

LTR/DKC0051/4/JDH

Ms Katherine Mellor
Architect
TACP Architects Limited
Pembroke House
Ellice Way
Wrexham
Wrexham Technology Park
LL13 7YT

11 July 2018

Dear Katherine,

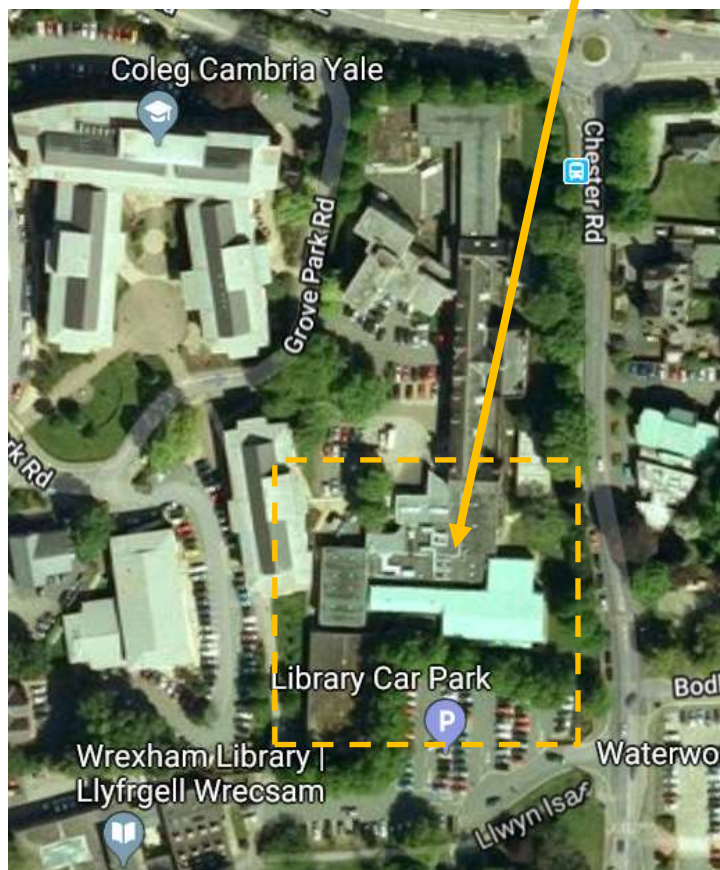
Re: Drainage strategy for the proposed redevelopment of Yale Campus, Wrexham.

We write regarding the proposed alterations at Yale Campus, Wrexham that will replace the existing mixed-use buildings bounding Chester Road with a new multi-use university complex, full details are shown in your drawings package.

1.0 Existing school and site area.

The proposed site area is currently occupied by the existing buildings, all of which are fully functional, serviced and utilised by the university. The new complex will occupy the same site area.

Existing and proposed site area/location.



Haltec (Chester) Limited

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Tel: 01244 853883 Fax: 01244 853892 Email: design@haltec-chester.co.uk

The existing drainage system in the area consists fully functioning surface water system for the external hardstanding areas and roofs to the buildings. The drainage survey of the existing system shows the surface water discharges into a mixture of soakaways and the public sewerage system. The site area is substantially impermeable with only limited soft landscaping consisting of a grassed area bounding Chester Road.

The foul down pipes all discharging into public sewerage system.

The drainage survey requires further works to provide a complete existing, drainage drawing of the area that would then be diverted and adapted to suit the new building footprint. Full designs and drawings are currently being prepared and will agreed with Welsh Water and Building Control.

2.0 Proposed replacement foul drainage.

We have completed an initial assessment of the existing and proposed foul water discharge rates and the difference is a nominal 2.54 litres per second, see the attached calculation sheets.

TACP have contacted Welsh Water who have confirmed the additional flows from the project can be accommodated in the existing sewerage system in their letter dated, 13.06.2018 and a copy of their letter is enclosed at the rear of this letter.

3.0 Proposed replacement surface water system.

The surface water runoff will not alter significantly from the existing, largely impermeable hardstanding area. The existing discharge rates would not be exceeded, and we would examine and confirm which areas are discharging into soakaways and areas which currently discharge into the public sewers.

We have performed a preliminary assessment of the surface flows and have enclosed the calculations in the following section.

The site investigation for the area has been instructed which includes soakaway permeability testing. When this is complete we will then prepare a design based upon the following principles:

- I. Not increasing the existing surface water flow rates from the site.
- II. Provide new soakaways, if feasible to deal with the expect increase in surface runoff from the new development due to a slight increase in the impermeable areas.
- III. Should soakaways not be feasible due to permeability of the soils we would provide attenuation tanks with a restricted discharge into the existing system.
- IV. All designs would be completed and then agreed with Welsh Water and Building Control.
- V. Full layout drawings showing the required diversions and new pipework runs would then be prepared.

We trust this clarifies the proposed design for the drainage to the site.

Yours sincerely

John Halliwell
For and on behalf of
Haltec (Chester) Limited.

TACP Architects Ltd
Pembroke House
Ellice Way
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Wrexham
LL13 7YT

Date: 13/06/2018
Our Ref: PPA0003163

Dear Sirs

Grid Ref: 333548 350645

Site Address: Coleg Cambria, Yale, Grove Park Road, Wrexham

Development: 2D Application - Redevelopment at Coleg Cambria

I refer to the Schedule 1C - Article 2D notice received and your formal request for a pre-application consultation response before applying for planning permission from Dwr Cymru Welsh Water as a 'Specialist Consultee' as defined by Paragraph (y) of Schedule 4 of the Town & Country Planning (Development Management Procedure) (Wales) (Amendment) Order 2016. It is acknowledged that the consultation request relates to a major development site and thus seeks a substantive response within 28 days from the date of the notice, 11th June 2018, as per the requirements of Article 2E. This request includes our views on the capacity of our network of assets and infrastructure to accommodate your proposed development.

Having reviewed the details submitted I would offer the following standing advice which should be taken into account within any future planning application for the development:

SEWERAGE

The foul flows only from the proposed development can be accommodated within the public sewerage system.

SURFACE WATER

With reference to the surface water flows from the proposed development, you are required to fully exhaust all technical options outlined under Sections 3.2 and 3.4 of Part H of the publication 'Building Regulations 2000; Disposal should be made through the hierarchical approach, preferring infiltration and, where infiltration is not possible, disposal to watercourses in liaison with the Land Drainage Authority and/or Natural Resources Wales.

Discharge of surface water to the public sewer is only to be made as a last resort. Please refer to further detailed advice relating to surface water management included in our attached Advice & Guidance note.

In addition, please note that no highway or land drainage run-off will be permitted to discharge directly or indirectly into the public sewerage system.

SEWAGE TREATMENT

No problems are envisaged with the Waste Water Treatment Works for the treatment of domestic discharges from this site.

I trust the above information is helpful and will assist you in forming water and drainage strategies that should accompany any future planning application. I also attach copies of our water and sewer extract plans for the area, and a copy of our Planning Guidance Note which provides further information on our approach to the planning process, making connections to our systems and ensuring any existing public assets or infrastructure located within new development sites are protected.

Please note that our response is based on the information provided in your enquiry and should the information change we reserve the right to make a new representation. Should you have any queries or wish to discuss any aspect of our response please do not hesitate to contact our dedicated team of planning officers, either on 0800 917 2652 or via email at developer.services@dwrcymru.com

Please quote our reference number in all communications and correspondence.

Yours faithfully,



Owain George
Planning Liaison Manager
Developer Services

Please Note that demands upon the water and sewerage systems change continually; consequently the information given above should be regarded as reliable for a maximum period of 12 months from the date of this letter.

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	Part of structure Foul and Surface Water Drainage					Sheet No./Rev. Cover	
	Calc. By DRB	Date July '18	Checked by JDH	Date July '18		Approved JDH	Date July '18
Ref.	Calculations					Output	

Structural Calculations

Yale Campus Redevelopment

Wrexham



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Project Number : DKC0051

Foul and Surface Water Drainage

Jul-18



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Project Yale Campus Redevelopment, Wrexham					Job Ref. DKC0051	
Part of structure Foul Water Drainage					Sheet No./Rev. 1	
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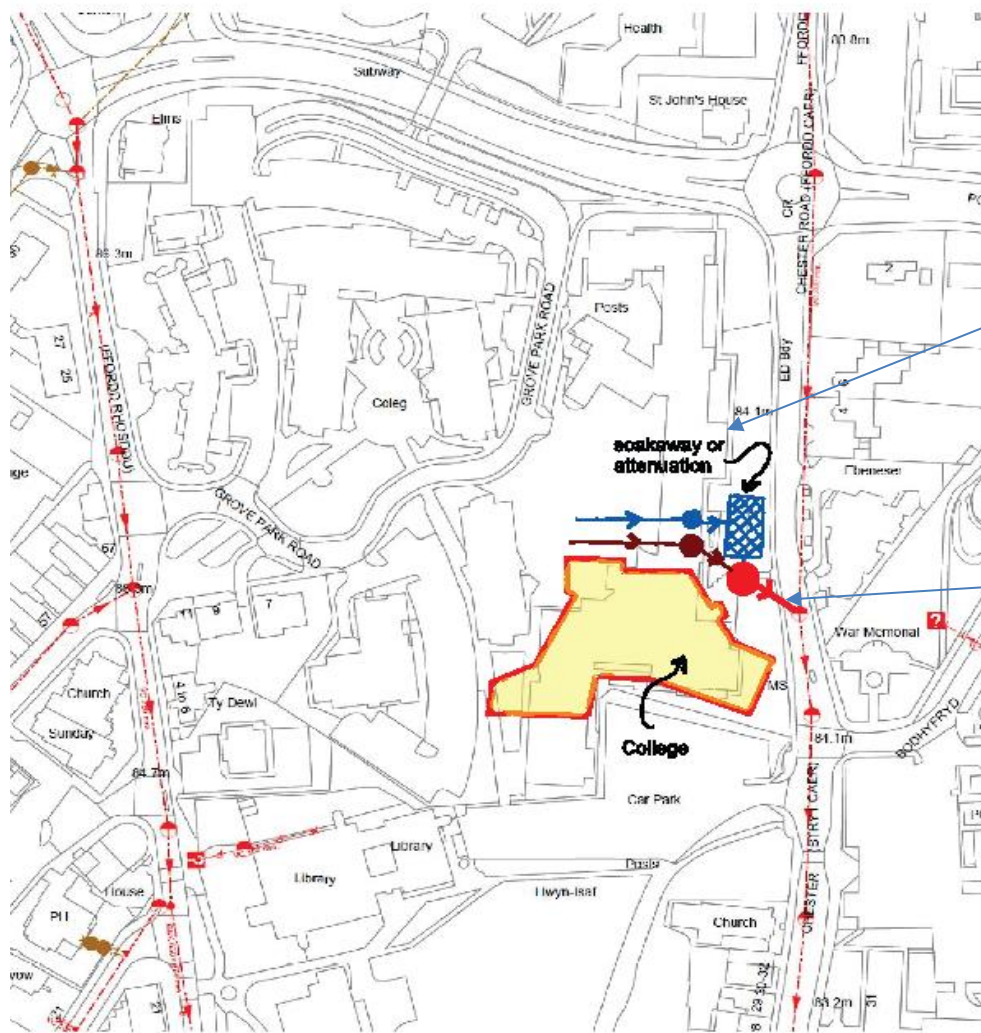
Drainage Summary

Foul

Nominal increase in foul flow, 2.54l/s, but an overall reduction is made as the system is combined

Surface (Soakaway) Existing site soakaways only serve 20% of the current hardstanding being redeveloped therefore the existing system is actually combined - evidence of this is shown on the site survey drawing (gullies/RWPs go in to Foul Runs)
New Soakaway size will vary dependant on whether the existing ground is suitable and what infiltration rates are provided - two sizes are shown, depths vary to suit good or average infiltration rate.
Soakaway designed for 1:100 year storm plus 30% climate change

Surface (Storage) Required if infiltration rates of the soils aren't suitable for surface water soakaways.
Storage designed for 1:100 year storm plus 30% climate change



Dependant on whether the soils are suitable for infiltration

Existing site outfall connection to be used



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Part of structure

Foul Water Drainage

Sheet No./Rev.

Cover

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Calculations

Output

Structural Calculations

Yale Campus Redevelopment

Wrexham



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Foul Water Drainage

Jul-18



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Foul Water Drainage

Sheet No./Rev.

1

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Date

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Calculations

Output

Foul Water Drainage

Existing

Data and Parameters

School : 1
Floors : 2
Students : 150
Staff : 20

Frequency (k) : 0.7

College

Appliance	Amount	DU	sum DU
Toilet	20	2.0	40.0
Washbasin	10	0.3	3.0
Sinks	5	0.8	4.0
Dishwasher	2	0.5	1.0
Washing Machine	2	1.0	2.0
Total			50.0

Flowrate = 4.95 l/s



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Project Yale Campus Redevelopment, Wrexham					Job Ref. DKC0051	
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Foul Water Drainage

Proposed

Data and Parameters

School : 1
Floors : 3
Students : 300
Staff : 36

Frequency (k) : 0.7

College

Appliance	Amount	DU	sum DU
Toilet	50	2.0	100.0
Washbasin	25	0.3	7.5
Sinks	5	0.8	4.0
Dishwasher	2	0.5	1.0
Washing Machine	2	1.0	2.0
Total			114.5

Flowrate = 7.49 l/s

Difference of Flow = **2.54 l/s**

Note : refer to the surface water calculations as although the foul water flow is increasing the overall flow of the site will be less, as the current site discharges as a combined system - approximate overall site flow decrease of 21.63l/s

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Structural Calculations

Yale Campus Redevelopment

Wrexham



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Project Number : DKC0051

Surface Water Drainage - Soakaways

Jul-18



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Part of structure

Surface Water Drainage

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Calculations

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Surface Water Drainage

Existing

Data and Parameters

College : 1
Floors : 2

College

Appliance			m2
Building			2625.0
		Total	2625.0

Infiltration Rate = 0.0001 m/s **to be confirmed (ground investigation results required)**

2 soakaways shown on drainage survey - each can support approximately 225m2 : **Total 450m2**

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Design rainfall intensity

Location of catchment area : Other
Impermeable area drained to the system : $A = 225.0 \text{ m}^2$
Return period : Period = 100 yr
Ratio 60 min to 2 day rainfall of 5 yr return period : $r = 0.300$
5-year return period rainfall of 60 minutes duration : $M5_{60\text{min}} = 20.0 \text{ mm}$
Increase of rainfall intensity due to global warming : $p_{\text{climate}} = 30 \%$

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m ³)	Outflow (m ³)	Storage required (m ³)
5	0.34	8.8	1.88	16.6	3.74	0.24	3.50
10	0.49	12.7	1.95	24.9	5.80	0.48	5.12
15	0.59	15.3	1.99	30.6	6.88	0.72	6.16
30	0.77	20.0	2.03	40.6	9.14	1.44	7.70
60	1.00	26.0	2.00	52.1	11.71	2.88	8.83
120	1.25	32.5	1.95	63.4	14.28	5.76	8.50
240	1.57	40.8	1.88	76.9	17.30	11.52	5.78
360	1.78	46.3	1.84	85.1	19.16	17.28	1.88
600	2.12	55.1	1.78	97.8	22.02	28.80	0.00
1440	2.84	73.8	1.65	121.7	27.38	69.12	0.00

Required storage volume : $S_{req} = 8.83 \text{ m}^3$

Soakaway storage volume : $S_{sw} = \pi \times (D_{ring}^2 / 4) \times d + (d \times w^2 - (\pi \times ((D_{ring} + 2 \times T_{ring})^2 / 4) \times d)) \times V_{fill} = 9.33 \text{ m}^3$

PASS - Soakaway storage volume

Time for emptying soakaway to half volume : $t_{50} = S_{req} \times 0.5 / (a_{250} \times f) = 1 \text{ hr } 31 \text{ min } 50 \text{ s}$

PASS - Soakaway discharge time less than or equal to 24 hours

2 soakaways shown on drainage survey - the drained area, 450m2, is less than the total existing building area, 2625m2

therefore the site drainage must be split foul, surface and combined.

The combined takes approximately 80% of the current surface water drainage - typically the existing building to be demolished.



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Surface Water Drainage

Sheet No./Rev.

2

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Calculations

Output

Surface Water Drainage

Proposed (Soakaway Design)

Data and Parameters

College : 1
Floors : 3

to be designed for a 1:100 year storm plus 30% Climate Change

College

Appliance		m2
Building		2760.0
	Total	2760.0

Infiltration Rate = 0.0001 m/s

to be confirmed (ground investigation results required)

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Design rainfall intensity

Location of catchment area

Other

Impermeable area drained to the system

A = 2760.0 m²

Return period

Period = 100 yr

Ratio 60 min to 2 day rainfall of 5 yr return period

r = 0.300

5-year return period rainfall of 60 minutes duration

M5_60min = 20.0 mm

Increase of rainfall intensity due to global warming

p_{climate} = 30 %

Good Infiltration Rate

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m ³)	Outflow (m ³)	Storage required (m ³)
5	0.34	8.8	1.88	16.6	45.92	0.88	45.07
10	0.49	12.7	1.95	24.9	68.70	1.71	66.99
15	0.59	15.3	1.99	30.6	84.37	2.57	81.80
30	0.77	20.0	2.03	40.6	112.16	5.13	107.03
60	1.00	26.0	2.00	52.1	143.66	10.26	133.40
120	1.25	32.5	1.95	63.4	174.92	20.52	154.39
240	1.57	40.8	1.88	76.9	212.19	41.04	171.15
360	1.78	46.3	1.84	85.1	235.00	61.56	173.44
600	2.12	55.1	1.78	97.8	270.06	102.60	167.46
1440	2.84	73.8	1.65	121.7	335.84	246.24	89.60

Required storage volume

$S_{req} = 173.44 \text{ m}^3$

Soakaway storage volume

$S_{sw} = l \times d \times w \times V_{max} = 179.55 \text{ m}^3$

PASS - Soakaway storage volume

Time for emptying soakaway to half volume

$t_{50} = S_{req} \times 0.5 / (q_{100} \times f) = 8 \text{ hr } 27 \text{ min } 8 \text{ s}$

PASS - Soakaway discharge time less than or equal to 24 hours

Average Infiltration Rate

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m ³)	Outflow (m ³)	Storage required (m ³)
5	0.34	8.8	1.88	16.6	45.92	0.40	45.53
10	0.49	12.7	1.95	24.9	68.70	0.79	67.91
15	0.59	15.3	1.99	30.6	84.37	1.19	83.18
30	0.77	20.0	2.03	40.6	112.16	2.37	109.79
60	1.00	26.0	2.00	52.1	143.66	4.75	138.92
120	1.25	32.5	1.95	63.4	174.92	9.49	165.42
240	1.57	40.8	1.88	76.9	212.19	18.98	193.21
360	1.78	46.3	1.84	85.1	235.00	28.47	206.53
600	2.12	55.1	1.78	97.8	270.06	47.45	222.61
1440	2.84	73.8	1.65	121.7	335.84	113.89	221.95

Required storage volume

$S_{req} = 222.61 \text{ m}^3$

Soakaway storage volume

$S_{sw} = l \times d \times w \times V_{max} = 332.17 \text{ m}^3$

PASS - Soakaway storage volume

Time for emptying soakaway to half volume

$t_{50} = S_{req} \times 0.5 / (q_{100} \times f) = 23 \text{ hr } 27 \text{ min } 22 \text{ s}$

PASS - Soakaway discharge time less than or equal to 24 hours

Soakaway Size Required

18m x 10.5m x 1.0m (below the incoming pipes invert level)

Good Infiltration Rate

18m x 10.5m x 1.85m (below the incoming pipes invert level)

Average Infiltration Rate

Refer to Surface Water - Storage Design (if Ground Investigation confirms soils not suitable for Soakaways)



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Project

Yale Campus Redevelopment, Wrexham

Job Ref.

DKC0051

Part of structure

Surface Water Drainage

Sheet No./Rev.

Cover

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Date

July '18

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Calculations

Output

Structural Calculations

Yale Campus Redevelopment

Wrexham



Haltec
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Project Number : DKC0051

Surface Water Drainage - Storage

Jul-18



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Surface Water Drainage

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Surface Water Drainage

Existing

Data and Parameters

College : 1

Floors : 2

College

Appliance			m2
Building			2625.0
20% to Soakaway			2100.0
		Total	2100.0

20% of Area to Soakaways

Flowrate = 29.17 l/s



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Surface Water Drainage Proposed (Green Field Runoff) Required if Ground Investigation confirms ground unsuitable for Soakaways

Data and Parameters

College : 1
Floors : 3

to be designed for a 1:100 year storm plus 30% Climate Change

College

Appliance			m2
Building			2760.0
		Total	2760.0

Flowrate = 5.00 l/s Reduced with Flow Restrictor (on site storage)

Difference of Flow = 24.17 l/s

Therefore adopting Site Attenuation with a restricted discharge rate of 5l/s would reduce the current surface water flow in to the combined sewer in Chester Road by approximately 24.17l/s

Tank Size Required

Estimated attenuation volume - 100 year

Attenuation storage vol	Uvol _{100yr} = 581.8 m ³ / hectare	Basic storage volume	BSV _{100yr} = 160.59 m ³
FEH rainfall factor	FF _{100yr} = 0.90	Storage volume ratio	SVR _{100yr} = 1.77
Adjusted storage volume	ASV _{100yr} = 283.91 m ³	Hydrological regional vol ratio	HR _{100yr} = 1.11
Final est. attenuation storage	Vol _{100yr} = 315.84 m ³		

Attenuation storage required

Max attenuation storage reqd V_{req_max} = **264.0** m³

18m x 14.5m x 1.0m (above incoming invert pipe)