

Drainage Statement

**Ebenezer Chapel
Prudhoe
Northumberland**

March 2023

Revision Log

Revision	Description	By	Date
Ø	Initial issue	SH	24 th February 2023
A	Drainage Strategy drawing amended	SH	29 th March 2023

Introduction

Portland Consulting Engineers have been engaged to carry out a drainage strategy of the drainage on for the conversion of the former Ebenezer Chapel into 5 No. residential Karbon Housing in Prudhoe, Northumberland.

The drainage systems proposed on this development have been designed to take into consideration the requirements of Northumberland County Council's (NCC) Local Plan, whilst complying with Northumbrian Water's (NWL) requirements.

Surface Water Philosophy

Connection point:

The surface water is to connect to the NWL surface water sewer in Woodhead Road, in accordance with the Pre-Planning Enquiry dated 14/02/2023.

Maximum Flow Rates:

NCC's requirements are such that surface water systems designed must accommodate all storms up to and including the 1/100 year return period with a 45% allowance for climate change, allowing no surface water flooding to leave the site or affect any new properties. A Greenfield runoff rate of 0.4 l/s has been calculated using the ICP SUDS module within 'MicroDrainage'. In accordance with Section 25.8.4 of the SuDS manual, a minimum orifice size of 75mm should be utilised for the development. Therefore, following preliminary drainage design using a vortex flow control device with a 75mm orifice, a discharge rate of **2.6 l/sec** should be achieved on all storms up to and including the 100year + 45% cc event.

Climate change allowance:

45% has been allowed for in the calculations

Storm Water Attenuation:

A cellular storage tank has been designed to accommodate the volumes associated the above flow restrictions/allowances. The tank will be in land owned by Karbon Housing Ltd

Silt Removal/Surface Water Treatment:

Permeable paving is specified for all private parking areas. Including these elements into the system will reduce the levels of silt and pollutants that may otherwise enter the surface water systems from private parking areas

Drainage System Maintenance:

Karbon Housin Ltd will own and maintain the entire onsite drainage system including all pipework, inspection chambers, permeable paving and the attenuation tank. Details of the maintenance requirements can be found appendix F.

Foul Water

The foul water is to connect to the exiting foul sewer adjacent to the site in accordance with the Pre-Planning Enquiry dated 14/02/2023.

Appendices:

Appendix A – Drainage Strategy Drawing

Appendix B – NWL Pre-Planning Enquiry Response

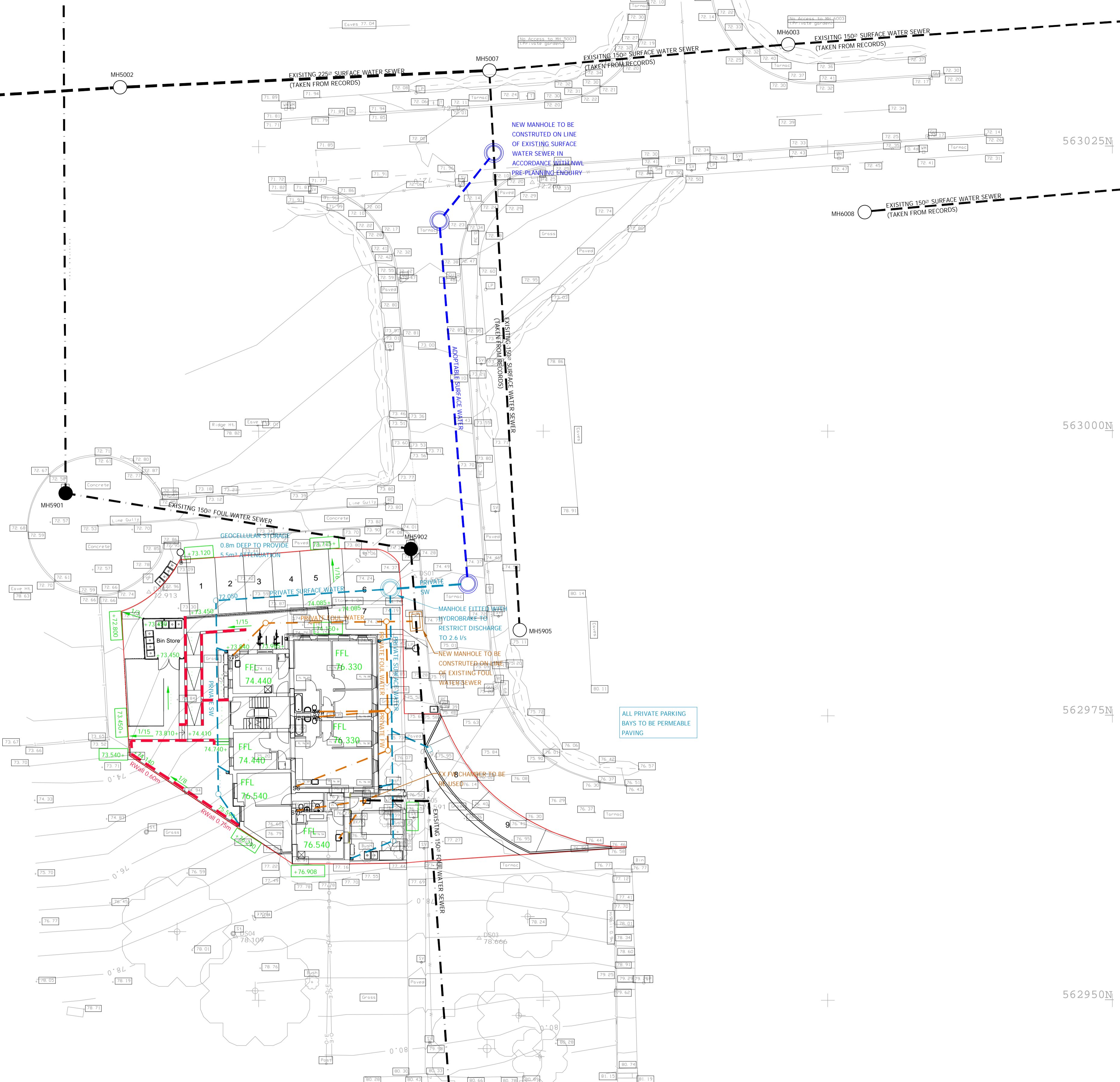
Appendix C – Hydraulic Calculations

Appendix D – Maintenance Schedules



Ebenezer Chapel
Prudhoe
Drainage Statement

Appendix A – Drainage Strategy Drawing



- KEY:**
- EXISTING ADOPTED COMBINED
 - PROPOSED PRIVATE FOUL
 - PROPOSED PRIVATE SURFACE

- NOTES:**
1. ALL DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE WATER SERVICES AUTHORITY 'SEWERS FOR ADOPTED' CURRENT EDITION AND ADOPTING WATER AUTHORITY SEWERAGE AGENCY REQUIREMENTS AND SPECIFICATIONS. ALL PRIVATE DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH BUILDING REGULATIONS 2010 EDITION.
 2. POSITION SIZE AND DEPTH OF ALL EXISTING SEWERS AND SERVICES SHALL BE ESTABLISHED BY MAIN CONTRACTOR PRIOR TO COMMENCEMENT ON SITE.
 3. THE CONTRACTOR SHALL ALLOW FOR THE PROTECTION, TEMPORARY AND PERMANENT SUPPORT, AND TEMPORARY DIVERSION WORKS, AS NECESSARY TO ALL EXISTING SERVICES.
 4. THE CONTRACTOR SHALL ALLOW FOR ALL TRAFFIC MANAGEMENT IN CONNECTION WITH ROAD AND SEWER WORKS.
 5. THE CONTRACTOR SHALL ALLOW FOR KEEPING SEWER TRENCHES AND EXCAVATIONS AS DRY AS PRACTICABLE BY PUMPING FROM TEMPORARY SUMPS AND DRAINING AS APPROPRIATE. THE POINT AND METHOD OF DISCHARGE TO BE AGREED WITH THE DRAINAGE AUTHORITY.
 6. PIPES UP TO AND INCLUDING 225mm Ø TO BE EXTRA STRENGTH V CLAY OR UNPLASTICISED PVC. VITRIFIED CLAY PIPES AND FITTINGS SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN295 AND BS 65 RESPECTIVELY. PIPES 300mm Ø AND GREATER TO BE CONCRETE CLASS H.
 7. VITRIFIED CLAY PIPES AND FITTINGS SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN295 AND BS 65 RESPECTIVELY AND BE KITEMARKED. ALL PIPES SHALL BE EXTRA STRENGTH TO BS 65 OR EQUIVALENT BS EN295 PIPE CRUSHING STRENGTH.
 8. ALL PIPEWORK TO BE 100mm DIAMETER UNLESS NOTED OTHERWISE.
 9. IN-SITU AND PRECAST CONCRETE UNITS SHALL HAVE SULPHATE RESISTING PORTLAND CEMENT TO BS 4027, UNLESS AGREED OTHERWISE WITH THE ADOPTING AUTHORITY.
 10. PRECAST CONCRETE PRODUCTS SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS 5911 AND BE KITEMARKED.
 11. MANHOLE COVERS AND FRAMES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN124. HAVE MINIMUM 675 x 675 CLEAR OPENINGS WITH 150 DEEP FRAMES UNLESS OTHERWISE SPECIFIED. MANHOLE COVERS AND FRAMES TO BE OF A NON-ROCKING DESIGN WITHOUT CUSHION INSERTS AND BE KITEMARKED. LOAD CLASS D400 IN VEHICULAR TRAFFICED AREAS AND LOAD CLASS B125 IN FOOTWAYS AND PEDESTRIAN AREAS.
 12. GULLY GRATES AND FRAMES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN124 AND BE OF A NON-ROCKING DESIGN WITH CAPTIVE HINGE ACCESS AND BE KITEMARKED. LOAD CLASS D400 FOR ROADS REGULARLY CARRYING FAST MOVING HEAVY VEHICLES. CLASS C250 TO BE USED IN LESSER TRAFFICED AREAS eg. ESTATE ROADS, CUL-DE-SACS, RESIDENTIAL CAR PARKING AREAS ETC.
 13. CLASS X BEDDING DETAIL SHALL BE PROVIDED WHERE COVER TO THE PIPE BARREL IS LESS THAN 1.2M IN VEHICULAR TRAFFICED AREAS AND 0.9M ELSEWHERE. TO ALL ROAD GULLY CONNECTIONS AND WITHIN AREAS OF DEEP-ROOTING VEGETATION.
 14. WHERE CLASS X TRENCH BEDDING DETAIL IS USED, THE CONCRETE BED AND SURROUND SHALL BE DISCONTINUED AT EACH PIPE JOINT OVER THE FULL CROSS SECTION BY MEANS OF A SHAPED COMPRESSIBLE FILLER.
 15. SELECTED BACKFILL MATERIAL SHALL CONSIST OF UNIFORM MATERIAL FREE FROM STONES LARGER THAN 40mm. CLAY LUMPS LARGER THAN 15mm, TREE ROOTS, ORGANIC MATTER AND FROZEN SOIL. SELECTED BACKFILL MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING 225mm, EACH LAYER COMPACTED TO FORM A STABLE TRENCH BACKFILL.
 16. GENERAL BACKFILL MATERIAL, TO BE FREE FROM STONES LARGER THAN 40mm. GENERAL BACKFILL MATERIAL IS TO BE PLACED IN LAYERS NOT EXCEEDING 150mm THICKNESS AND EACH LAYER COMPACTED BY HAND. NO MECHANICAL COMPACTION OF FILL MATERIAL SHALL BE PERMITTED WITHIN 300mm ABOVE THE CROWN/BARREL OF THE PIPE.
 17. BACKFILLING AND REINSTATEMENT TO TRENCHES IN PUBLIC HIGHWAYS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS AND SPECIFICATIONS OF THE ADOPTING AUTHORITY. OR, IN THE ABSENCE OF SUCH, IN ACCORDANCE WITH THE REQUIREMENTS OF 'THE STREET WORKS REGULATIONS 1997' AND RELEVANT PROVISIONS OF H.A.U.C. 'SPECIFICATION FOR THE REINSTATEMENT OF OPENINGS IN HIGHWAYS' JUNE 1992, BOTH UNDER SECTION 71 OF THE NEW ROADS AND STREET WORKS ACT 1991.
 18. BACKFILL TO DRAINAGE TRENCHES IN HARD PAVED AREAS SHALL BE G.S.B. TYPE 1.
 19. ALL RUN-DOWNWATERS TO DISCHARGE TO TRAPPED GULLIES.
 20. ALL ROAD GULLIES ARE TO BE TRAPPED GULLIES.
 21. ALL GULLY LEADS TO BE 150mm DIAMETER.
 22. ALL REDUNDANT EXISTING DRAINAGE TO BE GRUBBED UP OR GROUTED. ANY EXISTING LIVE DRAINAGE SHOULD BE REPORTED TO THE ENGINEER AND RECONNECTED.
 23. ALL ROAD GULLIES & LEADS TO BE CLEARED OF DEBRIS UPON COMPLETION OF WORKS.
 24. ANY EXISTING DRAINAGE WHICH BECOMES UNDER TRAFFICED AREAS IN THE NEW SCHEME SHOULD BE SUBJECT TO THE FOLLOWING REMEDIALS/REVISIONS, WHERE DEPTH OF COVER IS LESS THAN 1200mm. THE EXISTING PIPEWORK SHALL BE EXPOSED & SURROUNDED WITH 150mm CONCRETE AS CLASS 'X' BEDDING, WHERE THE EXISTING MANHOLE COVER & FRAME IS NOT AS MANHOLE DETAIL A OR B, OR TO BS EN124 CLASS D, THEN IT SHOULD BE CHANGED FOR SUCH.
 25. THE CONTRACTOR MUST ENSURE THAT ANY OF THE EXISTING DRAINAGE WHICH IS LIVE IS KEPT CLEAR OF DEBRIS AND SHOULD ALLOW FOR JETTING THROUGH THE NEW & EXISTING DRAINAGE UPON COMPLETION.
 26. CONTRACTOR TO TAKE MEASURES TO PROTECT HIS OPERATIVES WITH RESPECT TO THE PRESENCE OF GAS IN SEWER TRENCHES AND MANHOLES THROUGH THE USE OF GAS MONITORING EQUIPMENT AND BREATHING APPARATUS AS REQUIRED.
 27. CONTRACTOR TO APPLY FOR SEWER PERMITS AND ROAD OPENING PERMITS AS NECESSARY FROM THE APPROPRIATE AUTHORITIES, PRIOR TO COMMENCING WORKS.

- HEALTH & SAFETY**
1. CONTRACTOR SHOULD BE AWARE OF GENERAL CONSTRUCTION RISKS TO PREVENT SLIPS, TRIPS AND FALLS AND TAKE NECESSARY PRECAUTIONS WITHOUT SPECIAL INSTRUCTION.
 2. CONTRACTOR TO PROVIDE TRENCH SUPPORTS AS APPROPRIATE AND ENSURE THAT PLANT REMAINS A SAFE DISTANCE FROM TRENCHES PRIOR TO INSTALLING DRAINAGE.
 3. THE TIME THAT EXCAVATIONS ARE OPEN ON SITE SHOULD BE KEPT TO A MINIMUM AND ALL TRENCHES SHOULD BE SURROUNDED BY A BARRIER.
 4. CONTRACTOR TO MAKE OPERATIVES AWARE OF ASSOCIATED DANGERS TO HEALTH SUCH AS LEPTOSPIROSIS (WELLS DISEASE) AND RECOMMENDED PRECAUTIONS. ADEQUATE WELFARE FACILITIES AND PROTECTIVE CLOTHING TO BE PROVIDED AS REQUIRED.
 5. UNFINISHED MANHOLES MUST BE COVERED WITH LOAD BEARING MATERIALS AND SURROUNDED WITH BARRIER.
 6. SERVICE RECORDS TO BE REFERRED TO PRIOR TO WORK COMMENCING. CONTRACTOR TO PROCEED WITH CAUTION AND SERVICES TO BE LOCATED BY HAND AND PROTECTED ACCORDINGLY.
 7. CONTRACTOR TO ENSURE RELEVANT MEASURES ARE TAKEN TO KEEP PLANT AND PEOPLE A SAFE DISTANCE FROM STEEP SLOPES DURING THE WORKS.
 8. CONTRACTOR TO ENSURE THAT PROCEDURES ARE IN PLACE TO KEEP PEOPLE A SAFE DISTANCE FROM WORKING PLANT WHERE NECESSARY.
 9. CONTRACTOR TO REFER TO GROUND INVESTIGATION REPORT FOR CONTAMINATION TESTS AND TO PROVIDE ADEQUATE WELFARE FACILITIES AND PROTECTIVE CLOTHING AS REQUIRED.

Rev.	Description	By	Chk	App	Date
A	External levels amended	SH	SH	LRB	03/03/23
01	Initial Issue	SH	SH	LRB	24/02/23



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 T: 0191 4619710 W: www.portlandconsulting.co.uk
 F: 0191 4663028 E: info@portlandconsulting.co.uk

Client: Karbon Homes

Project: Ebenezer Chapel Prudhoe

Drawing Title: Drainage Strategy

Scale	1:200	Sheet Size	A1
Drawn By	SH	Checked By	SH
Approved By	LRB	Date	24/02/23

Drawing Status: Preliminary		
Project No.	Drawing No.	Revision
2022093	000-00	A

DS01	410563.717	562987.231	74.522
DS02	410540.354	562985.856	72.913
DS03	410569.366	562955.455	78.666
DS04	410547.974	562955.594	78.109
DS05	410563.987	562967.290	76.591
LF1	410574.047	563021.847	72.266

This drawing and design is for use solely in connection with the above project. This drawing is the copyright of Portland Consulting Engineers, and must not be reissued, loaned or copied without written consent. All dimensions and setting out shall be checked on site before construction. Do not scale from this drawing. This drawing is to be read in conjunction with all other information relevant to the project. Any apparent discrepancy shall be brought to the attention of Portland Consulting Engineers.



Appendix B – NWL Pre-Planning Enquiry Response

Direct Line: 07543301284
Email: developmentenquiries@nwl.co.uk
Our Ref: 304724

Tuesday, 14 February 2023

Portland Consulting Engineers
Bankside
10 The Watermark
Newcastle upon Tyne
NE11 9SY

Dear Stephen,

Re: Pre-Planning Enquiry – Ebenezer Church, Scales Crescent, West Wylam

Further to the Point of Connection Application for the above site, received 25 January 2023, we are now able to provide the following response.

We have based our response on the information in your application and accompanying correspondence. Therefore, should any of the information now be different, then you must ensure that you inform us of any changes as further Network Modelling may be required and our response may also change, leading to this response being invalid.

Northumbrian Water assesses the impact of the proposed development on our assets and assesses the capacity within our network's to accommodate and treat the anticipated flows arising from the development. We do not therefore offer comment on aspects of planning applications that are outside of our area of control.

Enclosed in this response is a scaled plan showing the approximate position of the water and sewerage networks within the vicinity of this site.

We have changed the way contractors and developers can access our assets.

Historically only our own staff and framework contractors could access our sewerage network. As of 1st January 2018, we are allowing third party contractors to access our sewer network on a site by site basis, subject to certain conditions.

Further information (including how to apply) is available from our web site - <https://www.nwl.co.uk/services/developers/developer-sewerage-services/>

Also enclosed is our extract showing locations within the approximate vicinity of this site that have, from our records, experienced flooding. This has been provided to demonstrate the known flood risks within the vicinity which have been considered as part of our assessment on this enquiry.

We have also carried out a review of your application and can confirm the following:

Sewerage and Sewage Treatment

Northumbrian Water would ask that you please separate the foul and surface water flows in accordance with Part H of the Building Regulations prior to the final connection to the public sewer.

All new connections to the public sewerage system must first be approved through the Section 106 of the Water Industry Act 1991 process prior to construction.

Should you decide to proceed with this development, a fully completed Sewer Connection application form will be required. These are available to download from the following link:

https://www.nwl.co.uk/services/developers/developer_sewerage-services/new-sewer-connections-s106/

Foul Water Discharge

The foul flows can discharge without restriction into the 150mm diameter foul public sewer running through the site via manhole 5902.

Surface Water Discharge

No surface water flow from the proposed development will be allowed to connect into the existing public sewerage system unless it is proven that the alternative options which are listed within Part H of the Building Regulations 2010 are not available:

Rainwater from a system provided pursuant to sub-paragraphs (1) or (2) shall discharge to one of the following, listed in order of priority –

- (a) an adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable,
- (b) a watercourse; or, where that is not reasonably practicable,
- (c) a sewer.

If the more sustainable options prove to be unfeasible, a unrestricted surface water flows would be permitted to discharge into the 150mm diameter surface water public sewer via manhole 5905 or 5906. Any excess in flows must be attenuated on site.

Written approval for all individual connections (direct or indirect) to the public sewerage system should be obtained through the Section 106 process, following completion of the detailed drainage design and before the commencement of any drainage works on site.

Protection of Existing Sewerage Assets

We wish to draw your attention to the existing sewer which passes through the site. This sewer could be diverted, protected or accommodated within your site layout with an appropriate easement.

Part H of the Building Regulations also details the reasons why Northumbrian Water does not permit buildings to be built over or near to its sewerage network:

Undue risk in the event of failure of the drain or sewer

Maintaining access
Protection of the drain or sewer during construction
Protection from settlement
Protection against piling

To discuss the diversion of this asset in further detail, please contact:

Graeme Telford
07715 547429
graeme.telford@nwl.co.uk

Sewage Treatment Capacity

The Sewage Treatment Works to which this development finally discharges to is 'Howdon STW' and these works are able to accept the additional flows.

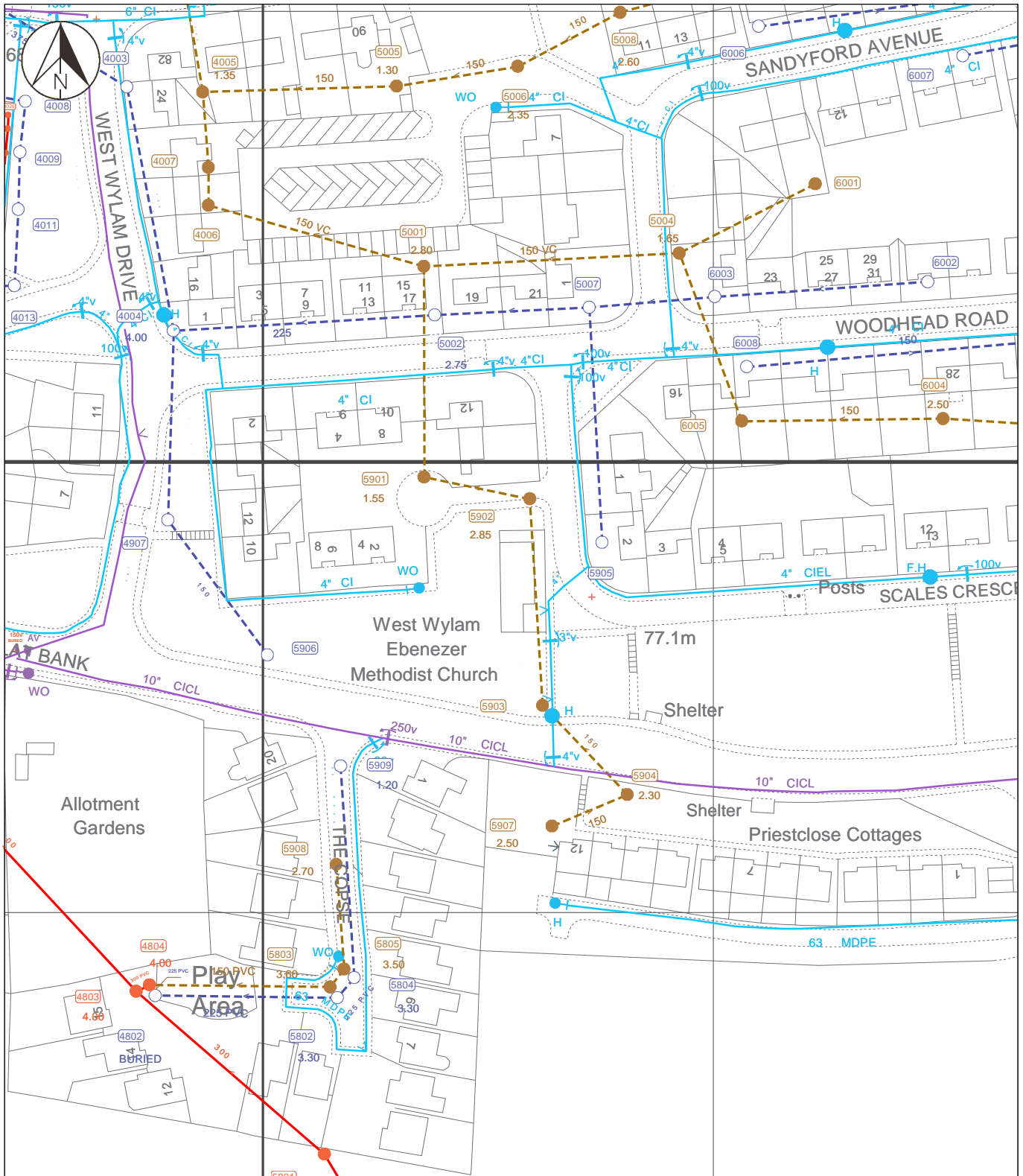
Please note that this response is valid for 1 year only and you should resubmit your proposals should this period lapse prior to your development beginning.

Should you require any further assistance or information, then please do not hesitate to contact me at developmentenquiries@nwl.co.uk or alternatively on 07543301284, please quote our reference number above in any future correspondence.

Yours sincerely,

A solid black rectangular box used to redact the signature of Sophie Clarke.

Sophie Clarke
Technical Support Advisor
Developer Services

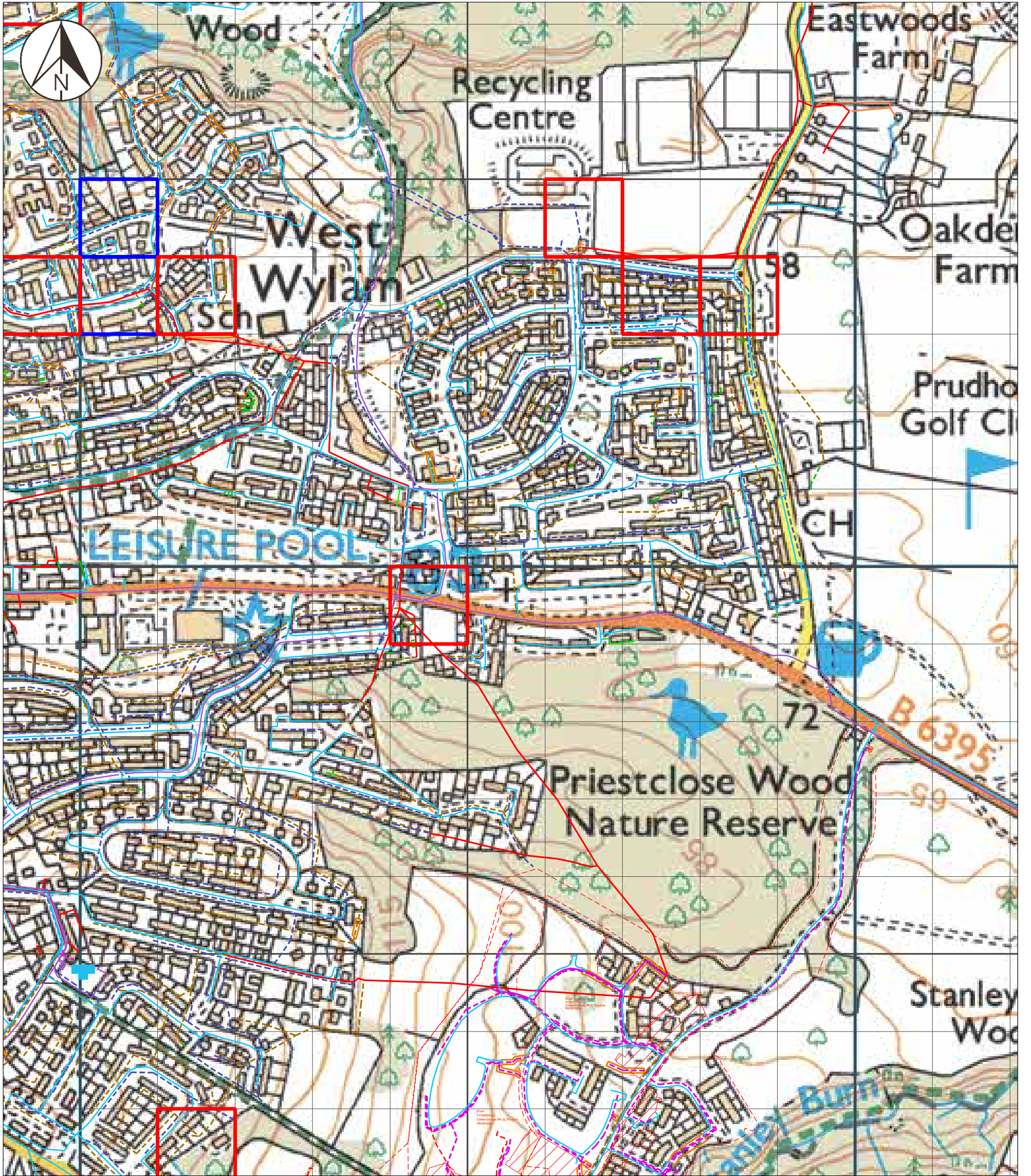


Waste Water - NWL Responsibility		Private/Non NWL		Proposed		Water Network - Network Types		AB Asbestos	
Combined	—	Combined	—	Combined	—	Distribution	—	Asbestos	XXXX
Foul	—	Foul	—	Foul	—	Treated	—	Abandoned	----
Surface	—	Surface	—	Surface	—	Raw	—	Out of Comm	----
Treated Eff	—	Treated Eff	—			Fire	—	Proposed	----
Untreated Eff	—	Trade Eff	—			Supply	—		
Overflow	—	Watercourse	—			Private	—		

NORTHUMBRIAN WATER *living water*
 User : BOWMS Date : 30/01/2023 11:56:01
 Title : Map Sheet : NZ1062NE
 Centre Point : 410555,562971 Paper / Scale : A4@1:1250

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Waste Water - NWL Responsibility		Private/Non NWL		Proposed		Water Network -		Network Types	
Combined		Combined		Combined		Distribution		AB Asbestos	
Foul		Foul		Foul		Treated		Abandoned	
Surface		Surface		Surface		Raw		Out of Comm	
Treated Eff		Treated Eff				Fire		Proposed	
Untreated Eff		Trade Eff				Supply			
Overflow		Watercourse				Private			



User : BOWMS
 Title :
 Centre Point : 410555,562971

Date : 30/01/2023 11:34:52
 Map Sheet : NZ1062
 Paper / Scale : A3@1:5015


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Ebenezer Chapel
Prudhoe
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Appendix C – Hydraulic Calculations

Portland Consulting Engineers Ltd		Page 1
10 Bankside, The Watermark Gateshead NE11 9SY	EBENEZER CHAPEL PRUDHOE	
Date 24/02/2023 File Drainage Strategy.MDX	Designed by SH Checked by	
Micro Drainage	Network 2020.1	

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)	2	PIMP (%)	100
M5-60 (mm)	17.000	Add Flow / Climate Change (%)	0
Ratio R	0.331	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	22.150	2.215	10.0	0.019	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	17.000	1.700	10.0	0.011	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	15.340	0.110	139.5	0.014	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	6.850	0.046	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	79.150	1.190	66.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	7.650	0.077	99.4	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	5.12	74.155	0.019	0.0	0.0	0.0	3.20	56.6	2.6
2.000	50.00	5.09	73.750	0.011	0.0	0.0	0.0	3.20	56.6	1.5
2.001	50.00	5.39	72.050	0.025	0.0	0.0	0.0	0.85	15.0	3.4
1.001	50.00	5.53	71.940	0.044	0.0	0.0	0.0	0.82	14.5	6.0
1.002	48.23	6.60	71.894	0.044	0.0	0.0	0.0	1.23	21.8	6.0
1.003	47.82	6.72	70.704	0.044	0.0	0.0	0.0	1.01	17.8	6.0

10 Bankside, The Watermark Gateshead NE11 9SY	EBENEZER CHAPEL PRUDHOE	
Date 24/02/2023 File Drainage Strategy.MDX	Designed by SH Checked by	


Micro Drainage	Network 2020.1
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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)	2	Cv (Summer) 0.750
Region England and Wales		Cv (Winter) 0.840
M5-60 (mm)	17.000	Storm Duration (mins) 30
Ratio R	0.331	

Portland Consulting Engineers Ltd		Page 3
10 Bankside, The Watermark Gateshead NE11 9SY	EBENEZER CHAPEL PRUDHOE	
Date 24/02/2023 File Drainage Strategy.MDX	Designed by SH Checked by	
Micro Drainage	Network 2020.1	

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 4, DS/PN: 1.001, Volume (m³): 3.6

Unit Reference	MD-SHE-0075-2600-1100-2600
Design Head (m)	1.100
Design Flow (l/s)	2.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	75
Invert Level (m)	71.940
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	2.6	Kick-Flo®	0.671	2.1
Flush-Flo™	0.331	2.6	Mean Flow over Head Range	-	2.3

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	2.1	1.200	2.7	3.000	4.1	7.000	6.1
0.200	2.5	1.400	2.9	3.500	4.4	7.500	6.3
0.300	2.6	1.600	3.1	4.000	4.7	8.000	6.5
0.400	2.5	1.800	3.3	4.500	5.0	8.500	6.7
0.500	2.5	2.000	3.4	5.000	5.2	9.000	6.9
0.600	2.3	2.200	3.6	5.500	5.5	9.500	7.1
0.800	2.2	2.400	3.7	6.000	5.7		
1.000	2.5	2.600	3.9	6.500	5.9		

10 Bankside, The Watermark
 Gateshead
 NE11 9SY

EBENEZER CHAPEL
 PRUDHOE



Date 24/02/2023
 File Drainage Strategy.MDX

Designed by SH
 Checked by


Micro Drainage Network 2020.1

Storage Structures for Storm

Cellular Storage Manhole: 4, DS/PN: 1.001

Invert Level (m) 71.940 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	12.5	12.5	0.900	0.0	24.5
0.800	12.5	24.5			

Portland Consulting Engineers Ltd		Page 5
10 Bankside, The Watermark Gateshead NE11 9SY	EBENEZER CHAPEL PRUDHOE	
Date 24/02/2023 File Drainage Strategy.MDX	Designed by SH Checked by	

Micro Drainage Network 2020.1

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 0.335
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 17.000 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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Water Level (m)
1.000	1	15 Winter	1	+0%				74.174
2.000	2	15 Winter	1	+0%				73.766
2.001	3	15 Winter	1	+0%	30/15 Winter			72.093
1.001	4	30 Winter	1	+0%	30/15 Summer			72.045
1.002	5	30 Winter	1	+0%				71.926
1.003	6	30 Winter	1	+0%				70.741

PN	US/MH Name	Surcharged Flooded			Half Drain Pipe		Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap. (l/s)	Time (mins)	Pipe Flow (l/s)	
1.000	1	-0.131	0.000	0.04		2.1	OK
2.000	2	-0.134	0.000	0.02		1.2	OK
2.001	3	-0.107	0.000	0.18		2.5	OK
1.001	4	-0.045	0.000	0.17	14	2.1	OK
1.002	5	-0.119	0.000	0.10		2.1	OK
1.003	6	-0.113	0.000	0.14		2.1	OK

Portland Consulting Engineers Ltd		Page 6
10 Bankside, The Watermark Gateshead NE11 9SY	EBENEZER CHAPEL PRUDHOE	
Date 24/02/2023 File Drainage Strategy.MDX	Designed by SH Checked by	

Micro Drainage Network 2020.1

30 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 0.335
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 17.000 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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	30	+0%					74.186
2.000	2	15 Winter	30	+0%					73.773
2.001	3	30 Winter	30	+0%	30/15 Winter				72.255
1.001	4	30 Winter	30	+0%	30/15 Summer				72.249
1.002	5	60 Winter	30	+0%					71.929
1.003	6	60 Winter	30	+0%					70.745

PN	US/MH Name	Surcharged Flooded			Half Drain Pipe		Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap. (l/s)	Time (mins)	Pipe Flow (l/s)		
1.000	1	-0.119	0.000	0.10		5.2	OK	
2.000	2	-0.127	0.000	0.06		3.0	OK	
2.001	3	0.055	0.000	0.36		5.0	SURCHARGED	
1.001	4	0.159	0.000	0.21	22	2.6	SURCHARGED	
1.002	5	-0.116	0.000	0.12		2.6	OK	
1.003	6	-0.109	0.000	0.17		2.6	OK	

Portland Consulting Engineers Ltd		Page 7
10 Bankside, The Watermark Gateshead NE11 9SY	EBENEZER CHAPEL PRUDHOE	
Date 24/02/2023 File Drainage Strategy.MDX	Designed by SH Checked by	

Micro Drainage Network 2020.1

100 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 0.335
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 17.000 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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	100	+45%					74.198
2.000	2	15 Winter	100	+45%					73.783
2.001	3	60 Winter	100	+45%	30/15 Winter				72.738
1.001	4	60 Winter	100	+45%	30/15 Summer				72.732
1.002	5	480 Summer	100	+45%					71.929
1.003	6	480 Summer	100	+45%					70.745

PN	US/MH Name	Surcharged Flooded			Half Drain Pipe		Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Overflow Cap. (l/s)	Time (mins)	Pipe Flow (l/s)		
1.000	1	-0.107	0.000	0.18		9.6	OK	
2.000	2	-0.117	0.000	0.11		5.6	OK	
2.001	3	0.538	0.000	0.44		6.1	SURCHARGED	
1.001	4	0.642	0.000	0.21		50 2.6	SURCHARGED	
1.002	5	-0.116	0.000	0.12		2.6	OK	
1.003	6	-0.109	0.000	0.17		2.6	OK	



Appendix D – Maintenance Schedules

Drainage Maintenance Schedule/Requirements

This maintenance schedule should be read in conjunction with the following Portland Consulting drawing numbers:

000-00 Drainage Strategy

Section 1

General Maintenance & Inspection Recommendations

For Below Ground Gravity Drainage. (Including Drainage Channels)

1. No work shall be carried out on the drainage system without permission from a nominated person, who has access to information/a working knowledge of the system.
2. Maintenance/inspection work shall be carried out in a safe/planned manner.
3. All work is to be carried out by competent persons suitably trained and equipped in accordance with current statutory safe working policies.
4. Entry into confined spaces shall be kept to a minimum and be restricted to suitably qualified/equipped persons working in accordance with current statutory safe working policies.
5. High levels of hygiene shall be maintained at all times, with adequate welfare facilities being provided for the personnel.
6. Drainage systems shall be inspected on a regular basis or should any problems be suspected. Any debris/ defects discovered shall be recorded and a programme of cleaning/ repair initiated. Urgent repairs/ cleaning shall be actioned as soon as practicable.
7. The following operations should be carried out annually.
 - a) Covers of inspection chambers and manholes shall be removed and the sides, benchings and channels cleared.
 - b) Accumulated deposits of silt in soakaways, catchpit manholes, drainage channels, gullies etc. shall be removed. Any traps shall then be plunged and thoroughly flushed out with clean water.
 - c) Main and branch drains shall be cleared as required and afterwards be flushed with clean water. Any obstructions found shall be removed and not flushed down the system.
 - d) Covers of inspection chambers, manholes, gullies etc. shall be replaced, bedded in suitable grease or other sealing material as required and bolted/locked down as appropriate. Missing bolts and broken items shall be replaced in accordance with the manufacturer's details.
8. Trapped gullies shall be checked and replenished as necessary in order to maintain the seal, preventing the escape of odours.
9. Clearing of the drainage system can be achieved by a number of methods depending on the nature of the work
 - a) Rodding – Manual/Mechanical with flexible rods.
 - b) Jetting – High pressure water jetting.
 - c) Plunging.

Section2
Specific Items

Maintenance schedule for permeable paved parking bays

Responsibility of Karbon Homes Ltd

A copy of this page must be given to the maintenance company employed by Karbon Homes Ltd

Regular Maintenance		
Element	Maintenance/Action required	Frequency
Permeable Paving	Regular cleaning will be required, brushing should suffice to remove surface dirt and silt build up between blocks. Following the routine maintenance it may be necessary to redress the surface with 2-4mm gritstone as per manufacturer's recommendations	Bi-Annual – In the spring Autumn after leaf fall
Regular Monitoring		
Permeable Paving: Initial Inspections	1- Inspect for poor operation 2- Inspect for evidence of poor operation and or weed growth. Take remedial action if required.	1- Monthly for 3 months after installation 2- Every 3 months, 48hours after large storms
Permeable Paving	Check surface is draining adequately during storms.	Annually – during storm conditions
Remedial Actions		
Rutting of paving /broken blocks	Repair areas as necessary	As required
Surface and upper substructure if poor operation is encountered and cannot be rectified by cleaning of surface etc	Rehabilitation/Replacement of these layers	As required

Maintenance schedule for Hydrobrake Manhole

Responsibility of Karbon Homes Ltd

A copy of this page must be given to the maintenance company employed by Karbon Homes Ltd

Regular Maintenance		
Element	Maintenance/Action required	Frequency
Manhole	1-Clear out sump 2-Check pivoting bypass door is operational	1- Bi annual – after leaf fall and after first large storm 2-Annually in dry weather
Regular Monitoring		
Manhole and swale	Check manhole/swale to ensure emptying is occurring satisfactorily	Annually – during heavy storm conditions and if water builds up in swales
Outlet pipe	Check for blockages or pipe damage	Annually
Remedial Actions		
Manhole/swale not emptying/flooding	Activate pivoting bypass door to release the water. Once system is empty check and remove blockages and silt deposits	As required
Outlet pipe: Damaged or blocked	Repair pipe/unblock pipe Clear out all silt from catch pit	As required

Maintenance schedule for Geocellular Crates

Responsibility of Believe Housing Ltd

A copy of this page must be given to the maintenance company employed by Believe Housing Ltd

Regular Maintenance		
Element	Maintenance/Action required	Frequency
Catch Pits	Clear out sumps of catch pits to remove all silt/debris	Annually – Autumn after leaf fall
Crate Structure	CCTV/Jetting through central channel to assess and clear any build-up of silt	Annually – Autumn after leaf fall
Remedial Actions		
Element	Maintenance/Action required	Frequency
Inlets/outlets/vents	Repair/rehabilitation as necessary	As required
Aquacell Crates	Inspect and Replace crates where necessary	Once every 50 years
Monitoring		
Element	Maintenance/Action required	Frequency
Inlets/outlets/vents	Inspect all inlets/outlets and vents to ensure in a good working condition and operating as designed	Annually and after large storms