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COCH – SAME DAY EMERGENCY CARE BELOW GROUND DRAINAGE STRATEGY

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COCH – SAME DAY EMERGENCY CARE
BELOW GROUND DRAINAGE STRATEGY

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1. INTRODUCTION

Ramboll UK Ltd has been appointed to undertake a Drainage Strategy to support a planning application for the development of a new same-day emergency care (SDEC) unit within the existing Countess of Chester Health Park, Liverpool Road, Chester, CH2 1UL.

The proposed development will hereafter be referred to as the "Application Site".

The new emergency care unit will be constructed adjacent to the existing Accident and Emergency Department at and centred at the approximate National Grid Reference - *SJ 40100 68250*.

An indicative location plan can be found below.

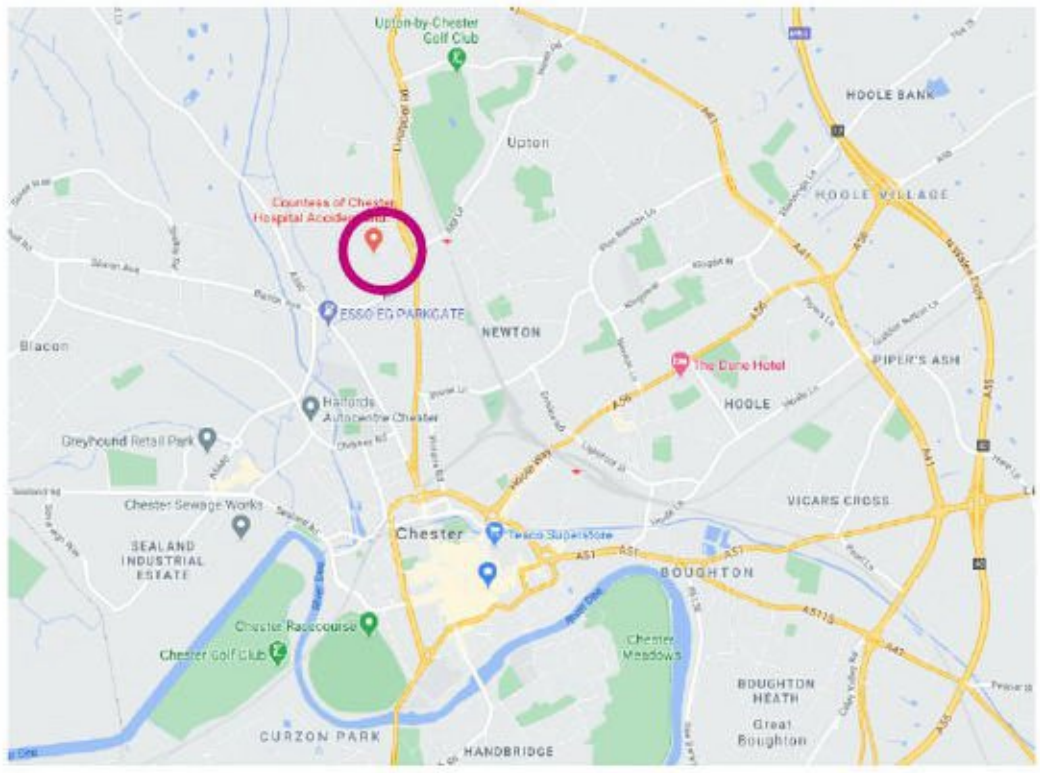


Figure 1.1: Site Location [Google Earth Extract ©2020 Google]

National Grid Reference
SJ 40100 68250

X Co-ordinates
340100

Y Co-ordinates
368250

WhatThreeWords:
///torch.faded.tried

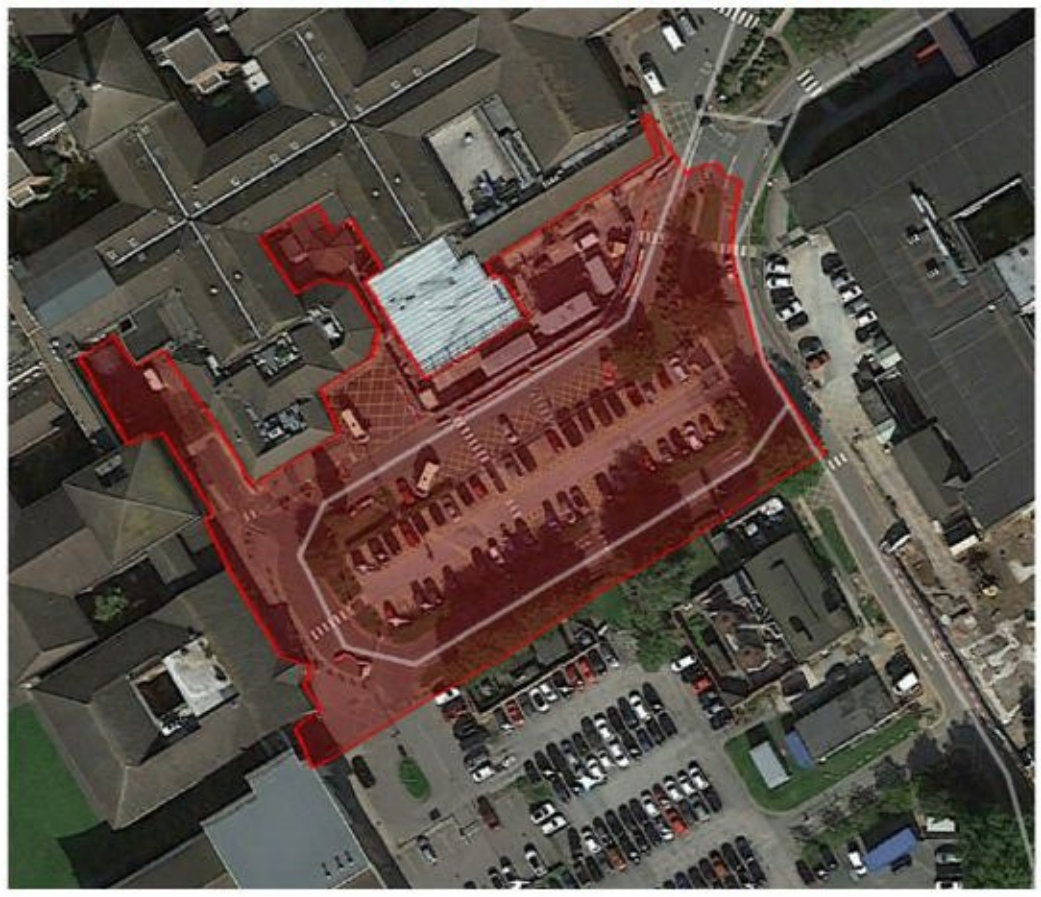


Figure 1.2: Indicative Works Area [Google Earth Extract ©2020 Google]

2. SCOPE AND OBJECTIVES

This Drainage Strategy report should be read in conjunction with all other planning documents.

The specific objectives of this assessment are to establish the following:

- Existing drainage systems on the Application Site
- Proposals for collection and discharge of surface water from the Application Site
- Proposals for collection and discharge of foul water from the Application Site

3. LIMITATIONS

This report has been prepared for the planning application and shall not be relied upon by any third party unless that party has been granted a contractual right to rely on this report for the purpose for which it was prepared.

The findings and opinions in the report are based upon information derived from a variety of information sources. Ramboll believes these information sources to be reliable and where possible has tried to verify the information.

This report has been prepared on the basis of the proposed end use defined by the Client at the time of writing. If this proposed end use or duration is altered, then it will be necessary to review the findings of this report.

It should be noted that some of the aspects considered in this study are subject to change with time. Therefore, if the development is delayed or postponed for a significant period then it should be reviewed to confirm that no changes have taken place, either at the Application Site or within relevant legislation.

4. LEGISLATION

The following legislation has been reviewed and considered in preparation of the proposed drainage strategy.

4.1 Planning Policy

Government has strengthened planning policy on the provision of sustainable drainage systems (SuDS) for 'major' planning applications and this is covered in Section 14 of National Planning Policy Framework February 2019. As per the guidance issued by the Department of Communities and Local Government (DCLG), all 'major' planning applications being determined from 6 April 2015 and the NPPF 2019, must consider sustainable drainage systems.

Assessment of the suitability of sustainable drainage systems must be undertaken in accordance with Section 14 Meeting the challenge of climate change, flooding and coastal change.

The Department for Environment, Food and Rural Affairs (DEFRA) has produced a non-statutory technical standard for sustainable drainage systems which states that:

For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

4.2 Strategic Flood Risk Assessment (SFRA)

According to Table 6-12 of the SFRA Level 1 assessment, the estimated increase in peak rainfall intensity for buildings with a design life exceed 40 years (i.e. beyond 2060) shall be between +20% and +40%.

This is similar to the EA guidance where buildings with an expectancy over 50 years (i.e. beyond 2070) shall have an increased rate between +20 to 40%.

For the purpose of this development, a figure of +40% shall be adopted.

The SFRA also discusses Areas of Critical Drainage (ACDs), however none are present in or around the vicinity of the Application Site.

4.3 Local Development Plan

In line with Policy ENV1 of the Cheshire West and Chester Council Local Plan (Part One); major developments must incorporate Sustainable Drainage Systems (SuDS).

In line with Policy DM41 of the Cheshire West and Chester Council Local Plan (Part Two); Brownfield sites should be reduced to greenfield rates where possible or provide at least a 30% reduction of the actual existing rates where this is not achievable.

5. CONSULTATIONS

5.1 Lead Local Flood Authority (LLFA) – Cheshire West and Chester Council (CWAC)

Initial consultation was made with the LLFA on 17th December 2020 regarding the proposed drainage strategy for the Application Site in line with requirements of Policy DM41 of the Local Plan (Part Two).

To date, no response has been received.

5.2 Environment Agency (EA)

Initial consultation was made with the EA on 17th December 2020 regarding the proposed surface water drainage strategy for the Application Site.

A response was received on 20th January 2021 indicating that based on the information provided at the time of consultation, the EA would have no environmental concerns form the proposed development.

5.3 Dwr Cymru Welsh Water (DCWW)

Initial consultation was made with DCWW's developer services via telephone on 18th January 2021 and a subsequent email enquiry was submitted on 22nd January 2021. At the time of writing no

formal response has been received, however we note that we are still within the allowable response period.

During the initial telephone conversation, DCWW advised that there did not appear to be any public sewers in the vicinity of the Application Site and that this should be confirmed during the formal application process.

Refer to Appendix 1 for details of all correspondence undertaken to date.

6. ADJACENT PLANNING APPLICATIONS

There have been several planning applications submitted by/on behalf of CoCH for upgrade works to the existing hospital campus during recent times.

Prior to the construction of Phase 1 of the Emergency Department extension, a planning application was submitted under application no. 18/03540/FUL. During the planning approval process, consultation responses were provided by DCWW and LLFA to the LPA with regard to this entrance extension and associated drainage infrastructure.

DCWW's response indicated that the development must ensure that no increase in impermeable area (roof or hardstanding) shall be allowed to discharge directly or indirectly in the public sewer system

The response from the LLFA also stipulated that no increased run-off shall enter the sewer system and any on-site drainage system shall utilise attenuation and pollution control measures to ensure there is no increased flood risk or pollution risk to surrounding groundwaters.

7. SITE DESCRIPTION

7.1 General Existing and Proposed Description

The proposed location for the new SDEC facility sits upon an existing carpark and access road within the Countess of Chester Hospital campus, adjacent to the existing Accident and Emergency Department Entrance and Ambulance drop-off.

The Application Site is approximately 5,450 m^2 in area and comprises existing building and roof areas, footway and carriageway and small, localised areas of soft landscaping/vegetation in the existing scenario.

The proposed development shall comprise a 2-storey emergency care facility complete with treatment rooms, patient bays, diagnostics, staff welfare and a pharmacy. The building shall also be connected to the existing hospital via linked corridors, one of which shall be at first floor level and span the adjacent access road.

The external works to the SDEC facility shall comprise the reconfiguration of kerb lines, internal junctions, as well as existing parking and ambulance drop-off areas. There will also be the requirement to divert or incorporate several existing external services into the new development.

7.2 Topography

The topography of the wider Countess of Chester Hospital shows there to be a significant level difference across the entire site - with a general fall from North East to South West between 21.5mAOD and 14.8mAOD. The site further drops off in the most Western corner to circa 7.5mAOD and lower on Valley Drive.

The topography within the Application Site is much more consistent with an approximate range in levels between 17.9m and 19.2m – typically falling in an East-West direction. These levels are also typical of the adjacent areas.

7.3 Flood Risk

According to the EA flood map for planning and the long-term flood risk maps, the Application Site sits within Flood Zone 1 and has low risk of flooding from other sources. The flood risk maps do indicate a small area of low-medium risk of localised surface water flooding with between a 1% and 3.3% chance of flooding. However, this is expected to be down to localised surface levels and positioning of existing surface drainage.

Figure 7.1: Extract from Flood Warning Information Service - Surface Water Flooding Extents [Accessed Jan 2021]

According to government guidance, as the site sits within Flood Zone 1 and is less than 1.0ha in area, a site-specific flood risk assessment is not required.

7.4 Existing Drainage

There are a large and complex system of underground drains serving the Countess of Chester Hospital. The networks have been installed or amended throughout various expansion or re-developments undertaken on site since its initial construction.

There are known to be two separate systems: one predominantly serving foul/wastewater and the second serving stormwater from roofs and external areas. These trunk mains have multiple spurs and often pass beneath the main hospital buildings.

Following a telephone discussion with DCWW and reviewing all currently available services information, there are no known Public Sewers within or near to the Application Site boundary, and all drains in these areas are believed to be under private ownership by the Countess of Chester.

Further information on the wider site drainage systems can be found below.

7.4.1 *Foul Drainage*

Immediately adjacent to the Application Site, there are three main foul sewers: two to the East and the second to the West, both following the approximate alignment of the access roads.

- DN225 drain serving area immediately adjacent to the Ambulance drop off, before running along the access road to the south of the existing disabled carpark
  This drain is approximately 2.5-3.1m deep.

- DN225 drain serving area to the East of the Application site, including the Women and Children building.
  This drain is approximately 3.2-4.6m deep within the access road.

- DN300 drain running beneath the main A&E and radiology building before running south within the Western access road.
  This drain is approximately 2.6m deep.

Archive records show that the foul drainage network for the wider site converges on the south western corner of the campus where an existing 375/450mm (increasing to 525mm) diameter sewer passes beneath the A5480 (Countess Way). The drain is then routed through the car park of the nearby public house (Little Owl) and then turning westerly towards A540 (Parkgate Road).

It is assumed that this sewer connects into a wider public sewer network within/around Parkgate Road, however this is still to be confirmed with Dwr Cymru Welsh Water (DCWW).

7.4.2 *Storm Water Drainage*

There are 2no. main trunk networks identified within the vicinity of the proposed SDEC and associated car park works. However, there are several additional spurs leading too these trunk mains from other buildings and hardstanding.

- DN150 to DN225 drain serving the disabled car parking and southern access road.
  This drain is approximately 1.7-1.9m deep where it connects into the site wide system.

- DN450 drain collecting SW from the main entrance and beneath the existing building to the east of the car park.
  This drain is approximately 2.6-3.6m deep within the main eastern access road

- DN300 to DN600 drain serving the existing maternity bock and the existing building and new A&E entrance.
  This drain is approximately 2.6-4.3m deep within the existing access road

As with the site wide foul drainage system, the storm water also converges on the south western corner of the CoCH campus. Archive records indicate that this drain passes beneath Countess Way (A5480) and discharges into a watercourse (brook) adjacent to Abbot's Mead roundabout near to the Aldi Supermarket. The watercourse flows into Finchett's Gutter where it discharges into the River Dee. It is understood that this section of brook is classified as a 'Main River' and therefore is under EA ownership.

Details of the existing on-site drainage can be found in Appendix 2.

7.5 Existing Surface Water Run-Off

The area of the proposed development covers approximately 5,450m^2. In the current scenario, the existing site has approximately 585m^2 soft landscaping and vegetation within this boundary area. This equates to an approximate existing impermeable area of 4,865m^2 or 89.3%.

The existing site is served by several small drains that feed back into the wider storm network in multiple locations. It is not possible to create a complete hydraulic model of the existing drains as the majority of the flow through these systems is generated outside the Application Site boundary and this information is not available nor does it form part of the scope of this report.
To establish the existing peak storm run-off rates, two different methods have been assessed and compared against each other.

- Partial modelling of the existing system – will not confirm capacity of the drains but will provide information on existing peak run-off rates at the outfall locations; and
- Assessment of peak rainfall figures based on Wallingford Procedure

The tables below compare the peak storm water run-off figures for the above methodologies.

Table 7.1: Existing Hydraulic Model - Site area = 0.545ha

Return Period	Outfall/Drainage System		Combined Existing Storm Water Discharge from Application Site
	OPD 3	Valley Drive	
M1-5	20.4 l/s	26.4 l/s	**46.8 l/s**
M2-5	26.5 l/s	34.2 l/s	**60.7 l/s**
M30-5	50.2 l/s	64.6 l/s	**114.8 l/s**
M100-5	64.7 l/s	83.4 l/s	**148.1 l/s**

An assessment was also undertaken for the impermeable site area using the Wallingford Procedure. This also considered the full site development area of 0.545ha.

Table 7.2: Existing Run-off - Wallingford Procedure - Site Area = 0.545ha

Return Period	Peak Run-off Rate (l/s)
M1-5	66 l/s
M2-5	85 l/s
M30-5	155 l/s
M100-5	196 l/s

For comparison, the equivalent existing greenfield rate, assuming a SOIL value of 0.45 (location based) and 0.50 (required for brownfield sites), have been calculated and summarised as follows. However, these are not expected to be factored into the design due to the site being classified as Brownfield and there being a number of limiting factors – refer to Section 8 for further details.

Table 7.3: Existing Surface Water Run-off – Greenfield – IH 124 – Site Area = 0.545ha

Return Period	Peak Run-Off Rate	
	SOIL = 0.45	SOIL = 0.50
M1-5	2.1 l/s	2.6 l/s
M2-5	2.2 l/s	2.8 l/s
M30-5	4.1 l/s	5.1 l/s
M100-5	5.0 l/s	6.3 l/s
QBAR	2.4 l/s	3.0 l/s

8. PROPOSED SURFACE WATER DRAINAGE

8.1 Strategy

The following hierarchy has been reviewed in regard to discharge of surface water from the Application Site to confirm the discharge strategy taken forward.

- To Ground/Infiltration
- To Surface Water Body/Watercourse
- To Sewer

Ground/Infiltration

Historic soakaway tests were undertaken for the nearby ED extension project and the results established that there was little-to-no infiltration capacity in the test location. As the SDEC facility is located in close proximity to the ED extension, it is assumed that the results will be similar. This will be confirmed by additional permeability testing (falling head test) during the current ground investigation works.

Given the site layout, location of a significant amount of existing and proposed underground services and the extent of the works boundary; locating soakaways on site would result in infiltration occurring close to existing/proposed structures, critical services or access roads. As such, there is the potential that infiltration could cause undermining of these areas which would have an increased risk to the operation of the Countess of Chester hospital.

For the above reasons, discharging surface water into the ground via soakaways is not considered appropriate for the Application site.

Surface Water Body/Watercourse

The nearest Main River to the development site is a brook located within Countess of Chester Country Park. It is believed that this watercourse forms part of Finchett's Gutter and ultimately discharges into the River Dee. Archive information indicates that the Countess of Chester Hospital has a positive connection into this watercourse, via a DN600 drain.

As such, this is considered the discharge location for the Application Site, via existing connections into the site wide drainage systems.

Should the site be found not to connect into the watercourse, it is not considered feasible to form a new connection from the Application Site. This is due to the watercourse being located approximately 325m due West with a number of buildings and steep topography changes between the areas. Any new connection to watercourse would result in significant disruption to the hospital campus.

A second watercourse, Bache Brook, lies approximately 250m due South from the Application Site. However, a connection into this brook is not considered feasible due to the requirement to cross through third-party land, a public highway, and the additional disruption the infrastructure works would cause to the hospital campus.

Surface Water Sewer or Combined Sewer

If the existing site is found not to discharge into watercourse, it is expected that it shall drain into a nearby storm water or combined public sewer. In this instance, it is proposed to drain the Application Site as per existing scenario, but at reduced flow rates as Section 8.3 below.

There are no known public sewers in the direct vicinity of the site. It is expected that the nearest sewers lie within nearby public highway or housing areas and therefore a new connection into these areas would require significant infrastructure works and cause further disruption to the hospital campus. As such no new connections are proposed.

The proposed surface water drainage system for the Applications Site shall be designed to adhere to the following criteria:

- No surcharging of pipework during storms up to a 1:2-year annual probability
- No flooding to occur on suit during storms up to a 1:30-year annual probability
- No flooding of third-party land or buildings during storms up to a 1:100-year annual probability + 40% allowance for climate change.

It is acceptable to allow car parks or areas of soft landscaping to flood during 1:100-year annual probability events providing that it does not impact safe access/egress to the development for emergency services, emergency escape routes or impact third-parties. As this site forms part of an operational hospital, the design shall target zero flooding during that 1:100 year + 40% climate change probability event.

The car parking and ambulance drop-off area shall be served by a petrol interceptor to ensure there is a reduced risk of pollution to groundwater or downstream watercourse.

Details of the indicative drainage strategy can be found within Appendix 3.

8.2 Proposed Area Breakdown

The site currently discharges via two storm drainage networks before combining to form a single outfall to watercourse. It is proposed that the new system will maintain this existing area split as far as reasonably practicable without resulting in negative impacts to the existing site wide infrastructure and operation.

The following figures estimate the post-development site area breakdown.

- Proposed red-line boundary (plan) = **5,450m²** (0.545ha)
- Building = 2,000m² (0.200 ha) – *including link bridge and existing roof area*
- Soft Landscaping = 260m² (0.026 ha)
- Hardstanding/Carpark = 3,190m² (0.319 ha) – *includes existing hardstanding within works boundary*

At this stage, assuming a 95% impermeable area to accommodate for vegetation, absorption and evaporation. This gives a total impermeable area of 5,190m².

8.3 Proposed Surface Water Flows

There are a number of driving factors behind the selected discharge rate for the proposed development.

- Restrictions imposed by LLFA to suit local and site development plans – 30% betterment on existing flows
- Restrictions imposed by EA to suit local flood risk requirements – as per LLFA requirements
- Restrictions imposed by BREEAM to achieve certain credits – min. 30% betterment on existing flows
- Capacity of the existing downstream system
- Proposed site layout and adjacencies dictating viable space for attenuation or SuDS features.

As such, an assessment has been taken based on the above information and can be found in the table below.

Table 8.1: Proposed Discharge Rates – Application Site

Return Period	**Predevelopment run-off rate** (l/s)	**LLFA + BREEAM 30% Betterment** (l/s)	**BREEAM 1:1 Year Flow Rate** (l/s)	**Proposed Development Discharge Rates** (i.e. lowest per storm period) and indicated % betterment	
M1-5	46.8	32.7	46.8	**32.7 l/s**	30%
M2-5	60.7	42.4	46.8	**42.4 l/s**	30%
M30-5	114.8	80.3	46.8	**46.8 l/s**	59.2%
M100-5	148.1	130.6	46.8	**46.8 l/s**	68.3%
M100-5 + 40% CC	*(205.1*)*	130.6**	46.8	**46.8 l/s**	*(77.1%)*

** The M100 + Climate Change figure does not apply to the existing system but has been included for reference to provide an indicative % betterment figure only.*

*** The Proposed discharge rate for the M100 + Climate Change shall be restricted to no more that the pre-development M100 year rate.*

To achieve these staged discharge rates, it may be necessary to utilise complex or multiple control systems (i.e. vortex flow controls) with varying discharge rates for equivalent storm periods/water levels. This shall be reviewed during detailed design.

Using the above figures, it has been possible to estimate the volume of storm water attenuation required for the proposed development for a M100 year probability event with an additional 40% allowance for climate change. An estimated value of between **95m³** and **175m³** of surface water attenuation shall be required.

Given that the site currently discharges via. two private storm systems, it is proposed that the Application site is also split proportionally to maintain these existing discharge rates/locations. As such there shall be 2no. outfalls with a combined overall discharge rate of **46.8 l/s**. Details of the split and required attenuation volumes for each part of the development site shall be finalised during detailed design.

8.4 Design Codes

The following British Standards and design guides shall be used for storm water design purposes. Please note that this list is not exhaustive but covers the overall general drainage requirements.

BS EN 752	Drain and Sewer Systems Outside Buildings
BS EN 12056-3	Gravity Drainage Systems Inside Buildings – Part 3 Roof Drainage
BS EN 16933-2	Drain and Sewer Systems Outside Buildings – Part 2: Design
Ciria C753	The SuDS Manual
HR Wallingford	Wallingford Procedure for Design and Analysis of Urban Storm Drainage
PPG3	Environment Agency Pollution Prevention Guidelines 3 (Withdrawn but remains best practice)
SSG 2019	Sewer Sector Guidance (formerly Sewers for Adoption)
Building Regulations 2010	Approved Document H – Drainage and Waste Disposal 2015
NHS Design Guides	Various

In accordance with Building Regulations 2010 Approved Document H, Section H5, separate foul and surface water systems shall be designed for the proposed development. However, existing outfalls shall be re-used and therefore may become combined downstream of the application site.

8.5 Review of Sustainable Drainage Techniques

Planning policy promotes sustainable management of surface water run-off from a new development or redevelopment, and the use of SuDS is recommended. Due to the restrictions imposed on the surface water discharge rate, attenuation will need to be incorporated within the design of the SDEC facility at Countess of Chester Hospital.

A review of potential sustainable drainage systems has been undertaken to identify the likely form of attenuation which could be included, and which methods are possible for the Application Site.

- Infiltration measures
  Soakaways which infiltrate directly into the ground as opposed to discharging to a watercourse or sewer are <u>not</u> deemed possible for the Application Site due to issues associated with infiltration rates, existing services, structures, site adjacencies and the proposed development requirements.

- Permeable paving/Porous Surfacing
  Surfacing systems which allow water to infiltrate through the surface to an underlying gap-graded sub-base or into a sub-base geo-cellular system may be considered possible for this development. Further consideration would be required with regard to surface types, vehicular access and loading requirements, existing and proposed underground services and proximity to buildings.

- Rainwater Harvesting
  The use of rainwater harvesting for greywater use within the building would decrease the volume and rate of surface water runoff from the building. This would reduce the roof runoff in low return period events; however, it cannot be considered to reduce peak flows off-site since the drainage strategy has to assume that the rainwater tank is full and therefore overflowing. As such this is excluded from the below ground drainage strategy.

- Detention Basins
  Surface storage basins are normally dry and can provide attenuation of surface water run-off in peak storm conditions. The space requirements for detention basins are not suited to this development given the extent of the works boundary and requirement to minimise disruption to the wider site.

- Swales
  A grassland depression which is shallow and wider than a conventional ditch. Swales convey surface water run-off from the drained surface into a storage or infiltration system, or let the surface water infiltrate directly and provide storage for peak surface water runoff flows. Swales require a large plan area for construction and therefore are not possible on this development.

- Green/Brown Roof
  Multi-layered system that covers the roof of a building with vegetation cover/landscaping over a drainage layer. Designed to intercept and retain precipitation, reducing the volume of run-off and attenuating peak flows. These are not considered feasible for this development due to the modular nature of the proposed building and the likely increase in number of outlets which in turn do not reduce the run-off rate considerably. These structures are also not a reliable attenuation system for extreme storm events due to the potential to become saturated. As such the use of green roofs have been discounted form any attenuation calculations.

- Blue Roof
  A blue roof is a system which can provide attenuation within a tank solution at source on a roof area which stores water from that roof level. This can also be incorporated with a green roof above. Whilst blue roofs may be possible on some areas of the building, it is expected to be limited due to plant and access spatial requirements as well as the requirement for an increased number of outlets (i.e. at every module) and thus reducing the overall achievable discharge restriction.

- Oversized Pipes
  The use of large diameter pipes as attenuation tanks either in lieu or in addition to conventional drainage systems. These are deemed suitable for use within the proposed development and if laid to shallow gradients will assist in keeping the drainage system as shallow as possible. The tanks can be suitable for vehicular loading therefore being suited to the Application Site.

- Below ground tank/cellular storage
  A method involving storage tanks or geo-cellular crates installed below the lowest ground level has the advantage of having a 95% void ratio allowing it to attenuate large volumes. The use of a tank solution is viable beneath the car parking areas or paved external

landscaping however further consideration will be required in relation to vehicular loading, service co-ordination, groundwater and burial depths.

Due to the reasons indicated above it is therefore proposed that the below ground drainage includes oversized pipes/underground storage tanks around the perimeter of the application site, with localised permeable surfacing/porous paving within the disabled car-parking area. This will provide flexibility with the positioning of existing and proposed services and any temporary works required to construct the proposed development.

9. FOUL DRAINAGE PROPOSALS

9.1 Strategy

The foul drainage strategy for the proposed development will be to collect foul effluent beneath the slab and route to the nearest external area prior to connecting into the existing site wide drainage prior to connection into the combined public sewer network. There will likely be a requirement to install internal manholes within the building due to the anticipated large number of foul stacks, structural and architectural layouts, however these will be minimised where possible.

Foul drainage from the application site is proposed to connect into the existing site wide sewer network on the south western corner of the existing car-park – into a DN300 sewer laid to a 1:130 gradient.

The below ground foul network shall be designed to achieve a minimum self-cleansing velocity of 0.70 m/s.

Details of the indicative drainage strategy can be found within Appendix 3.

9.2 Proposed Peak Foul Water Flows

Peak and average foul water flow rates shall be calculated using the Population Method as prescribed in BS EN 752, BS EN 16933-2 and British Water Flows and Loads Code of Practice.

The proposed foul drainage pipes shall be sized using the Probability Method as prescribed by BS EN 752, BS EN 12056-2 and BS EN 16933-2.

At the time of writing, finalised peak and average foul flow rates have not yet been established for the development. However, to assess the likely peak flow arising from appliances, the following elements have been assessed for sources of foul effluent and have been used to provide an initial estimate for pipe sizing.

- Treatment and Consultation Rooms – assumed 1no. wash-hand basin per unit
- Patient Bays – assumed 1no.
- WC Facilities – WC and hand basins
- Staff Change – assumed shower, WC, hand basin and floor gullies
- Kitchen and Beverage Bays – assumed kitchen sink and dishwasher
- Plant Space – assumed floor-gully per mechanical plant room
- Utility Space – assumed cleaners sink and floor gully
- Corridors – assumed wash-hand basins throughout treatment area

Based on architectural floor layouts to estimate the number of appliances, a peak foul flow has been estimated at **6.3 l/s**; using a frequency factor of 0.7 as prescribed in BS EN 12056-2.

However, this flow is the theoretical peak from all appliances and does not consider occupancy/staffing rates in much detail. The average flow will be less than this figure.

For comparison, a DN150 pipe laid no shallower than a 1:120 gradient has a full-bore capacity sufficient for a peak flow of 6.3l/s.

The full-bore capacity of the private, on-site drainage system immediately downstream of the proposed SDEC connection point has been estimated as 85 l/s, using a pipe gradient of 1:300 and diameter of 300mm.

Refer to Appendix 4 for indicative foul calculations.

9.3 Design Codes

The following British Standards and design guides shall be used for foul water design purposes. Please note that this list is not exhaustive but covers the overall general drainage requirements.

BS EN 752	Drain and Sewer Systems Outside Buildings
BS EN 12056-2	Gravity Drainage Systems Inside Buildings – Part 2 Sanitary Drainage
BS EN 16933-2	Drain and Sewer Systems Outside Buildings – Part 2: Design
SSG 2019	Sewer Sector Guidance (formerly Sewers for Adoption)
BW COP 4	British Water Flows and Loads 4
Building Regulations 2010	Approved Document H – Drainage and Waste Disposal 2015
NHS Design Guides	Various

In accordance with Building Regulations 2010 Approved Document H, Section H5, separate foul and surface water systems shall be designed for the proposed development. However, existing outfalls shall be re-used and therefore may become combined downstream of the application site.

10. MAINTENANCE OF DRAINAGE SYSTEMS

10.1 Performance Objectives

The operational maintenance need of the installed below ground drainage system is to provide a system that will continue to perform in accordance with the design and that the operation of the system is safe, environmentally acceptable, economically efficient and provide the client with a functional and easily operated asset.

10.2 Maintenance Requirements

Effective maintenance includes a combination of planned and reactive tasks and looks to ensure that the system is kept in a condition that it can function as required.

The tasks may include:

- Localised repair or replacement of damaged pipework or other structures
- Removal of natural occurring sediments, abnormal obstructions etc. to restore hydraulic capacity
- Maintenance of mechanical plant
- Rodent and insect control

10.3 Maintenance Schedule

A strategy for the maintenance of the underground drainage elements will be developed incorporating normal regular maintenance requirements, any potential long-term maintenance work and any monitoring required.

Any parties involved with the disposal of any waste materials from the underground drainage system should hold appropriate management licenses to undertake any such activities. Disposal of any site materials is required to be made in accordance with current legislation and guidance.

This initial maintenance schedule has been prepared using guidance provided in 'CIRIA C625 – Model agreements for sustainable water management systems', CIRIA 626 – Rainwater and Greywater systems and manufacturers recommendation for specialist drainage elements. The detailed design drawings will incorporate the maintenance requirements for the project.

The following table notes the likely maintenance requirements for this project, and this is to be developed further at the next stage of the design.

Table 10.1 – Indicative Maintenance Requirements – Pipes and Manholes

Conventional Drainage Systems		
Foul and surface water gravity pipework and manholes		
Silt accumulation, blockage, structural integrity		
Maintenance Schedule	*Requirement*	*Recommended minimum frequency*
Regular	*Litter/Debris removal*	*Monthly (or as required)*
	Excess silts to silt traps and gully pots to be removed	*Monthly (or as required)*
Occasional	*Pipe cleaning and inspection*	*As required*
Monitoring	*Inspect of manholes/chambers to identify evidence of sedimentation accumulation*	*Quarterly per annum*

Table 10.2: Indicative Maintenance Requirements – Attenuation Structures

Storm Water Attenuation Tank and Flow Controls		
Silt accumulation, blockage, structural integrity		
Maintenance Schedule	Requirement	Recommended minimum frequency
Regular	*Removal of excess silts*	*Monthly (or as required)*
Occasional	*Removal and disposal of oil or petrol residues using safe standard practices*	*As required*
Monitoring	*Inspect upstream and downstream manholes and flow control devices for evidence of silt accumulation and integrity of system*	*Quarterly per annum*

APPENDIX 1
CONSULTATIONS

Gavin Smith

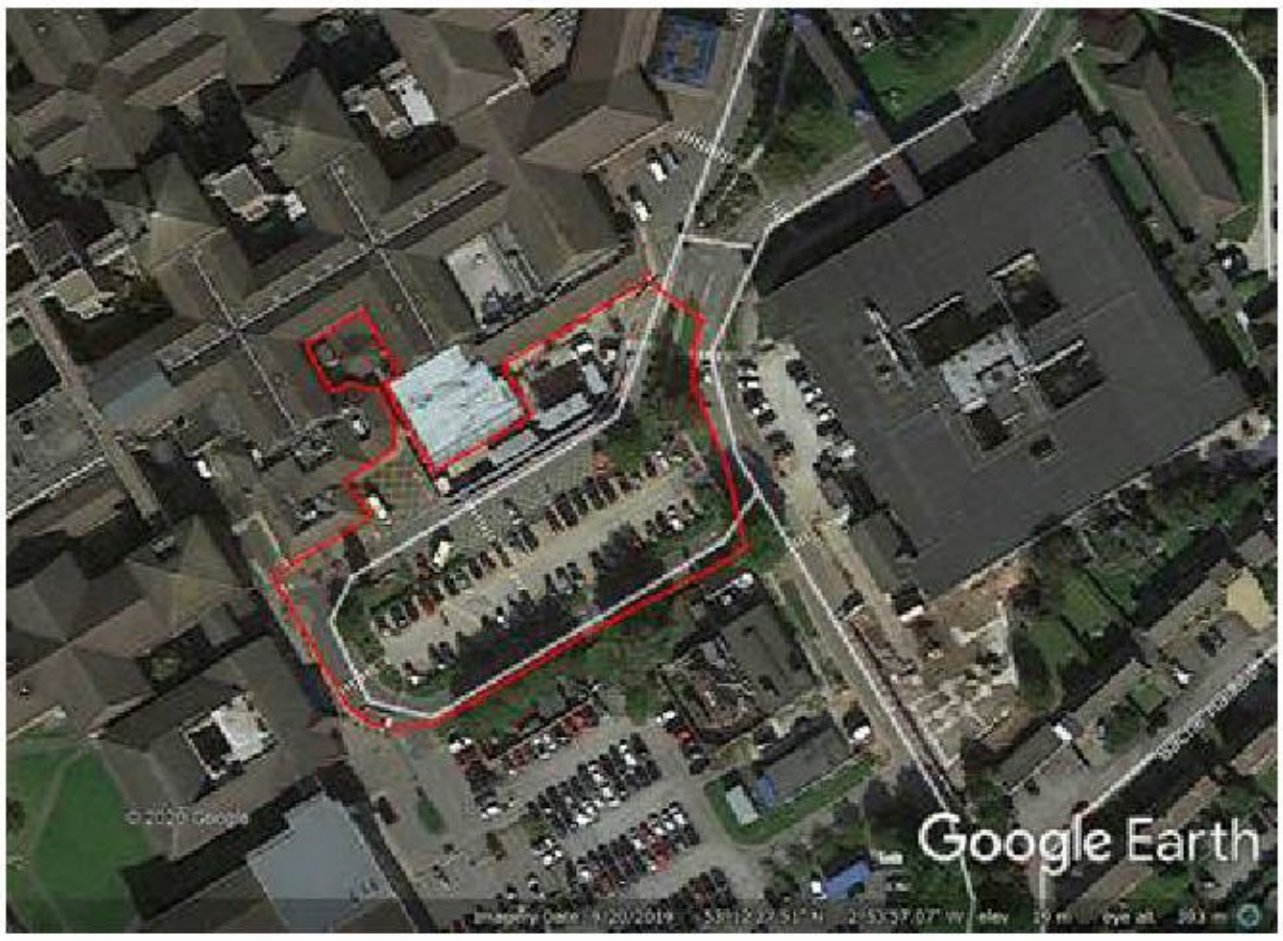
From: Gavin Smith
Sent: 17 December 2020 15:14
To: 'planningpolicy@cheshirewestandchester.gov.uk'
Cc: 'enquiries@cheshirewestandchester.gov.uk'
Subject: Pre-development Advice - Countess of Chester Hospital

Good Afternoon,

FAO: Lead Local Flood Authority

We are currently working on plans for a new development within the grounds of the Countess of Chester Hospital. I am developing the below ground drainage proposals and am seeking guidance on the proposed strategy in your capacity as the Lead Local Flood Authority for the area.

The new development shall comprise a 2-storey modular same day emergency care unit located near to the existing A&E department. The building shall be positioned over an existing car park and road network and will make allowances for the re-configuration of this area. The building is approximately 0.20ha with the works to the external road and carparks an additional 0.25ha. An indicative development area is shown below.



The area is currently served by channel drains and gullies and is predominately impermeable. There are isolated areas of soft landscaping which shall be incorporated into the new site plan and it is expected that the overall impermeable area shall be comparable to the existing scenario. From reviewing the existing site and archive drawings for the area, it is believed that the surface water for the area connects into a private drainage system before being directed towards Countess Way (A5480) where it is believed to connect into Finchett's Gutter. This is classified as a Main River and therefore the Environment Agency (EA) shall also be consulted in due course.

The site currently sits within Flood Zone 1 and has low to risk of flooding from other sources based on EA flood mapping.

From reviewing previous nearby GI information, infiltration is not considered viable due to no water draining into the sub-soil during a soakaway test. A further percolation test is scheduled to be undertaken in the New Year to confirm this; however, it is expected that surface water from the proposed development shall connect into the wider site wide private drainage network (as it currently does) at a reduced rate.

In line with Part 2 of the local plan (DM41), we understand that a 30% betterment shall be targeted for surface water systems located within brownfield sites. Regarding an increase in rainfall intensity due to climate change, the EA guidance stipulates either a 20%-40% increase should be applied.

As such please can you confirm the LLFA's stance on:

- Acceptance that the proposed surface water discharge rates are to be restricted to provide a **30% betterment** to the pre-development flow rates
- What the required climate change allowance will be – 20% or 40%.

We will forward over more detailed plans of the proposals in the future; however, we are currently looking to define the key parameters such that we can inform the building drainage design.

Should you have any questions on the above please don't hesitate to contact me, otherwise I look forward to your response.

Many thanks in advance.

Kind regards
Gavin Smith

BEng (Hons)
Senior Engineer
1621993 Highways North

[redacted]

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CH1 1DA
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Gavin Smith

From: Gavin Smith
Sent: 17 December 2020 16:50
To: enquiries@environment-agency.gov.uk
Subject: Pre-development Advice - Countess of Chester Hospital, Liverpool Road, Chester, CH2 1UL

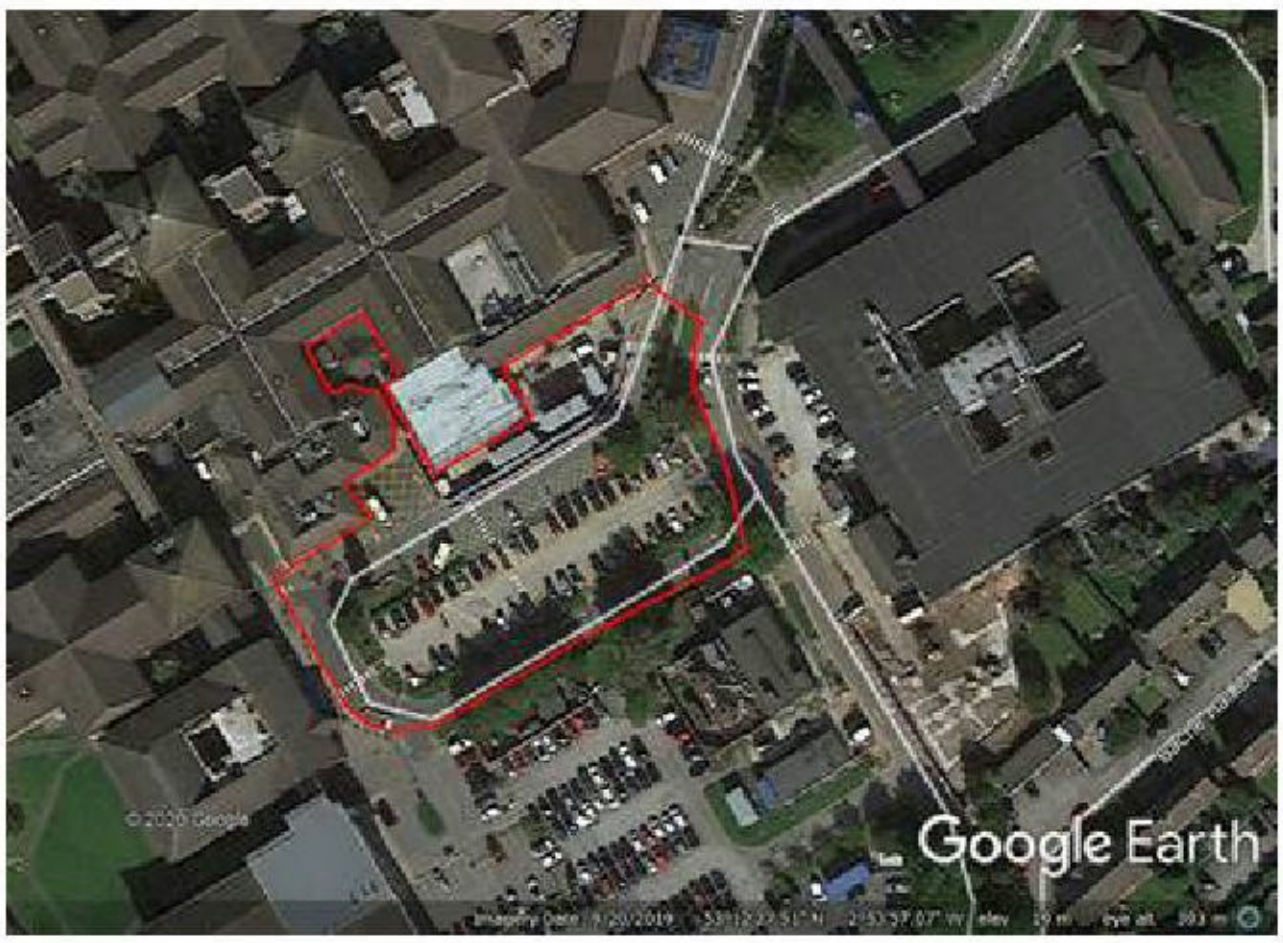
Good Afternoon

FAO: Flood Risk and Planning Team

I am currently working on a project for the provision of a new same day emergency care unit within the existing Countess of Chester Hospital (CoCH) campus, Liverpool Road, Chester, CH2 1UL.

The site currently comprises car parking and an access road and covers an area approximately 4,500m^2. The development site is located within Flood Zone 1 and has low risk of flooding from surface water, groundwater and reservoirs.

The new development shall comprise a 2-storey modular building (circa 2,000m^2) and associated car parking and access road adjustments (circa 2,500m^2). It is proposed that the surface water shall discharge into the existing on-site private storm water drainage network prior to leaving the site as it does in the current scenario. The proposed site layouts are being developed; however, the impermeable area is considered to be comparable to the pre-development scenario and therefore no large increase in flows are anticipated. See below for an indicative works boundary.



The area is currently served by channel drains and gullies and is predominately impermeable. There are isolated areas of soft landscaping which shall be incorporated into the new site plan and it is expected that the overall impermeable area shall be comparable to the existing scenario. From reviewing the existing site and archive drawings for the area, it is believed that the surface water for the area connects into a private drainage system before being directed towards Countess Way (A5480) where it is believed to connect into Finchett's Gutter. This is classified as a Main River and therefore we understand to be under EA ownership.

From reviewing previous nearby GI information, infiltration is <u>not</u> considered viable due to no water draining into the sub-soil during a soakaway test. A further percolation test is scheduled to be undertaken in the New Year to confirm this; however, it is expected that surface water from the proposed development shall connect into the wider site wide private drainage network (as it currently does) at a reduced rate.

In line with Part 2 of the Council's Local Plan (DM41), we understand that a **30%** betterment shall be targeted for surface water systems located within brownfield sites. This is currently being discussed with Cheshire West and Chester Council (CWAC) in their capacity as LLFA. Regarding an increase in rainfall intensity due to climate

change, the EA guidance stipulates either a **20%-40%** increase should be applied. The local SFRA also states that both the Central and Upper End values shall be assessed.

Foul water will connect into the existing onsite private drainage system where it is directed towards Countess Way. It is believed that this system connects into a nearby Public Sewer system and this will be discussed with Dwr Cymru Welsh Water in due course.

As such please can you confirm the EA's stance on:

- Acceptance that the proposed surface water discharge rates are to be restricted to provide a **30% betterment** to the pre-development flow rates
- What the required climate change allowance will be – 20% or 40%.
- If there will be a requirement for any consents/permits to discharge surface water indirectly into Finchett's Gutter through existing connections.

We will forward over more detailed plans of the proposals in the future as required; however, we are currently looking to define the key parameters such that we can inform the building drainage design at this stage.

Should you have any questions on the above please don't hesitate to contact me, otherwise I look forward to your response.

Many thanks in advance.

Kind regards
Gavin Smith

BEng (Hons)
Senior Engineer
1621993 Highways North

[redacted]

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CH1 1DA
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Mr Gavin Smith
Ramboll UK Ltd
2nd Floor The Exchange
St. John Street
CHESTER
CH1 1DA

Our ref: SO/2020/120813/01-L01
Your ref: 201222/ER12

Date: 20 January 2021

Dear Mr Smith

PRE-APPLICATION ENQUIRY - COUNTESS OF CHESTER HOSPITAL NEW SAME DAY EMERGENCY CARE UNIT WITHIN THE EXISTING CAMPUS.

COUNTESS OF CHESTER HOSPITAL (COCH) CAMPUS, LIVERPOOL ROAD, CHESTER, CH2 1UL.

Thank you for consulting us on 17th December 2020 regarding the outline proposals for the above development.

Having reviewed the outlined proposals we are providing a preliminary opinion, which outlines the key environmental issues within our remit that are relevant to the proposals and provides guidance on any further actions you need to undertake.

Based on the information currently available, the development raises no environmental concerns for the Environment Agency. However, we would offer the following advice.

Flood Risk
Based on our records, the proposed development falls within flood zone 1 and as such our Flood Risk Standing Advice (FRSA) applies. Further information on carrying out flood risk assessments in flood zone 1 is available on the gov.uk website at:
https://www.gov.uk/guidance/flood-risk-assessment-in-flood-zone-1-and-critical-drainage-areas

The Lead Local Flood Authority are responsible for providing advice on the management of surface water from new larger developments. We recommend consulting them for their comments on your proposals.

Please note, this response is based on the information you have made available at this time. It is based on current national planning policy, associated legislation and environmental data / information. If any of these elements change in the future then we may need to reconsider our position.

Yours sincerely

Jeni Templeman
Sustainable Places Advisor

Direct e-mail [redacted]

Environment Agency
Richard Fairclough House Knutsford Road, Warrington, WA4 1HT.
Customer services line: 03708 506 506
www.gov.uk/environment-agency
End

Gavin Smith

From: Gavin Smith
Sent: 20 January 2021 10:57
To: 'developer.services@dwrcymru.com'
Subject: FAO: Rhodri Perry - Pre planning advice for proposed development at Countess of Chester Hospital, Chester, CH2 1UL

FAO: Rhodri Perry

Good Morning Rhodri,

I have spoken with one of your colleagues who suggested I contact you regarding pre-development advice for a new scheme at the Countess of Chester Hospital, Liverpool Road, Chester, CH2 1UL. Please accept my apologies for the out-of-the-blue email but I hope this is okay.

I was looking to complete the online form however I was struggling to define the project and project data into the acceptable fields given the specialist building. I was also unsure as to the cost of the application as there were different figures quoted on the website - hence the suggestion to come direct to yourself.

I am a design consultant working alongside a contractor to design a build a new Same Day Emergency Care Unit at the Countess of Chester Hospital, on behalf of the NHS Trust. I am aware that there have recently been some developments to the site, namely the extension to the existing Emergency Department entrance (Your Ref: PLA 0037546), and was hoping that you could provide me with some advice for this new scheme.

We understand that the Countess of Chester sits within Part 2 of the local development plan (DM41). The proposed works area is situated within an existing access road and disabled car parking area near to the A&E entrance. Location details can be found below.

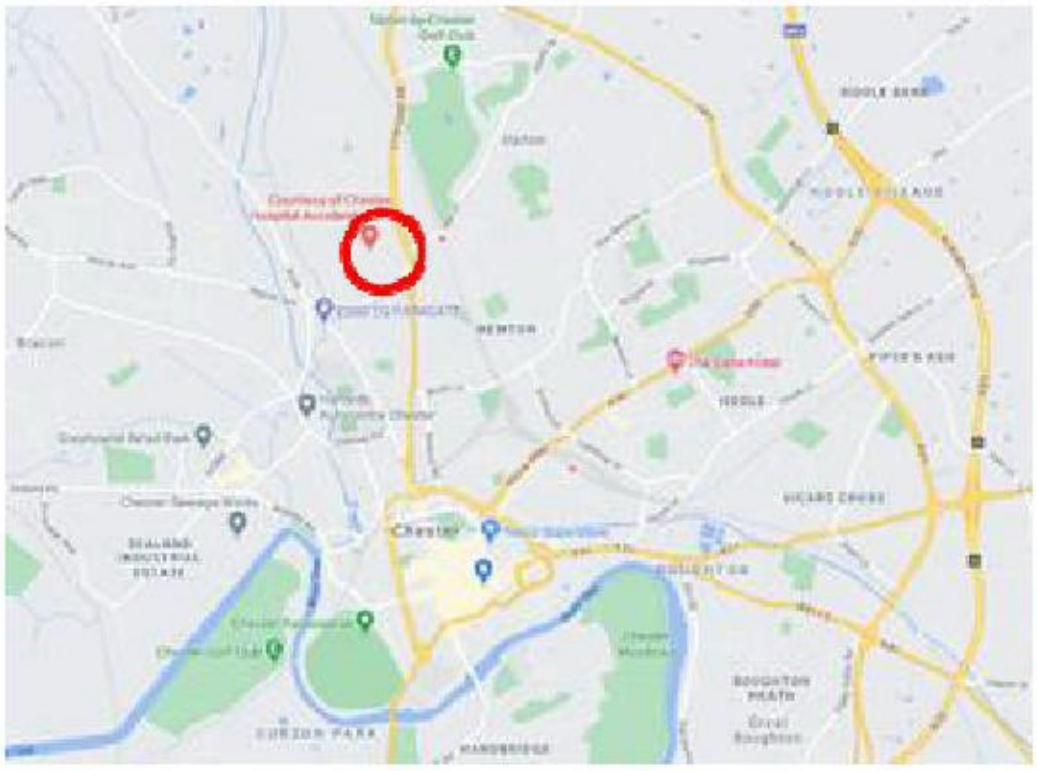

Figure 1.1: Site Location [Google Earth Extract ©2020 Google]

National Grid Reference
SJ 40100
68250

X Co-ordinates
340100

Y Co-ordinates
368250

WhatThreeWords:
///torch.faded.tried

Figure 1.2: Main Survey Area [Google Earth Extract ©2020 Google]

The development will be a 2-storey modular unit with consultation/treatment rooms, staff welfare and associated plant space, etc. There will also be minor refurbishment works to the tie in points with existing building to form connecting corridors and useable spaces and the realignment of the ambulance entrance and parking areas. The intended building use is to provide same day care to accompany the main emergency department, rather than be treated like a typical hospital ward with overnight stays, etc. Current plans indicate there will be approximately 50 bed/treatment spaces across the two storeys.

From reviewing the existing on-site drainage system and archive drawings we believe that:

- the storm water for the Countess of Chester campus discharges via a private drainage system into a nearby watercourse; and
- the foul water discharges via a private drainage network into an offsite sewer which is then likely to connect into public sewer near to the A540.

The new development will follow the above principles and ensure that storm water is discharged to watercourse (or ground if infiltration is feasible) and the new foul effluent will discharge to public sewer via existing connections from the private sewer system.

We are due to submit a planning application in due course however we were looking to seek some advice prior to this. As such we would like to know if DCWW have any immediate concerns with the above strategy and if there would be any restrictions imposed on the foul effluent discharge (i.e. flow rates or requirements for Trade Effluent licences, etc.)

Please could you advise on the above strategy and any associated costs for the application?

If you feel a quick conversation may be easier, my mobile no. is below.

Thanks in advance for your help.

Kind regards
Gavin Smith

BEng (Hons)
Senior Engineer
1621993 Highways North
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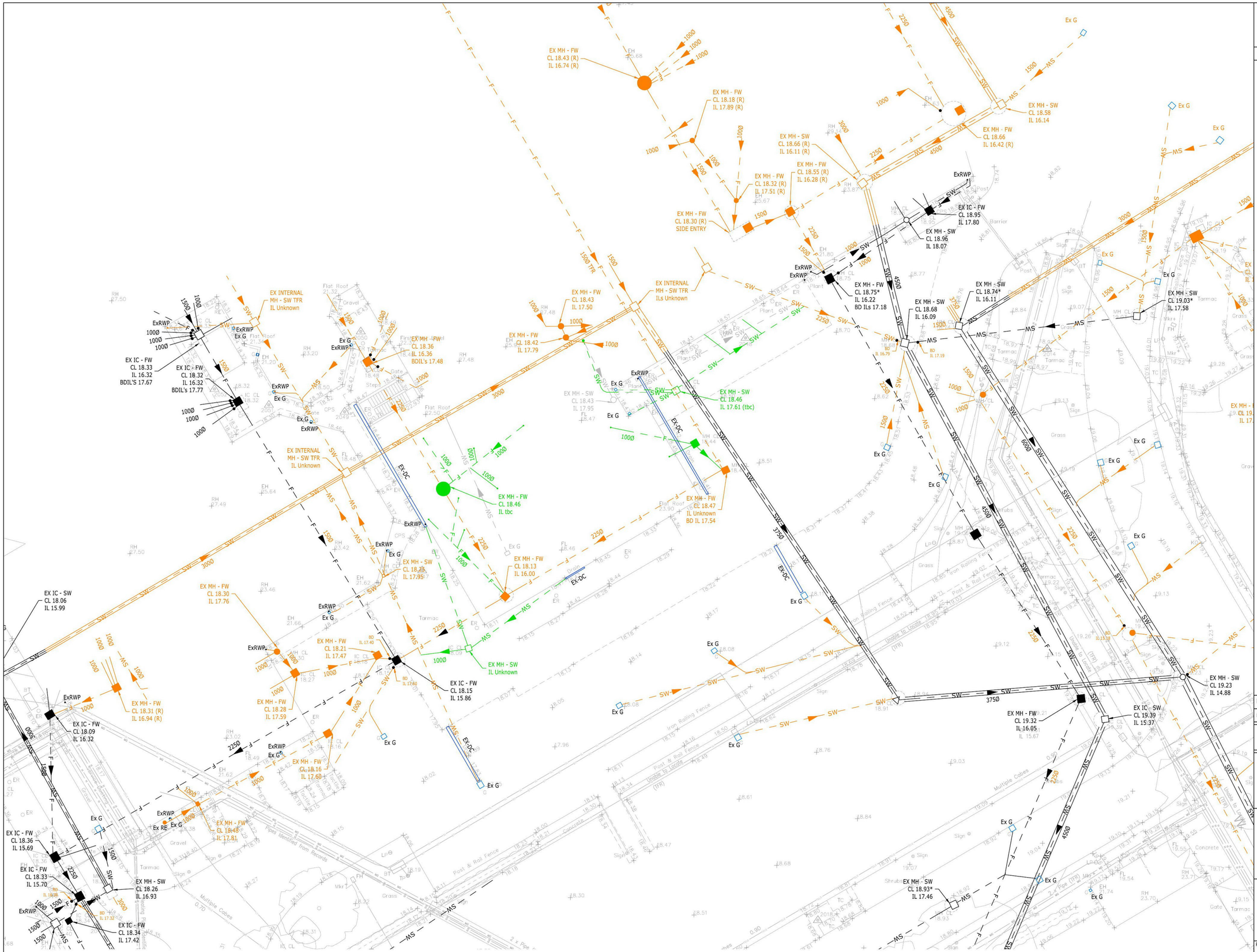
APPENDIX 2
EXISTING DRAINAGE



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   - COCH-Services Master Drawing_October 2014 updated with JDSC extension [Received 08/12/2020]
   - CCED-FGM-XX-FN-DR-C-0001 S4 P05 Proposed Drainage Layout [Dated 22/08/2019]
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- EXISTING FOUL DRAIN (<300mm Ø) — F
- EXISTING FOUL DRAIN (≥300mm Ø) — F
- EXISTING STORM DRAIN (<300mm Ø) — SW
- EXISTING STORM DRAIN (≥300mm Ø) — SW
- EXISTING FOUL MANHOLE
- EXISTING STORM MANHOLE
- DRAIN/MANHOLE FROM 2020 SURVEY — F
- DRAIN/MANHOLE FROM 2019 ED EXTENSION (ASSUMED) — F
- DRAIN/MANHOLE FROM 2014 ARCHIVE — F
- INDICATIVE EXTENT OF MANHOLE CHAMBER BELOW (2014 ARCHIVE)
- ASSUMED DRAIN/MANHOLE REMOVED DURING 2019 ED WORKS — SW
- EXISTING CHANNEL DRAIN — Ex DC
- EXISTING GULLY — Ex G
- EXISTING RAINWATER PIPE — ExRWP
- EXISTING BACKDROP AND ASSUMED LEVEL — BD IL 16.12

Rev	Description	Date	By	Chk	App
P01	PRELIMINARY	13/01 2021	GS	-	-

SKETCH

COUNTESS OF CHESTER SAME DAY EMERGENCY CARE

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EXISTING DRAINAGE COMMENTARY

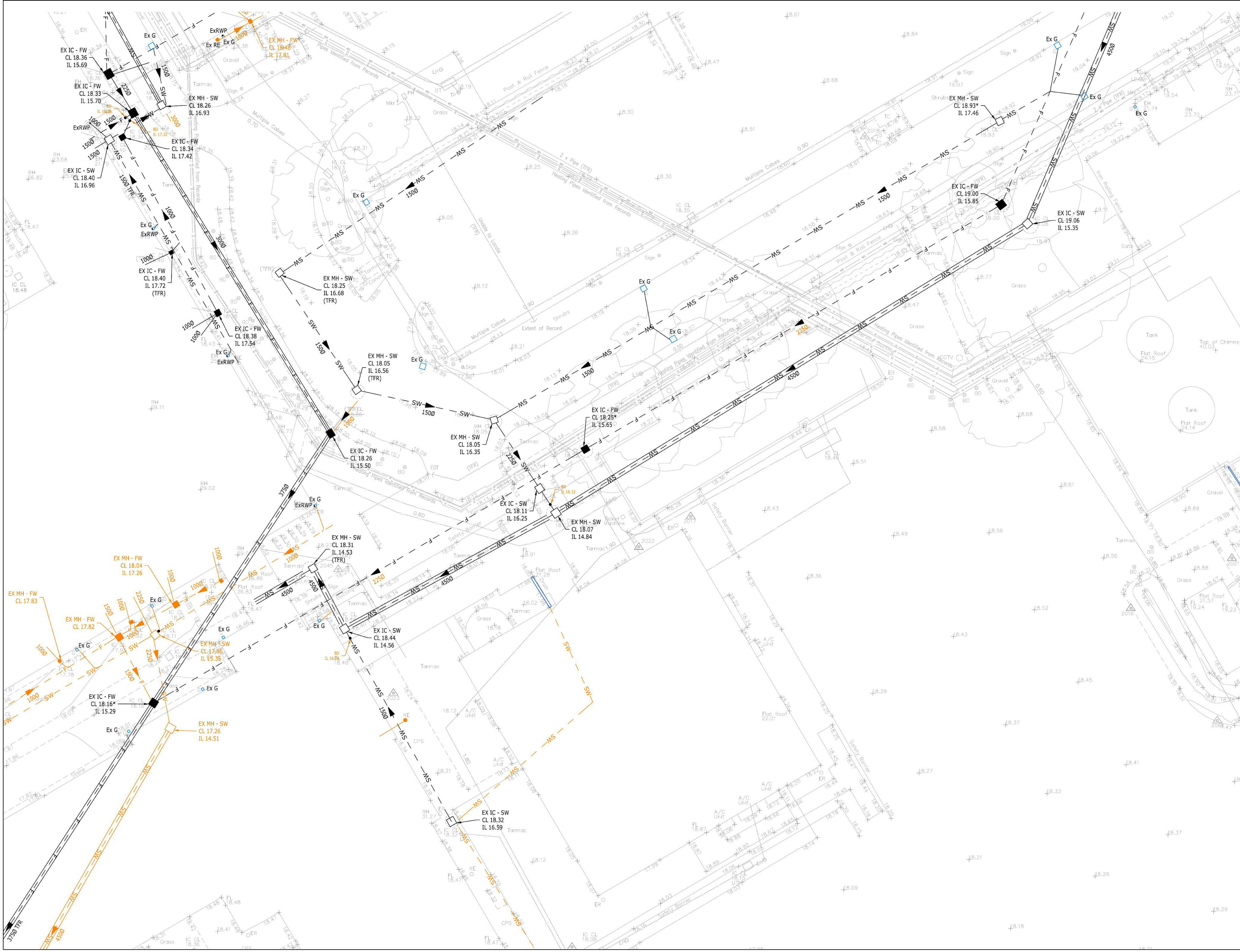
SHEET 1

Project No:	Scale (@A1):	Drawn:	Date:
1620011132	1:150	GS	JAN 2021

Drawing No:	Rev:
CCSDEC-RAM-ZZ-XX-SK-C-0002	P01

FOR CONTINUATION REFER TO CCSDEC-RAM-ZZ-XX-SK-C-0002

FOR CONTINUATION REFER TO CCSDEC-RAM-ZZ-XX-SK-C-0002



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EXISTING FOUL DRAIN (≥300mm Ø) — F —
EXISTING STORM DRAIN (<300mm Ø) — SW —
EXISTING STORM DRAIN (≥300mm Ø) — SW —
EXISTING FOUL MANHOLE
EXISTING STORM MANHOLE
DRAIN/MANHOLE FROM 2020 SURVEY — F —
DRAIN/MANHOLE FROM 2019 ED EXTENSION (ASSUMED) — F —
DRAIN/MANHOLE FROM 2014 ARCHIVE — F —
INDICATIVE EXTENT OF MANHOLE CHAMBER BELOW (2014 ARCHIVE)
ASSUMED DRAIN/MANHOLE REMOVED DURING 2019 ED WORKS — SW —
EXISTING CHANNEL DRAIN — Ex DC
EXISTING GULLY — Ex G
EXISTING RAINWATER PIPE — ExRWP
EXISTING BACKDROP AND ASSUMED LEVEL — BD IL 16.12

Rev	Description	Date	By / Chk	App
P01	PRELIMINARY	13/01 2021	GS / -	-

SKETCH

COUNTESS OF CHESTER SAME DAY EMERGENCY CARE

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EXISTING DRAINAGE COMMENTARY

SHEET 2

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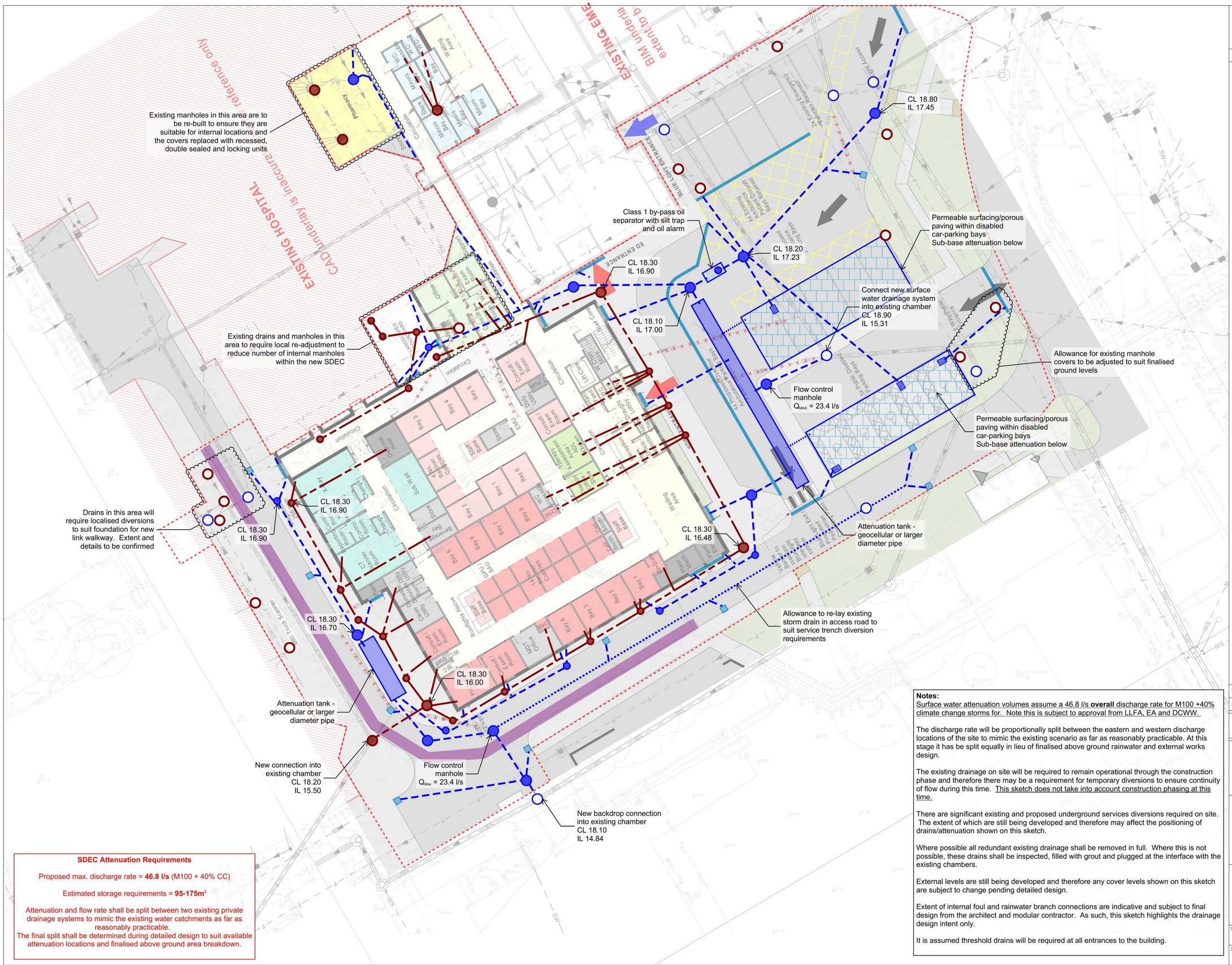
1620011132	1:150	GS	JAN 2021

Drawing No:	Rev:
CCSDEC-RAM-ZZ-XX-SK-C-0003	P01

APPENDIX 3
PROPOSED DRAINAGE STRATEGY



SDEC Attenuation Requirements

Proposed max. discharge rate = **46.8 l/s** (M100 + 40% CC)

Estimated storage requirements = **95-175m³**

Attenuation and flow rate shall be split between two existing private drainage systems to mimic the existing water catchments as far as reasonably practicable.
The final split shall be determined during detailed design to suit available attenuation locations and finalised above ground area breakdown.

Notes:
Surface water attenuation volumes assume a 46.8 l/s **overall** discharge rate for M100 +40% climate change storms for. Note this is subject to approval from LLFA, EA and DCWW.

The discharge rate will be proportionally split between the eastern and western discharge locations of the site to mimic the existing scenario as far as reasonably practicable. At this stage it has be split equally in lieu of finalised above ground rainwater and external works design.

The existing drainage on site will be required to remain operational through the construction phase and therefore there may be a requirement for temporary diversions to ensure continuity of flow during this time. This sketch does not take into account construction phasing at this time.

There are significant existing and proposed underground services diversions required on site. The extent of which are still being developed and therefore may affect the positioning of drains/attenuation shown on this sketch.

Where possible all redundant existing drainage shall be removed in full. Where this is not possible, these drains shall be inspected, filled with grout and plugged at the interface with the existing chambers.

External levels are still being developed and therefore any cover levels shown on this sketch are subject to change pending detailed design.

Extent of internal foul and rainwater branch connections are indicative and subject to final design from the architect and modular contractor. As such, this sketch highlights the drainage design intent only.

It is assumed threshold drains will be required at all entrances to the building.

Notes

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KEY

- Existing drain to be removed
- Existing foul drain & manhole (FW)
- Existing storm drain & manhole (SW)
- Works required to existing chamber Foul / Surface Water
- Proposed storm drain & manhole
- Proposed foul drain & manhole
- Proposed permeable surfacing / sub-base attenuation
- Proposed underground tank Large diameter pipe or geocellular crate
- Proposed channel drain
- Proposed road gully
- Proposed oil separator
- Indicative red-line boundary
- Indicative service trench (by others)
- Indicative manhole depths (CL 18.30 IL 16.90)

Rev	Description	Date	By / Chk	App
P01	PRELIMINARY	25/01 2021	GS -	-

SKETCH

COUNTESS OF CHESTER
SAME DAY EMERGENCY CARE

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PROPOSED BELOW GROUND DRAINAGE STRATEGY

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Drawing No: CCSDEC-RAM-ZZ-XX-SK-C-0006 Rev: P01

APPENDIX 4
PROPOSED FOUL CALCULATIONS

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TRANSPORT

COCH- SAME-DAY EMERGENCY CAR FOUL WATER CALCULATION SHEET

Revision	Date	Prepared by	Checked by	Description
01	24/01/2021	Gavin Smith		Initial Calculations – Probability Method

Background Information

Peak and average foul water flow rates shall be calculated using the Population Method as prescribed in BS EN 752, BS EN 16933-2 and British Water Flows and Loads Code of Practice.

The proposed foul drainage pipes shall be sized using the Probability Method as prescribed by BS EN 752, BS EN 12056-2 and BS EN 16933-2.

Proposed Development

The number of appliances and expected sources of foul effluent can be estimate using AHR architectural layouts:

- CCSDEC-AHR-ZZ-00-DR-A-2001-S2-P3 – Ground Floor
- CCSDEC-AHR-ZZ-01-DR-A-2002-S2-P3 – First Floor

Using the above layouts, the following appliances, or sources of effluent have been identified.

Using BS EN 12056-2, it is possible to estimate the peak foul flow arising from certain appliances.

<u>Ground Floor</u>

- WCs - 11no. @ 1.7 DU each
- WHB – 23no. @ 0.3 DU each
- Additional WHB (in Bays) – 19no. @ 0.3 DU each
- Kitchen/Cleaners Sink – 5no. @ 1.3 DU each
- Floor Gully – 8no. @ 1.2 DU each
- Dishwasher – 2no. @ 0.2 DU each

TOTAL = 47.8 DU

<u>First Floor</u>

- WCs - 8no. @ 1.7 DU each
- WHB – 16no. @ 0.3 DU each
- Kitchen/Cleaners Sink – 3no. @ 1.3 DU each
- Floor Gully – 9no. @ 1.2 DU each
- Shower – 2no. @ 0.4 DU each

TOTAL = 33.9 DU

A frequency factor, k=0.7 is advised for frequent use which includes hospitals.

Therefore:

$$Q_{ww} = k\sqrt{\sum DU}$$
$$Q_{ww} = 0.7\sqrt{\sum (47.8 + 33.9)}$$
$$Q_{ww} = 0.7\sqrt{\sum 81.7}$$
$$Q_{ww} = 6.3\, l/s$$

This value shall be used to size the below ground foul drainage pipes.

An assessment will be required against the predicted peak occupancy figures in conjunction with any specialist effluent discharge.