West Cumberland Hospital
Phase 2 Development

Drainage Strategy Addendum

Curtins Ref: WCHPH2-CUR-VV-XX-RP-C-92003

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P01	Issued in response to planning consultee comments.	AMB	PT	01/10/2021

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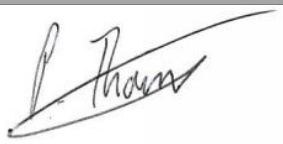
Peter Thomas **Meng (Hons) CEng MICE** Senior Engineer		01/10/2021

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1.0 Introduction

In June 2021, Curtins undertook a Flood Risk Assessment and Outline Drainage Strategy (or FRA&DS, document ref: WCHPH2-CUR-VV-RP-92002) of the site at West Cumberland Hospital, CA28 8JG, for North Cumbria Integrated Care NHS Foundation Trust. The site is centred on NGR 298950, 516040. This was submitted in support of a full planning application reference: 4/21/2294/0F1. In July 2021 Planning Consultee comments were provided, which this report aims to address.

Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Curtins shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Curtins.

2.0 Responses to Planning Consultee Comments

2.1 Drainage Hierarchy

Further evidence was requested that the drainage hierarchy is being followed. That is to discharge surface water by infiltration, watercourse, or surface water sewer in that order of priority. Since the FRA&DS the developer has undetaken BRE 365 infiltration tests at 3 locations shown on drawing WCHPH2-CUR-VV-XX-DR-C-04004 (Appendix A). Test locations SA02 and SA03 failed due to poor infiltration. However, the test at SA01 was successful. This success was unexpected due to the impermeable nature of the materials found in the ground investigation. It leads us to believe that the water was escaping into a localised fissure, drain or other conduit. It is likely that discharging large quantities of surface water to a point like this could lead to reemergance nearby. It would not be reasonable to discharge the site drainage to a single location like this. We do not expect to find other locations on site with reliable infiltration rates.

Existing watercourses are discussed further in section 2.3. Therefore, we propose that the current proposal for surface water discharge to surface water sewer is suitable.

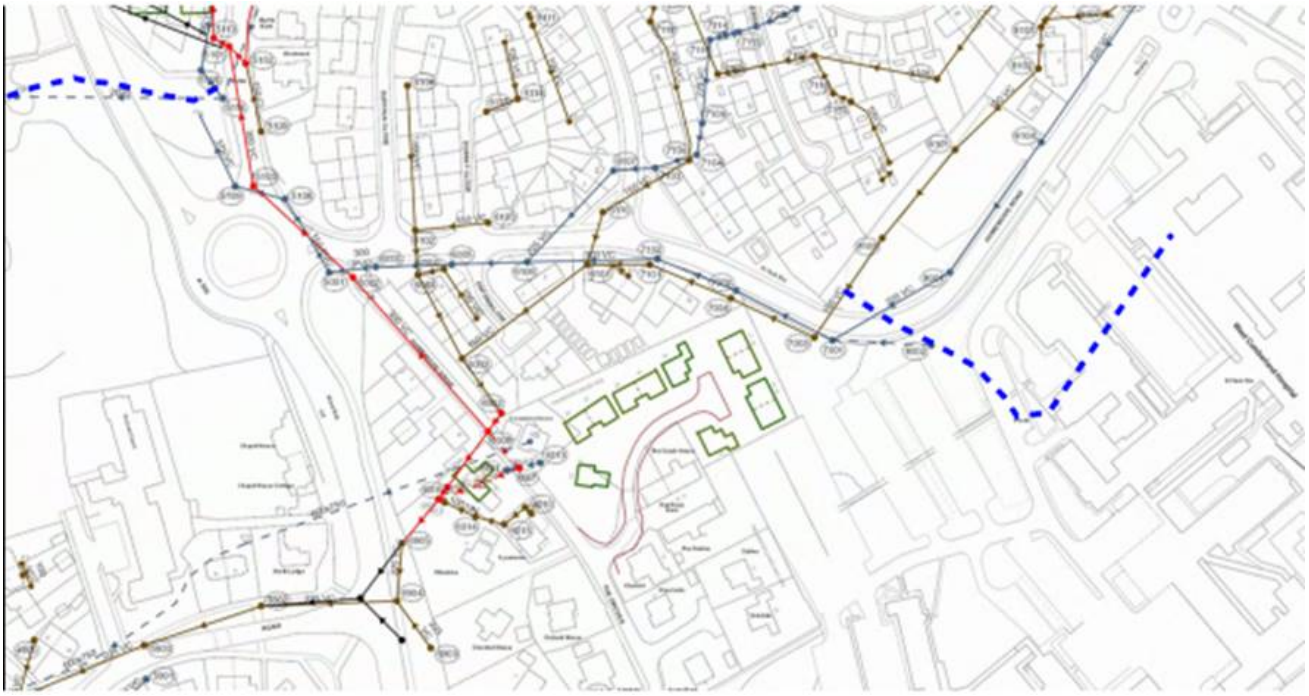
2.2 Discharge Rate

The development is on a Brownfield site. In the Outline Planning Application, it was proposed that the site discharge rate should provide a betterment over the brownfield discharge rate. Since then, the national standards for sustainable drainage design have changed runoff rates and the design has changed to suit. This means the site is now proposed to have surface water restricted to greenfield Q100 runoff, thus providing futher betterment from the pre-development brownfield rate.

2.3 Existing Watercourses

The watercourses identified on the 1949-1970 OS 1:10,560 map are highlighted below. By reference to the 1944-1970 OS 1:1,250/1:2,500 map, the watercourse within the hospital site is no longer evident on the map.

Overlaying the watercourse alignment from the 1949-1970 OS 1:10,560 map on to the United Utilities sewer records, it can be reasonably concluded that the historic watercourse within the hospital site has been connected to the public surface water sewer. Note the upper section between MH 7001 and 8002 is identified as a culvert by United Utilities.



Following the surface water sewer route to the west, it is clearly seen that it outfalls to the culverted section of unnamed watercourse to the northwest.

In respect to the culvert with its uppermost known section being on Homewood Drive, United Utilities sewer records indicate the head of the culvert to be under Ennerdale House and the culvert to be 600mm by 750mm. UU records currently show several new properties to the east of the upstream extent of the culvert. Given the culvert dimensions and the layout and density of the development (major development of 10 or more dwellings), it would seem likely that both the LLFA and Copeland Borough Council would have made comment on surface water drainage and the presence of any culvert passing through the site.

In conclusion the proposed ultimate receiving water body for site runoff is a watercourse.

2.4 Surcharging of Proposed Drainage

With reference to the revised site wide surface water drainage calculations (ref: WHCP2-CUR-VV-XX-CA-C-92000). Manholes S8, S10 and S11 show surcharging in the 1in1 year rainfall event. This is around the final flow controls on the network. The only way to prevent this surcharge would be to increase the allowable discharge rate for the site. When restricting flows to Greenfield Runoff rates it is typical to have minor surcharging at flow controls for the 1in1 year rainfall events.

2.5 Exceedance Design

Drainage calculations (ref: WCHPH2-CUR-VV-XX-CA-C-92000) show no flooding for up to the 1in100 year event with climate change. Hence the 1in200 year +CC rainfall event was also simulated. This shows flooding in the following locations, with commentary on the impact of each:

- Sneckyeat Road Car Park – Though this design is at outline design only and will be resolved under a separate planning application.
- Manhole SAR5 – Water will flow around the site loop road to west side of the site and enter gullies in the existing network.
- Manhole S8 and S9 – Flooding from these manholes will flow across the main car park southward and exit the site into the overflow car parks to the south-west of the site. However, there is additional attenuation in the permeable sub-base which is not included in the calculations which would be filled before offsite flooding occurs.

2.6 Attenuation, over vs underground

Curtins recognise the benefits of above ground SuDS. However, the hospital site has limited availability space which in prioritised for the provision of paient care facilities and associated infrastructure. Unfortunately, there is insuficient space for above ground drainage features, instead permeable paving and below ground attenuation are to be used below parking ares.

2.7 SuDS Maintenance

A Drainage Maintenance Strategy (ref: WCHPH2-CUR-VV-XX-RP-92002) was issued on 18/06/2021, which details the proposed maintenance regime for the various drainage and SuDS features.

3.0 Revised Drainage System

Since the full planning submission further investigations of existing drainage have shown that the best place to discharge surface water for all the development phases is through the Phase 2 outfall as shown on drawing WCHPH2-CUR-VV-XX-DR-C-92001, via a cascading system. A breakdown of the discharge rates is shown below.

Development Zone	**Impermeable area (ha)**	**Q100 based on 18.66 l/s/ha (l/s)**	**Downstream network and (Pass forward flow)**
Future Sneckyeat Road Car Park	1.131	21.1	North access road and waste combound (21.1 l/s)
North access road and waste combound	0.265	4.5	Phase 2B works (21.1 + 4.5 = 25.6 l/s)
Phase 2B works	0.660	12.3	(21.1 + 4.5 + 12.3 = 37.9 l/s)
Phase 2A works	0.426	8.0	
Total		45.9	

4.0 Appendices

Appendix A WCHPH2-CUR-VV-XX-DR-C-04004 - Site Investigation Test Requirements & Locations

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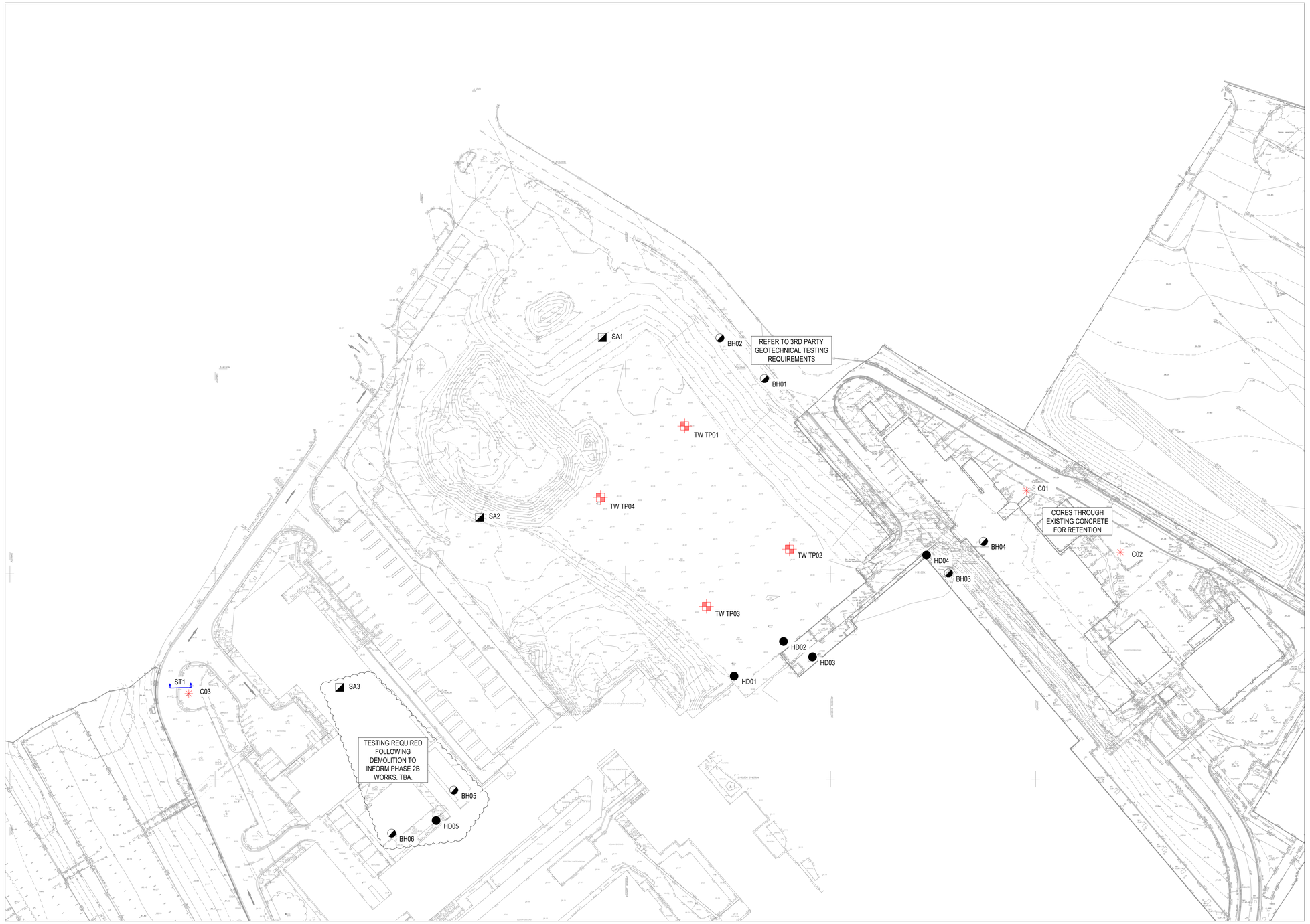

1:500 0 10m 20m 30m 40m 50m

1:1 0 10 20 30 40 50 60 70 80 90 100

SCALEBAR
(INDICATIVE ONLY)

GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
4. FOR GENERAL NOTES REFER TO DRAWING.

LEGEND

- SLIT TRENCH FROM BACK OF KERB
- BRE 365 SOAKAWAY TEST
- CORE EXISTING SLAB TO DETERMINE DEPTH. DCP/CBR TEST ON SUBGRADE MATERIAL WITHIN ROAD AND ADJACENT AREA
- HAND DIG TO EXISTING FOUNDATIONS
- BOREHOLE LOCATION
- TRIAL PIT LOCATION AS PER GCL TEMPORARY WORKS REQUIREMENTS

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P01	FIRST ISSUE	16/07/21	DM	PT

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Status: ISSUED FOR INFORMATION **S2**

Client: GRAHAM

Project: PROCURE 22 — WEST CUMBERLAND HOSPITAL PHASE 2 DEVELOPMENT

Drg Title:

SITE INVESTIGATION TEST REQUIREMENTS & LOCATIONS

Project No:	Size:	Date:	Drawn By:	Designed By:	Checked By:
072419	A1	JUL 21	DM	PT	PT
	Scale: 1:500				

Project Code:	Originator:	Zone:	Level:	Type:	Discipline:	Category / Number:	Rev:
WCHPH2-CUR -	VV -	XX -	DR -	C -		04004	- P01

WCHPH2-CUR-VV-XX-DR-C-04004-P01_Site Investigation Test Requirements & Locations.dwg

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