

Flood Risk Assessment
for the
New Decontamination Department
at
Whiston Hospital
Undertaken on behalf of
Halliday Meecham Architects

Report Title:	Flood Risk Assessment for the new Decontamination Department at Whiston Hospital
Report Reference:	9163/FRA/01
Client:	Halliday Meecham Architects
Issue Date:	February 2023
Drafted By:	Kevin Tyldesley
Authorised By:	Natalie Brock

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Executive Summary

Background	WML Consulting have been commissioned by Halliday Meecham Architects on behalf of St. Helens & Knowsley Teaching Hospitals NHS Trust to provide a Flood Risk Assessment (FRA) to accompany a forthcoming planning application in respect of the proposed Decontamination Department building within the existing Whiston Hospital site, Prescot. The proposed development involves the construction of a new four storey building to accommodate the Decontamination Unit, Endoscopy Suite, a plant area, plus expansion / office space as an extension to the existing main hospital building.
Flood Risk	From the online GOV.UK river (fluvial) flood mapping, it can be seen that the site is considered to be located within Flood Zone 1 (very low risk). This means that the area has a chance of flooding of less than 0.1% (1 in 1,000) each year. The National Planning Policy Framework considers that the proposed healthcare use would be classified as a "more vulnerable" type of development, and that it is appropriate in Flood Zone 1. In addition, the site is considered to be at low risk of flooding from surface water, reservoirs, groundwater, sewers and from other sources.

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1.0 INTRODUCTION

Appointment

- 1.1 WML Consulting have been commissioned by Halliday Meecham Architects on behalf of St. Helens & Knowsley Teaching Hospitals NHS Trust to provide a Flood Risk Assessment (FRA) to accompany a forthcoming planning application in respect of the proposed Decontamination Department building within the existing Whiston Hospital site, Prescot.

Objective

- 1.2 This report comprises an FRA, as required by the National Planning Policy Framework (NPPF). It has been carried out in accordance with BS 8533:2011 – Assessing and Managing Flood Risk in Development.
- 1.3 The NPPF identifies that it is the responsibility of developers to demonstrate:
- whether the development would be affected by current or future flooding from any source
 - that the development is safe and where possible reduces flood risk overall
 - whether flood risk would be increased elsewhere
 - mitigation measures for any identified flooding risks
 - that the site can be developed and occupied safely
- 1.4 The FRA identifies whether there are any flooding or surface water management issues related to the development site that may warrant further consideration, to comply with current Planning Policy and associated Flood Risk Practice Guide.

2.0 SITE LOCATION AND DESCRIPTION

- 2.1 The existing hospital site is located on Warrington Road, Rainhill, Prescot, Liverpool, L35 5DR.
- 2.2 The proposed building is to be constructed on an area of hard and soft landscaping, between the existing staff car park and the existing main hospital building.
- 2.3 There are no existing watercourses in the immediate vicinity of the site.
- 2.4 The site falls from north to south, i.e. the level the existing staff car park is around 67.5m AOD, whilst the level adjacent to the hospital building is around 64.0m AOD.

3.0 DEVELOPMENT PROPOSALS

- 3.1 The proposed development involves the construction of a new four storey building to accommodate the Decontamination Unit, Endoscopy Suite, a plant area, plus expansion / office space as an extension to the existing main hospital building.
- 3.2 A plan illustrating the development proposals can be found at appendix 01.

4.0 NATIONAL PLANNING POLICY

- 4.1 The aim of the Sequential Test, as set out in the National Planning Policy Framework (NPPF), is as follows:-

'Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere.'

It is intended that new development is steered to areas with the lowest probability of flooding.

- 4.2 The flood zones are shown on the Flood Map for Planning, these zones indicate the probability of sea and river flooding. The extents of Flood Zones 2 and 3 are shown on the flood map, with Flood Zone 1 being the land outside Flood Zones 2 and 3. Flood Zone 1 is the area at the lowest probability of sea or river flooding.

These maps can be viewed on the GOV.UK website via the link below.

<https://flood-warning-information.service.gov.uk/long-term-flood-risk>

- 4.3 The NPPF Technical Guidance defines at table 1 the Flood Risk Zones as below:

Flood Zone 1 Low Probability	Land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding in any year (<0.1%).
Flood Zone 2 Medium Probability	Land assessed as having between 1 in 100 and 1 in 1,000 annual probability of river flooding (1% to 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% to 0.1%) in any year.
Flood Zone 3a High Probability	Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Flood Zone 3b Functional Floodplain	Land where water has to flow or be stored at times of flood.

- 4.4 The NPPF Technical Guidance defines at table 2 the Flood Risk Vulnerability Classifications, i.e. five categories of flood risk vulnerability with each category having a list of appropriate development uses. The classifications are:-

- Essential infrastructure
- Highly vulnerable development
- More vulnerable development
- Less vulnerable development
- Water compatible development

- 4.5 The NPPF Technical Guidance defines at table 3 the Flood Risk Vulnerability and flood zone 'compatibility' as shown below. Thereby providing a matrix that confirms whether a proposed development type is appropriate within a particular flood risk zone.

Table 3 Flood risk vulnerability and flood zone 'compatibility'

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood Zone (Table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	X	Exception Test required	✓
	Zone 3b functional flood plain	Exception Test required	✓	X	X	X

Key: ✓ - Development is appropriate.
X - Development should not be permitted.

- 4.6 The NPPF considers that the proposed use (healthcare) would be classified as a "more vulnerable" type of development. As such the proposed development would be appropriate in Flood Zones 1 and 2, and also in Flood Zone 3a subject to passing the Exception Test.

5.0 ASSESSMENT OF FLOOD RISK AND MITIGATION

Correspondence

- 5.1 The Environment Agency (EA), Knowsley Council (KC), and United Utilities (UU) have been asked to confirm if they have any information regarding past, present or future flooding issues that may affect the site.
- 5.2 The response from the EA, which can be found at appendix 02, confirms that they are not aware of any flooding problems in the vicinity of the site, other than the risk potentially posed by surface water flooding. This potential risk is discussed further below.
- 5.3 The response from KC is yet to be received. However if it is received during the planning application determination period, and if it contains information that significantly alters the findings of this report, it will be appended to this report at appendix 03, the report amended to suit and then re-submitted to the planning authority.
- 5.4 The response from UU, which can be found at appendix 04, confirms that they are not aware of any flooding problems in the vicinity of the site.

Potential Sources of Flooding

- 5.5 **River and tidal flooding** – from the online GOV.UK river (fluvial) flood mapping, it can be seen that the site is considered to be located within Flood Zone 1 (very low risk). This means that the area has a chance of flooding of less than 0.1% (1 in 1,000) each year.
- 5.6 The National Planning Policy Framework considers that the proposed healthcare use would be classified as a “more vulnerable” type of development, and that it is appropriate in Flood Zone 1.
- 5.7 On this basis, it is considered that the risk to the site from this form of flooding is low.
- 5.8 **Surface water flooding** – from the online GOV.UK surface water (pluvial) flood mapping it can be seen that the area where the development is proposed could be at “low”, “medium” and “high” risk from this form of flooding.
- 5.9 Low risk means that this area has a chance of flooding of between 0.1% and 1% each year.
- 5.10 Medium risk means that this area has a chance of flooding of between 1% and 3.3% each year.
- 5.11 High risk means that this area has a chance of flooding of greater than 3.3% each year.
- 5.12 However it should be noted that flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast.
- 5.13 In addition local features, such as existing drainage systems that were not taken account of by the modelling behind the surface water flood mapping, can greatly affect the chance and severity of flooding.
- 5.14 In this instance it appears that the potential surface water flood risk indicated by the online mapping is as a result of the level difference between the existing staff car park at around 67.5m AOD and the level adjacent to the hospital building is around 64.0m AOD. This level difference is creating a low point where surface water would gather if the low point were not to be served by the hospital’s existing drainage system.
- 5.15 The proposed building will eliminate this level difference and in addition provide a new surface water drainage system to serve the new building.
- 5.16 Given the above, it is considered that the risk to the development from this form of flooding is low.

- 5.17 **Reservoir flooding** - from the online GOV.UK reservoir flood mapping it can be seen that the site is not located within an area that may be affected by reservoir flooding.
- 5.18 Given this it is considered that the risk to the site from this form of flooding is low.
- 5.19 **Groundwater flooding** – from the on-line British Geological Society (BGS) records, the near surface ground conditions in the vicinity of the site are described as Devensian Till, which generally comprises clay. Cohesive ground conditions such as clay tend to limit groundwater flooding problems.
- 5.20 Groundwater flooding tends to occur sporadically in both location and time. When groundwater flooding does occur, it tends to mostly affect low-lying areas or below ground infrastructure and buildings i.e. tunnels, basements, etc.
- 5.21 The proposed building will not have a basement.
- 5.22 On this basis, it is considered that the risk to the site from this form of flooding is low.
- 5.23 **Sewer flooding** – UU have confirmed that they are not aware of any sewer flooding problems in the vicinity of the site.
- 5.24 On this basis, it is considered that the risk to the site from this form of flooding is low.
- 5.25 **Flooding from other sources** – from a review of the Ordnance Survey mapping around the site it can be seen that there does not appear to be any other significant bodies of water near the site.
- 5.26 On this basis, it is considered that the risk to the site from flooding from other sources is low.
- 5.27 **Flood risk summary** – from the above it can be seen that overall flood risk in the vicinity of the proposed building is considered to be low.

6.0 DRAINAGE PROPOSALS

Surface Water Drainage

- 6.1 The proposed development is to be drained via separate foul and surface water drainage systems.
- 6.2 The surface water drainage proposals will be designed in accordance with BS EN 752-4 and the Building Regulations Approved Document H (2010), which indicates the following hierarchy for the disposal of surface water drainage from development sites:-
- discharge via infiltration;
 - discharge to watercourse;
 - discharge to sewer.
- 6.3 These options are discussed in further detail below.
- 6.4 **Surface water discharge via infiltration** - an intrusive site investigation has been completed, which has confirmed the near surface ground conditions as made ground over glacial till (clay). These ground conditions are not suited to the use of infiltration / soakaways.
- 6.5 **Surface water discharge via watercourse** - the closest watercourse to the site is Pendlebury Brook, which is around 850m away. Hence it is considered not to be feasible to discharge the surface water runoff from the development to a watercourse.
- 6.6 **Surface discharge via the public sewerage system** - given the above it will be necessary to discharge the surface water runoff from the proposed development to the existing hospital site's private drainage system, which in turn discharges to the public sewerage network.
- 6.7 In line with modern design standards for surface water drainage systems, the proposals will be formulated to ensure that there will be:-
- no surcharging of sewers for the critical 1 in 1 year storm event.
 - no surface flooding for the critical 1 in 30 year event.
 - no surface flooding that may affect buildings on or off site for the critical 1 in 100 year event including a 45% climate change allowance.
- 6.8 The surface water discharge rate for the proposed development, which has an area of around 770m sq, when based on greenfield run-off rate (Q_{bar}) is 0.4 l/sec. However it is considered that such a low allowable discharge rate would require a flow control with a very small orifice that would be prone to blocking.
- 6.9 Hence a discharge rate of 3 l / sec is proposed, this being considered to be a practical minimum that will not be prone to blocking. This proposed discharge rate will not be exceeded for all storm events up to and including the critical 1 in 100 year event with a 45% climate change allowance.
- 6.10 A drawing indicating the drainage proposals can be found at appendix 05, whilst supporting surface water drainage calculations can be found at appendix 06.

Foul Water Drainage

- 6.11 It is proposed that the new foul water drainage system that will be installed to serve the proposed building will discharge to the existing on site drainage system locally to the new building.

Appendix 01

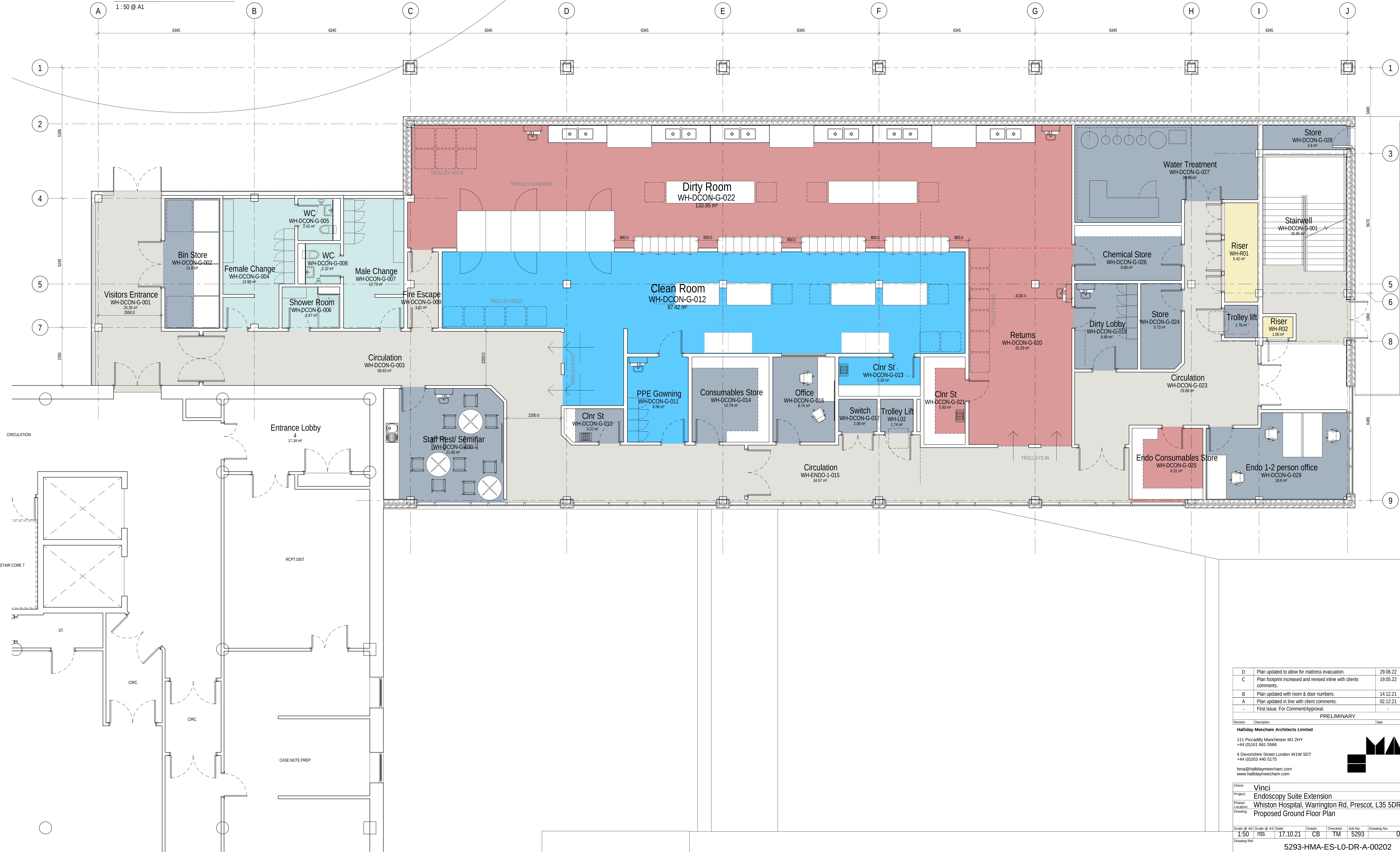
Proposed Layout Plan

Departments

- Circulation
- Clean Zone
- Dirty Zone
- Sanitary
- Service
- Support Spaces

Level 0 GA (Ground Floor)

1:50 @ A1



D	Plan updated to allow for mattress evacuation.	29.06.22	PC	TM
C	Plan footprint increased and revised inline with clients comments.	19.05.22	CB	TM
B	Plan updated with room & door numbers.	14.12.21	CB	TM
A	Plan updated in line with client comments.	02.12.21	CB	TM
-	First Issue. For Comment/Approval.	-	-	-
PRELIMINARY				
Revision	Description	Date	Drawn	Checked
Halliday Meecham Architects Limited				
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4 Devonshire Street London W1W 5DT +44 (0)203 440 5175				
hma@hallidaymeecham.com www.hallidaymeecham.com				
Client:	Vinci			
Project:	Endoscopy Suite Extension			
Phase/Location:	Whiston Hospital, Warrington Rd, Prescot, L35 5DR			
Drawing:	Proposed Ground Floor Plan			
Scale @ A0	Scale @ A3	Date	Drawn	Checked
1:50	NIS	17.10.21	CB	TM
Job No.	5293	Drawing No.	00202	
Drawing Ref.	5293-HMA-ES-L0-DR-A-00202			
				Revision D

Appendix 02

Environment Agency correspondence

Kevin Tyldesley

To: Bryan, John
Subject: RE: GMMC295364SW Data Supply

From: Bryan, John [mailto:John.Bryan@environment-agency.gov.uk]
Sent: 19 January 2023 09:58
To: Kevin Tyldesley <Kevin.Tyldesley@wmlconsulting.com>
Subject: RE: GMMC295364SW Data Supply

Morning Kevin,

Hope you're doing well.

With regards to this site, it is located in flood zone 1, we will provide a product 3 shortly with a few nodes on for reference (no historical flooding).

There is high surface water risk to the site, so I'd recommend you contact the local authority for further information on this, as the EA don't manage this anymore.

Regards an FRA, the EA probably won't get consulted on this as the site is in FZ1, and more than 8 meters from a main river.

Any other questions just give us a shout.

John

John Bryan | Flood & Coastal Risk Management Officer
FCRM - Partnerships & Strategic Overview
Greater Manchester, Merseyside and Cheshire Area
The Environment Agency
Richard Fairclough House, Knutsford Road, Warrington, WA4 1HT

External: 02084745774 | Mobile: 07785459197
john.bryan@environment-agency.gov.uk



From: Kevin Tyldesley <Kevin.Tyldesley@wmlconsulting.com>
Sent: 17 January 2023 13:17
To: GMMC Info Requests <InfoRequests.GMMC@environment-agency.gov.uk>
Subject: 9163 - Whiston Hospital, Warrington Road, Prescot, Merseyside L35 5DR

Hi.

We have been asked to provide a Flood Risk Assessment for a proposed development at the above site, as indicated on the attached.

Can you confirm if you are aware of any flood risk issues that may affect the site please ?

Kind regards.

Kevin Tyldesley

WML Consulting Ltd

Civil, Structural & Geotechnical Engineers

No. 8 Oak Green | Earl Road | Stanley Green Business Park | Cheadle Hulme | Cheshire | SK8 6QL

Tel: 0161 482 0600 | email: kevin.tyldesley@wmlconsulting.com

COVID-19 UPDATE

All our staff are able to work safely and flexibly from office or home.

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Appendix 03

Knowsley Council correspondence

Appendix 04
United Utilities correspondence

Kevin Tyldesley

To: wastewaterdeveloperservices@uuplc.co.uk
Subject: RE: Our reference - 9163 - Whiston Hospital, Warrington Road, Prescot, Merseyside L35 5DR

From: wastewaterdeveloperservices@uuplc.co.uk [mailto:wastewaterdeveloperservices@uuplc.co.uk]
Sent: 19 January 2023 08:35
To: Kevin Tyldesley <Kevin.Tyldesley@wmlconsulting.com>
Subject: Our reference - 9163 - Whiston Hospital, Warrington Road, Prescot, Merseyside L35 5DR



Good Morning Kevin

'I can confirm that we have no current records of sewer flooding within the vicinity of the proposed development.

Please note that United Utilities Water Limited (Uuw) can only record and check flooding events which are reported to us and we have to comply with our Regulators instructions on the qualification of flooding events to place on the register.

Our response does not include:

- any sewer flooding events caused by blockages or collapses which are the result of third party actions, natural events or other actions over which Uuw has no control and not a facet of sewer capacity; or
- any historical sewer flooding events that have been removed from the register as a result of investment in our infrastructure.

As with all development sites, we recommend you liaise with our water and wastewater engineers by contacting our Developer Services team so the details of your development proposal can be considered further. Details can be found at the following link.

<https://www.unitedutilities.com/services/builders-developers/>

Should you require any further information please do not hesitate to contact me.'

Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm. You just click on the orange live chat box on our webpage and one of our advisors will be ready to chat to you and help you with your enquiry <https://www.unitedutilities.com/builders-developers/> or you can email us at WastewaterDeveloperServices@uuplc.co.uk



Sharon Hitch

Developer Services Assistant
Developer Services & Metering
Customer Services
unitedutilities.com

Tel: 0345 072 6067 Option 2 for
Wastewater Services)

Direct Tel: 01925 233885

If you feel you have received a good service from myself, please can you take two minutes to fill in the survey below. This will be much appreciated



Visit: <https://unitedutilities.thewowawards.co.uk/nominate>



----- Original Message -----

From: Kevin Tyldesley [kevin.tyldesley@wmlconsulting.com]

Sent: 17/01/2023 13:18

To: wastewaterdeveloperservices@uuplc.co.uk

Subject: 9163 - Whiston Hospital, Warrington Road, Prescot, Merseyside L35 5DR

EXTERNAL EMAIL This email originated outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Hi.

We have been asked to provide a Flood Risk Assessment for a proposed development at the above site, as indicated on the attached.

Can you confirm if you are aware of any flood risk issues that may affect the site please ?

Kind regards.

Kevin Tyldesley

WML Consulting Ltd

Civil, Structural & Geotechnical Engineers

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Tel: 0161 482 0600 | email: kevin.tyldesley@wmlconsulting.com

COVID-19 UPDATE

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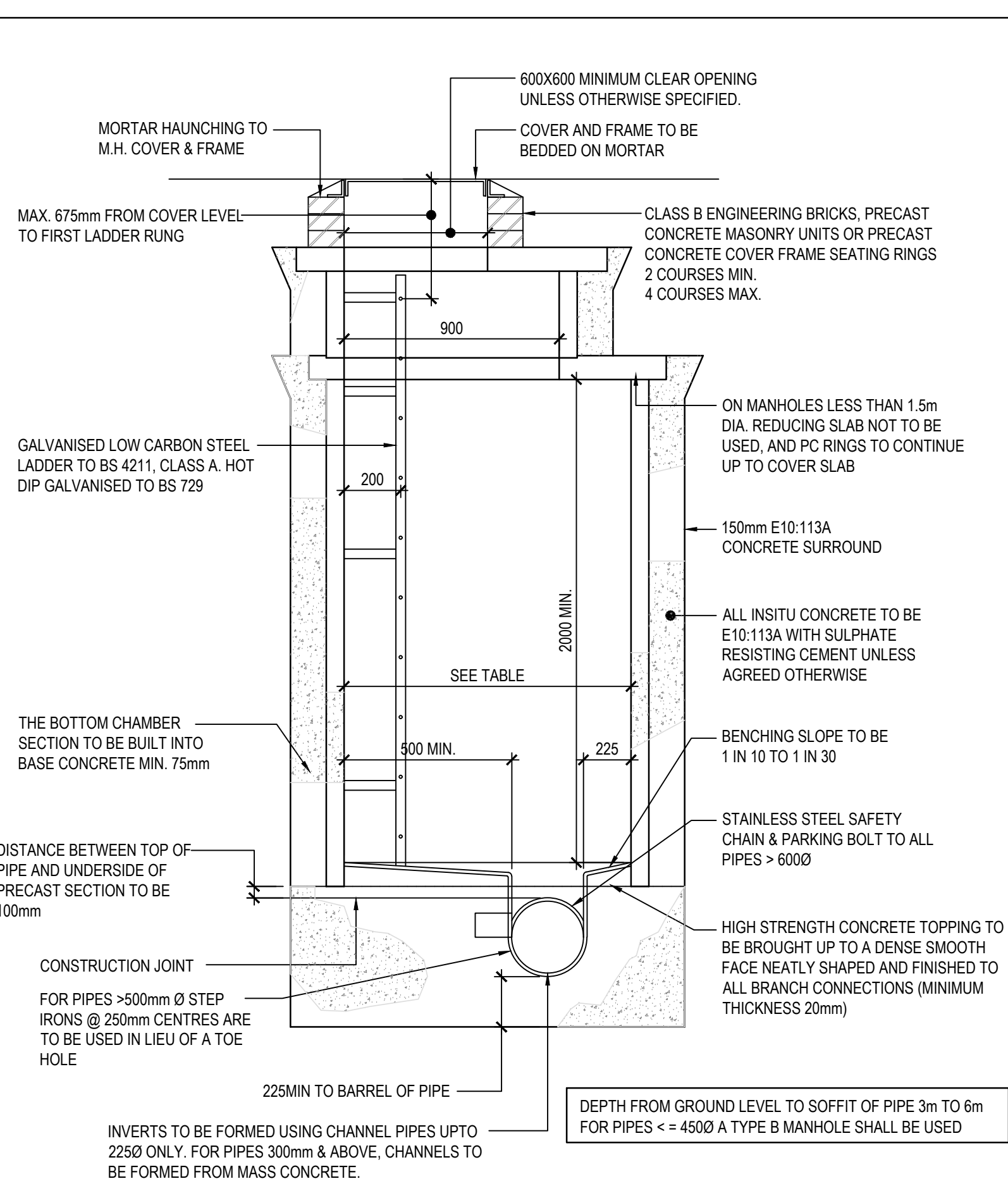
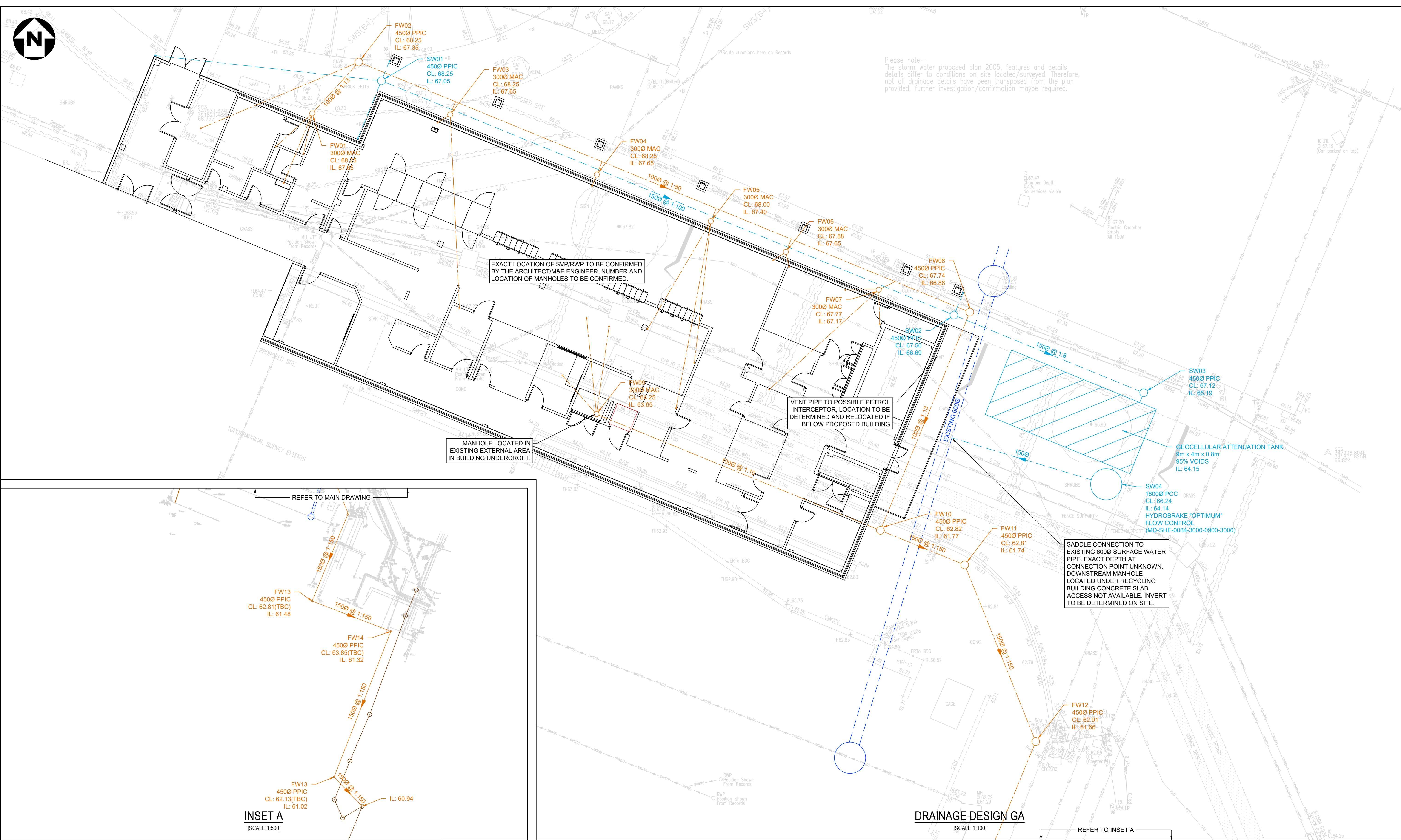

Constructionline
Gold Member



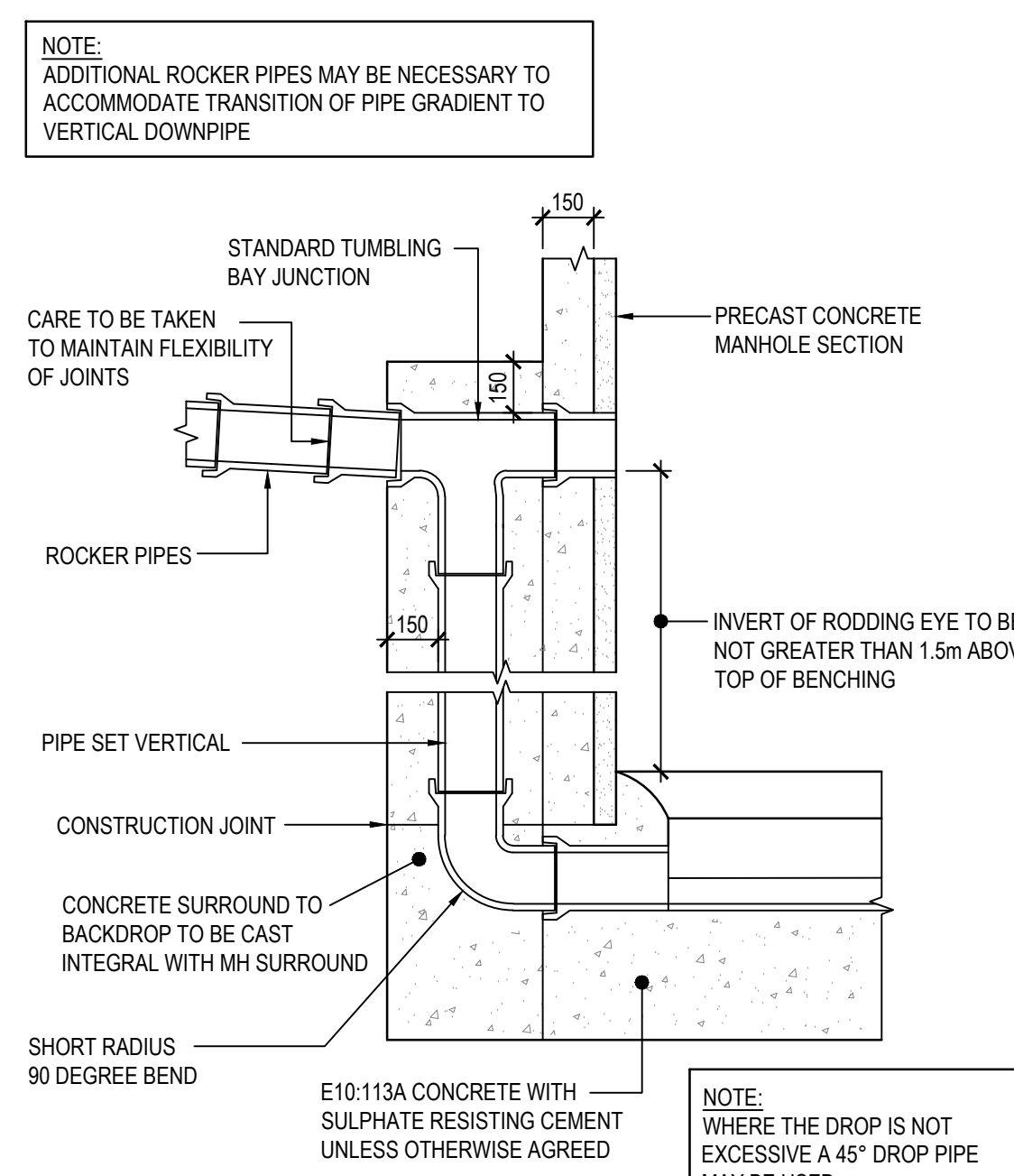
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Appendix 05

Proposed Drainage Layout



TYPICAL MANHOLE DETAIL TYPE A (SECTION)
(SCALE 1:20)



TYPICAL VERTICAL BACKDROP DETAIL
(SCALE 1:20)

GENERAL NOTES

DO NOT SCALE FROM THIS DRAWING WORK TO FIGURED DIMENSIONS ONLY.

NO DEVIATION FROM THE DETAILS SHOWN ON THIS DRAWING IS ALLOWED WITHOUT PRIOR PERMISSION IN WRITING.

ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS AND THE SPECIFICATION.

FOR DETAILS OF MATERIALS AND WORKMANSHIP REFER TO THE SPECIFICATION.

THE CONTRACTOR IS RESPONSIBLE FOR CHECKING INVERT LEVELS AND POSITIONS OF ALL EXISTING DRAINS, SEWERS, INSPECTION CHAMBERS AND MANHOLES SHOWN ON THIS DRAWING IMMEDIATELY ON SITE ESTABLISHMENT. ANY DISCREPANCIES MUST BE REPORTED TO WML CONSULTING IMMEDIATELY.

WHERE THE NEW SITE DRAINAGE CONNECTS IN TO EXISTING MANHOLES IN CARRIAGEWAYS AND / OR EXISTING ADOPTED SEWERS, THE CONTRACTOR IS RESPONSIBLE FOR ALL LIAISON WITH THE RELEVANT STATUTORY UNDERTAKER AND LOCAL AUTHORITY WITH REGARD TO ROAD CLOSURES, TRAFFIC MANAGEMENT, PERMITS TO WORK, SUBMISSION OF CONTRACTORS METHOD STATEMENTS AND RISK ASSESSMENTS AND OTHER DOCUMENTATION AND CORRESPONDENCE ASSOCIATED WITH THE SITE STAGE (PART 2) ELEMENT OF THE WORKS.

ROCKER PIPES TO BE PROVIDED AT ALL CONCRETE CASED INTERFACES.

PROVIDE ADEQUATE PROTECTION TO MAINTAIN MINIMUM COVER TO DRAINS DURING THE CONSTRUCTION PERIOD.

COVER LEVELS ON THIS DRAWING ARE APPROXIMATE AND INDICATIVE ONLY ARCHITECT TO CONFIRM COVER LEVELS TO ALL MANHOLES AND GULLIES PRIOR TO CONSTRUCTION.

THE LAYOUT OF DRAINAGE ON THIS DRAWING IS INDICATIVE ONLY ARCHITECT TO CONFIRM EXACT LOCATION OF MANHOLES AND GULLIES.

U.N.O. ALL DRAINAGE GOODS & FITTINGS TO BE:-

- UP TO 225 DIA. (AND INCLUDING) TO BE SUPERSLEVE VITRIFIED CLAY PIPES OR EQUIVALENT.
- 300 DIA AND ABOVE TO BE CONCRETE BY STANTON BONNA OR EQUIVALENT.

ALL COVERS AND RODDING ACCESS POINTS TO BE SEALED AND SCREWED TIGHT.

ALL INTERNAL MANHOLE COVERS TO BE DOUBLE SEALED, LOCKABLE AND RECESSED TO ACCEPT FLOOR FINISHES WHERE APPLICABLE.

SETTING OUT OF ALL INTERNAL GULLY / PLUMBING CONNECTIONS TO BE CO-ORDINATED BETWEEN THE SERVICE ENGINEERS AND THE ARCHITECT.

ALL INTERNAL GULLIES, PLUMBING CONNECTIONS, SOIL STACKS, SVPS AND ALL OTHER CONNECTIONS OF FOUL AND SURFACE WATER DRAINS TO BELOW GROUND TO BE FITTED WITH ACCESSIBLE RODDING POINTS ABOVE SLAB LEVEL.

ALL SURFACE WATER CONNECTIONS TO BE 150mm DIAMETER AT MINIMUM FALLS OF 1:100 UNLESS NOTED OTHERWISE.

ALL FOUL WATER CONNECTIONS TO BE 100mm DIAMETER AT MINIMUM FALLS OF 1:40 UNLESS NOTED OTHERWISE.

ALL CONNECTIONS TO BE MADE IN ACCORDANCE WITH STANDARD DETAIL DRAWINGS.

ALL PIPEWORK TO BE INSTALLED WITH SOFFITS LEVEL (E.G. AT CHANGES IN PIPE SIZE) U.N.O.

ON COMPLETION OF DRAINAGE WORKS, THE NEW DRAINAGE SYSTEM IS TO BE THOROUGHLY CLEANED AND A CCTV SURVEY CARRIED OUT TO CONFIRM NO CONSTRUCTION DEBRIS OR BLOCKAGES REMAIN.

CONNECTIONS TO CARRIER DRAINS ARE TO BE "Y" JUNCTIONS.

ALL PRIVATE DRAINAGE IS TO COMPLY WITH BS EN 752 AND BUILDING REGS. PART H.

MANHOLE COVERS IN VEHICULAR AREAS TO BE EN124 CLASS D400, IN NON - VEHICULAR AREAS TO BE EN124 CLASS C250.

SURFACE WATER DRAINAGE STRATEGY

THE PROPOSED DEVELOPMENT IS TO BE DRAINED VIA SEPARATE FOUL AND SURFACE WATER DRAINAGE SYSTEMS.

THE SURFACE WATER DRAINAGE PROPOSALS HAVE BEEN DESIGNED IN ACCORDANCE WITH BS EN 752-4 AND THE BUILDING REGULATIONS APPROVED DOCUMENT H (2019), WHICH INDICATES THE FOLLOWING HIERARCHY FOR THE DISPOSAL OF SURFACE WATER DRAINAGE FROM DEVELOPMENT SITES:

1. DISCHARGE VIA INFILTRATION;
2. DISCHARGE TO WATERCOURSE;
3. DISCHARGE TO SEWER.

THESE OPTIONS ARE DISCUSSED IN FURTHER DETAIL BELOW.

SURFACE WATER DISCHARGE VIA INFILTRATION

AN INTRUSIVE SITE INVESTIGATION HAS BEEN COMPLETED. FROM THE SURVEY THE NEAR SURFACE GROUND CONDITIONS HAVE BEEN CONFIRMED MADE GROUND TO 3m AND BELOW THAT AS GLACIAL TILL. ON THIS BASIS THE USE OF INFILTRATION / SOAKAWAYS ARE LIKELY NOT VIABLE.

SURFACE WATER DISCHARGE VIA WATERCOURSE

GIVEN THE ABOVE IT WOULD NEXT BE TO DISCHARGE TO A WATERCOURSE, HOWEVER THE CLOSEST TO THE SITE IS THE PENDLEBURY BROOK, 850m AWAY, THROUGH MULTIPLE HOUSES AND A GOLF COURSE. IT IS UNLIKELY THAT THIS WOULD BE FEASIBLE.

SURFACE DISCHARGE VIA THE PUBLIC SEWERAGE SYSTEM

GIVEN THE ABOVE IT WOULD BE NECESSARY TO DISCHARGE THE SURFACE WATER RUNOFF FROM THE PROPOSED DEVELOPMENT TO THE PUBLIC DRAINAGE SYSTEM. THIS WOULD MEAN THAT THE SYSTEM WOULD CONNECT TO THE NEARBY PRIVATE SYSTEM ALREADY IN PLACE AT THE SITE.

- IN LINE WITH MODERN DESIGN STANDARDS FOR SURFACE WATER DRAINAGE SYSTEMS, THE PROPOSALS HAVE BEEN FORMULATED TO ENSURE THERE WILL BE:-
1. NO SURCHARGING OF SEWERS FOR THE CRITICAL 1 IN 1 YEAR STORM EVENT.
 2. NO SURFACE FLOODING FOR THE CRITICAL 1 IN 30 YEAR EVENT.
 3. NO SURFACE FLOODING THAT MAY AFFECT BUILDINGS ON OR OFF SITE FOR THE CRITICAL 1 IN 100 YEAR EVENT INCLUDING A 45% CLIMATE CHANGE ALLOWANCE.

THE SURFACE WATER DISCHARGE RATE FOR THE PROPOSED DEVELOPMENT, WHICH HAS AN AREA OF AROUND 770m², WHEN BASED ON GREENFIELD RUN-OFF RATE (Q_{run}) IS 0.4 l/s. HOWEVER IT IS CONSIDERED THAT SUCH A LOW ALLOWABLE DISCHARGE RATE WOULD REQUIRE A FLOW CONTROL WITH A VERY SMALL ORIFICE THAT WOULD BE PRONE TO BLOCKING. HENCE A DISCHARGE RATE OF 3 l/s IS PROPOSED, THIS BEING CONSIDERED TO BE A PRACTICAL MINIMUM THAT WILL NOT BE PRONE TO BLOCKING. THIS PROPOSED DISCHARGE RATE WILL NOT BE EXCEEDED FOR ALL STORM EVENTS UP TO AND INCLUDING THE CRITICAL 1 IN 100 YEAR EVENT WITH A 45% CLIMATE CHANGE ALLOWANCE.

MAINTENANCE OF THE BELOW GROUND DRAINAGE SYSTEM

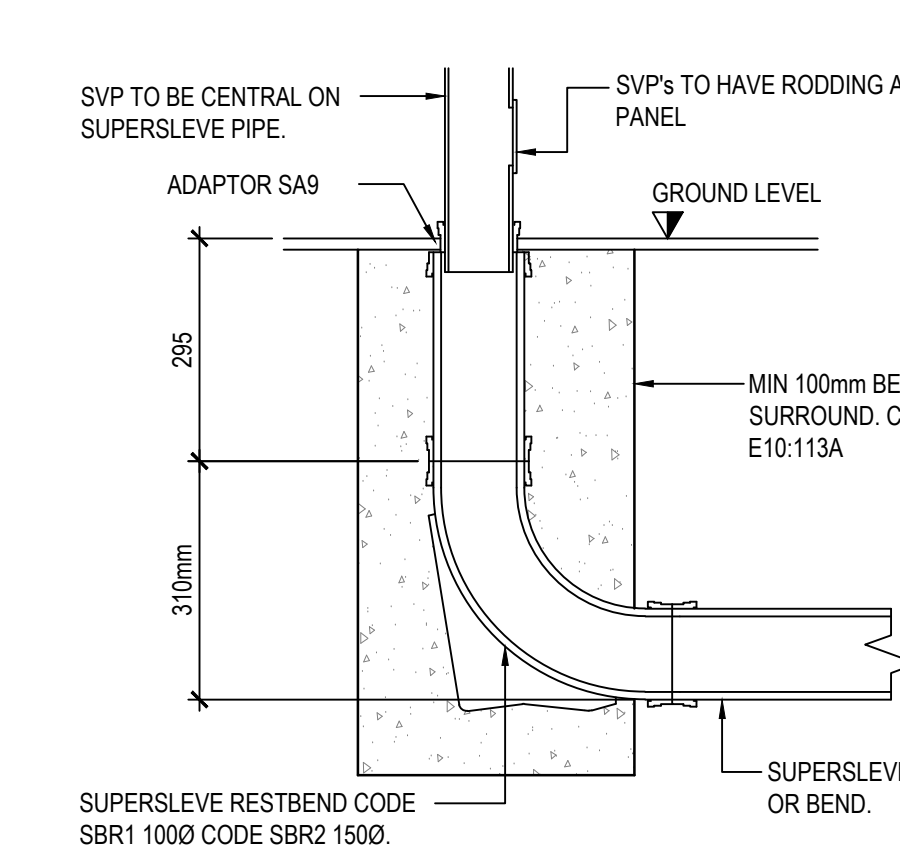
THE BELOW GROUND FOUL AND SURFACE WATER DRAINAGE PROPOSALS INDICATED ARE RELATIVELY TRADITIONAL IN NATURE, AND SHOULD PROVIDE YEARS OF RELATIVELY LOW MAINTENANCE OPERATION IN RELATION TO THE ANTICIPATED LIFESPAN OF THE PROPOSED DEVELOPMENT.

IN LINE WITH CURRENT GOOD PRACTICE:-

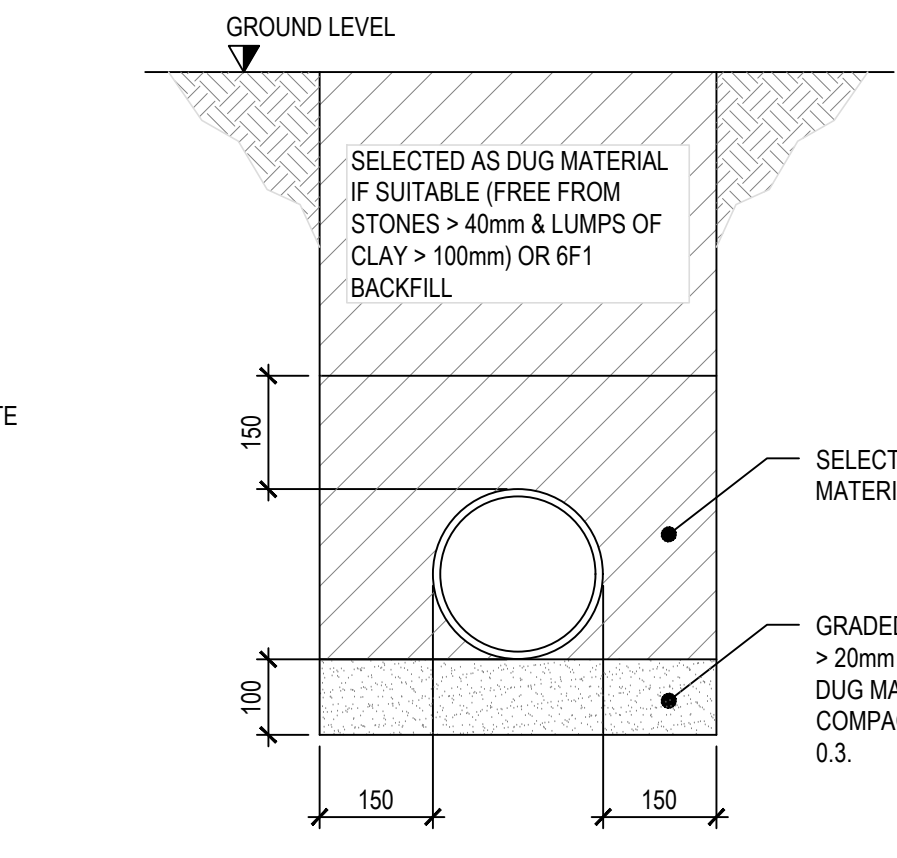
- GULLIES AND LINEAR DRAINAGE CHANNELS SHOULD BE INSPECTED AND / OR CLEANED OUT AT 6 MONTHLY INTERVALS.
- INSPECTION CHAMBERS, MANHOLES, CATCHPITS, ETC. SHOULD BE INSPECTED AT 6 MONTHLY INTERVALS TO ENSURE THAT THE PIPEWORK AND INFILTRATION DEVICES ASSOCIATED WITH THEM ARE OPERATING EFFECTIVELY.

ANY PROBLEMS HIGHLIGHTED BY THESE INSPECTIONS WILL NEED TO BE INVESTIGATED, POSSIBLY BY CCTV SURVEY, TO CONFIRM THE NATURE OF THE PROBLEM AND TO ALLOW IT TO BE REMEDIED IN A TIMELY MANNER.

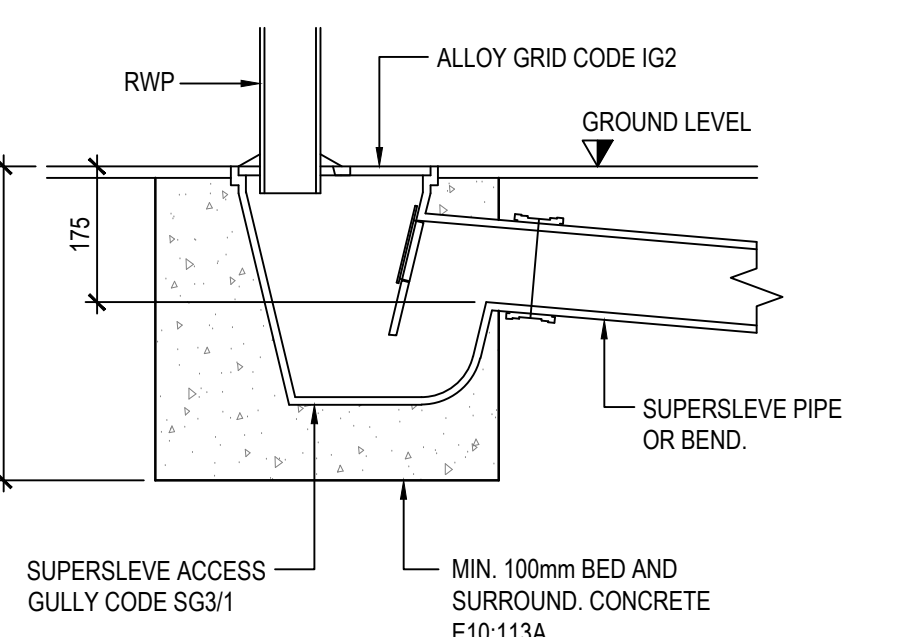
IT IS UNDERSTOOD THAT THE MONITORING AND ROUTINE MAINTENANCE OF THE BELOW GROUND DRAINAGE SYSTEM WILL BE CARRIED OUT BY THE OCCUPIERS MAINTENANCE STAFF WITH ADDITIONAL HELP PROVIDED BY EXTERNAL SPECIALIST DRAINAGE PROFESSIONALS BROUGHT IN AS REQUIRED.



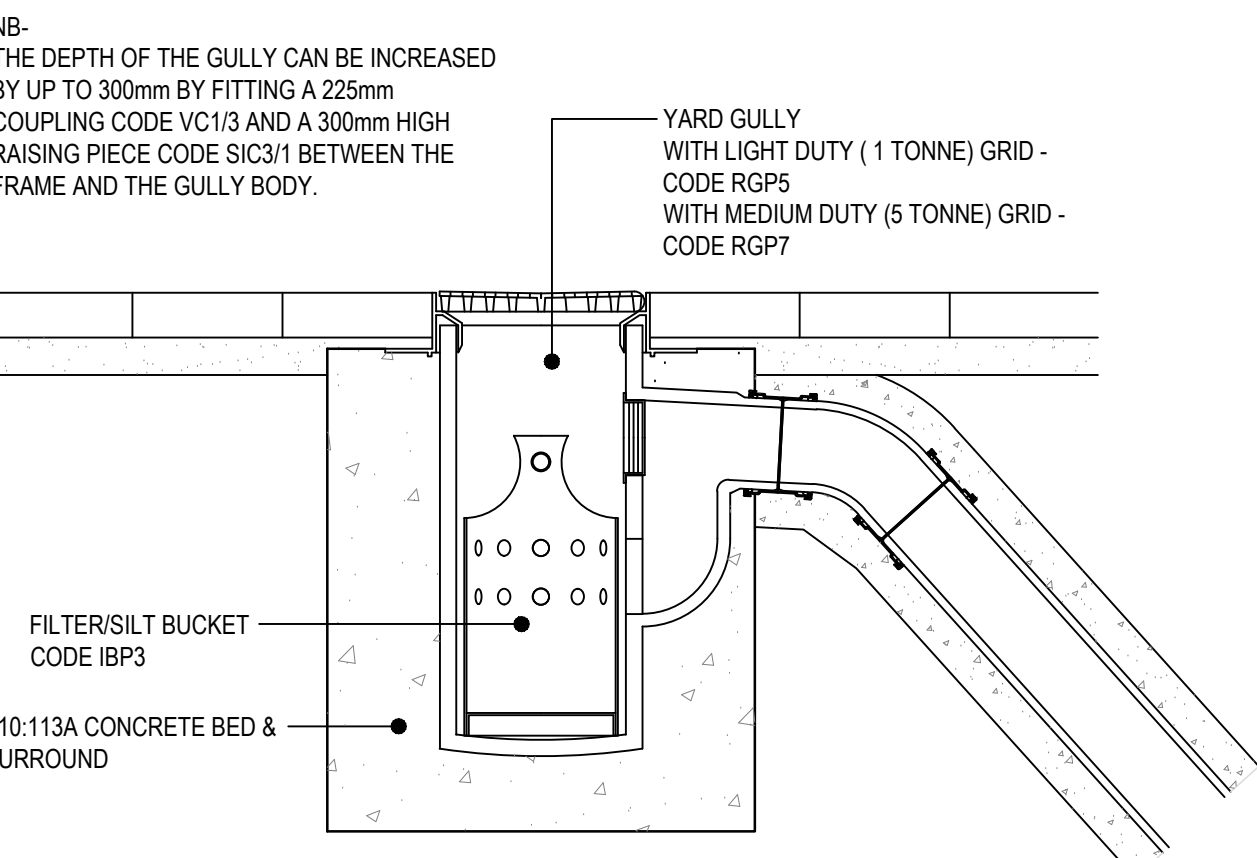
SOIL VENT PIPE
(SCALE 1:10)



DRAIN TRENCH NOT
SUBJECTED TO TRAFFIC
(BEDDING CLASS N)
(SCALE 1:10)

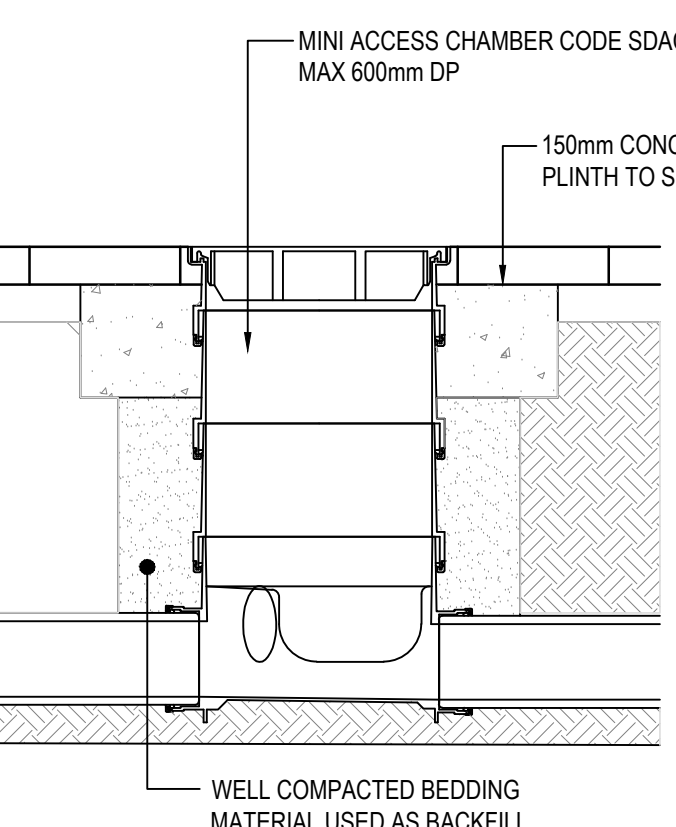


RWP DETAIL
(SCALE 1:10)

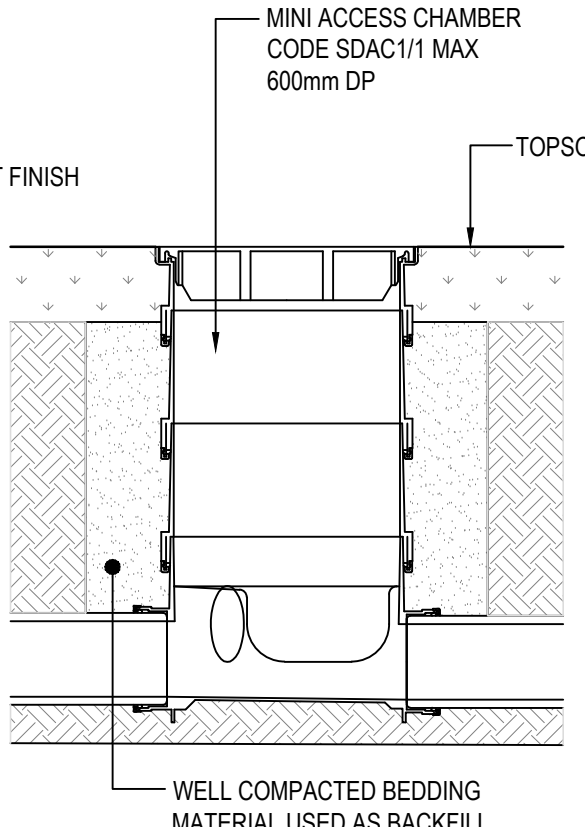


YARD GULLY CONNECTION DETAIL
(SCALE 1:10)

SITED IN DRIVEWAYS/ PAVED AREAS

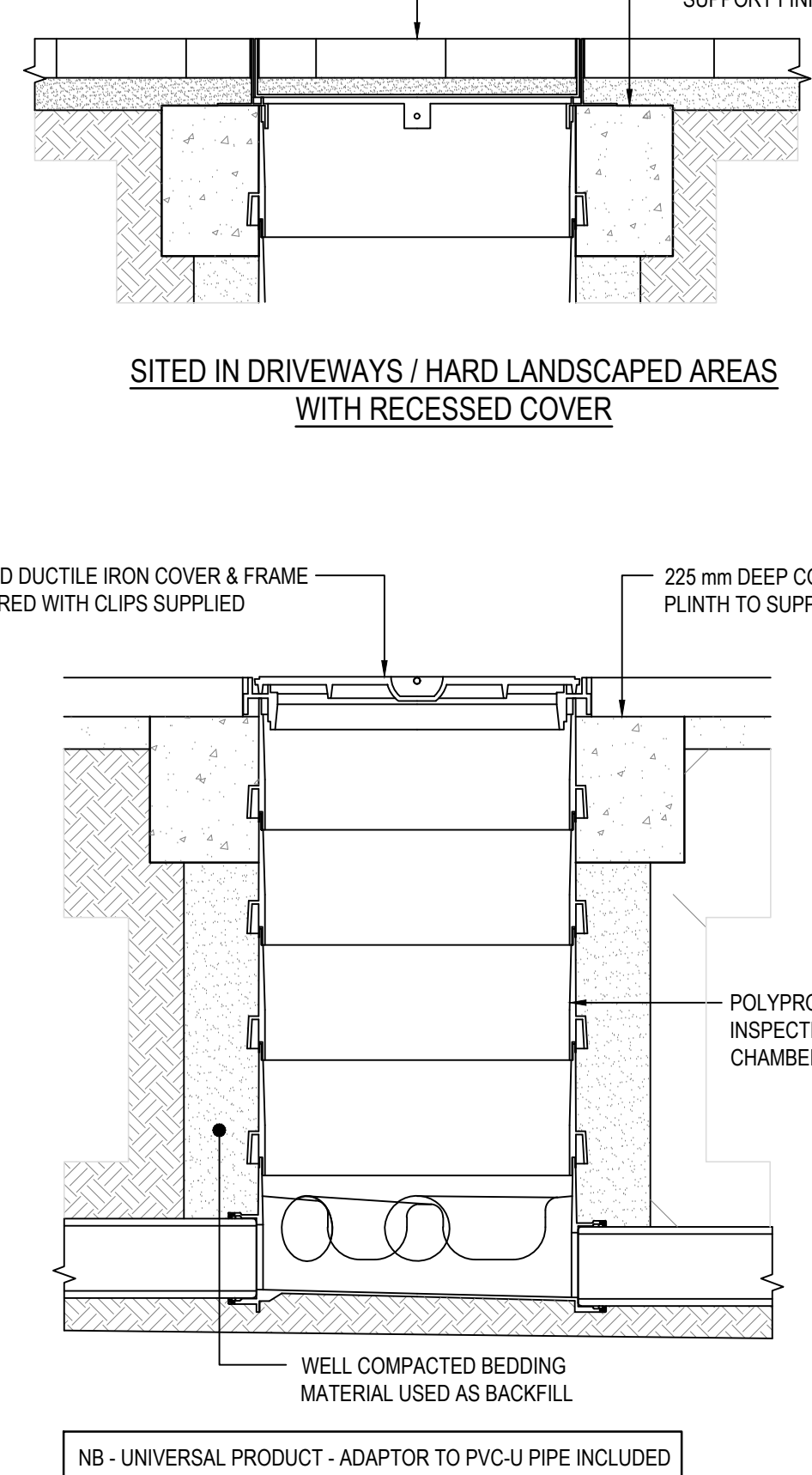


SITED IN LANDSCAPED AREAS



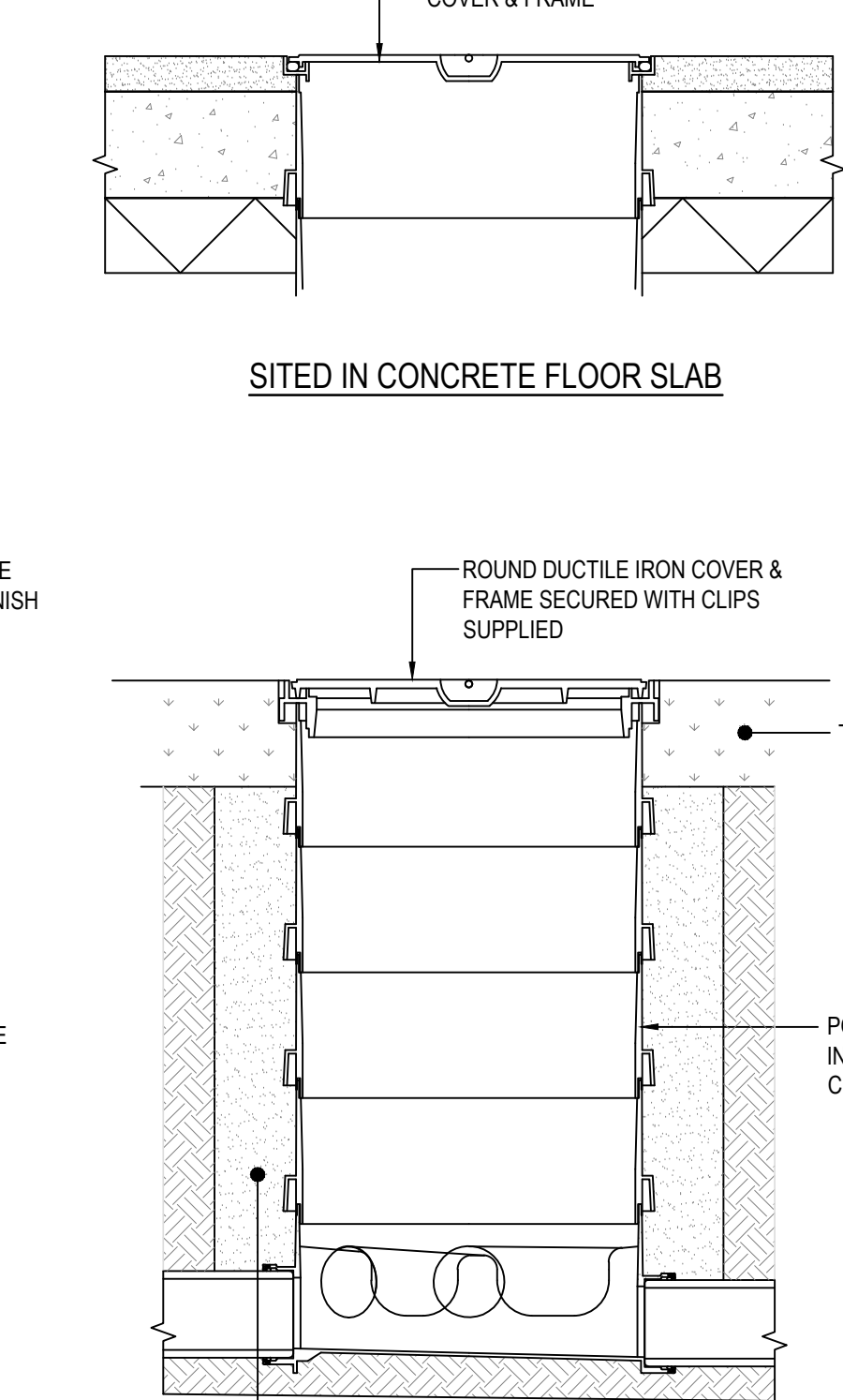
MINI ACCESS CHAMBER INSTALLATION DETAIL
(3000 MAX. DEPTH 600mm)
(HEPWORTH PRODUCTS)
(SCALE 1:20)

SITED IN DRIVEWAYS / HARD LANDSCAPED AREAS WITH RECESSED COVER



SITED IN DRIVEWAYS / HARD LANDSCAPED AREAS
WITH STANDARD ROUND COVER

SITED IN CONCRETE FLOOR SLAB



SITED IN SOFT LANDSCAPED AREAS WITH
STANDARD ROUND COVER

POLYPROPYLENE INSPECTION CHAMBER
INSTALLATION DETAIL (4500 UP TO 1.2m DEEP)
(HEPWORTH PRODUCTS)
(SCALE 1:20)

PLANNING

Rev.	Amendment	Date	By	Chkd
P02	UPDATED TO ON SITE INVESTIGATIONS	14.02.23	RH	NB
P01	PRELIMINARY ISSUE.	29.11.22	RH	NB

Project
**DECONTAMINATION DEPARTMENT
WHISTON HOSPITAL**

Client
HALLIDAY MEECHAM

Title
**DRAINAGE DESIGN GA
& DRAINAGE DETAILS**

WML Job No.	Drawn	Checked	Date	Scale
9163	RH	NB	NOVEMBER 2022	AS SHOWN

WML CONSULTING
Civil Structural & Geotechnical Engineers

No 8 Oak Green
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www.wmlconsulting.com

Appendix 06

Surface water drainage calculations

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No. 8 Oak Green Stanley Green Business Park Earl Rd, Cheadle Hulme, SK8 6QL	9163 - Whiston Hospital Decontamination Unit Proposed Surface Water Design	
Date 14/02/2023 10:27 File Proposed.MDX	Designed by Richard H Checked by Kevin T	
Innovyze	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.396	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	35.597	0.360	98.9	0.041	2.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	11.794	1.500	7.9	0.032	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	5.690	0.050	113.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	9.271	0.100	92.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	2.59	67.050	0.041	0.0	0.0	0.0	1.01	17.9	5.6
1.001	50.00	2.64	66.690	0.073	0.0	0.0	0.0	3.62	63.9	9.9
1.002	50.00	2.74	65.190	0.073	0.0	0.0	0.0	0.94	16.6	9.9
1.003	50.00	2.89	65.140	0.073	0.0	0.0	0.0	1.04	18.4	9.9

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
SW1	68.250	1.200	Open Manhole	450	1.000	67.050	150				
SW2	67.500	0.810	Open Manhole	450	1.001	66.690	150	1.000	66.690	150	
SW3	67.120	1.930	Open Manhole	450	1.002	65.190	150	1.001	65.190	150	
SW4	66.240	1.100	Open Manhole	1800	1.003	65.140	150	1.002	65.140	150	
SADDLE	66.240	1.200	Open Manhole	0		OUTFALL		1.003	65.040	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SW1	347942.351	391823.240	347942.351	391823.240	Required	
SW2	347975.294	391809.752	347975.294	391809.752	Required	
SW3	347986.209	391805.284	347986.209	391805.284	Required	
SW4	347984.053	391800.018	347984.053	391800.018	Required	
SADDLE	347975.176	391802.693			No Entry	

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
1.003	SADDLE	66.240	65.040	0.000	0	0

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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.396		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: SW4, DS/PN: 1.003, Volume (m³): 2.9

Unit Reference	MD-SHE-0084-3000-0900-3000
Design Head (m)	0.900
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	84
Invert Level (m)	65.140
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	3.0
Flush-Flo™	0.267	3.0
Kick-Flo®	0.570	2.4
Mean Flow over Head Range	-	2.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.5	1.200	3.4	3.000	5.2	7.000	7.8
0.200	3.0	1.400	3.7	3.500	5.6	7.500	8.1
0.300	3.0	1.600	3.9	4.000	6.0	8.000	8.3
0.400	2.9	1.800	4.1	4.500	6.3	8.500	8.6
0.500	2.7	2.000	4.3	5.000	6.7	9.000	8.8
0.600	2.5	2.200	4.5	5.500	7.0	9.500	9.0
0.800	2.8	2.400	4.7	6.000	7.3		
1.000	3.1	2.600	4.9	6.500	7.5		

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No. 8 Oak Green	9163 - Whiston Hospital													
Stanley Green Business Park	Decontamination Unit													
Earl Rd, Cheadle Hulme, SK8 6QL	Proposed Surface Water Design													
Date 14/02/2023 10:27	Designed by Richard H													
File Proposed.MDX	Checked by Kevin T													
Innovyze	Network 2020.1.3													
<u>Storage Structures for Storm</u> <u>Tank or Pond Manhole: SW4, DS/PN: 1.003</u> Invert Level (m) 65.150 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>31.5</td><td>0.800</td><td>31.5</td><td>0.801</td><td>0.0</td></tr></tbody></table>			Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	31.5	0.800	31.5	0.801	0.0
Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)									
0.000	31.5	0.800	31.5	0.801	0.0									
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No. 8 Oak Green
Stanley Green Business Park
Earl Rd, Cheadle Hulme, SK8 6QL

9163 - Whiston Hospital
Decontamination Unit
Proposed Surface Water Design

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Micro Drainage

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor 1.000

Additional Flow - % of Total Flow 0.000

Hot Start (mins) 0

MADD Factor * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coefficient 0.800

Manhole Headloss Coeff (Global) 0.500

Flow per Person per Day (l/per/day) 0.000

Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0

Number of Storage Structures 1

Number of Online Controls 1

Number of Time/Area Diagrams 0

Number of Offline Controls 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR

Ratio R 0.396

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 20.000

Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status OFF

DVD Status ON

Inertia Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440

Return Period(s) (years) 1, 30, 100

Climate Change (%) 0, 0, 45

Water

US/MH

Return Climate

First (X)

First (Y)

First (Z)

Overflow

Level

PN

Name

Storm

Period

Change

Surcharge

Flood

Overflow

Act.

(m)

1.000

SW1 15 Summer

1

+0%

30/15 Summer

67.120

1.001

SW2 15 Summer

1

+0%

100/15 Summer

66.734

1.002

SW3 15 Summer

1

+0%

30/15 Summer

65.292

1.003

SW4 30 Winter

1

+0%

30/15 Summer

65.259

Surcharged Flooded

US/MH

Depth

Volume

Flow / Overflow

Half Drain

Pipe

Level

PN

Name

(m)

(m³)

Cap.

(l/s)

(mins)

(l/s)

Status

Exceeded

1.000

SW1

-0.080

0.000

0.42

7.3

OK

1.001

SW2

-0.106

0.000

0.18

10.5

OK

1.002

SW3

-0.048

0.000

0.77

10.6

OK

1.003

SW4

-0.031

0.000

0.17

2.7

OK

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Stanley Green Business Park	Decontamination Unit	
Earl Rd, Cheadle Hulme, SK8 6QL	Proposed Surface Water Design	
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File Proposed.MDX	Checked by Kevin T	
Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 45

									Water
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow
PN	Name	Storm	Period		Change	Surcharge	Flood	Overflow	Act.
1.000	SW1	15	Summer	30	+0%	30/15	Summer		
1.001	SW2	15	Summer	30	+0%	100/15	Summer		
1.002	SW3	15	Summer	30	+0%	30/15	Summer		
1.003	SW4	60	Winter	30	+0%	30/15	Summer		

PN	US/MH Name	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status	Level Exceeded
		Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)		
1.000	SW1	0.054	0.000	1.01			17.3	SURCHARGED	
1.001	SW2	-0.074	0.000	0.50			28.6	OK	
1.002	SW3	0.176	0.000	2.12			29.2	SURCHARGED	
1.003	SW4	0.202	0.000	0.18			3.0	SURCHARGED	

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Innovyze				Network 2020.1.3																																																																										
<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>																																																																														
<u>Simulation Criteria</u>																																																																														
Areal Reduction Factor		1.000		Additional Flow - % of Total Flow		0.000																																																																								
Hot Start (mins)		0		MADD Factor * 10m³/ha Storage		2.000																																																																								
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Manhole Headloss Coeff (Global)		0.500		Flow per Person per Day (l/per/day)		0.000																																																																								
Foul Sewage per hectare (l/s)		0.000																																																																												
Number of Input Hydrographs		0		Number of Storage Structures		1																																																																								
Number of Online Controls		1		Number of Time/Area Diagrams		0																																																																								
Number of Offline Controls		0		Number of Real Time Controls		0																																																																								
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Return Period(s) (years)						1, 30, 100																																																																								
Climate Change (%)						0, 0, 45																																																																								
<table><tr><td></td><td>US/MH</td><td></td><td>Return</td><td>Climate</td><td>First (X)</td><td>First (Y)</td><td>First (Z)</td><td>Overflow</td><td>Water</td></tr><tr><td>PN</td><td>Name</td><td>Storm</td><td>Period</td><td>Change</td><td>Surcharge</td><td>Flood</td><td>Overflow</td><td>Act.</td><td>Level</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>(m)</td></tr><tr><td>1.000</td><td>SW1</td><td>15 Summer</td><td>100</td><td>+45%</td><td>30/15 Summer</td><td></td><td></td><td></td><td>68.136</td></tr><tr><td>1.001</td><td>SW2</td><td>15 Summer</td><td>100</td><td>+45%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>66.993</td></tr><tr><td>1.002</td><td>SW3</td><td>15 Winter</td><td>100</td><td>+45%</td><td>30/15 Summer</td><td></td><td></td><td></td><td>66.071</td></tr><tr><td>1.003</td><td>SW4</td><td>60 Winter</td><td>100</td><td>+45%</td><td>30/15 Summer</td><td></td><td></td><td></td><td>65.988</td></tr></table>										US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water	PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level										(m)	1.000	SW1	15 Summer	100	+45%	30/15 Summer				68.136	1.001	SW2	15 Summer	100	+45%	100/15 Summer				66.993	1.002	SW3	15 Winter	100	+45%	30/15 Summer				66.071	1.003	SW4	60 Winter	100	+45%	30/15 Summer				65.988
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