



**PROPOSED HOTEL
PARC CYBI, HOLYHEAD.**

DRAINAGE STRATEGY REPORT

Report No. Q/17/6641-DS1/SGJ

CLIENT:-

Axis

Camellia House
76 Water Lane
Wilmslow
SK9 5BB

CONSULTING ENGINEER:-

Tier Consult Ltd
Richmond House
Sandpiper Court
Chester Business Park
Chester
CH4 9QZ

Tel: 01244 684900

Version	Date	By
V1	08/06/2017	S Jones

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1.0 INTRODUCTION

- 1.1 Tier Consult was appointed by Axis, to prepare a drainage strategy proposal for the proposed development at Parc Cybi, Ty Mawr Business Park, Holyhead.
- 1.2 The development occupies a plot with a larger commercial development which has been provided with drainage infrastructure specifically designed to serve the business park, with agreed connection points and flow rates.
- 1.3 This report aims to identify the established drainage strategy for the business park and ensure the proposed development plot drainage complies with the previously approved design principles.

2.0 SITE DESCRIPTION AND DEVELOPMENT PROPOSAL

- 2.1 The site is located approximately 1.2km southeast of Holyhead Town Centre in Ty Mawr Business Park on the north side of "Parc Cybi" near junction 2 of A55. The approximate National Grid Reference for the centre of the site is Easting: 225289, Northing: 381054 at postcode LL65 2YF. The site is accessed off "Parc Cybi".
- 2.2 Ty Mawr Business Park development has been designed and constructed with roads, drainage and services infrastructure to serve multiple development plots for commercial use. The development site under consideration occupies approximately half of plot 2 within the park.
- 2.3 The development plot is currently vacant greenfield land, with no history of previous development.
- 2.4 The plot is to be developed in 2 parts. Initially the Northern portion will be developed as 80 bed hotel with associated parking and an access road off "Parc Cybi". The Southern portion of the plot will be left vacant for future commercial development; however the hotel drainage scheme will make appropriate allowance to ensure the drainage for this future development is no compromised.
- 2.5 Descriptions used in this report for the site zones are as follows:-
 - Plot 2 – Is the whole plot area as set out in the original Business Park drainage strategy by Atkins
 - Plot 2a - The hotel site – the main subject of this report
 - Plot 2b – The available space area opposite the hotel
 - Plot 2a/b – Plot 2 a and b combined with the access road

3.0 EXISTING DRAINAGE

- 3.1 As discussed above the site is located within a larger commercial complex which has been provided with service infrastructure including foul and surface water drainage systems located in the distributor road to the site frontage.
- 3.2 The provided drainage systems include a foul water system which is in process of being adopted by Welsh Water as the statutory water authority and storm water system which connects to the local watercourse system which is owned and maintained by the Welsh Government as the landowner.
- 3.3 The main drainage systems have been designed, by ATKINs as Engineers acting for the business park owners, to accommodate the flows from the individual plots subject to certain restrictions on peak discharge rates.

The individual plot strategy is:-

- a) "Unrestricted" Roof water discharge, subject to the roof areas not exceeding those assumed in Atkins design
 - b) In the case of plot 2 roof area = 3100 m²
 - c) Hardstanding run-off not to exceed 5 l/s/ha
 - d) For Plot 2 this is based on 4.16 Ha = 20.8 l/s
 - e) SuDS to be provided to hardstandings e.g. swales / permeable paving where possible
 - f) Building drainage NOT to discharge into external drainage
- 3.4 In order to apply the above parameters to Plot 2a & 2b, the rates are to be applied in proportion to the developable areas.

4.0 PRELIMINARY STORM WATER STORAGE DESIGN

- 4.1 The design principles established in Atkins strategy are to be applied to the development plot(s) under consideration.
- 4.2 Plot 2 discharge rate of 20.8 litre/sec based on gross plot area = 4.47 Ha less assumed building size 3100 m² = 4.16 x 5.0 l/s/ha = 20.8 l/s
- 4.3 Pro-rata building size permitted for free discharge is related to buildable areas.
- Plot 2 ratio = 3100m² / 2.82 Ha = 1100m² / Ha
- Plot 2a/b gross area = 1.72 Ha

thrfr permitted free discharge roof area = $1.72 \times 1100 = 1892\text{m}^2$

(Plot 2a demise = 4614 m^2 thrfr proportional free discharge area = 851 m^2)
(Plot 2b demise = 5672 m^2 thrfr proportional free discharge area = 1041 m^2)

4.4 Thrfr discharge rate for Plots 2a/b area of 1.72 – 0.189 = 1.53Ha
 $1.53 \times 5.0\text{ l/s/Ha} = \mathbf{7.65\text{ litre/sec}}$

4.4 Impermeable catchment areas for Plot 2a/b external pavements are summarized as

Zones	Area m^2	% of Total
Plot 2a Hotel	3060	37%
Plot 2b Available Space	3740	46%
Access Road	1400	17%
Totals	8200	100%

4.5 Microdrainage calculations appended to this report demonstrate the storage volume required for 100 year storm + 30% allowance for climate change is 410 m^3 when the discharge rate is restricted to 7.65 l/sec.

4.6 The required attenuation volumes are to be distributed between the development zones in proportion to the contributing areas as summarized in the table below.

Zones	Volume m^3	% of Total
Plot 2a Hotel	152	37%
Plot 2b Available Space	188	46%
Access Road	70	17%
Totals	410	100%

The schematic drainage layout appended to this report illustrates the arrangement of the drainage systems.

5.0 SUDS & MAINTENANCE

- 5.1 The site wide concept relies on 2 Suds treatment stages being applied to external paved areas. The final discharge from the main site passes through a lagoon before final discharge to watercourse. The lagoon provides 1 level of treatment therefore each individual site is required to provide a further level of treatment prior to discharge to the site wide drainage system.
- 5.2 Ground infiltration based systems are precluded due to impermeable ground conditions.
- 5.3 A swale drain is proposed to serve the access road. This facility filters pollutants from the run-off prior to discharge.
- 5.4 Catchpits and filters are proposed for the hotel parking areas to extract suspended particles from the run-off prior to discharge into the storage tank.
- 5.5 All drainage component located within the development site are to be owned and managed by the site occupier. Maintenance schedules and requirements are to specified in the development management manual on completion of the works.


6.0 SUMMARY

- 8.2 Development proposal for 80 bed hotel with parking and access road, is to drain to existing provided infrastructure.
- 8.1 Discharge rates are to be restricted in accordance with existing agreed drainage strategy for the wider development. And attenuation storage provided accordingly.
- 8.3 Storm water discharge rates for external paved areas are effectively reduced to existing predevelopment greenfield rates for all storm events up to 100 year + 30% climate change allowance.
- 8.4 Water quality is maintained by provision of swales and catchpit filters.

APPENDIX

**MICRODRAINAGE PRELIMINARY TANK STORAGE
CALCULATION**


PROPOSED DRAINAGE SCHEMATIC DRAWING

Tier Consult		Page 1
Richmond House Chester Bus. Park CH4 9QZ	Parc Cybi Plot 2	
Date 8-6-2017 File 170529 PRELIM STORAGE.SRCX	Designed by SGJ Checked by	
Micro Drainage	Source Control 2016.1	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
15 min Summer	9.786	0.286	7.7	143.2	O K
30 min Summer	9.890	0.390	7.7	195.1	O K
60 min Summer	10.002	0.502	7.7	251.0	O K
120 min Summer	10.111	0.611	7.7	305.7	O K
180 min Summer	10.164	0.664	7.7	331.9	O K
240 min Summer	10.189	0.689	7.7	344.7	O K
360 min Summer	10.202	0.702	7.7	350.8	O K
480 min Summer	10.202	0.702	7.7	350.8	O K
600 min Summer	10.197	0.697	7.7	348.3	O K
720 min Summer	10.188	0.688	7.7	344.2	O K
960 min Summer	10.168	0.668	7.7	333.8	O K
1440 min Summer	10.117	0.617	7.7	308.3	O K
2160 min Summer	10.036	0.536	7.7	267.8	O K
2880 min Summer	9.957	0.457	7.7	228.3	O K
4320 min Summer	9.818	0.318	7.7	159.1	O K
5760 min Summer	9.714	0.214	7.7	106.9	O K
7200 min Summer	9.645	0.145	7.7	72.3	O K
8640 min Summer	9.606	0.106	7.7	53.0	O K
10080 min Summer	9.593	0.093	7.1	46.6	O K
15 min Winter	9.822	0.322	7.7	161.0	O K
30 min Winter	9.939	0.439	7.7	219.7	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	96.918	0.0	148.8	18
30 min Summer	67.029	0.0	205.9	33
60 min Summer	44.405	0.0	272.8	62
120 min Summer	28.487	0.0	350.1	122
180 min Summer	21.655	0.0	399.3	182
240 min Summer	17.694	0.0	435.0	240
360 min Summer	13.184	0.0	486.3	348
480 min Summer	10.704	0.0	526.4	404
600 min Summer	9.097	0.0	559.2	466
720 min Summer	7.960	0.0	587.2	530
960 min Summer	6.440	0.0	633.4	664
1440 min Summer	4.766	0.0	703.2	938
2160 min Summer	3.518	0.0	778.5	1344
2880 min Summer	2.831	0.0	835.4	1732
4320 min Summer	2.079	0.0	920.5	2464
5760 min Summer	1.668	0.0	984.5	3168
7200 min Summer	1.408	0.0	1038.8	3816
8640 min Summer	1.226	0.0	1085.4	4416
10080 min Summer	1.090	0.0	1126.5	5144
15 min Winter	96.918	0.0	166.6	18
30 min Winter	67.029	0.0	230.6	33

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Richmond House Chester Bus. Park CH4 9QZ	Parc Cybi Plot 2	
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Micro Drainage	Source Control 2016.1	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	10.067	0.567	7.7	283.6	O K
120 min Winter	10.195	0.695	7.7	347.5	O K
180 min Winter	10.259	0.759	7.7	379.7	O K
240 min Winter	10.294	0.794	7.7	396.8	O K
360 min Winter	10.319	0.819	7.7	409.3	O K
480 min Winter	10.321	0.821	7.7	410.3	O K
600 min Winter	10.309	0.809	7.7	404.7	O K
720 min Winter	10.298	0.798	7.7	399.1	O K
960 min Winter	10.268	0.768	7.7	383.9	O K
1440 min Winter	10.188	0.688	7.7	344.1	O K
2160 min Winter	10.059	0.559	7.7	279.3	O K
2880 min Winter	9.935	0.435	7.7	217.4	O K
4320 min Winter	9.730	0.230	7.7	115.2	O K
5760 min Winter	9.610	0.110	7.7	54.8	O K
7200 min Winter	9.588	0.088	6.8	44.1	O K
8640 min Winter	9.577	0.077	5.9	38.5	O K
10080 min Winter	9.569	0.069	5.3	34.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	44.405	0.0	305.6	62
120 min Winter	28.487	0.0	392.2	120
180 min Winter	21.655	0.0	447.2	178
240 min Winter	17.694	0.0	487.2	236
360 min Winter	13.184	0.0	544.6	348
480 min Winter	10.704	0.0	589.6	454
600 min Winter	9.097	0.0	626.3	544
720 min Winter	7.960	0.0	657.7	570
960 min Winter	6.440	0.0	709.5	722
1440 min Winter	4.766	0.0	787.6	1024
2160 min Winter	3.518	0.0	872.0	1452
2880 min Winter	2.831	0.0	935.7	1848
4320 min Winter	2.079	0.0	1031.0	2552
5760 min Winter	1.668	0.0	1102.7	3064
7200 min Winter	1.408	0.0	1163.5	3680
8640 min Winter	1.226	0.0	1215.6	4408
10080 min Winter	1.090	0.0	1261.7	5144

Tier Consult		Page 3
Richmond House Chester Bus. Park CH4 9QZ	Parc Cybi Plot 2	
Date 8-6-2017 File 170529 PRELIM STORAGE.SRCX	Designed by SGJ Checked by	
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	17.000	Shortest Storm (mins)	15
Ratio R	0.300	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram


Total Area (ha) 0.820

Time (mins) Area		
From:	To:	(ha)
0	4	0.820

Time Area Diagram

Total Area (ha) 0.000

Time (mins) Area		
From:	To:	(ha)
0	4	0.000

Tier Consult		Page 4
Richmond House Chester Bus. Park CH4 9QZ	Parc Cybi Plot 2	
Date 8-6-2017 File 170529 PRELIM STORAGE.SRCX	Designed by SGJ Checked by	
Micro Drainage	Source Control 2016.1	

Model Details

Storage is Online Cover Level (m) 12.000

Tank or Pond Structure

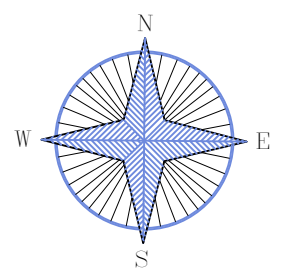
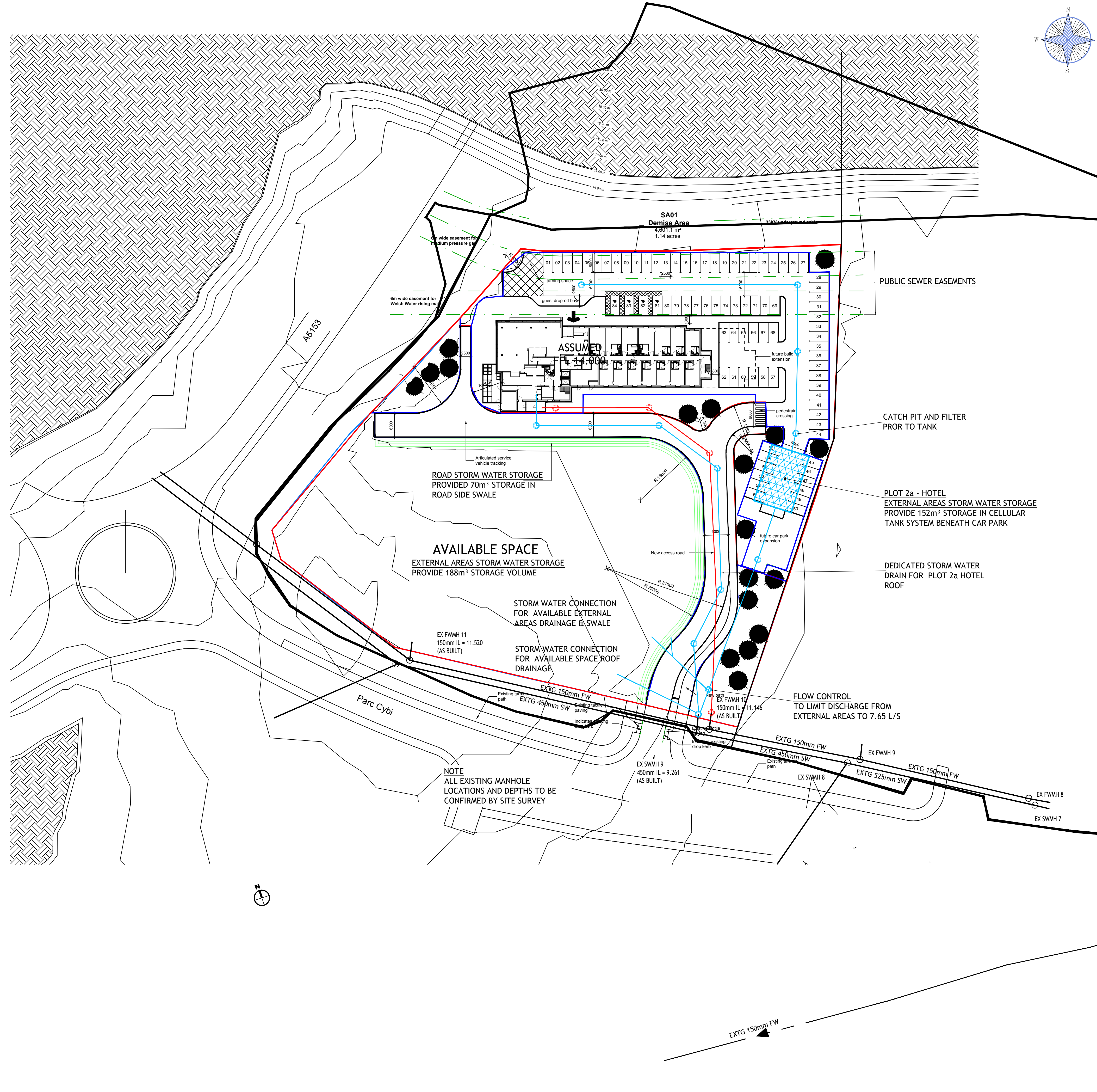
Invert Level (m) 9.500

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	500.0	1.000	500.0	1.001	0.0

Depth/Flow Relationship Outflow Control

Invert Level (m) 9.500

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.6500	0.900	7.6500	1.700	7.6500	2.500	7.6500
0.200	7.6500	1.000	7.6500	1.800	7.6500	2.600	7.6500
0.300	7.6500	1.100	7.6500	1.900	7.6500	2.700	7.6500
0.400	7.6500	1.200	7.6500	2.000	7.6500	2.800	7.6500
0.500	7.6500	1.300	7.6500	2.100	7.6500	2.900	7.6500
0.600	7.6500	1.400	7.6500	2.200	7.6500	3.000	7.6500
0.700	7.6500	1.500	7.6500	2.300	7.6500		
0.800	7.6500	1.600	7.6500	2.400	7.6500		



DRAINAGE STRATEGY AND DESIGN NOTES

BUILDING ROOF DRAINAGE
TO HAVE UNRESTRICTED DISCHARGE TO PRIVATE SURFACE WATER SEWER IN 'PARC CYBI' VIA EXISTING CONNECTION

EXTERNAL PAVED AREAS SURFACE WATER DISCHARGE & CONNECTION
TO BE RESTRICTED TO 7.65 LITRE/SEC BY VORTEX CONTROL UNIT PRIOR TO CONNECTION TO PRIVATE SURFACE WATER SEWER IN 'PARC CYBI' VIA EXISTING CONNECTION

STORAGE TO BE PROVIDED TO EXTERNAL AREAS FOR 100 YEAR + 30% CLIMATE CHANGE DESIGN STORAGE VOLUME TO BE ACCOMMODATED WITHIN STORAGE TANKS AS SHOWN. FINAL TANK SIZES TO BE CONFIRMED AT DETAILED DESIGN STAGE.

POLLUTION CONTROL
SURFACE WATER RUN-OFF FROM DELIVERY AND PARKING AREAS IS TO BE TREATED ON SITE BY SUDS SWALE SYSTEM, TRAPPED GULLIES AND CATCHPIT FILTERS. FINAL TREATMENT IS PROVIDED BY OFFSITE ATTENUATION LAGOON SERVING WIDER DEVELOPMENT.

FOUL WATER DRAINAGE
IS TO CONNECT TO EXISTING PUBLIC FOUL SEWER IN THE DISTRIBUTOR ROAD SUBJECT TO SECTION 104 / 106 AGREEMENTS WITH WELSH WATER.

MAINTENANCE & MANAGEMENT
ALL DRAINAGE SYSTEMS ARE TO REMAIN PRIVATE THROUGHOUT THE DEVELOPMENT. MANAGEMENT & MAINTENANCE OF THE DRAINAGE COMPONENTS (PIPE RUNS, STORAGE TANKS, CONTROLS ETC) WILL BE UNDERTAKEN BY THE OCCUPIERS.

DO NOT SCALE

NOTES

THE LOCATION LINE & LEVEL OF ALL KNOWN EXISTING DRAINAGE PIPEWORK INDICATED ON THE DRAWINGS ARE APPROXIMATE AND FOR GUIDANCE PURPOSES ONLY.

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS TOGETHER WITH THE APPROPRIATE SPECIFICATION.

IT IS THE CONTRACTOR'S RESPONSIBILITY TO CHECK ALL DIMENSIONS ON SITE. DIMENSIONS MUST NOT BE SCALED FROM THIS DRAWING. ANY DISCREPANCIES TO BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ARCHITECT IN WRITING.

ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS NOTED OTHERWISE.

ALL LEVELS ARE IN METRES, UNLESS NOTED OTHERWISE.

LEGEND

- DEVELOPMENT BOUNDARY
- ⊕ EXISTING FOUL DRAIN
- ⊕ EXISTING STORM DRAIN
- ⊕ PROPOSED FOUL WATER DRAINAGE
- ⊕ PROPOSED SURFACE WATER DRAINAGE
- ⊕ VORTEX CONTROL CHAMBER 'HYDROBRANE'
- ⊕ PETROL OIL SEPARATOR UNIT
- ⊕ CELLULAR STORAGE TANK

REV	DATE	BY	DESCRIPTION	CHK	APP
P1	08.06.17	SGJ	ISSUED FOR INFORMATION	MCH	MCH

INFORMATION

CLIENT: **AXIS**

ARCHITECT: **C4 CONSULTING**

PROJECT: **PREMIER INN, PARC CYBI HOLYHEAD**

TITLE: **PROPOSED DRAINAGE STRATEGY**

SCALE @ SIZE:	CHECKED:	APPROVED:
1:500 @ A1	MCH	MCH
CAD FILE:	DESIGN/DRAWN:	DATE:
	SGJ	JUN 17
PROJECT No:	DRAWING No:	REV:
Q/17/6641	CL(00)01	P1

Tier Consult Ltd.
Sandpiper Court
Chester Business Park, Chester
CH4 9QZ
Telephone: 01244 684900
Fax: 01244 684901
Mobile: 07366 687066
Email: info@tieruk.com