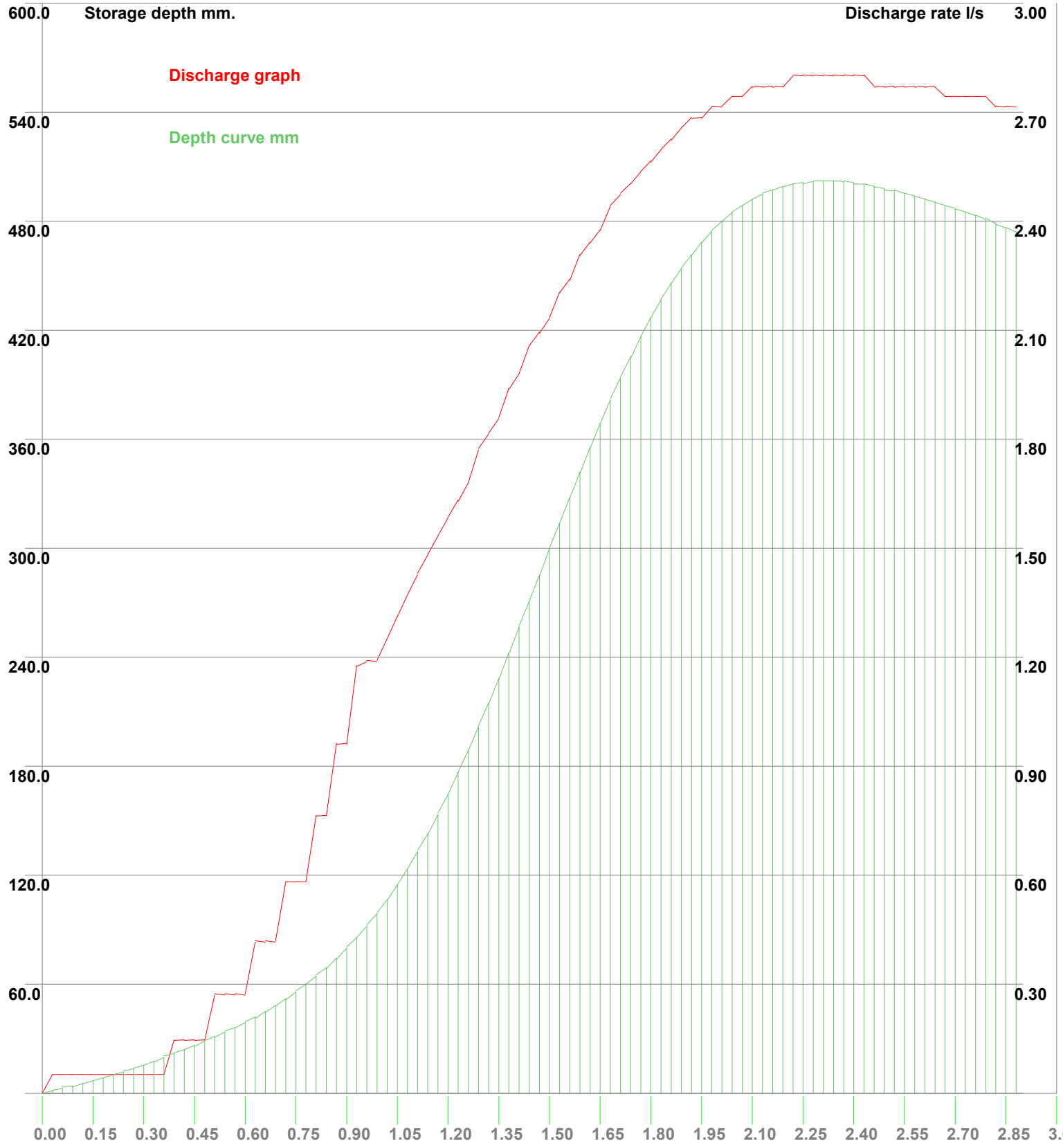
Project Warninglid School School Building		By	Checked / Reviewed
Title Hydrograph storage analysis (Winter profile) for School Building			

Storage curves for a 3 hours storm.



Incremental rainfall figures.

Storm Mins	Storage Depth mm	Control Flow l/s	Storm Mins	Storage Depth mm	Control Flow l/s
1.8	1.4	0.05	91.8	313.9	2.20
3.6	2.7	0.05	93.6	328.0	2.24
5.4	4.1	0.05	95.4	342.0	2.31
7.2	5.5	0.05	97.2	355.6	2.34
9.0	6.9	0.05	99.0	368.8	2.38
10.8	8.4	0.05	100.8	381.6	2.44
12.6	10.0	0.05	102.6	393.8	2.47
14.4	11.8	0.05	104.4	405.4	2.50
16.2	13.6	0.05	106.2	416.5	2.54
18.0	15.5	0.05	108.0	427.1	2.57
19.8	17.6	0.05	109.8	436.8	2.60
21.6	19.7	0.05	111.6	445.8	2.63
23.4	21.9	0.15	113.4	454.1	2.66
25.2	24.1	0.15	115.2	461.6	2.69
27.0	26.4	0.15	117.0	468.5	2.69
28.8	28.8	0.15	118.8	474.5	2.71
30.6	31.3	0.27	120.6	480.0	2.71
32.4	33.7	0.27	122.4	484.8	2.74
34.2	36.2	0.27	124.2	488.7	2.74
36.0	38.9	0.27	126.0	492.1	2.77
37.8	42.0	0.42	127.8	494.9	2.77
39.6	45.0	0.42	129.6	497.2	2.77
41.4	48.4	0.42	131.4	499.1	2.77
43.2	52.1	0.58	133.2	500.5	2.80
45.0	55.9	0.58	135.0	501.4	2.80
46.8	59.9	0.58	136.8	501.9	2.80
48.6	64.5	0.76	138.6	502.2	2.80
50.4	69.2	0.76	140.4	502.1	2.80
52.2	74.4	0.96	142.2	501.8	2.80
54.0	79.8	0.96	144.0	501.2	2.80
55.8	85.7	1.18	145.8	500.3	2.80
57.6	91.9	1.19	147.6	499.2	2.77
59.4	98.9	1.19	149.4	498.0	2.77
61.2	106.6	1.25	151.2	496.7	2.77
63.0	114.7	1.31	153.0	495.4	2.77
64.8	123.5	1.37	154.8	493.9	2.77
66.6	132.9	1.43	156.6	492.3	2.77
68.4	142.9	1.48	158.4	490.6	2.77
70.2	153.5	1.53	160.2	488.8	2.74
72.0	164.7	1.58	162.0	487.0	2.74
73.8	176.6	1.63	163.8	485.1	2.74
75.6	189.0	1.68	165.6	483.0	2.74
77.4	201.8	1.77	167.4	480.9	2.74
79.2	214.9	1.81	169.2	478.6	2.71
81.0	228.5	1.86	171.0	476.3	2.71
82.8	242.4	1.94	172.8	473.9	2.71
84.6	256.5	1.98	174.6	471.5	2.71
86.4	270.9	2.06	176.4	469.1	2.69
88.2	285.2	2.10	178.2	466.6	2.69
90.0	299.6	2.13	180.0	464.1	2.69

Using the Get Max button causes the program to step through a series of storm durations until a maximum volume is obtained.
Each duration is sampled 600 times and the results recorded. The storm durations (hrs) are:-

0.25, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 18, 20, 24, 30, 36, 42, 48, 54, 60, 66, 72, 84, 96, 120, 150, 175, 200, 250, 300, 375, 500, 750, 1000, 1250, 1500, 1570, 2000, 2500, 3000, 3500, 4000

It should be noted that the six hour storm frequently requested rarely demonstrates the worst case for storage.

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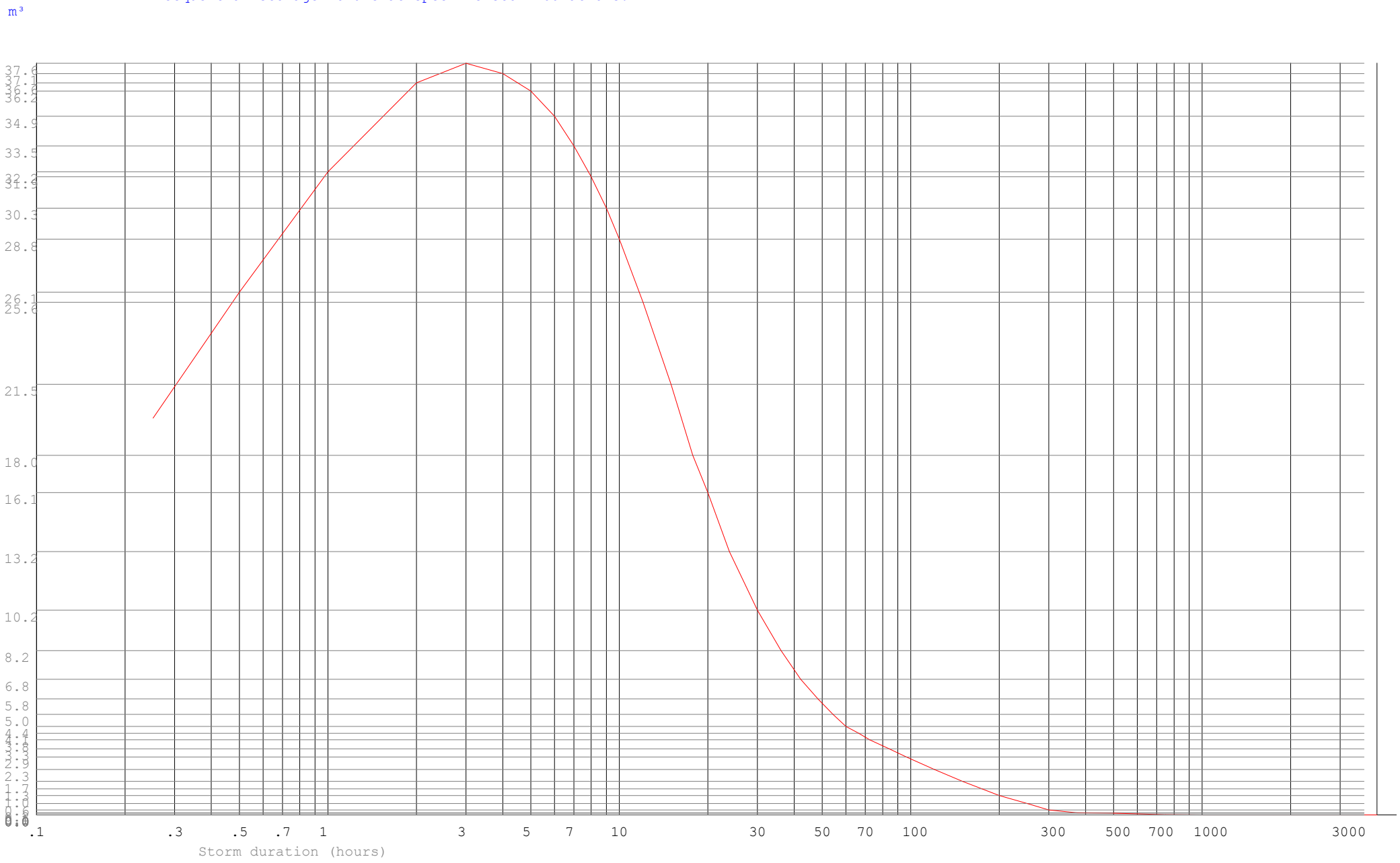
Job No.	Sheet no.	Date	By	Checked	Reviewed
862	4	15/12/25			

MasterDrain SW

Project **Warninglid School School Building**

Title **Hydrograph storage analysis (Winter profile) for School Building**

Sequential storage volume at specific storm durations.



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Job No.	862
Sheet no.	1
Date	15/12/25

Project	By	Checked	Reviewed
Warninglid School New Residences			

Title: Hydrograph storage analysis (Winter profile) for New Residences

Data:-

Location = WARNINGLID
M5-60 (mm) = 19.8
Soil index = 0.45
Return period = 100
UCWI = 0.0

Grid reference = TQ2526
r = 0.34
SAAR (mm/yr) = 825
WRAP = 4
Climate change = +45%

Clayey, or loamy over clayey soils with an impermeable layer at shallow depth.

Percentage runoff = 95.0% (manual setting)

Imperv. area = 447 m²
Total area = 447 m²
Total runoff = 30.6 m³

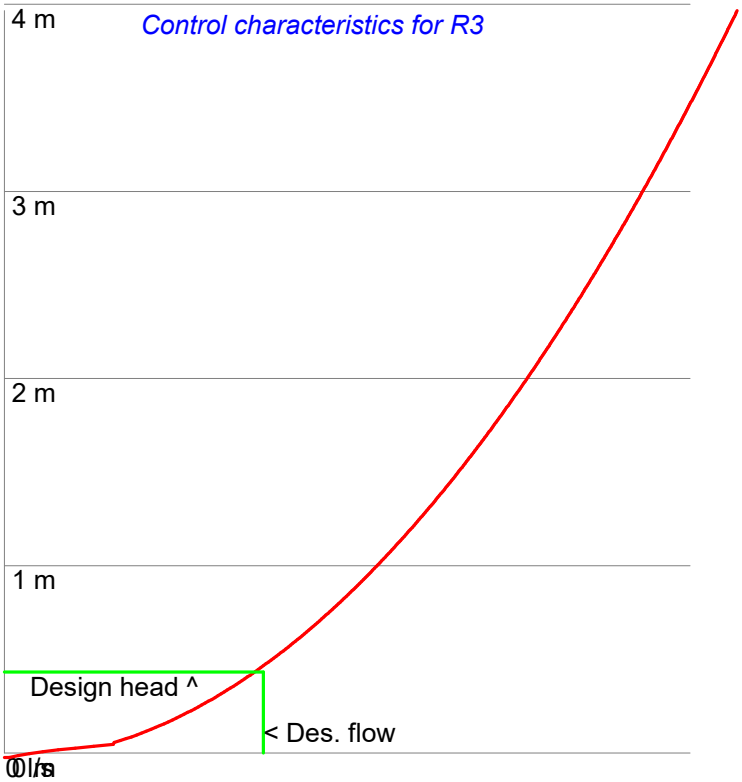
Pervious area = 0 m²
Equiv area = 425 m² (Tot. area x % runoff).
Discharge rate = 2.800 l/s

Design Head = 0.5m
Control device = R3
Max. calc. depth = 0.5 m
Mean discharge = 1.89 l/s

Peak flow = 2.80 l/s
Orifice diam = 55.6 mm
Available depth = 0.0 m³

Available system storage = 0.00 m³ under a system plane at the design head level.
Offline storage = 0.0 m³
Total storage = 21.1 m³

Peak input flow =10.64 l/s



Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
0.01	0.05	2.01	5.61
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0.10	1.25	2.10	5.74
0.15	1.53	2.15	5.81
0.20	1.77	2.20	5.87
0.25	1.98	2.25	5.94
0.30	2.17	2.30	6.01
0.35	2.34	2.35	6.07
0.40	2.50	2.40	6.13
0.45	2.66	2.45	6.20
0.50	2.80	2.50	6.26
0.55	2.94	2.55	6.32
0.60	3.07	2.60	6.38
0.65	3.19	2.65	6.45
0.70	3.31	2.70	6.51
0.75	3.43	2.75	6.57
0.80	3.54	2.80	6.63
0.85	3.65	2.85	6.68
0.90	3.76	2.90	6.74
0.95	3.86	2.95	6.80
1.00	3.96	3.00	6.86
1.05	4.06	3.05	6.92
1.10	4.15	3.10	6.97
1.15	4.25	3.15	7.03
1.20	4.34	3.20	7.08
1.25	4.43	3.25	7.14
1.30	4.51	3.30	7.19
1.35	4.60	3.35	7.25
1.40	4.69	3.40	7.30
1.45	4.77	3.45	7.35
1.50	4.85	3.50	7.41
1.55	4.93	3.55	7.46
1.60	5.01	3.60	7.51
1.65	5.09	3.65	7.57
1.70	5.16	3.70	7.62
1.75	5.24	3.75	7.67
1.80	5.31	3.80	7.72
1.85	5.39	3.85	7.77
1.90	5.46	3.90	7.82
1.95	5.53	3.95	7.87
2.00	5.60	4.00	7.92

MasterDrain SW

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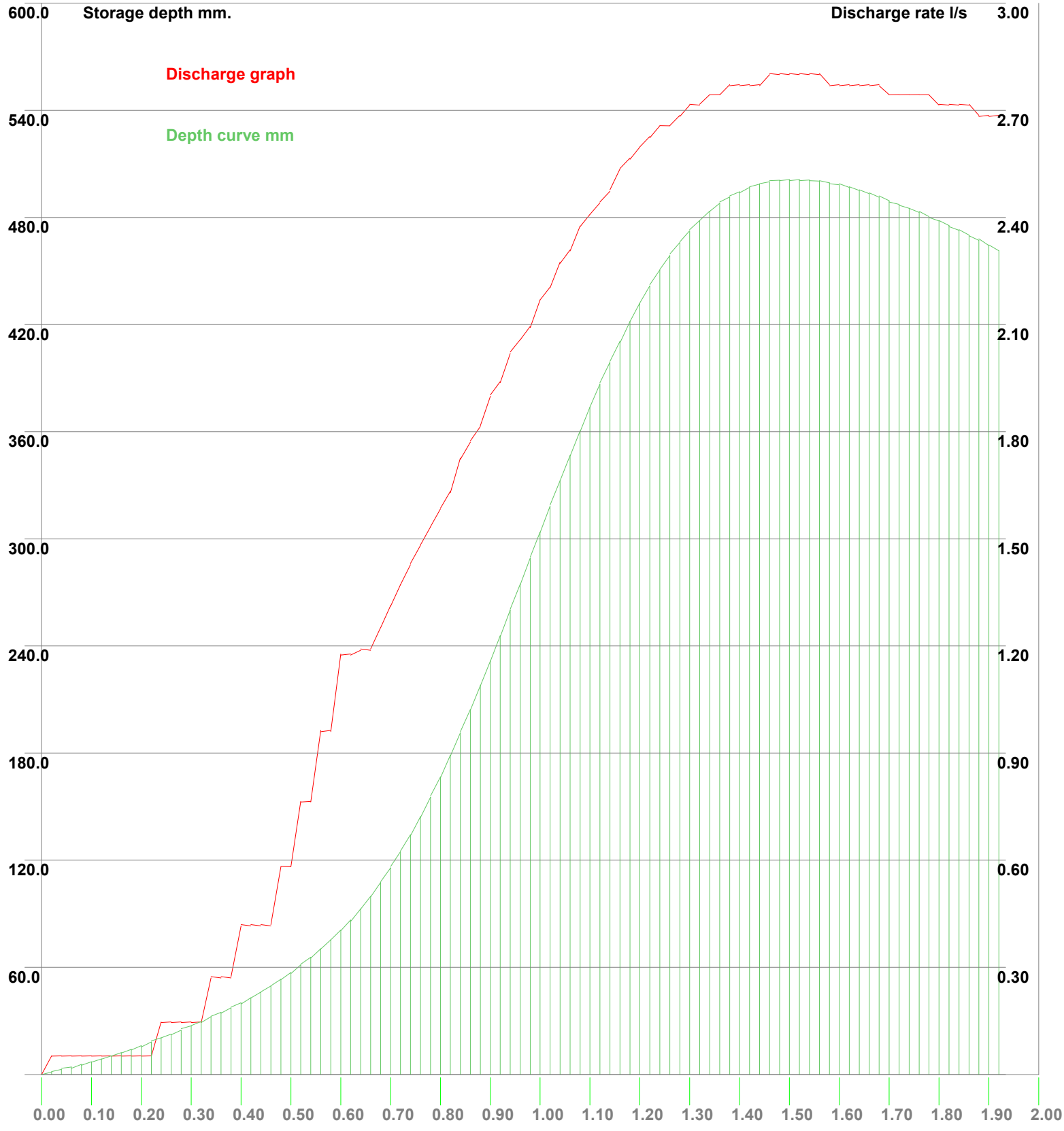
Job No. 862			
Sheet no. 2			
Date 15/12/25			
Project Warninglid School New Residences	By	Checked	Reviewed
Title Hydrograph storage analysis (Winter profile) for New Residences			

Storage curves for a 2 hours storm.



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Job No.	862
Sheet no.	1
Date	15/12/25 16:37

Project	By	Checked	Reviewed
Warninglid School - School Conversion			

Title: **Manhole printout for WARNINGLID SCHOOL.SW**

Manhole ref.	X ref	Y ref	Form	Cham diam. or length	Rect. width	Chamb. height	Shaft height	MH Volume	Exit Diam	Exit Crown	Exit Invert	Chamb const	Slab level	Cover Level	Dwnstr MH
SW1	285	217	circ	450	N/A	0.50		0.08	100	89.585	89.460	N/A	89.410	89.960	SW2
SW2	280	200	circ	450	N/A	0.52		0.08	100	89.405	89.280	N/A	89.230	89.800	SW3
SW3	274	189	circ	450	N/A	0.50		0.08	100	88.925	88.800	N/A	88.750	89.300	SW4
SW4	281	186	circ	600	N/A	0.50		0.14	100	88.625	88.500	N/A	88.450	89.000	SW5
SW5	278	177	circ	450	N/A	0.50		0.08	150	88.525	88.350	N/A	88.300	88.850	SW6
SW6	268	173	circ	450	N/A	0.50		0.08	150	88.295	88.120	N/A	88.070	88.620	SW8
SW7	264	183	circ	450	N/A	0.50		0.08	100	89.175	89.050	N/A	89.000	89.550	SW8
SW8	261	164	circ	600	N/A	1.20		0.34	150	88.175	88.000	N/A	87.950	89.200	STORAGE
SW9	277	218	circ	450	N/A	0.50		0.08	100	89.435	89.310	N/A	89.260	89.810	SW10
SW10	274	209	circ	450	N/A	0.73		0.12	100	89.335	89.210	N/A	89.160	89.940	SW11
SW11	263	213	circ	450	N/A	0.65		0.10	100	89.215	89.090	N/A	89.040	89.740	SW12
SW12	258	200	circ	450	N/A	0.55		0.09	150	89.125	88.950	N/A	88.900	89.500	SW13
SW13	251	177	circ	450	N/A	0.50		0.08	150	88.675	88.500	N/A	88.450	89.000	STORAGE
STORAGE	251	170	circ	11588	N/A	1.12		118.12	225	88.130	87.880	N/A	87.830	89.000	SW14
SW14	247	167	circ	450	N/A	1.02		0.16	225	88.080	87.830	N/A	87.780	88.850	SEWER

All manholes to be as per 'Sewers for Adoption'

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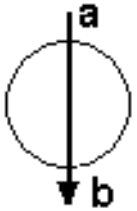
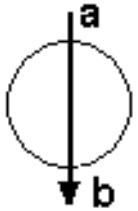
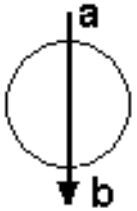
Project Warninglid School - School Conversion		By	Checked	Reviewed
Title Manhole printout for WARNINGLID SCHOOL.SW				



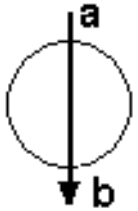
MH = SW1
a=head
b = 100



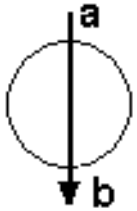
MH = SW2
a= 100
b = 100



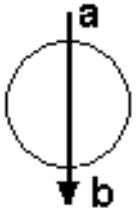
MH = SW3
a= 100
b = 100



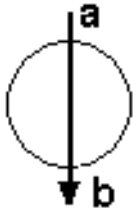
MH = SW4
a= 100
b = 100



MH = SW5
a= 100
b = 150

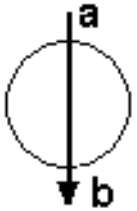


MH = SW6
a= 150
b = 150

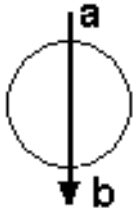


MH = SW7
a=head
b = 100

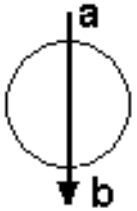
MH = SW8
a= 150
b = 150
c = 100
d = 150
e = 0



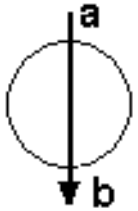
MH = SW9
a=head
b = 100



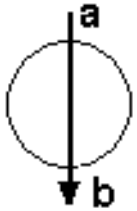
MH = SW10
a= 100
b = 100



MH = SW11
a= 100
b = 100

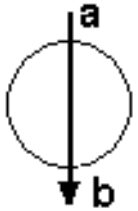


MH = SW12
a= 100
b = 150



MH = SW13
a= 150
b = 150

MH = STORAGE
a= 150
b = 225
c = 150
d = 150
e = 0



MH = SW14
a= 225
b = 225

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Job No.	862
Sheet no.	3
Date	15/12/25 16:37

Project	By	Checked	Reviewed
Warninglid School - School Conversion			
Title: Manhole printout for WARNINGLID SCHOOL.SW			

These explanatory notes should be read in conjunction with the Manhole printout

1) Manhole ref - the reference for the manhole in question
2) Form - either circular or rectangular
3) Chamber diam or length - diameter of chamber if circular, or length if rectangular - in metres
4) Rectangular width - if form is rectangular, this gives the width of the chamber
5) Chamber height - height of chamber from invert
6) Shaft height - height of access shaft if applicable, from top of chamber to ground level
7) Manhole volume - cubic capacity of manhole chamber
8) Exit diameter - diameter of pipe leaving this manhole
9) Exit crown - crown level of pipe leaving this manhole
10) Exit invert - invert level of pipe leaving this manhole
11) Chamb const - manhole construction :-
    N/A - not specified
    Conc - concrete rings
    Poly - polypropylene rings surrounded by selected fill
    Poly/conc - polypropylene rings surrounded by concrete
    Brick - brick built with waterproof render
    In situ - concrete cast in situ
12) Slab level - surface level of base slab (if no sump, this is placed at 50mm below exit invert to allow levels manipulation).
13) Manhole diameters of 9999 have exceeded the sizes available in SfA
14) Manhole diameters may have to be modified due to the number of branches

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Job No. 862			
Sheet no. 1			
Date 16/12/25 10:00			
Project Warninglid School - New Residences	By	Checked	Reviewed
Title Manhole printout for WARNINGLID RESIDENCES.SW			

Manhole ref.	X ref	Y ref	Form	Cham diam. or length	Rect. width	Chamb. height	Shaft height	MH Volume	Exit Diam	Exit Crown	Exit Invert	Chamb const	Slab level	Cover Level	Dwnstr MH
SW15	273	142	circ	450	N/A	0.50		0.08	100	87.475	87.350	N/A	87.300	87.850	SW16
SW16	265	126	circ	450	N/A	0.67		0.11	100	87.295	87.170	N/A	87.120	87.840	SW18
SW17	247	146	circ	450	N/A	0.50		0.08	100	88.125	88.000	N/A	87.950	88.500	SW18
SW18	252	129	circ	450	N/A	1.12		0.18	150	87.205	87.030	N/A	86.980	88.150	SW19
SW19	252	118	circ	450	N/A	1.08		0.17	150	87.095	86.920	N/A	86.870	88.000	SW22
SW20	268	114	circ	450	N/A	0.50		0.08	100	87.425	87.300	N/A	87.250	87.800	SW21
SW21	260	100	circ	450	N/A	0.50		0.08	100	86.825	86.700	N/A	86.650	87.200	SW22
SW22	247	102	circ	600	N/A	0.84		0.24	150	86.735	86.560	N/A	86.510	87.400	STORAGE
STORAGE	232	103	circ	6848	N/A	1.80		66.29	150	86.575	86.400	N/A	86.350	88.200	SW23
SW23	230	96	circ	450	N/A	0.50		0.08	150	86.385	86.210	N/A	86.160	86.710	SEWER

All manholes to be as per 'Sewers for Adoption'

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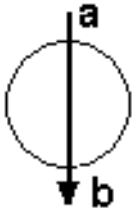
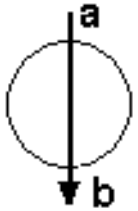
Job No.	862
Sheet no.	2
Date	16/12/25 10:00
Project	Warninglid School - New Residences
Title	Manhole printout for WARNINGLID RESIDENCES.SW

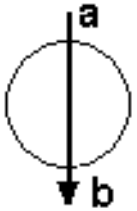
By	Checked	Reviewed



MH = SW15
a=head
b = 100

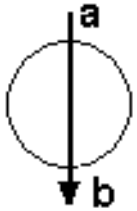


MH = SW16
a= 100
b = 100

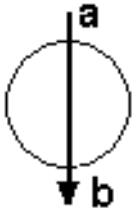


MH = SW17
a=head
b = 100

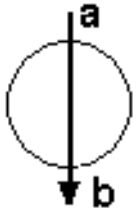
MH = SW18
a= 100
b = 150
c = 100
d = 100
e = 0



MH = SW19
a= 150
b = 150

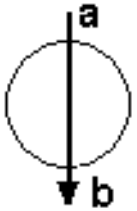


MH = SW20
a=head
b = 100

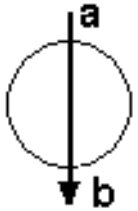


MH = SW21
a= 100
b = 100

MH = SW22
a= 150
b = 150
c = 100
d = 150
e = 0



MH = STORAGE
a= 150
b = 150



MH = SW23
a= 150
b = 150

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Job No.	862
Sheet no.	3
Date	16/12/25 10:00

Project	By	Checked	Reviewed
Warninglid School - New Residences			
Title: Manhole printout for WARNINGLID RESIDENCES.SW			

These explanatory notes should be read in conjunction with the Manhole printout

1) Manhole ref - the reference for the manhole in question
2) Form - either circular or rectangular
3) Chamber diam or length - diameter of chamber if circular, or length if rectangular - in metres
4) Rectangular width - if form is rectangular, this gives the width of the chamber
5) Chamber height - height of chamber from invert
6) Shaft height - height of access shaft if applicable, from top of chamber to ground level
7) Manhole volume - cubic capacity of manhole chamber
8) Exit diameter - diameter of pipe leaving this manhole
9) Exit crown - crown level of pipe leaving this manhole
10) Exit invert - invert level of pipe leaving this manhole
11) Chamb const - manhole construction :-
    - N/A - not specified
    - Conc - concrete rings
    - Poly - polypropylene rings surrounded by selected fill
    - Poly/conc - polypropylene rings surrounded by concrete
    - Brick - brick built with waterproof render
    - In situ - concrete cast in situ
12) Slab level - surface level of base slab (if no sump, this is placed at 50mm below exit invert to allow levels manipulation).
13) Manhole diameters of 9999 have exceeded the sizes available in SfA
14) Manhole diameters may have to be modified due to the number of branches

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Job No.	Sheet no.	Date	By	Checked	Reviewed
862	0	16/12/25			

MasterDrain Foul 11.5

Project: **Warninglid School Foul**

Title: **Manhole printout for WARNINGLID SCHOOL.FL**

Manhole ref.	Form	Cham diam. or length	Rect. width	Chamb. height	Shaft height	MH Volume	Ent. Diam	Ent. Crown	Ent. Invert	Exit Diam	Exit Crown	Exit Invert	Chamb const	Cover Level	Dwnstr MH
PC1	circ	450	N/A	0.50		0.08	Head	----	----	100	89.625	89.500	N/A	90.000	FW1
FW1	circ	450	N/A	0.56		0.09	100	0.000	0.000	100	89.335	89.210	N/A	89.770	FW2
FW2	circ	450	N/A	0.50		0.08	100	0.000	0.000	100	88.795	88.670	N/A	89.170	PC2
PC2	circ	450	N/A	0.50		0.08	100	0.000	0.000	100	88.585	88.460	N/A	88.960	PC3
FW3	circ	450	N/A	0.50		0.08	Head	----	----	100	87.905	87.780	N/A	88.280	PC3
PC3	circ	450	N/A	0.90		0.14	100	0.000	0.000	100	87.765	87.640	N/A	88.540	EDC
FW4	circ	450	N/A	0.50		0.08	Head	----	----	100	87.025	86.900	N/A	87.400	EDC

All manholes to be as per 'Sewers for Adoption'

Levels calculated for level inverts

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MasterDrain Foul 11.5

Job No.	862
Sheet no.	0
Date	16/12/25
Project	Warninglid School Foul
Title	Manhole printout for WARNINGLID SCHOOL.FL

By	Checked	Reviewed

These explanatory notes should be read in conjunction with the Manhole printout

1) Manhole ref - the reference for the manhole in question

2) Form - either circular or rectangular

3) Chamber diam or length - diameter of chamber if circular, or length if rectangular - in metres

4) Rectangular width - if form is rectangular, this gives the width of the chamber

5) Chamber height - height of chamber from invert

6) Shaft height - height of access shaft if applicable, from top of chamber to ground level

7) Manhole volume - cubic capacity of manhole chamber

8) Exit diameter - diameter of pipe leaving this manhole

9) Exit crown - crown level of pipe leaving this manhole

10) Exit invert - invert level of pipe leaving this manhole

11) Manhole diameters of 9999 have exceeded the sizes available in SfA

12) Manhole diameters may have to be modified due to the number of branches

MasterDrain

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Data printout for

Location	**Nat. Grid.**	**M5-60**	**r**	**Soil**	**SAAR**	**Bearing**	**Radius**	**WARNINGLID**	**TQ2526**	**19.80**	**0.34**	**4**	**825**	**0.0**	**0.0**

The above data taken from the Hydrological maps of HR Wallingford by permission.

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Job No.	Sheet no.	Date	By	Checked	Reviewed
862	3	15/12/25			

Project: Warninglid School New Residences

Title: Hydrograph storage analysis (Winter profile) for New Residences

Incremental rainfall figures.

Storm Mins	Storage Depth mm	Control Flow l/s	Storm Mins	Storage Depth mm	Control Flow l/s
1.2	1.5	0.05	61.2	318.3	2.20
2.4	2.8	0.05	62.4	332.6	2.27
3.6	4.3	0.05	63.6	346.7	2.31
4.8	5.7	0.05	64.8	360.5	2.38
6.0	7.2	0.05	66.0	373.8	2.41
7.2	8.8	0.05	67.2	386.6	2.44
8.4	10.4	0.05	68.4	398.9	2.47
9.6	12.2	0.05	69.6	410.6	2.54
10.8	14.1	0.05	70.8	421.6	2.57
12.0	16.1	0.05	72.0	432.1	2.60
13.2	18.3	0.05	73.2	441.7	2.63
14.4	20.5	0.15	74.4	450.5	2.66
15.6	22.7	0.15	75.6	458.6	2.66
16.8	24.9	0.15	76.8	466.0	2.69
18.0	27.2	0.15	78.0	472.6	2.71
19.2	29.8	0.15	79.2	478.3	2.71
20.4	32.3	0.27	80.4	483.5	2.74
21.6	34.8	0.27	81.6	487.9	2.74
22.8	37.4	0.27	82.8	491.5	2.77
24.0	40.2	0.42	84.0	494.4	2.77
25.2	43.0	0.42	85.2	496.8	2.77
26.4	46.2	0.42	86.4	498.6	2.77
27.6	49.6	0.42	87.6	500.0	2.80
28.8	53.4	0.58	88.8	500.8	2.80
30.0	57.2	0.58	90.0	501.2	2.80
31.2	61.3	0.76	91.2	501.2	2.80
32.4	65.6	0.76	92.4	500.9	2.80
33.6	70.4	0.96	93.6	500.3	2.80
34.8	75.4	0.96	94.8	499.4	2.77
36.0	80.9	1.18	96.0	498.2	2.77
37.2	86.5	1.18	97.2	496.7	2.77
38.4	92.8	1.19	98.4	495.1	2.77
39.6	99.8	1.19	99.6	493.2	2.77
40.8	107.6	1.25	100.8	491.3	2.77
42.0	115.8	1.31	102.0	489.4	2.74
43.2	124.8	1.37	103.2	487.3	2.74
44.4	134.3	1.43	104.4	485.1	2.74
45.6	144.5	1.48	105.6	482.8	2.74
46.8	155.2	1.53	106.8	480.5	2.74
48.0	166.7	1.58	108.0	478.0	2.71
49.2	178.8	1.63	109.2	475.5	2.71
50.4	191.4	1.73	110.4	472.8	2.71
51.6	204.4	1.77	111.6	470.1	2.71
52.8	217.8	1.81	112.8	467.2	2.69
54.0	231.6	1.90	114.0	464.3	2.69
55.2	245.7	1.94	115.2	461.3	2.69
56.4	260.1	2.02	116.4	458.2	2.66
57.6	274.7	2.06	117.6	455.2	2.66
58.8	289.3	2.10	118.8	452.2	2.66
60.0	303.8	2.17	120.0	449.1	2.63

Using the Get Max button causes the program to step through a series of storm durations until a maximum volume is obtained.
Each duration is sampled 600 times and the results recorded. The storm durations (hrs) are:-

0.25, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 18, 20, 24, 30, 36, 42, 48, 54, 60, 66, 72, 84, 96, 120, 150, 175, 200, 250, 300, 375, 500, 750, 1000, 1250, 1500, 1570, 2000, 2500, 3000, 3500, 4000

It should be noted that the six hour storm frequently requested rarely demonstrates the worst case for storage.

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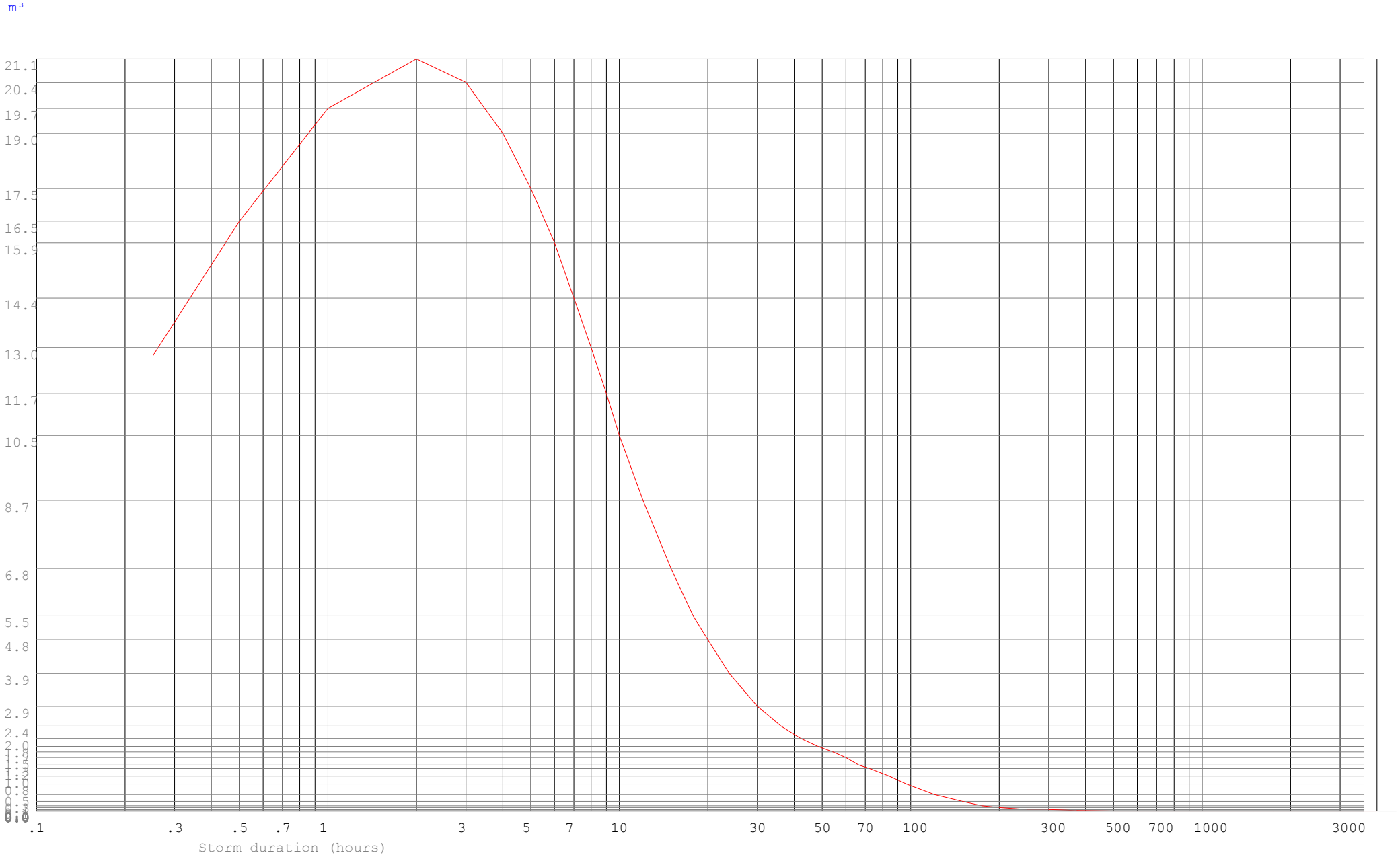
Job No.	Sheet no.	Date	By	Checked	Reviewed
862	4	15/12/25			

MasterDrain SW

Project: **Warninglid School New Residences**

Title: **Hydrograph storage analysis (Winter profile) for New Residences**

Sequential storage volume at specific storm durations.



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Job No.	Sheet no.	Date	By	Checked	Reviewed
862	1	15/12/25			

MasterDrain SW

Project: Warninglid School - School Conversion

Title: Surcharge calcs (Sized at 30 yrs storm) for WARNINGLID SCHOOL.SW CCF = 45%

Using in-line restrictors
Return period = 100 yrs
Climate change factor = 45

PEAK hydrograph values printed
Storm duration = 15 mins
No offline storage

Mean rain intens. 134.00 mm/hr
Storm profile = Summer
Using FSR data

Peak rain intens. 525.28 mm/hr
Sample period = 7.5 secs.

Entry No.		SECT. No.	MANHOLE REF	PIPE CAPACITY l/s	RATE FLOW l/s	PIPE SIZE mm	CHAMBER DIAM/LxW mm	INVERT LEVEL m	WATER LEVEL m	GRND LEVEL m	SURCHARGE fract.	SURCHARGE Depth	EXCESS FLOW l/s	FLOODED VOL m³	DRAINED AREA (m²) x FACTOR	STATUS
1	I	1.01	SW1	6.1	2.1	100	450	89.46	89.50	89.96	0.34	0.04	0.00	0.000	33	OK
2	I	1.02	SW2	11.9	6.5	100	450	89.28	89.33	89.80	0.54	0.05	0.00	0.000	102	OK
3	I	1.03	SW3	12.2	11.0	100	450	88.80	88.89	89.30	0.91	0.09	0.00	0.000	175	OK
4	I	1.04	SW4	7.6	11.0	100	600	88.50	88.69	89.00	1.45	0.19	3.42	0.000	175	Surch.
5	I	1.05	SW5	26.0	12.0	150	450	88.35	88.42	88.85	0.46	0.07	0.00	0.000	190	OK
6	I	1.06	SW6	18.2	14.4	150	450	88.12	88.23	88.62	0.79	0.11	0.00	0.000	228	OK
7	B	2.01	SW7	14.4	8.9	100	450	89.05	89.15	89.55	0.62	0.10	0.00	0.000	141	OK
8	I	1.07	SW8	18.0	25.6	150	600	88.00	88.35	89.20	1.42	0.35	7.61	0.000	406	Surch.
9	B	3.01	SW9	6.2	3.0	100	450	89.31	89.36	89.81	0.49	0.05	0.00	0.000	48	OK
10	B	3.02	SW10	6.1	7.2	100	450	89.21	89.36	89.94	1.18	0.15	1.10	0.000	114	Surch.
11	B	3.03	SW11	6.1	9.1	100	450	89.09	89.33	89.74	1.51	0.24	3.07	0.000	145	Surch.
12	B	3.04	SW12	24.4	13.4	150	450	88.95	89.07	89.50	0.55	0.12	0.00	0.000	213	OK
13	B	3.05	SW13	54.0	15.0	150	450	88.50	88.63	89.00	0.28	0.13	0.00	0.000	238	OK
14	I	1.08	STORAGE	51.9	40.6	225	11588	87.88	88.04	89.00	0.78	0.16	0.00	0.000	644	OK
15	I	1.09	SW14‡	58.5	2.6	225	450	87.83	87.85	88.85	0.04	0.02	0.00	0.000	644	OK

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Job No.	862
Sheet no.	2
Date	15/12/25

MasterDrain SW

Project	Warninglid School - School Conversion	By	Checked / Reviewed
Title	Surcharge calcs (Sized at 30 yrs storm) for WARNINGLID SCHOOL.SW CCF = 45%		

Notes

Printout headings

1) Entry no - position in file
2) Section no - pipe identifier
3) Manhole ref - Manhole identifier
4) Pipe cap - full bore capacity of that pipe
5) Rate of flow - calculated flow rate (l/s) ‡ = flow restrictor.
6) Pipe diam - outlet pipe diameter (mm)
7) Chamber diam - chamber diam. at base of MH
8) Invert level - invert level of manhole
9) Water level - calculated peak water level.
10) Grnd level - ground / cover level
11) Surch. fract - calc.flow/pipe capacity
12) Surch. depth - surcharge level above soffit
13) Overflow - surcharged flow rate (l/s)
14) Flooded vol - volume of water above cover
15) Upstrm Vol - upstream pipe vol to previous manhole(s)
16) Status - OK - outlet not surcharged
17) Status - Surcharged - outlet surcharged
18) Status - Warning - water level within 299mm of cover level
19) Status - Flooded - cover over-topped
20) § against diameter indicates throttle pipe used.

Title box

Hydrograph data

1) Ret. period - that used to calculate profile
2) Duration - length of storm (mins)
3) Profile - either Winter (75%) or Summer (50%)

Flow restrictors

Manhole reference - SW14 Restrictor flowrate - 2.6 l/s

Flood volumes

Check that the upstream storage of the manhole is adequate to take the flood volume - see Upstrm Vol above.

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Job No.	Sheet no.	Date	By	Checked	Reviewed
862	3	15/12/25			

MasterDrain SW

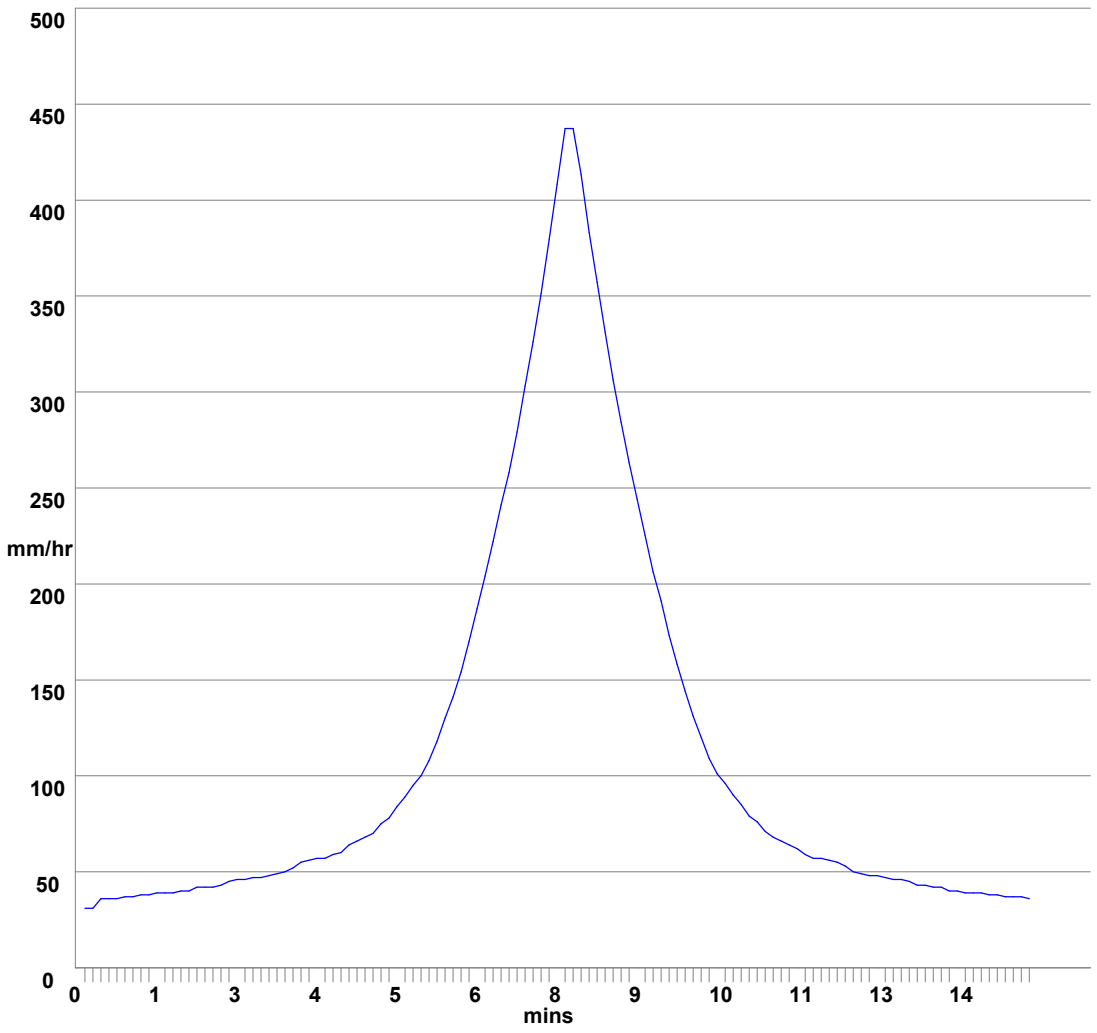
Project: Warninglid School - School Conversion

Title: Surcharge calcs (Sized at 30 yrs storm) for WARNINGLID SCHOOL.SW CCF = 45%

Time mins	Rain mm/hr	Time mins	Rain mm/hr	Time mins	Rain mm/hr
0:08	31.20	5:08	89.13	10:08	95.82
0:15	31.20	5:15	94.70	10:15	90.25
0:22	35.65	5:22	100.27	10:22	84.68
0:30	35.65	5:30	108.07	10:30	79.11
0:38	35.65	5:38	118.10	10:38	75.76
0:45	36.77	5:45	130.36	10:45	71.31
0:52	36.77	5:52	141.50	10:52	67.96
1:00	37.88	6:00	153.75	11:00	65.74
1:08	37.88	6:08	170.47	11:08	63.51
1:15	39.00	6:15	187.18	11:15	62.39
1:22	39.00	6:22	203.89	11:22	59.05
1:30	39.00	6:30	221.72	11:30	56.82
1:38	40.11	6:38	240.66	11:38	56.82
1:45	40.11	6:45	258.48	11:45	55.71
1:52	42.34	6:52	278.54	11:52	54.59
2:00	42.34	7:00	303.05	12:00	53.48
2:08	42.34	7:08	326.45	12:08	50.14
2:15	43.45	7:15	350.96	12:15	49.02
2:22	44.57	7:22	378.81	12:22	47.91
2:30	45.68	7:30	407.78	12:30	47.91
2:38	45.68	7:38	436.75	12:38	46.79
2:45	46.79	7:45	436.75	12:45	45.68
2:52	46.79	7:52	413.35	12:52	45.68
3:00	47.91	8:00	383.27	13:00	44.57
3:08	49.02	8:08	356.53	13:08	43.45
3:15	50.14	8:15	330.91	13:15	43.45
3:22	52.37	8:22	306.39	13:22	42.34
3:30	54.59	8:30	284.11	13:30	42.34
3:38	55.71	8:38	262.94	13:38	40.11
3:45	56.82	8:45	244.00	13:45	40.11
3:52	56.82	8:52	225.06	13:52	39.00
4:00	59.05	9:00	206.12	14:00	39.00
4:08	60.16	9:08	190.52	14:08	39.00
4:15	63.51	9:15	172.69	14:15	37.88
4:22	65.74	9:22	158.21	14:22	37.88
4:30	67.96	9:30	143.73	14:30	36.77
4:38	70.19	9:38	131.47	14:38	36.77
4:45	74.65	9:45	120.33	14:45	36.77
4:52	77.99	9:52	109.19	14:52	35.65
5:00	83.56	10:00	101.39	15:00	35.65

Hydrograph profile derived from data in the Flood Studies Report

Return period= 100 yrs Duration= 15 mins Profile - summer



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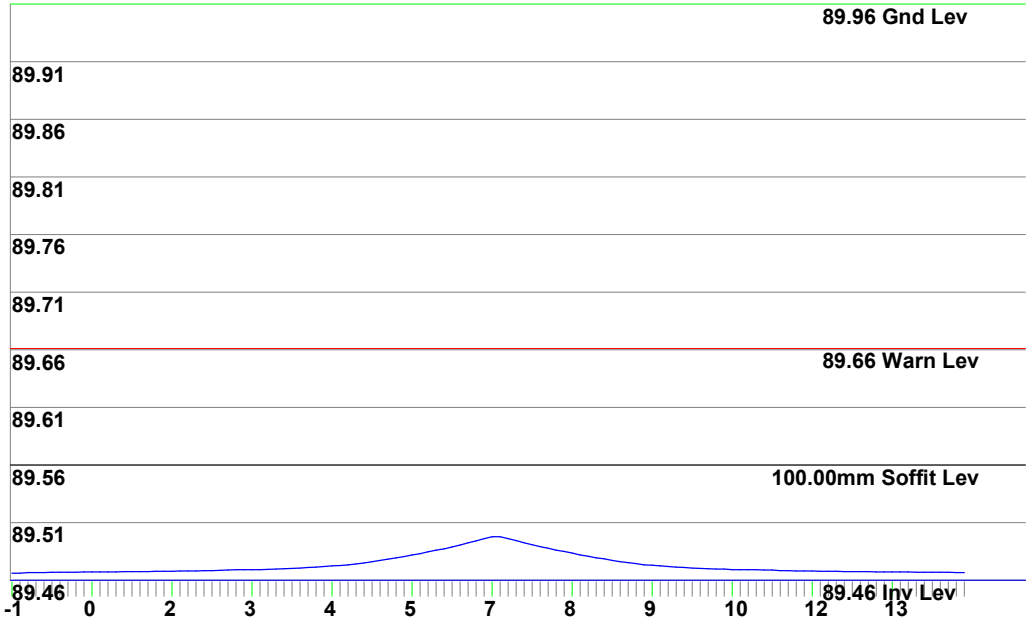
Job No.	862
Sheet no.	4
Date	15/12/25

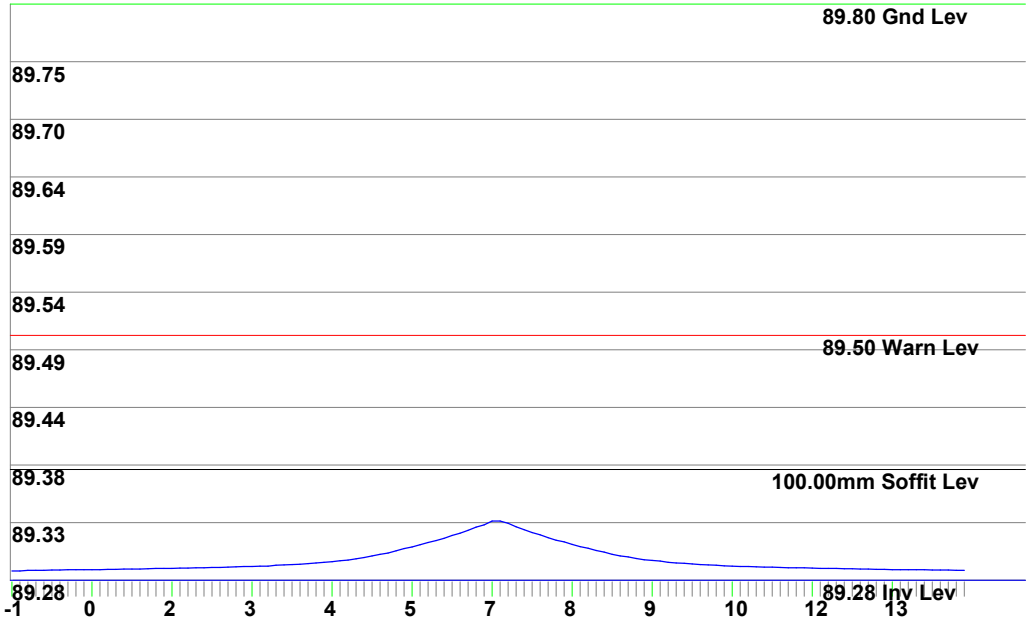
MasterDrain SW

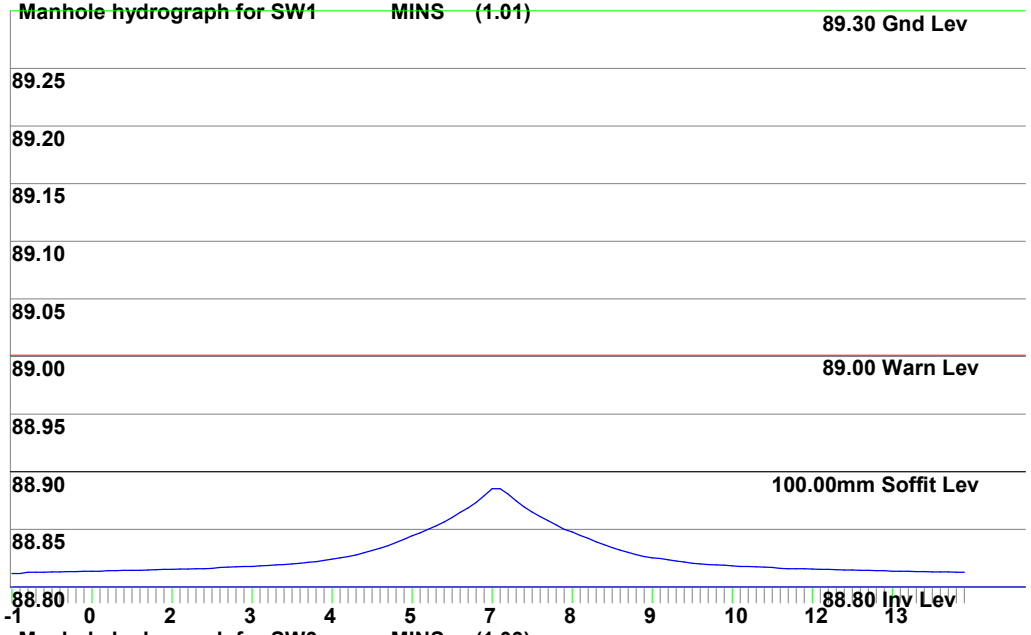
Project: Warninglid School - School Conversion

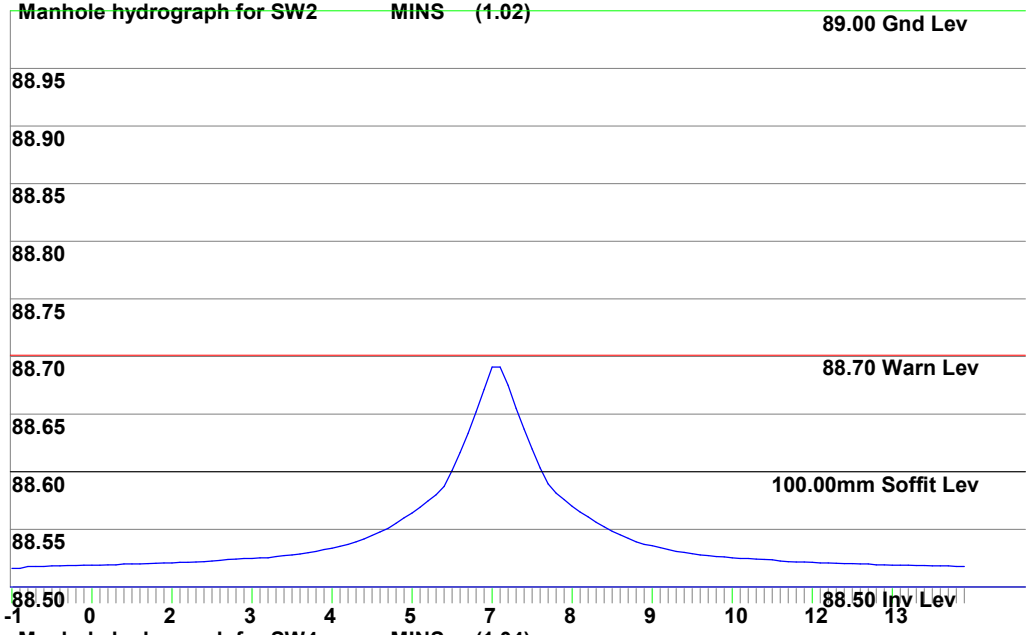
Title: Surcharge calcs (Sized at 30 yrs storm) for WARNINGLID SCHOOL.SW CCF = 45%

By	Checked	Reviewed









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Job No.	862
Sheet no.	5
Date	15/12/25
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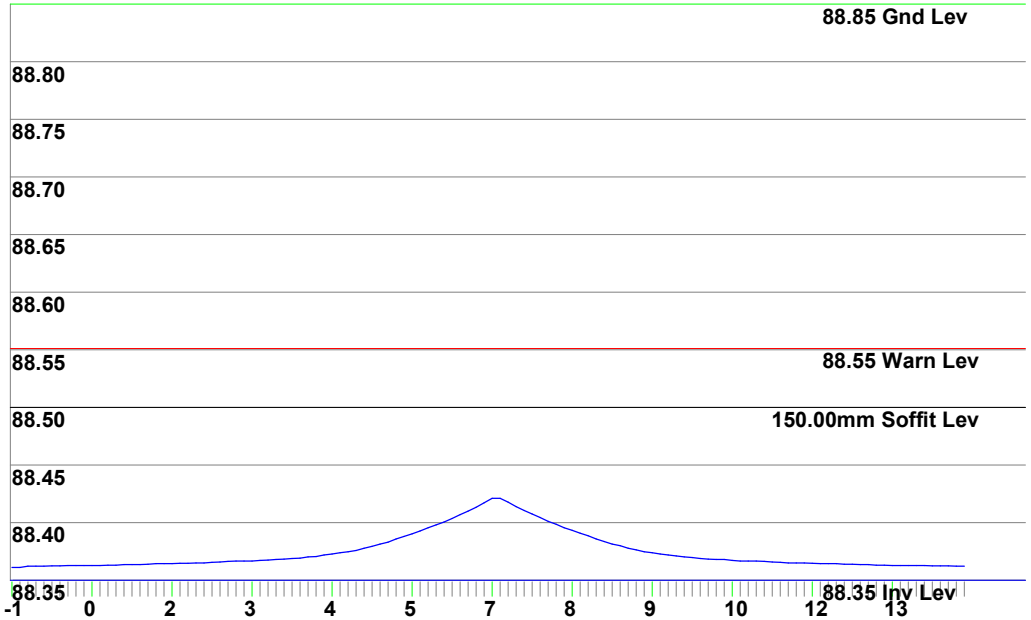
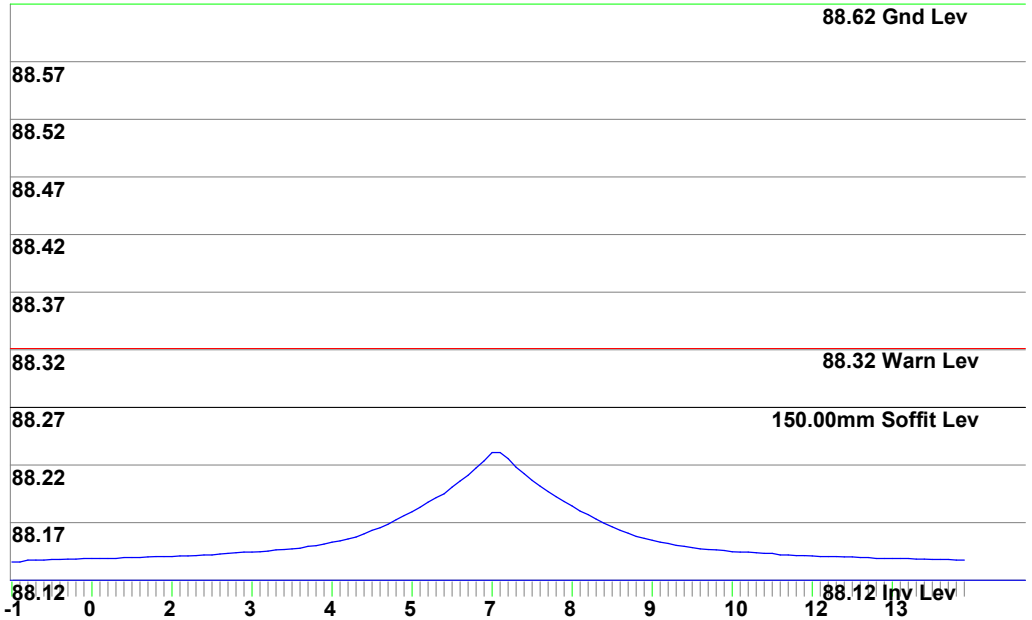
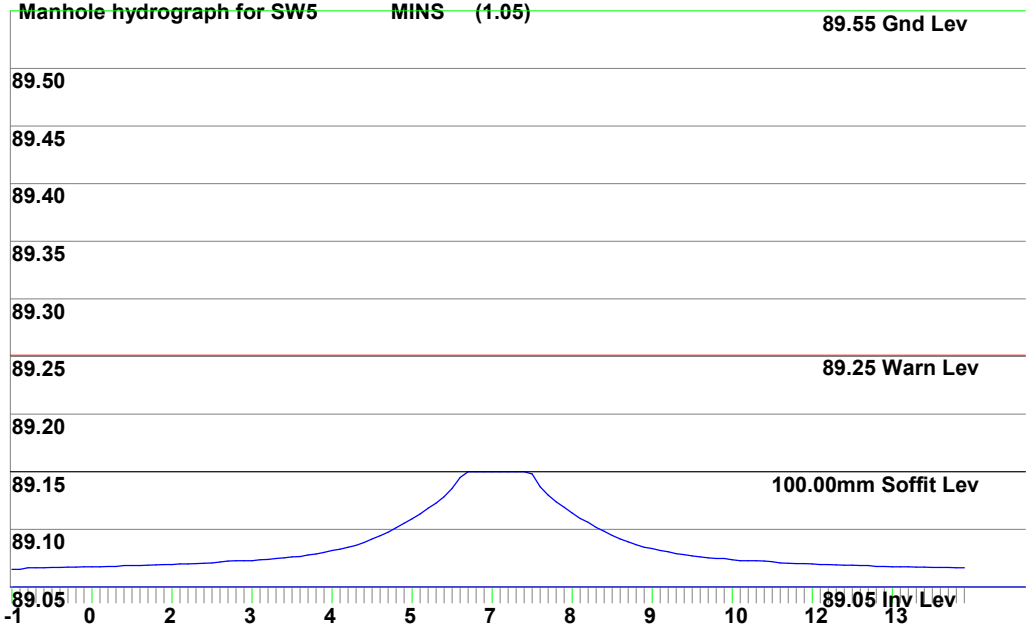
Checked	
Reviewed	

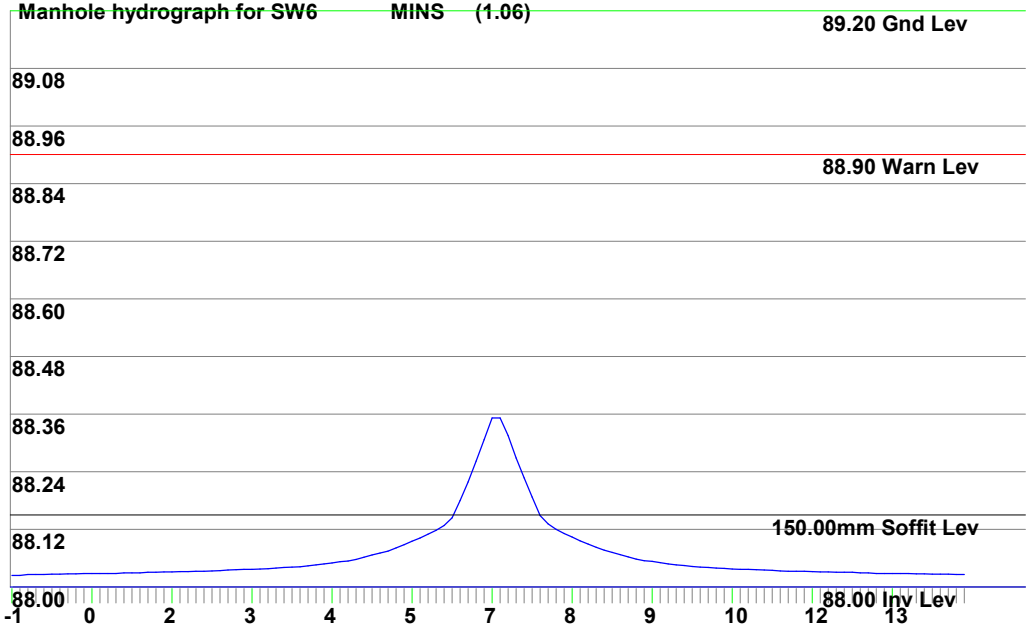
Project: Warninglid School - School Conversion

Title: Surcharge calcs (Sized at 30 yrs storm) for WARNINGLID SCHOOL.SW CCF = 45%









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Job No.	862
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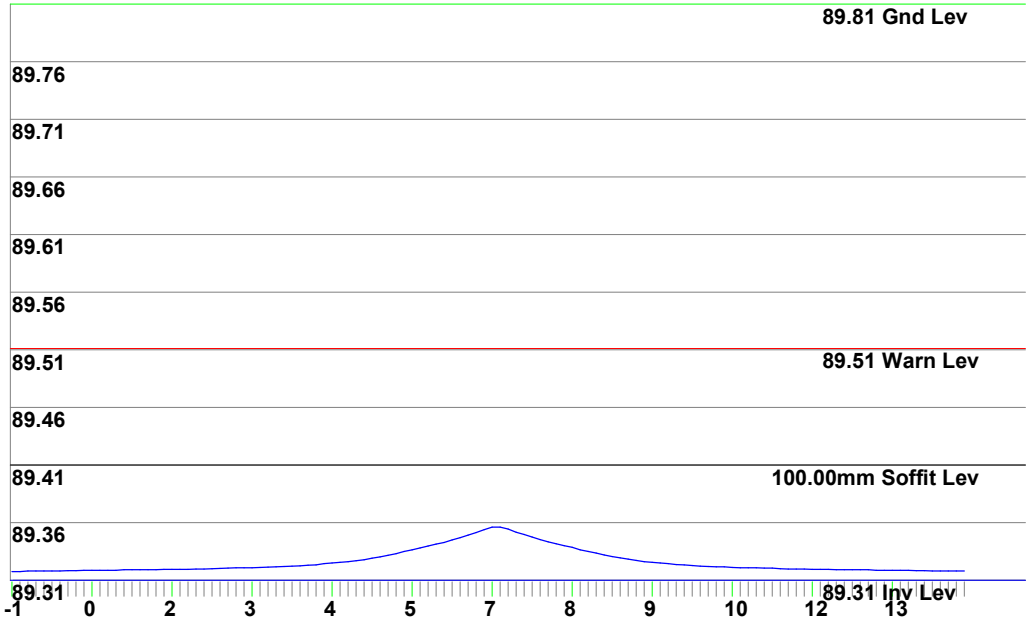
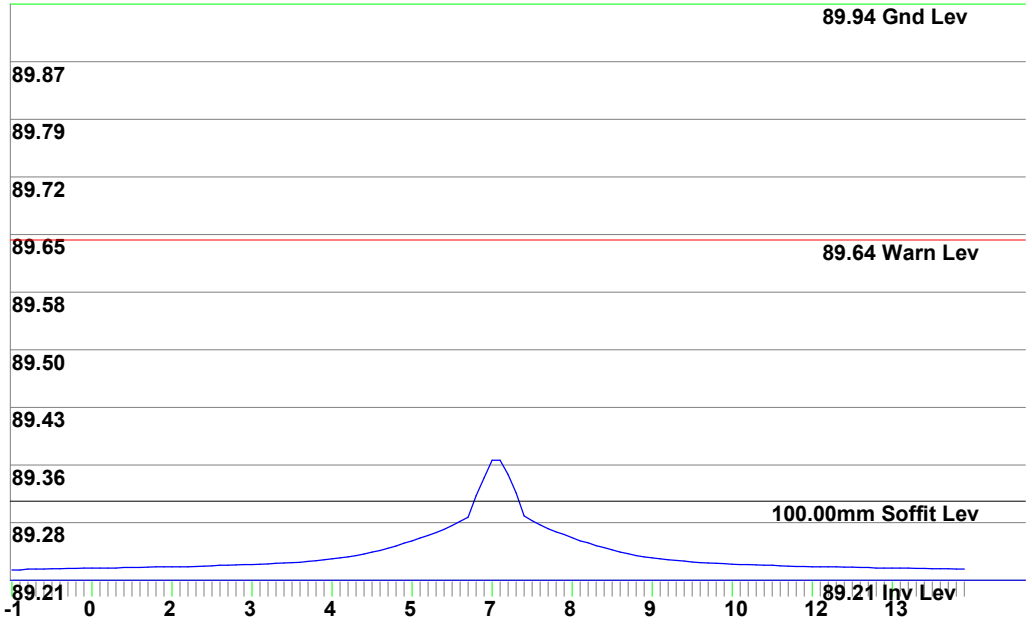
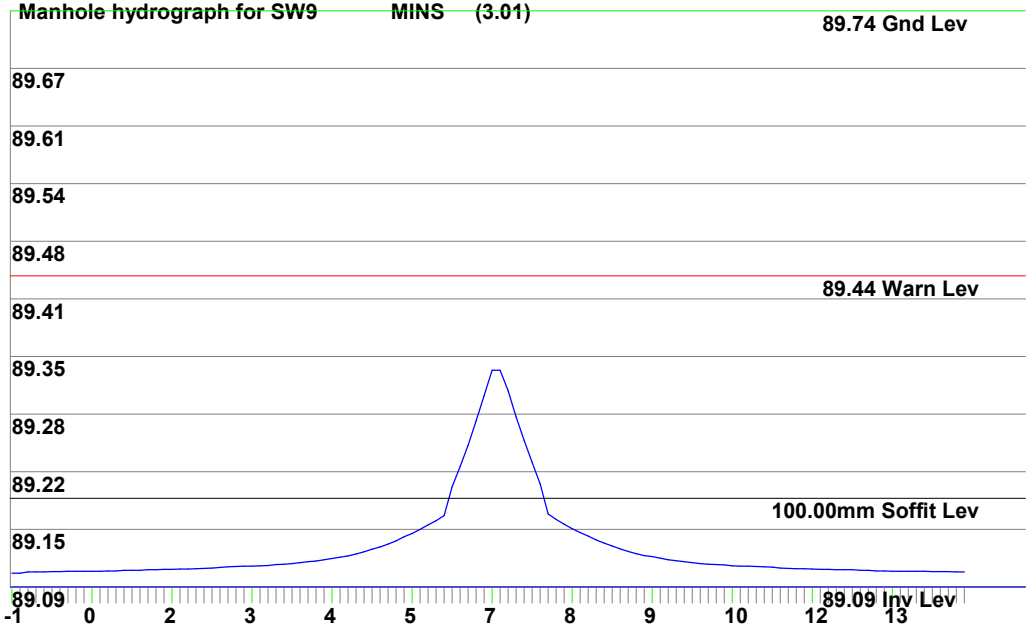
Project: Warninglid School - School Conversion

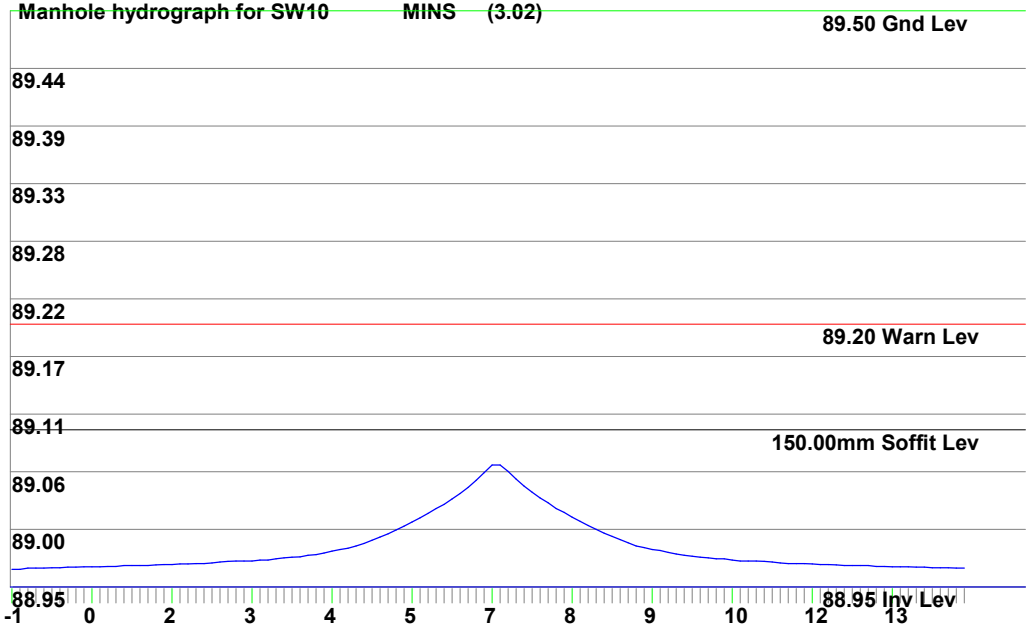
Title: Surcharge calcs (Sized at 30 yrs storm) for WARNINGLID SCHOOL.SW CCF = 45%

By	Checked	Reviewed









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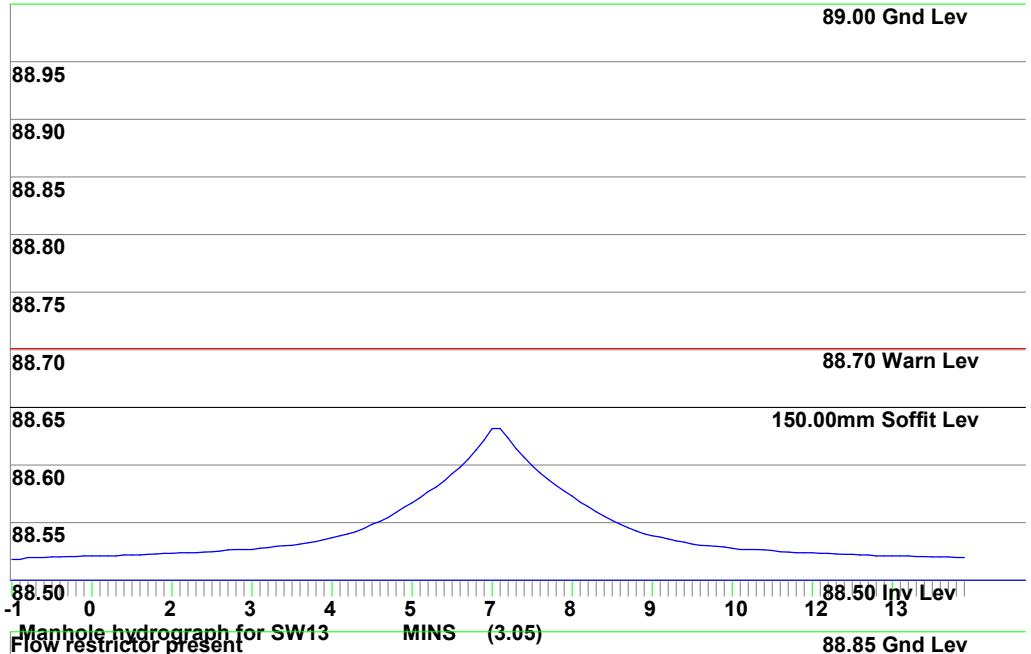
Date	15/12/25

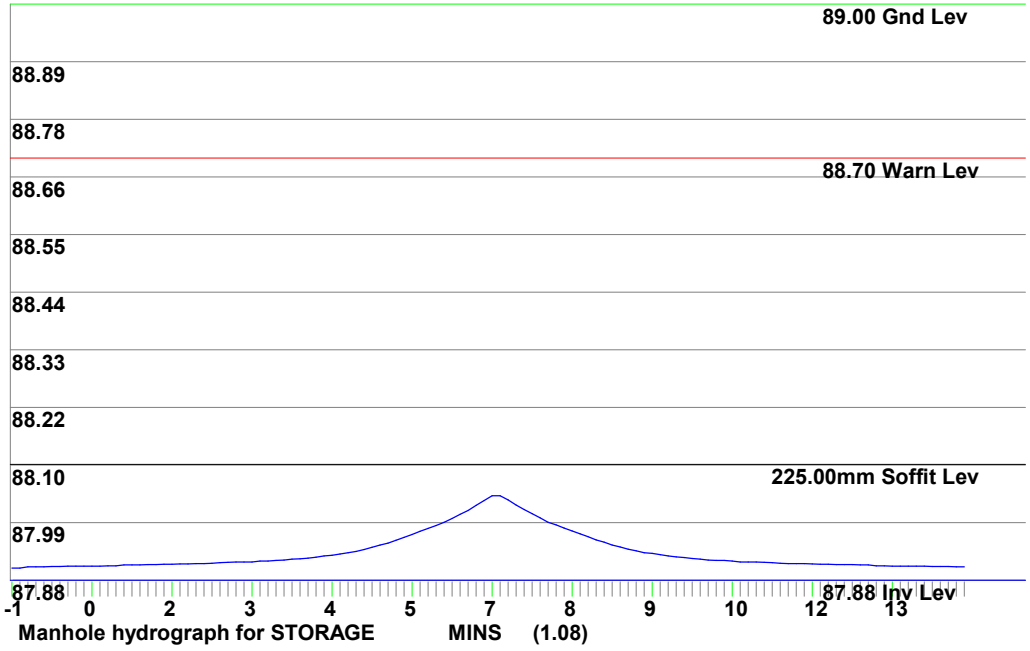
MasterDrain SW

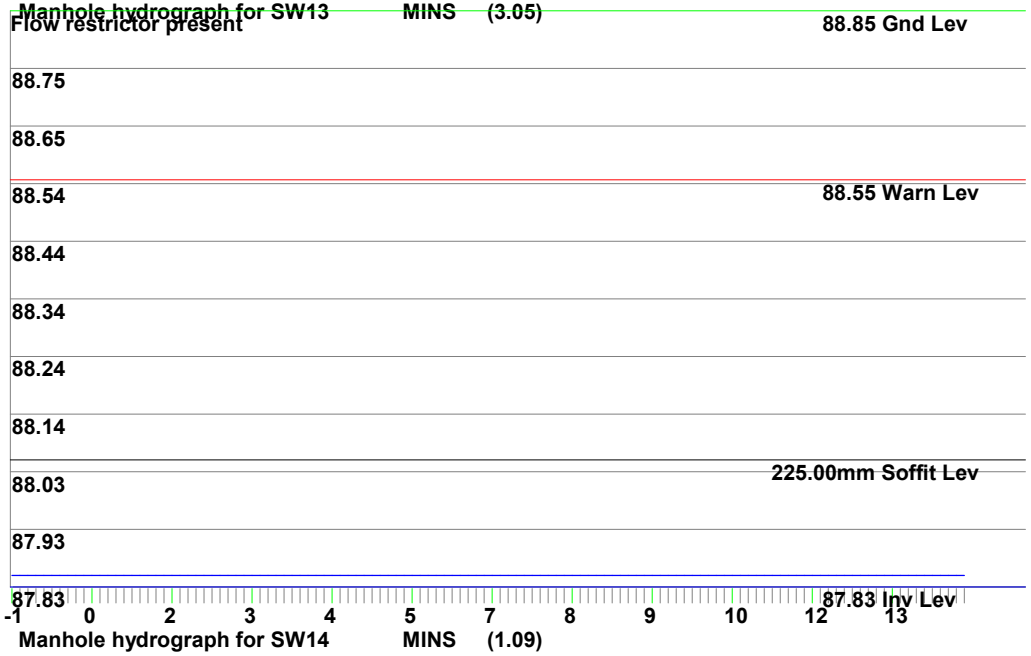
Project: Warninglid School - School Conversion

Title: Surcharge calcs (Sized at 30 yrs storm) for WARNINGLID SCHOOL.SW CCF = 45%

By	Checked	Reviewed







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Job No.	862
Sheet no.	8
Date	15/12/25

Project	By	Checked	Reviewed
Warninglid School - School Conversion			

Title: **Surcharge calcs (Sized at 30 yrs storm) for WARNINGLID SCHOOL.SW CCF = 45%**

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Job No.	862
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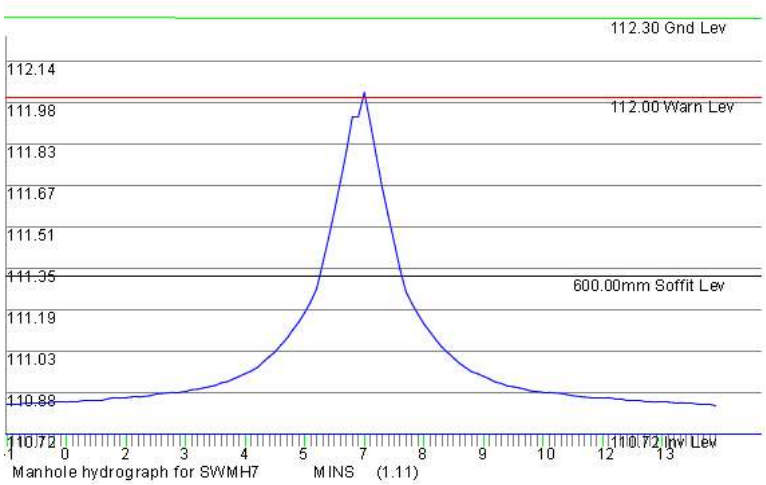
Project	Warninglid School - School Conversion	By	Checked / Reviewed
Title	Surcharge calcs (Sized at 30 yrs storm) for WARNINGLID SCHOOL.SW CCF = 45%		



1) Ground / cover level

2) Warning level - in this case, set at 300mm below cover level.

3) Soffit level of outflow pipe.

4) Invert level of chamber.

Notes

a) Lower section of the graph shows the water depth filling the channel. Channel is assumed to be a full pipe diameter in depth.

b) Upper section of the graph shows the water depth filling the chamber. Chamber has a greater width/diameter than the channel, so increases in depth are proportionally less.

c) The top of the graph clips the warning level and would be marked thus on the printout.

d) In many cases the invert of the offline storage is required to enter at the channel soffit level, meaning that the pipe will still surcharge but flooding risk reduced.

e) The diagram above is a general one and is not part of the current calculation.

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MasterDrain SW

Job No.	862
Sheet no.	1
Date	16/12/25
By	
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Project: Warninglid School - New Residences

Title: Surcharge calcs (Sized at 30 yrs storm) for WARNINGLID RESIDENCES.SW CCF = 45%

Using in-line restrictors
Return period = 100 yrs
Climate change factor = 45

PEAK hydrograph values printed
Storm duration = 15 mins
No offline storage

Mean rain intens. 134.00 mm/hr
Storm profile = Summer
Using FSR data

Peak rain intens. 525.28 mm/hr
Sample period = 7.5 secs.

Entry No.		SECT. No.	MANHOLE REF	PIPE CAPACITY l/s	RATE FLOW l/s	PIPE SIZE mm	CHAMBER DIAM/LxW mm	INVERT LEVEL m	WATER LEVEL m	GRND LEVEL m	SURCHARGE fract.	SURCHARGE Depth	EXCESS FLOW l/s	FLOODED VOL m^3	DRAINED AREA (m^2) x FACTOR	STATUS
1	I	1.01	SW15	6.1	3.3	100	450	87.35	87.40	87.85	0.55	0.05	0.00	0.000	53	OK
2	I	1.02	SW16	6.2	7.2	100	450	87.17	87.32	87.84	1.16	0.15	1.01	0.000	114	Surch.
3	B	2.01	SW17	14.4	1.9	100	450	88.00	88.03	88.50	0.13	0.03	0.00	0.000	30	OK
4	I	1.03	SW18	17.7	13.6	150	450	87.03	87.14	88.15	0.76	0.11	0.00	0.000	215	OK
5	I	1.04	SW19	26.0	15.5	150	450	86.92	87.01	88.00	0.60	0.09	0.00	0.000	245	OK
6	B	3.01	SW20	11.7	3.3	100	450	87.30	87.35	87.80	0.28	0.05	0.00	0.000	53	OK
7	B	3.02	SW21	6.2	7.2	100	450	86.70	86.85	87.20	1.16	0.15	0.97	0.000	114	Surch.
8	I	1.05	SW22	18.3	27.1	150	600	86.56	86.94	87.40	1.48	0.38	8.81	0.000	430	Surch.
9	I	1.06	STORAGE	28.9	27.1	150	6848	86.40	86.53	88.20	0.94	0.13	0.00	0.000	430	OK
10	I	1.07	SW23‡	32.0	2.6	150	450	86.21	86.23	86.71	0.08	0.02	0.00	0.000	430	OK

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MasterDrain SW

Project	Warninglid School - New Residences	By	Checked / Reviewed
Title	Surcharge calcs (Sized at 30 yrs storm) for WARNINGLID RESIDENCES.SW CCF = 45%		

Notes

Printout headings

1) Entry no - position in file
2) Section no - pipe identifier
3) Manhole ref - Manhole identifier
4) Pipe cap - full bore capacity of that pipe
5) Rate of flow - calculated flow rate (l/s) ‡ = flow restrictor.
6) Pipe diam - outlet pipe diameter (mm)
7) Chamber diam - chamber diam. at base of MH
8) Invert level - invert level of manhole
9) Water level - calculated peak water level.
10) Grnd level - ground / cover level
11) Surch. fract - calc.flow/pipe capacity
12) Surch. depth - surcharge level above soffit
13) Overflow - surcharged flow rate (l/s)
14) Flooded vol - volume of water above cover
15) Upstrm Vol - upstream pipe vol to previous manhole(s)
16) Status - OK - outlet not surcharged
17) Status - Surcharged - outlet surcharged
18) Status - Warning - water level within 299mm of cover level
19) Status - Flooded - cover over-topped
20) § against diameter indicates throttle pipe used.

Title box

Hydrograph data

1) Ret. period - that used to calculate profile
2) Duration - length of storm (mins)
3) Profile - either Winter (75%) or Summer (50%)

Flow restrictors

Manhole reference - SW23

Restrictor flowrate - 2.6 l/s

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Job No.	Sheet no.	Date	By	Checked	Reviewed
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MasterDrain SW

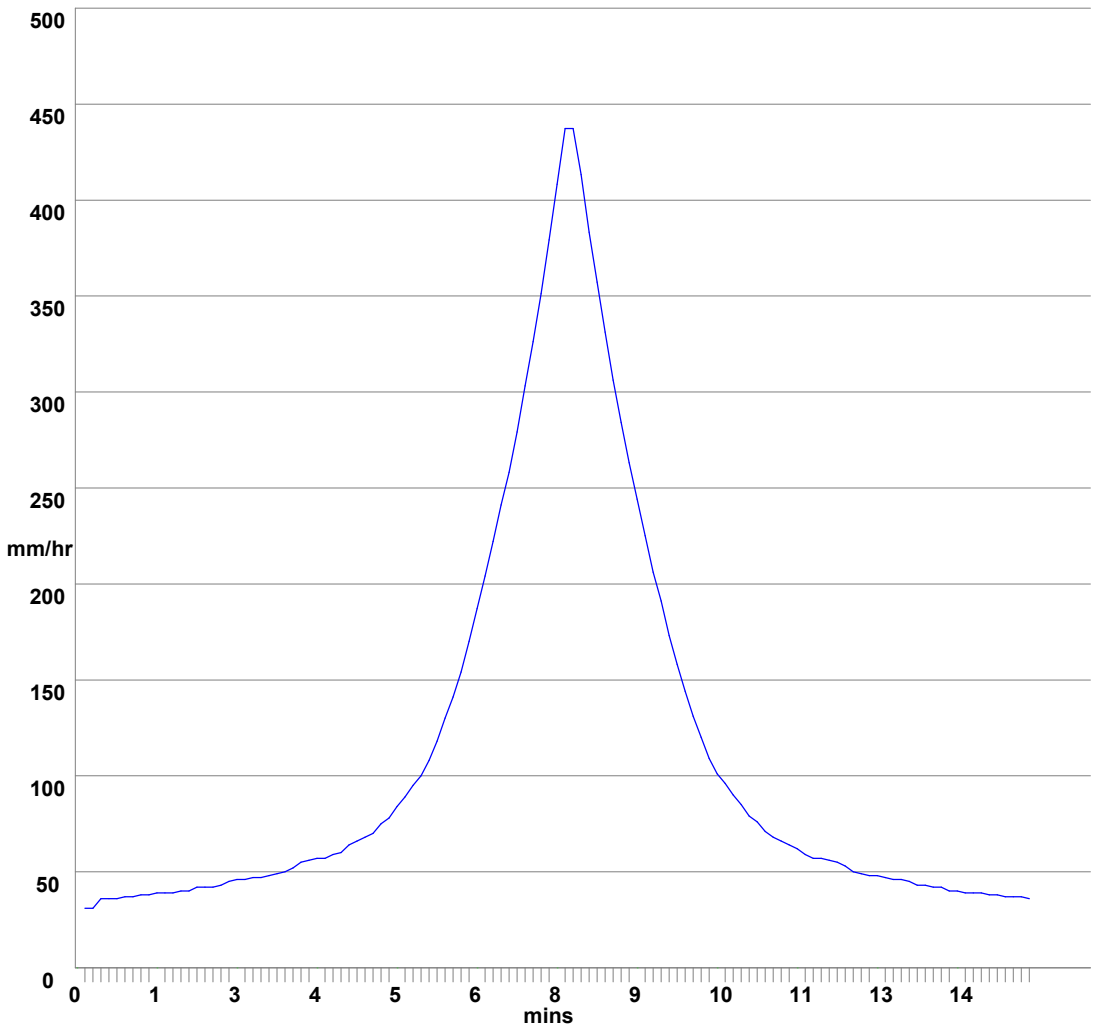
Project: Warninglid School - New Residences

Title: Surcharge calcs (Sized at 30 yrs storm) for WARNINGLID RESIDENCES.SW CCF = 45%

Time mins	Rain mm/hr	Time mins	Rain mm/hr	Time mins	Rain mm/hr
0:08	31.20	5:08	89.13	10:08	95.82
0:15	31.20	5:15	94.70	10:15	90.25
0:22	35.65	5:22	100.27	10:22	84.68
0:30	35.65	5:30	108.07	10:30	79.11
0:38	35.65	5:38	118.10	10:38	75.76
0:45	36.77	5:45	130.36	10:45	71.31
0:52	36.77	5:52	141.50	10:52	67.96
1:00	37.88	6:00	153.75	11:00	65.74
1:08	37.88	6:08	170.47	11:08	63.51
1:15	39.00	6:15	187.18	11:15	62.39
1:22	39.00	6:22	203.89	11:22	59.05
1:30	39.00	6:30	221.72	11:30	56.82
1:38	40.11	6:38	240.66	11:38	56.82
1:45	40.11	6:45	258.48	11:45	55.71
1:52	42.34	6:52	278.54	11:52	54.59
2:00	42.34	7:00	303.05	12:00	53.48
2:08	42.34	7:08	326.45	12:08	50.14
2:15	43.45	7:15	350.96	12:15	49.02
2:22	44.57	7:22	378.81	12:22	47.91
2:30	45.68	7:30	407.78	12:30	47.91
2:38	45.68	7:38	436.75	12:38	46.79
2:45	46.79	7:45	436.75	12:45	45.68
2:52	46.79	7:52	413.35	12:52	45.68
3:00	47.91	8:00	383.27	13:00	44.57
3:08	49.02	8:08	356.53	13:08	43.45
3:15	50.14	8:15	330.91	13:15	43.45
3:22	52.37	8:22	306.39	13:22	42.34
3:30	54.59	8:30	284.11	13:30	42.34
3:38	55.71	8:38	262.94	13:38	40.11
3:45	56.82	8:45	244.00	13:45	40.11
3:52	56.82	8:52	225.06	13:52	39.00
4:00	59.05	9:00	206.12	14:00	39.00
4:08	60.16	9:08	190.52	14:08	39.00
4:15	63.51	9:15	172.69	14:15	37.88
4:22	65.74	9:22	158.21	14:22	37.88
4:30	67.96	9:30	143.73	14:30	36.77
4:38	70.19	9:38	131.47	14:38	36.77
4:45	74.65	9:45	120.33	14:45	36.77
4:52	77.99	9:52	109.19	14:52	35.65
5:00	83.56	10:00	101.39	15:00	35.65

Hydrograph profile derived from data in the Flood Studies Report

Return period= 100 yrs Duration= 15 mins Profile - summer



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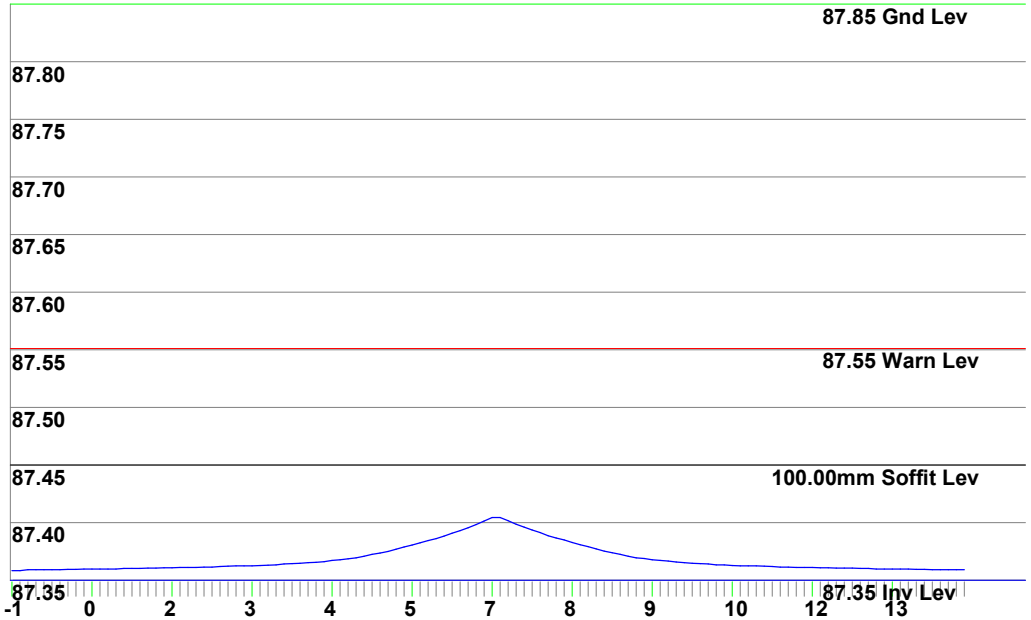
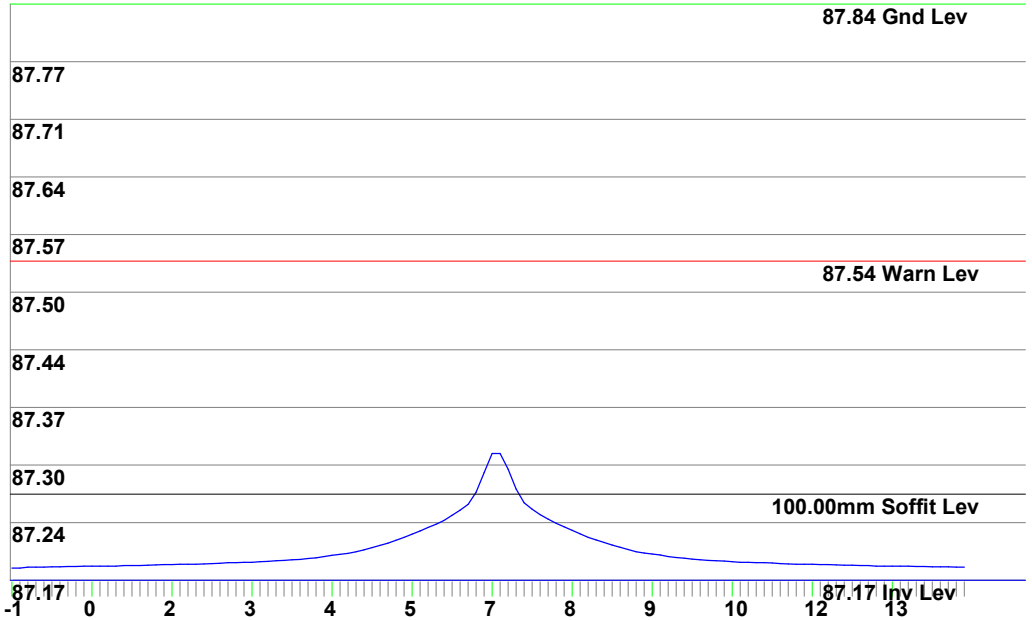
MasterDrain SW

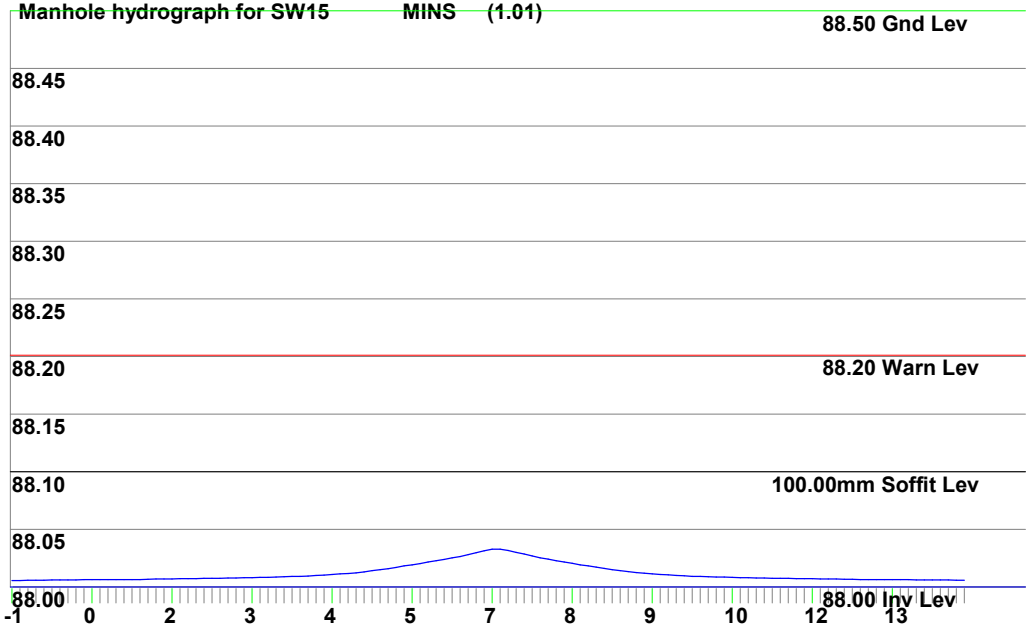
Project: Warninglid School - New Residences

Title: Surcharge calcs (Sized at 30 yrs storm) for WARNINGLID RESIDENCES.SW CCF = 45%

By	Checked	Reviewed







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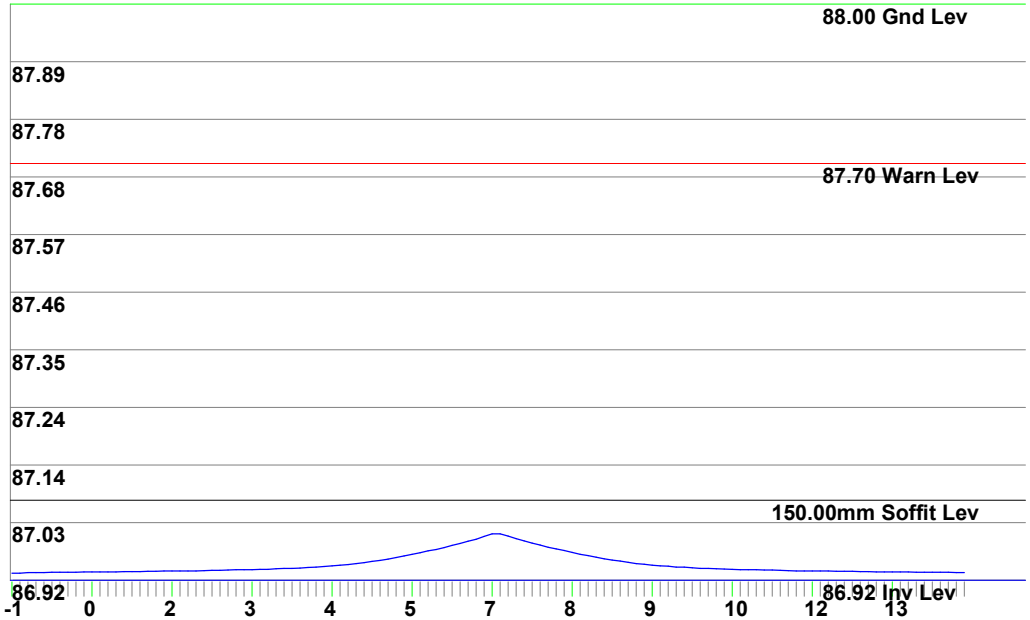

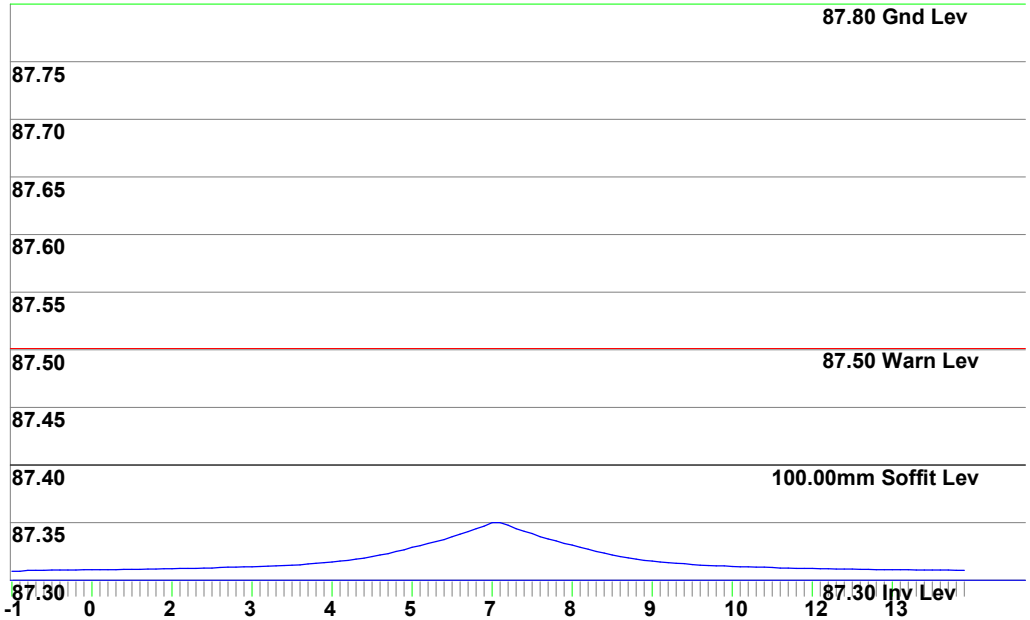

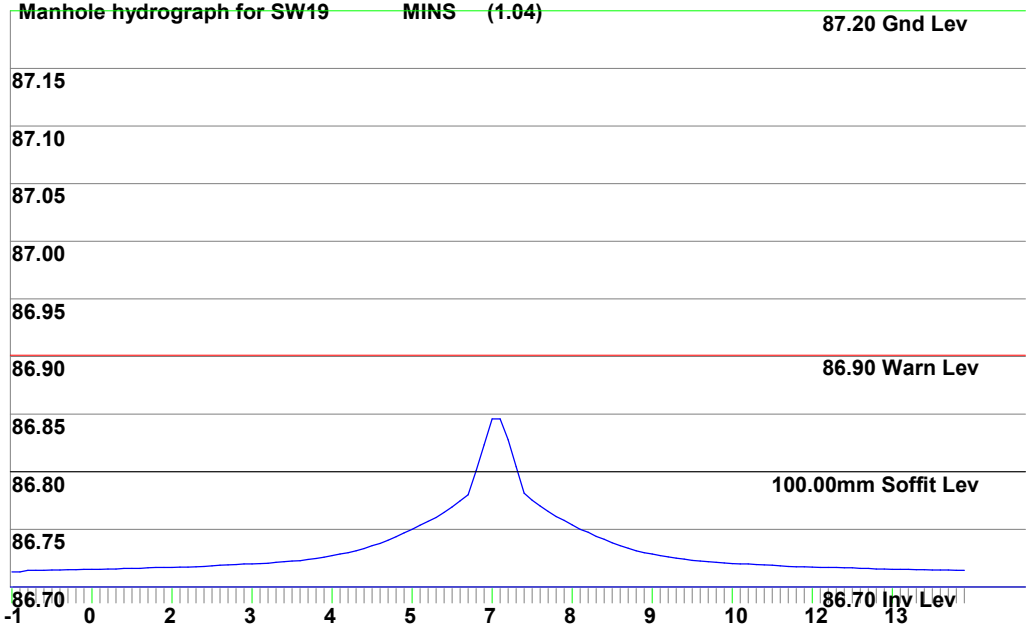

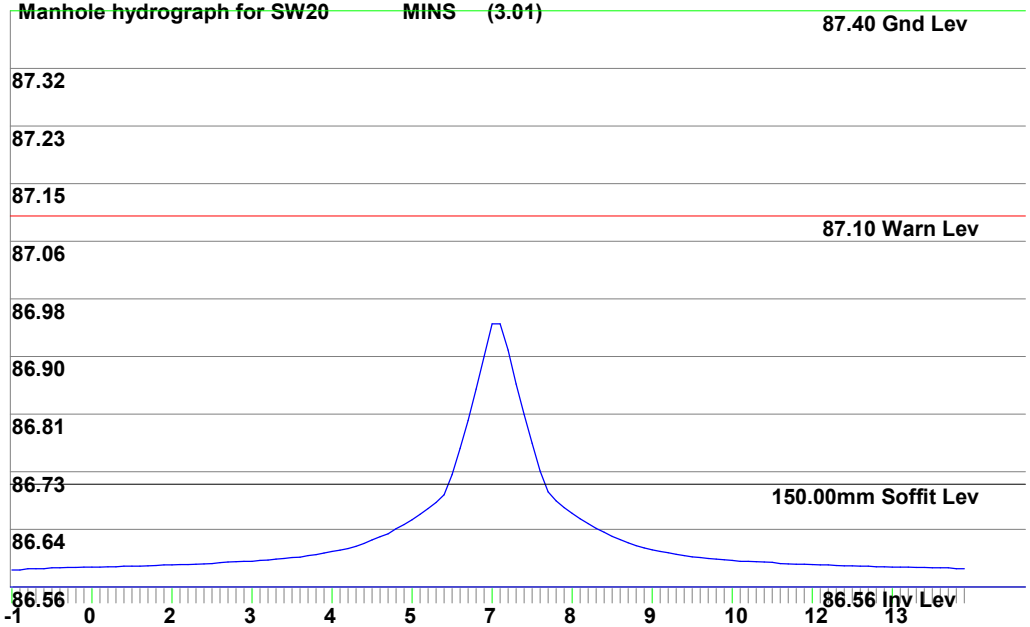

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MasterDrain SW

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Warninglid School - New Residences			

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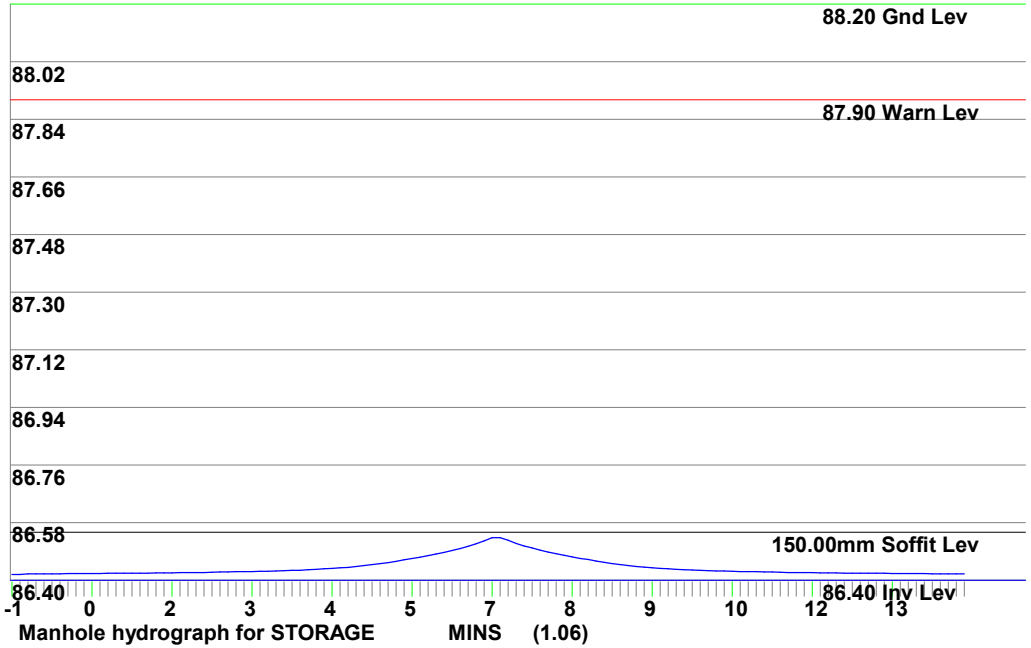

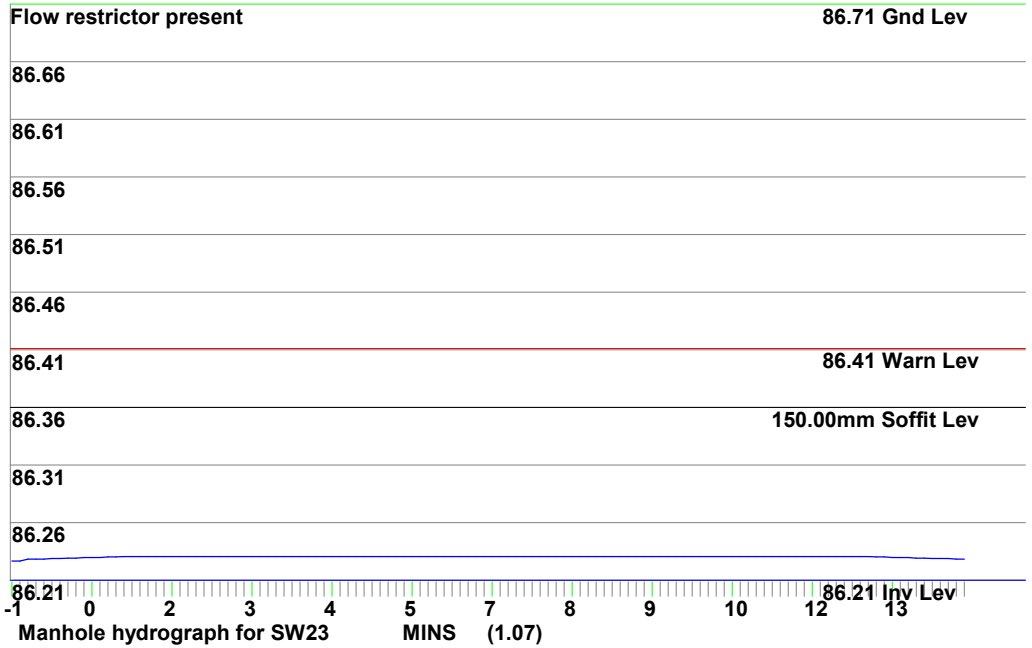

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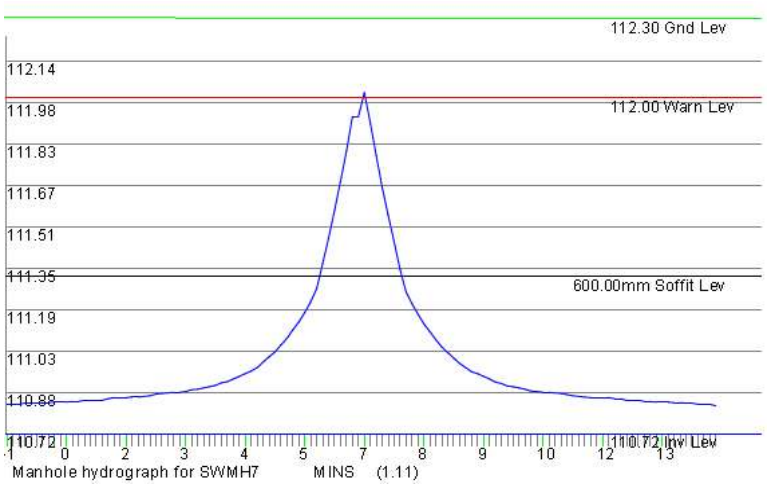


1) Ground / cover level

2) Warning level - in this case, set at 300mm below cover level.

3) Soffit level of outflow pipe.

4) Invert level of chamber.

Notes

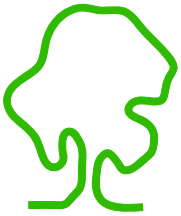
a) Lower section of the graph shows the water depth filling the channel. Channel is assumed to be a full pipe diameter in depth.

b) Upper section of the graph shows the water depth filling the chamber. Chamber has a greater width/diameter than the channel, so increases in depth are proportionally less.

c) The top of the graph clips the warning level and would be marked thus on the printout.

d) In many cases the invert of the offline storage is required to enter at the channel soffit level, meaning that the pipe will still surcharge but flooding risk reduced.

e) The diagram above is a general one and is not part of the current calculation.



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