JC CONSULTING

Former Women's Institute, Newton-By-The-Sea Alnwick

Drainage Strategy

Report Ref: JCC23-111-C-01
Revision: 00, August 2023

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DOCUMENT CONTROL SHEET

CONSULTING

Former Women's Institute, Newton-By-The-Sea, Alnwick

DRAINAGE STRATEGY

Client: Mr Jonathan Sutherland / George F. White

Client Address: 4-6 Market Street
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Project Reference: JCC23-111

Report Reference: JCC23-111-C-01-00

Status: Planning

Author: R Jones

Revision Record:

Rev.	Date	Status	Prepared	Signed	Checked	Signed	Approved	Signed
00	04/08/23	Planning	R Jones	[redacted]	A Short	[redacted]	T Holland	[redacted]

CONTENTS PAGE

1 INTRODUCTION

1.1 BRIEF

JC Consulting Ltd (JCC) have been commissioned by George F.White on behalf of Jonathan Sutherland to undertake a Drainage Strategy to support a detailed planning application. The planning application consists of two residential properties, with associated hard and soft landscaping.

The development site is located at Ordnance Survey (OS) Grid Reference: NU 23700 25196 (E423702, N625198), as shown in Figure 1.1.

Figure 1.1 - Ordnance Survey Map – Site Location

As a new development, Sustainable Drainage Systems (SuDS), surface and foul water drainage must be considered. This report gives an overview of the methodology used, summarises the options investigated and the drainage proposals for the development.

1.2 REPORT SCOPE

The principal objectives of this Drainage Strategy are as follows:

- To establish the appropriate design standards and guidance that will assist the design of the Drainage Strategy.
- To establish the existing site constraints and drainage features.
- To determine a Drainage Strategy for the discharge of surface water flows from the site.
- To determine a suitable Drainage Strategy for the discharge of foul water flows from the site.

2 RELEVANT POLICIES, LEGISLATION AND GUIDANCE

2.1 OVERVIEW

This Drainage Strategy will be in accordance with the following legislation and guidance:

National Planning Policy Framework

Planning Practice Guidance

Non-Statutory Technical Standards for Sustainable Drainage Systems

This Drainage Strategy will be designed using the standards:

BS EN 725:2017 – Drain and sewer systems outside buildings.

BS EN 12056-2 2000 – Gravity drainage systems inside buildings.

SuDS Manual (CIRIA C753)

Building Regulations Approved Document Part H 2010 Drainage and waste disposal (2015 Edition)

PPG3 – Use and design of oil separators in surface water drainage systems.

National Building Specification

Civil Engineering Specification for the Water Industry (7th Edition)

SSG Appendix C - Design and construction guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England ("the Code"). Approved Version 2.0. 10 March 2020

2.2 NATIONAL PLANNING POLICY FRAMEWORK

The NPPF published in July 2018 and updated in February 2019, is a key part of the government's reform to make the planning system less complex and more accessible; to protect the environment and to promote sustainable growth.

In relation to drainage, the NPPF states that 'Major Developments' should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:

Take account of advice from the Lead Local Flood Authority.

Have appropriate proposed minimum operational standards.

Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development.

Where possible provide multifunctional benefits.

2.3 PLANNING PRACTICE GUIDANCE

The Planning Practice Guidance (2014) reiterates the government's expectation that sustainable drainage systems are provided in new developments wherever appropriate. It states that the government expect decisions based on incorporated policies, relating to 'Major Developments' (developments of 10 dwellings or more, or equivalent non-residential developments) to ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated otherwise.

2.4 NON-STATUTORY TECHNICAL STANDARDS FOR SUSTAINABLE DRAINAGE SYSTEMS

The 'Non-Statutory Technical Standards for Sustainable Drainage Systems' states that for greenfield developments, the peak run-off rate and run-off volume 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, 6-hour rainfall event should never exceed the peak greenfield run-off rate and volume for the same event.

For previously developed sites, the peak run-off rate and volume 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, 6-hour rainfall event must be as close as reasonably possible to the greenfield run-off rate and volume from the development at the same rainfall event but should never exceed the rate of discharge or run-off volume from the development prior to re-development for that event.

Where it is not reasonably practicable to constrain volume of run-off, the volume must be discharged at a rate that does not affect flood risk.

Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body, the peak flow standards and volume control standards need not apply.

The drainage system must be designed so that flooding does not occur on any part of the site for a 1 in 30-year rainfall event, unless there is an area of the site dedicated for compensatory storage.

The drainage system must also be designed so that flooding does not occur during a 1 in 100-year rainfall event in any part of the building or any utility plant on-site.

The design of the proposed development must ensure that flows resulting from excess rainfall for a 1 in 100-year event are managed in exceedance routes that minimise the risks to people and properties.

Components of the drainage network must be designed to ensure the structural integrity of the network is maintained throughout its design life. Materials, products, or fittings must be of a suitable standard for intended use.

Pumping should only be used to facilitate drainage for parts of the site where it is not practicable to drain water via gravity.

The construction of any communication with an existing sewer or drainage system must be such that the making of the communication would not damage the structural integrity or functionality of the sewerage system. Damage to the drainage system must be minimised, if unavoidable, and must be rectified prior to completion of the system.

3 SITE AND SURROUNDINGS

3.1 SITE LOCATION AND PROPOSED DEVELOPMENT DESCRIPTION

The proposed development site is situated at Newton-by-the-Sea, Alnwick; see Appendix A for the Proposed Site Plan. The proposed development site is centred at OS Grid Reference NU 23700 25196 (E423702, N625198).

This Drainage Strategy has been produced to support the planning application of a development site, which consists of 2 residential properties, with associated hard and soft landscaping.

The site at Newton-by-the-Sea is an irregular shaped parcel of land and encompasses an area of approximately 0.0596 ha (596^2), comprising of an existing non-residential structure, and an area of external hard and soft landscaping used as an access road for the building. The site is bounded by residential properties to the north, and by the main road to the west. To the east and south, the site is bound by land for agricultural use.

A topographical survey has been provided for the site by Project North Geomatics, see Appendix B for the Topography Survey.

4 SURFACE WATER DRAINAGE STRATEGY

4.1 METHODOLOGY

The following methodology was used to produce a surface water Drainage Strategy for the site:

Determine a suitable method for surface water discharge.

Calculate pre-development/greenfield run-off rate, using the method outlined in the Interim Code of Practice for Sustainable Drainage Systems (ICP SuDS).

Calculate the required post development attenuation/storage required for the critical storm with a return period of 30 years in line with the National Planning Policy Framework (NPPF).

Test the sensitivity of the site by investigating the volume of runoff produced during storms with a return period of 100 year plus 40% allowance for climate change in line with the NPPF.

Test the sites suitability for the use of Sustainable Drainage Systems.

Test the sites post development water quality & outline any mitigation procedures.

Outline the maintenance procedures for the proposed drainage network and determine who will be responsible for the maintenance of the network, in accordance with 'CIRIA - The SuDS Manual C753'.

Outline the relevant guidance to be followed with respect to safety issues of the network.

4.2 SURFACE WATER DISCHARGE METHOD

The potential methods of surface water discharge, in order of preference, are:

Discharge to the ground via infiltration.

Discharge to a nearby watercourse.

Discharge to an existing surface water sewer.

Discharge to an existing combined water sewer.

A site investigation has not been carried out for the proposed development site; however, geological information can be obtained from the British Geological Survey (BGS) Geology of Britain Viewer (2014).

According to the BGS Geology of Britain Viewer (2014), the sites bedrock geology comprises of an Stainmore Formation, which consists of limestone, sandstone, and mudstone.

The BGS Geology of Britain Viewer (2014) also indicates that the sites superficial deposits consist of till, devensian (diamicton), which is predominantly bolder clay.

Based on the hierarchy of discharge of surface water, the preferred method of surface water disposal is by infiltration. However, using the desk top geological information above, the sites superficial deposits are not anticipated to be suitable to fully allow for infiltration.

The Ordnance Survey maps, and EA maps, show that the site is within the vicinity of a small watercourse located approximately 25 metres to the Southwest. However, there are no named bodies of water or drainage ditches understood to be within the vicinity of the site. The watercourse transitions to a culverted watercourse which runs adjacent to the site boundary.

NWL have been contacted to identify any sewerage assets within the vicinity of the site (see Appendix C for the NWL Sewerage Plan).

NWL have verified that there is a 150mm combined water sewer approximately 5m south of the site, which is accessed via the access road to the site and connects to a pumping station to the east of the site. Chamber 6104 is shown to be 1.6m deep with 150mm inlet and outlet. However, it is anticipated that the most suitable location to discharge is at the SW manhole shown on the Topographic Survey (Appendix B) that is anticipated to be connection to the existing NWL culverted watercourse.

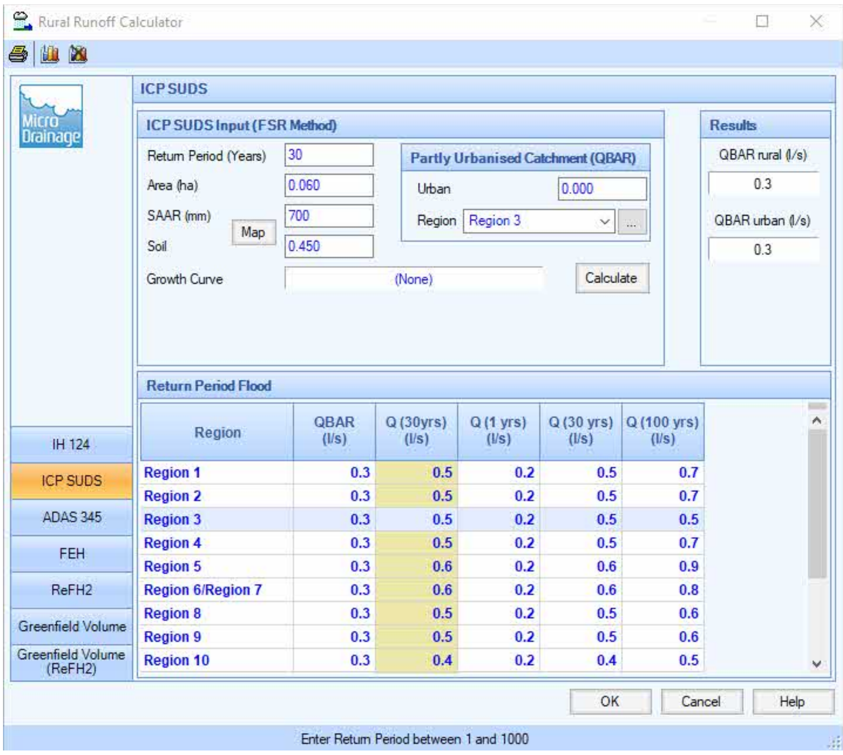
Following the hierarchy of discharge, it is therefore determined that the most suitable method of discharge for surface water will be into the NWL culverted watercourse whilst allowing for partial infiltration where possible at the development.

4.3 GREENFIELD RUN-OFF RATE CALCULATION

As discussed in the existing drainage discharge chapter it is assumed that the existing development would discharge into the NWL culverted watercourse at the chamber shown on the topographic survey. As part of the redevelopment works the network will be proposed to be split into separate surface and foul sewers with the surface discharging into the existing NWL surface water sewer. As a result, it would be proposed to restrict surface water flows to a rate agreed with the Lead Local Flood Authority (LLFA) to ensure that there will be no additional flooding to the surrounding area due to the development. It would be anticipated that surface water flows would be restricted as close as practicable to that of the pre-development greenfield runoff rate.

The proposed development has an approximate area of 0.0596ha (596 m²). The greenfield run-off flow rate for the area has been calculated using the ICP SuDS Method (calculations carried out using MicroDrainage).

Figure 4.3 – Greenfield Runoff Flow Rate Calculation



Given the relatively low flow rate calculated for greenfield runoff for all rainfall periods it is proposed to provide flow control restriction equivalent of using a minimum 75mm orifice sized flow control to avoid any blockages within the network, calculated to be 2.5 l/s. It is also understood that the existing development discharges unrestricted, whilst this rate is unknown it was a similar sized development, and the proposed restriction can reasonably be assumed to provide a significant betterment from the existing unrestricted discharge.

4.4 POST DEVELOPMENT ATTENUATION

It is proposed to provide a surface water drainage system serving all hard-standing areas for the site. Surface water flows are to be discharged to the existing NWL surface water culverted watercourse.

MicroDrainage has been used to model the proposed surface water drainage and carry out a simulation for various return periods for the site. Simulations were carried out to ensure that there is no exceedance of the surface water network for a 1 in 30-year return period event, in line with the NPPF guidelines. Further simulations have been carried out so that, for a 1 in 100-year return period event +45% for climate change and +10% urban creep), surface water flows are directed away from any buildings / structures and retained on-site, in accordance with the NPPF guidance.

The proposed drainage model does not show any flooding for a 1 in 30-year return period event or a 1 in 100-year return period event plus 45% allowance for climate change and plus 10% urban creep. Flows in exceedance of the surface water sewerage will be retained within the proposed permeable paving sub-base and filter drain. It is proposed to drain surface water flows through permeable paving and a filter drain to provide a measure of SuDS source control and water quality improvement. Refer to Appendix D for the Proposed Drainage Arrangement, Appendix E for the MicroDrainage Results.

Exceedance flow management has been designed to ensure any flows exceeding the discharge rate will be attenuated on-site, within the below ground sewerage network and SuDS features. The required storage has been sized for a 1 in 100-year storm event, with +45% for climate change + 10% urban creep. The proposed ground levels would also dictate that if there was any exceedance of the network surface water flows would naturally fall away from the building and to the lower ground level at the proposed filter drain and soft landscaping.

4.5 SUDS SUITABILITY ASSESSMENT

The NPPF states that SuDS should be incorporated in all new developments unless evidence of unsuitability is provided. Therefore, the following SuDS components have been considered for the site:

Table 4.5 – SuDS Component Assessment

SuDS Component	Description	Site Suitability	Comments
Rainwater Harvesting	Systems that collect runoff from the roof of a building or other paved surface for use.		Potential to water butts for soft landscaping irrigation but depends on occupants whether to adopt the use. Potential be retrofitted into property when occupied.
Green Roof	Planted soil layers on the roof of buildings that slow and store runoff.	×	The residential roofs are proposed to be pitched and unsuitable for green roofs.
Soakaway	Systems that collect and store runoff, allowing it to infiltrate into the ground.	×	Ground conditions deemed to be unsuitable for full infiltration and partial infiltration to be used.

Pervious Pavement	Structural paving through which runoff can soak and subsequently be stored in the sub-base beneath, and/ or allowed to infiltrate into the ground below.		Potential for paving as part of car parking arrangements.
Filter Strip	Grass strips that promote sedimentation and filtration as runoff is conveyed over the surface.	✗	Site layout unsuitable
Filter Trench	Shallow stone-filled trenches that provide attenuation, conveyance, and treatment of runoff.		Potential for Filter Trench
Infiltration Trench	Systems that collect and store runoff, allowing it to infiltrate to the ground.	✗	Site layout unsuitable
Swale	Vegetated channels (sometimes planted) used to convey and treat runoff.	✗	Site layout unsuitable
Bioretention	Shallow landscaped depressions that allow runoff to pond temporarily on the surface. Before filtering through vegetation and underlying soils.	✗	Restricted space for ponding.
Infiltration Basin	Vegetated depressions that store and treat runoff, allowing it to infiltrate into the ground.	✗	Restricted space on site.
Detention Basin	Vegetated depressions that store and treat runoff.	✗	Restricted space on site.
Pond	Permanent pools of water used to facilitate treatment of runoff – runoff can also be stored in attenuation zone above pool.	✗	Restricted space on site.
Stormwater Wetlands	Permanent pools of water used to facilitate treatment of runoff – runoff can also be stored in attenuation zone above pool.	✗	Size of development unsuitable.

4.6 WATER QUALITY MANAGEMENT

The surface water drainage design is required to consider the potential for contaminants to be collected with surface water runoff and discharge to the wider water catchment. Following the guidance within the Ciria SuDS Manual C753, Chapter 26, the impermeable areas to be drained have been classified as having the following pollution hazard levels:

Table 4.6 – Land Classification Pollution Hazard Indices

Land Use	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Residential roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (e.g., cul de sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g., schools, offices) i.e., < 300 traffic movements/day	Low	0.5	0.4	0.4

Residential roofs have a 'very low' pollution hazard level; therefore, the risk to water quality is considered very low.

Table 4.6.1 – SuDS Mitigation Indices

SuDS Component	Total Suspended Solids	Metals	Hydrocarbons
Permeable Paving	0.7	0.6	0.7
Filter Drain	0.4	0.4	0.4

The pollution load associated with the total run-off volume from all storm events will be retained on-site, where it will have time to biodegrade or be acted on by natural treatment processes. Interception of the pollution load cannot be guaranteed for every rainfall event, due to the variations in evapotranspiration and rainfall. However, to ensure a high probability of interception, it is proposed to provide additional storage for the first 5mm of rainfall for the majority of rainfall events, which will mitigate the risk to water quality entering the network.

Permeable paving has been shown to decrease concentrations of surface water pollutants. Silt can be trapped within the top 30mm of the paving and further treatment is achieved via biodegradation of organic pollutants, such as petrol. The frequency of runoff from all types of pervious paving is significantly reduced compared to gully / pipe networks; therefore, runoff does not typically occur from permeable surfaces for rainfall events up to 5mm.

On this basis, it is considered that suitable SuDS features have been proposed for the development to mitigate potential contaminants to the wider water catchment.

4.7 SURFACE WATER MAINTENANCE ISSUES

Surface water drainage within the plot boundary is anticipated to be retained within private ownership. Therefore, this drainage will be the responsibility of the landowner. Refer to Appendix F for the Drainage Maintenance Schedule.

4.8 SURFACE WATER SAFETY ISSUES

Surface water pipework and manholes have been designed in accordance with the appropriate building regulations and Sewers for Adoption, to ensure suitable access for maintenance and operation as required.

Exceedance flow management caused by system blockages has been considered and the proposed network has been designed to mitigate the risks to people and property.

Works are to be carried out by an established and professional contractor and in accordance with standard good practice guidance. The potential for flooding, caused by surface water rainfall, during construction is to be mitigated by the contractor by providing an in-depth method statement in accordance with BS8582 2013 and CIRIA C768.

4.9 SURFACE WATER DRAINAGE SUMMARY

Based on the investigation carried out to date, the surface water drainage strategy can be summarised as:

Flows from rooftop will be collected by traditional rainwater pipes and discharged into the pipe network via gravity. The piped network will then discharge into the permeable paving sub-base through a permavoid diffuser unit.

Flows from property parking area will be drained through permeable paving and discharged into the pipe network via gravity.

Flows from the access track will be drained to a filter trench. The filter trench is shown as suitable for partial infiltration with any exceedance of flows discharging into the pipe network via an overflow pipe.

Surface water flows will be discharged to the existing NWL surface water culverted watercourse network via gravity at an existing chamber.

Peak flows in excess of the restricted discharge rate of 2.5 l/s during storms up to 1 in 100 years, plus 45% for climate change and 10% urban creep will be attenuated on-site to ensure there is no flooding of the proposed site or flooding off site.

SuDS water quality improvement will be provided by draining flows through permeable paving and a filter drain.

5 FOUL WATER DRAINAGE STRATEGY

5.1 METHODOLOGY

The following methodology was used to produce a foul water Drainage Strategy for the site:

Determine a suitable method for foul water discharge.

Calculate the post development foul water drainage flows, in accordance with BS EN 12056-2:2000.

Outline the maintenance procedures for the proposed drainage network & who will be responsible for the maintenance of the network, in accordance with the relevant codes of practice.

Outline the relevant guidance to be followed with respect to safety issues of the network.

5.2 FOUL DRAINAGE DISCHARGE METHOD

The potential methods of foul water discharge, in order of preference, are:

- Discharge to an existing foul water network.
- Discharge to an existing combined water network.
- Discharge to a septic tank, with an appropriate form of treatment or another wastewater treatment system.
- Discharge to a cesspool.

NWL have been contacted to identify any sewerage assets within the vicinity of the site (see Appendix C for the NWL Sewerage Plan).

NWL have verified that there is a 150mm diameter combined water sewer within the existing access road. The combined water sewer is expected to collect foul water drainage from the properties to the north and east of the site as well as the previous development.

It is proposed to discharge the foul water to combined water sewer with a new connection, within the site boundary. A Pre-development application enquiry will need to be submitted to NWL to confirm that foul flows can be discharged at an unrestricted rate to their network.

5.3 FOUL WATER MAINTENANCE ISSUES

Foul water drainage within the plot boundary is anticipated to be retained within private ownership. Therefore, this drainage will be the responsibility of the landowner. Refer to Appendix F for the Drainage Maintenance Schedule.

5.4 FOUL WATER SAFETY ISSUES

Foul water pipework and manholes have been designed in accordance with the appropriate building regulations and Sewers for Adoption, to ensure suitable access for maintenance and operation as required.

Works are to be carried out by an established and professional contractor and in accordance with standard good practice guidance. The potential for flooding, caused by surface water rainfall, during construction is to be mitigated by the contractor by providing an in-depth method statement in accordance with BS8582 2013 and CIRIA C768.

6 CONCLUSION

The Drainage Strategy has been produced for the development of 2 residential properties with associated hard and soft landscaping. This report has been produced to present the drainage proposals for the development and document the underlying analysis, as required by Northumberland County Council's planning process. The drainage strategy has been produced in accordance with the applicable regulatory framework and relevant best practice guidance, as set out within the report.

Based on the available geological data, it is anticipated that surface water discharge to the ground via infiltration will not be achievable and there is no feasible open watercourse in proximity to the development. However, it is proposed to discharge surface water to the NWL culverted watercourse at a restricted rate of 2.5 l/s with the appropriate level of water quality treatment. SuDS source control and water quality improvement will be provided through permeable paving and a filter drain. Attenuation for exceedance flows will be provided through the permeable paving and filter drain sub-base for rainfall events up to 1 in 100 years, plus 45% for climate change + 10% urban creep.

It is proposed to discharge foul water flows to the existing NWL combined network in the access road. A pre-planning enquiry must be made to NWL prior to construction to ensure that additional foul water flows can be accommodated within their network.

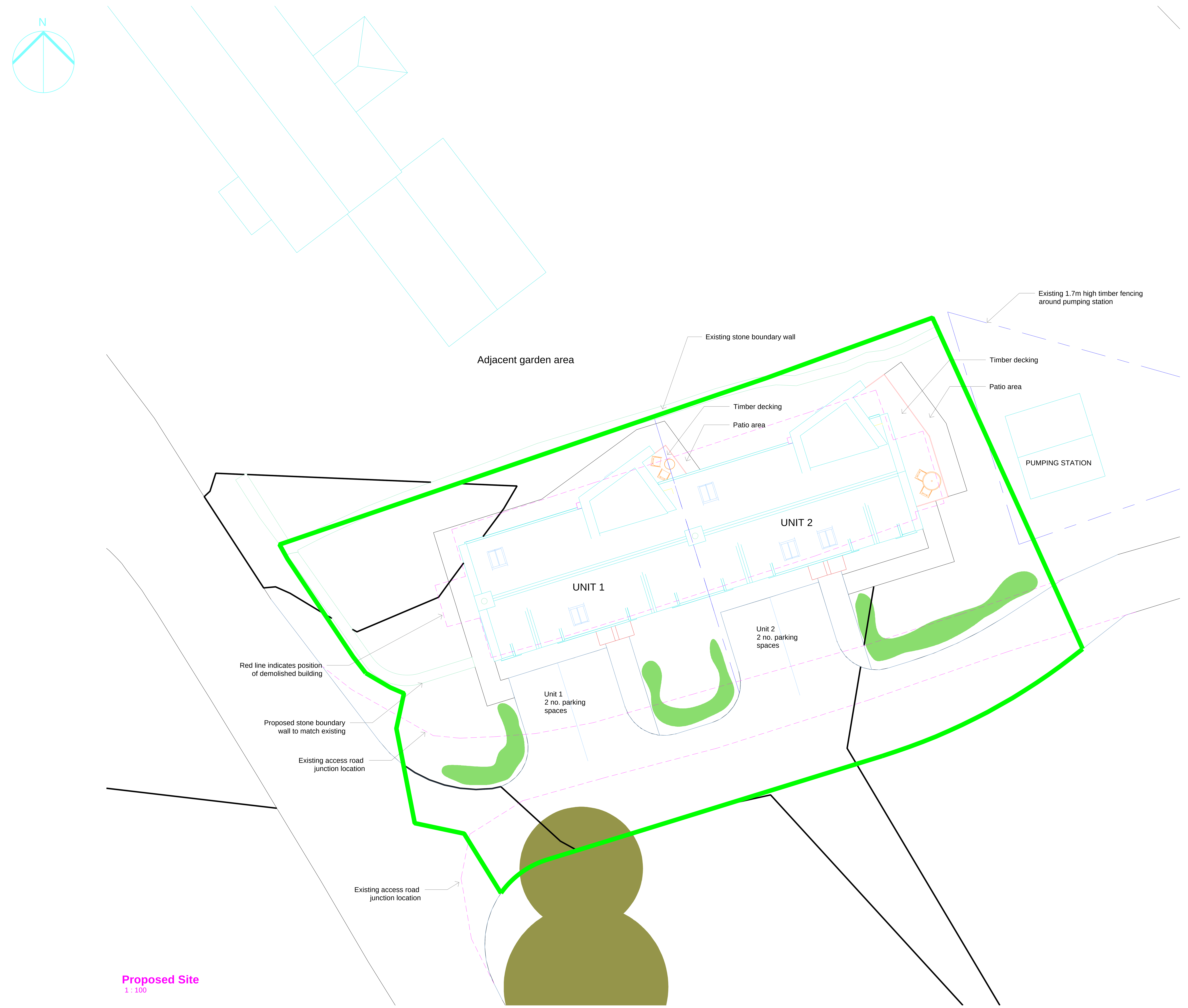
A S106 application must be agreed with NWL prior to construction, to ensure new connections can be made to their network.

7 LIST OF APPENDICES

APPENDIX A

PROPOSED SITE PLAN

A1



Proposed Site
1 : 100

Notes:

1. This drawing is subject to copyright laws and the use of this drawing is licensed by GFW for use on this project only.
2. In the event of any discrepancies being found these are to be brought to
3. the attention of GFW architectural team prior to commencement of works
4. This drawing is to be used solely for the information titled.
5. Construction staff and operatives must ensure the main contractor has provided accurate information on all H&S aspects relating to the designs identified on the drawing, including review of designers / contractors risk assessments, method statements, permits to work and pre construction information.
6. The proposed layouts are subject to the following, although not exhaustive;
   - Structural and Drainage Engineers requirements.
   - Mechanical and Electrical Engineers requirements.
   - Planning, Listed Building and Building Control approvals as appropriate.
7. Use only written dimensions for constructional purposes. Any discrepancies to be reported to the project manager prior to commencement of works
8. Where proposed layouts are based on third party survey information. The accuracy is not underwritten by GFW.

Date	Rev	Description	Chkd

Client: Mr Jonathan Sutherland

Project: Former Womens Institute, Newton-by-the-Sea

Status: Planning

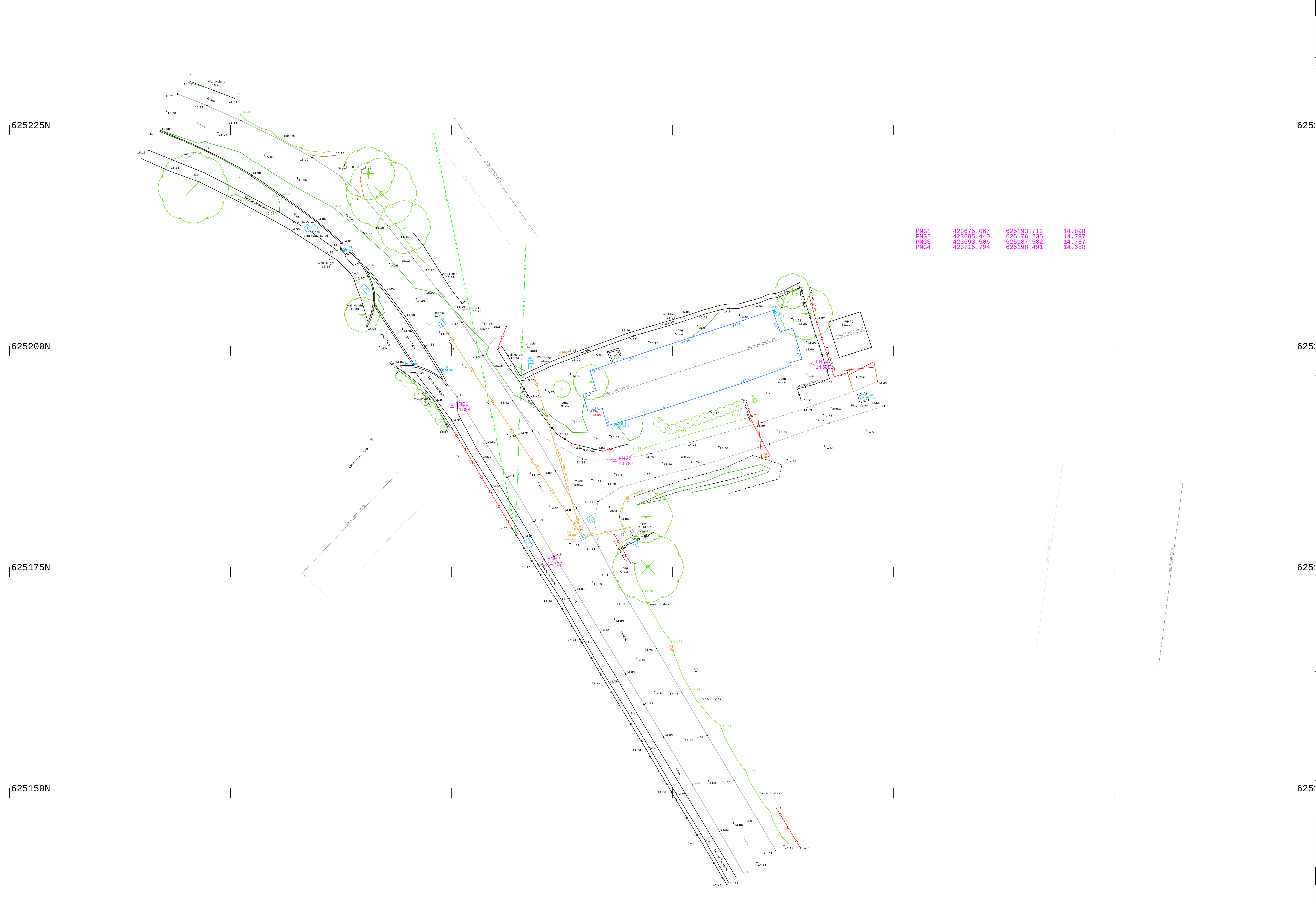
Drawing Title: **Proposed Site Plan**

Date	Drwn/Chkd		Scale
April 2023	PE	CR	1 : 100

Project Number	Dwg No.	Revision
0001843	**1120**	

APPENDIX B

TOPOGRAPHY SURVEY



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PNG2	423685.440	625176.235	14.797
PNG3	423693.506	625187.582	14.787
PNG4	423715.794	625198.491	14.688

PROJECT NORTH GEOMATICS

CO-ORDINATES AND ELEVATIONS ARE SET BY GNSS AT STATION PNG1.
CO-ORDINATES ARE TO OS NATIONAL GRID USING OSTN15 TRANSFORMATION
LEVELS ARE TO ORDNANCE DATUM USING OSGM15 GEOID MODEL.
THE REMAINDER OF THE SURVEY IS TO SCALE FACTOR 1 PLANE GRID.

REV A	SB			SB

CLIENT:

Mr Jonathan Sutherland

Womens Institute, Newton-by-the-sea

TITLE

Topographic Survey

Drawn By: SB Date: 29-03-23
Checked By: LH Date: 30-03-23
Clients Ref:

Drawing No: A92-001

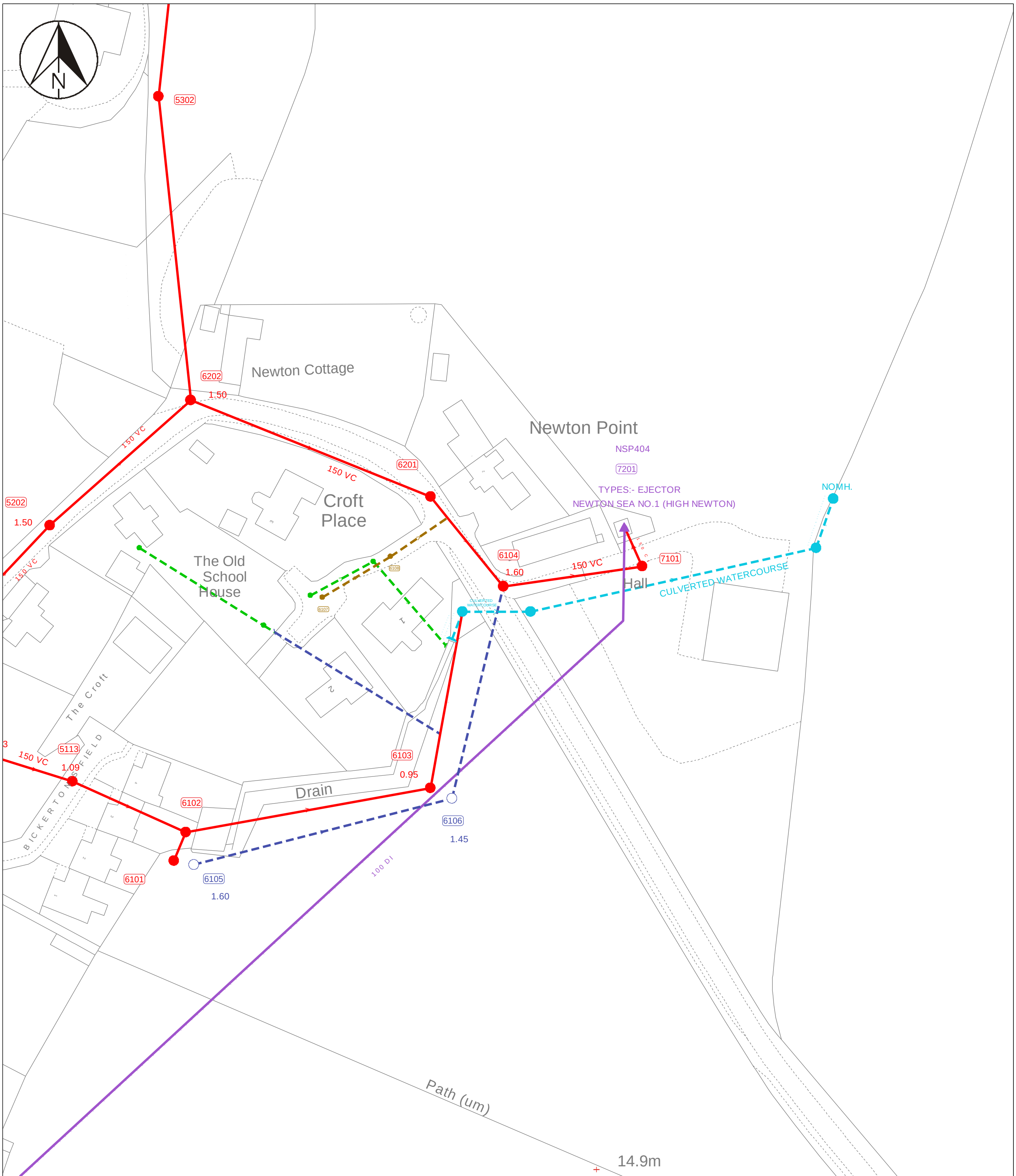
Scale: A1 1/200

PROJECT NORTH GEOMATICS

Suite 6, John Buddle Work Village, Buddle Road, Newcastle upon Tyne NE4 8AW
Tel: 0191 226 7367
Email: Office@Projectnorthgeomatics.co.uk Web:www.Projectnorthgeomatics.co.uk

APPENDIX C

NORTHUMBRIAN WATER SEWERAGE PLAN



	NWL Responsibility		Private/Non NWL		Proposed	
Combined			Combined		Combined	
Foul			Foul		Foul	
Surface			Surface		Surface	
Treated Eff			Treated Eff			
Untreated Eff			Trade Eff			
Overflow			Watercourse			

Annotations
- Direction of flow
- Backdrop
- Abandoned
- Rising Main

Symbols
- Chambers
- Inlet/Outlet
- Treatment Works
- Pumping Station
- Capped End
- Balancing Pond
- Termination Node
- Rodding Eye
- Unknown End
- Attribute Change
- Air Valve
- Property Connection
- Lamp Hole
- Hatchbox
- Dual Usage Chamber

NORTHUMBRIAN WATER living water

User : DAWSJ1

Date : 19/05/2023 14:12:04

Title :

Map Sheet : NU2325SE

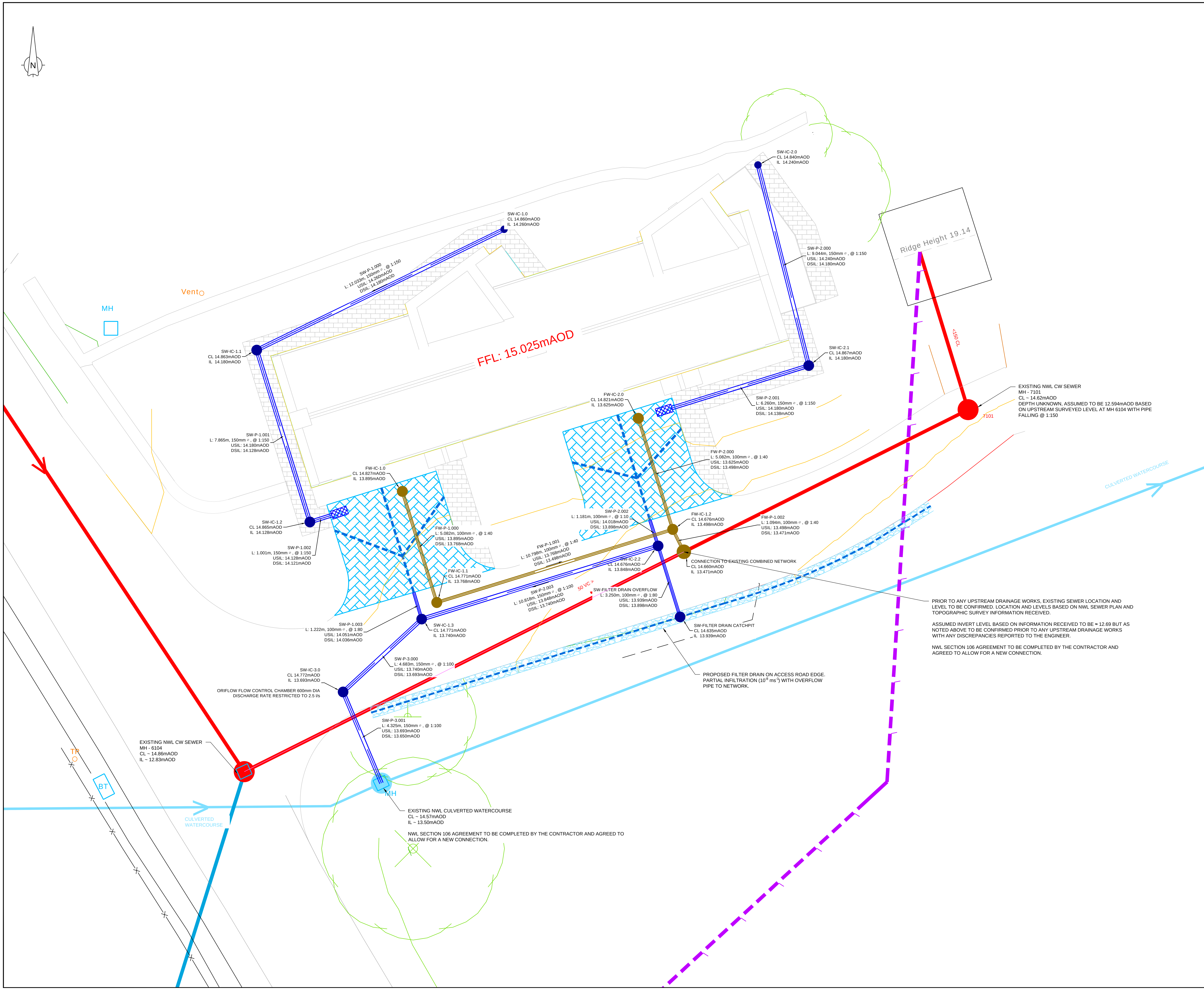
Centre Point : 423690,625185

Paper / Scale : A4@1:1500

10 m

APPENDIX D

PROPOSED DRAINAGE ARRANGEMENT



NOTES

1. EXISTING SEWER INFORMATION FROM NWL PDF PLAN AND TOPOGRAPHICAL SURVEY RECEIVED DOES NOT COINCIDE WITH EACH OTHER. ASSUMPTION BASED ON NWL PLAN ON PDF AND USING KNOWN MANHOLE COVERS SHOWN ON THE TOPOGRAPHICAL SURVEY.
2. REFER TO ARCHITECTS DRAWINGS FOR CONFIRMATION OF LANDSCAPING ARRANGEMENTS.
3. ALL LEVELS ARE mAOD UNLESS STATED OTHERWISE.

DRAWING INFORMATION

4. EXISTING SITE INFORMATION BASED ON TOPOGRAPHICAL SURVEY CARRIED OUT BY PROJECT NORTH GEOMATICS, DRAWING No. A92-001, DATED 30/03/23.
5. PROPOSED SITE INFORMATION BASED ON GEORGE F WHITE ARCHITECTURAL DRAWINGS RECEIVED.

GENERAL NOTES:

6. THIS DRAWING IS BASED ON ORDNANCE SURVEY AND TOPOGRAPHICAL SURVEY INFORMATION RECEIVED. WE CAN ACCEPT NO LIABILITY FOR DESIGN BASED ON INFORMATION RECEIVED.
7. THIS DESIGN HAS BEEN CARRIED OUT TO APPROPRIATE STANDARDS BUT IT IS TO BE CHECKED IN ACCORDANCE WITH PROCUREMENT AND REQUIREMENTS PRIOR TO THE COMMENCEMENT OF WORKS.
8. ALL LEVELS, DIMENSIONS AND DETAILS TO BE CONFIRMED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF CONSTRUCTION OR FABRICATION.
9. NO EXISTING BELOW GROUND CONDITIONS HAVE BEEN PROVIDED. THEREFORE, ALL INFORMATION IS TO BE BE VERIFIED FURTHER TO ANY SITE WORKS.
10. NO EXISTING SERVICES INFORMATION HAVE BEEN PROVIDED. THEREFORE, ALL INFORMATION IS TO BE BE VERIFIED FURTHER TO ANY SITE WORKS.
11. EXISTING GROUND LEVELS AND GROUND PROFILES HAVE BEEN TAKEN FROM THE INFORMATION PROVIDED AND AS SUCH ARE TO BE VERIFIED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF WORKS. ANY DISCREPANCIES TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER.

LEGEND:

- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED FOUL WATER DRAINAGE
- EXISTING NWL COMBINED NETWORK SEWER
- EXISTING NWL SURFACE WATER - CULVERTED WATERCOURSE
- EXISTING NWL COMBINED - PUMPED
- PROPOSED PERMEABLE PAVING WITH 100mm Ø PERFORATED PIPE
- PROPOSED FILTER DRAIN WITH 75mm Ø PERFORATED PIPE AS OVERFLOW OUTLET

Rev	Description	Drawn	Check'd	Date
P1	INITIAL ISSUE FOR PLANNING	RJ	AS	04/08/23

Drawing Status:

PLANNING

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Civil Engineering
Structural Engineering
Geo-Environmental Engineering

Client:

MR JONATHAN SUTHERLAND

Project:

FORMER WOMEN'S INSTITUTE, NEWTON-BY-THE-SEA

Drawing Title:

PROPOSED DRAINAGE ARRANGEMENT

Scale:	Drawn:	Checked:	Date:
1:75	RJ	AS	04/08/23

Job Number:	Drawing Number:	Rev:	Size:
JCC23 - 111	C - GA - 001	P1	A1

APPENDIX E

PROPOSED MICRODRAINAGE RESULTS

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)	30	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.298	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

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.023	4-8	0.006

Total Area Contributing (ha) = 0.028

Total Pipe Volume (m³) = 1.263

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	12.033	0.080	150.0	0.003	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	7.865	0.052	150.0	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	1.001	0.007	150.0	0.004	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	4.917	0.061	80.0	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	5.25	14.260	0.003	0.0	0.0	0.0	0.82	14.5	0.3
1.001	50.00	5.41	14.180	0.004	0.0	0.0	0.0	0.82	14.5	0.6
1.002	50.00	5.43	14.127	0.008	0.0	0.0	0.0	0.82	14.5	1.1
1.003	50.00	5.50	14.121	0.008	0.0	0.0	0.0	1.12	19.9	1.1

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
1.004	1.222	0.179	6.8	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	9.044	0.060	150.0	0.003	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	6.260	0.042	150.0	0.003	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.002	4.998	0.120	41.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.003	1.181	0.030	40.0	0.003	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	3.101	0.031	100.0	0.009	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.004	10.818	0.108	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.005	4.683	0.047	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.006	4.325	0.043	100.0	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)
1.004	50.00	5.50	14.059	0.011	0.0	0.0	0.0	3.88	68.6	1.4
2.000	50.00	5.18	14.240	0.003	0.0	0.0	0.0	0.82	14.5	0.4
2.001	50.00	5.31	14.180	0.006	0.0	0.0	0.0	0.82	14.5	0.8
2.002	50.00	5.37	14.138	0.006	0.0	0.0	0.0	1.56	27.6	0.8
2.003	50.00	5.38	14.018	0.008	0.0	0.0	0.0	1.60	28.2	1.1
3.000	50.00	5.05	13.879	0.009	0.0	0.0	0.0	1.00	17.8	1.2
2.004	50.00	5.56	13.848	0.018	0.0	0.0	0.0	1.00	17.8	2.4
1.005	50.00	5.63	13.740	0.028	0.0	0.0	0.0	1.00	17.8	3.8
1.006	50.00	5.71	13.693	0.028	0.0	0.0	0.0	1.00	17.8	3.8

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.003	0.003	0.003
1.001	User	-	100	0.002	0.002	0.002
1.002	User	-	100	0.004	0.004	0.004
1.003	-	-	100	0.000	0.000	0.000
1.004	User	-	100	0.002	0.002	0.002
2.000	User	-	100	0.003	0.003	0.003
2.001	User	-	100	0.003	0.003	0.003
2.002	-	-	100	0.000	0.000	0.000
2.003	User	-	100	0.003	0.003	0.003
3.000	User	-	100	0.009	0.009	0.009
2.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.028	0.028	0.028

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	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 Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	3	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.298		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 6, DS/PN: 1.006, Volume (m³): 0.4

Unit Reference	MD-SHE-0075-2500-1000-2500
Design Head (m)	1.000
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	75
Invert Level (m)	13.693
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)	1.000	2.5	Kick-Flo®	0.627	2.0
Flush-Flo™	0.307	2.5	Mean Flow over Head Range	-	2.2

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	6.2
0.200	2.4	1.400	2.9	3.500	4.5	7.500	6.4
0.300	2.5	1.600	3.1	4.000	4.7	8.000	6.6
0.400	2.5	1.800	3.3	4.500	5.0	8.500	6.8
0.500	2.4	2.000	3.4	5.000	5.3	9.000	7.0
0.600	2.1	2.200	3.6	5.500	5.5	9.500	7.1
0.800	2.3	2.400	3.7	6.000	5.7		
1.000	2.5	2.600	3.9	6.500	6.0		

Storage Structures for Storm

Porous Car Park Manhole: PP1.2, DS/PN: 1.004

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	6.9	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	14.059	Cap Volume Depth (m)	0.700

Porous Car Park Manhole: PP2.2, DS/PN: 2.003

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	6.9	Slope (1:X)	40.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	14.018	Cap Volume Depth (m)	0.700

Filter Drain Manhole: FD, DS/PN: 3.000

Infiltration Coefficient Base (m/hr)	0.00004	Pipe Diameter (m)	0.100
Infiltration Coefficient Side (m/hr)	0.00004	Pipe Depth above Invert (m)	0.600
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	13.879	Cap Volume Depth (m)	1.000
Trench Width (m)	0.5	Cap Infiltration Depth (m)	1.000
Trench Length (m)	26.0		

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	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.298
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360
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	1	+0%					14.276
1.001	2	15 Winter	1	+0%					14.199
1.002	3	15 Winter	1	+0%	100/30 Winter				14.156
1.003	PP1.1	15 Winter	1	+0%					14.144
1.004	PP1.2	15 Winter	1	+0%	100/15 Winter				14.077
2.000	5	15 Winter	1	+0%					14.257
2.001	6	15 Winter	1	+0%					14.203
2.002	PP2.1	15 Winter	1	+0%					14.155
2.003	PP2.2	15 Winter	1	+0%	100/15 Summer				14.042
3.000	FD	15 Winter	1	+0%	30/15 Summer				13.911
2.004	8	15 Winter	1	+0%	30/15 Summer				13.881
1.005	5	15 Winter	1	+0%	30/15 Summer				13.831
1.006	6	15 Winter	1	+0%	30/15 Summer				13.827

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.134	0.000	0.02		0.3	OK	
1.001	2	-0.130	0.000	0.04		0.5	OK	
1.002	3	-0.121	0.000	0.08		0.9	OK	
1.003	PP1.1	-0.127	0.000	0.06		0.9	OK*	
1.004	PP1.2	-0.132	0.000	0.03		0.9	OK*	
2.000	5	-0.133	0.000	0.03		0.4	OK	
2.001	6	-0.127	0.000	0.06		0.7	OK	
2.002	PP2.1	-0.133	0.000	0.03		0.7	OK*	
2.003	PP2.2	-0.126	0.000	0.06		0.7	OK*	
3.000	FD	-0.118	0.000	0.10		1.1	OK	
2.004	8	-0.117	0.000	0.11		1.7	OK	
1.005	5	-0.059	0.000	0.17		2.3	OK	
1.006	6	-0.016	0.000	0.17		2.2	OK	

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	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.298
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360
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	30	+0%					14.284
1.001	2	15 Winter	30	+0%					14.213
1.002	3	15 Winter	30	+0%	100/30 Winter				14.177
1.003	PP1.1	15 Winter	30	+0%					14.162
1.004	PP1.2	30 Winter	30	+0%	100/15 Winter				14.141
2.000	5	15 Winter	30	+0%					14.267
2.001	6	15 Winter	30	+0%					14.219
2.002	PP2.1	15 Winter	30	+0%					14.167
2.003	PP2.2	30 Winter	30	+0%	100/15 Summer				14.135
3.000	FD	60 Winter	30	+0%	30/15 Summer				14.140
2.004	8	15 Winter	30	+0%	30/15 Summer				14.207
1.005	5	15 Winter	30	+0%	30/15 Summer				14.304
1.006	6	60 Winter	30	+0%	30/15 Summer				14.372

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.126	0.000	0.06		0.8	OK	
1.001	2	-0.117	0.000	0.11		1.4	OK	
1.002	3	-0.100	0.000	0.24		2.6	OK	
1.003	PP1.1	-0.109	0.000	0.16		2.5	OK*	
1.004	PP1.2	-0.068	0.000	0.10		2.6	OK*	
2.000	5	-0.123	0.000	0.08		1.0	OK	
2.001	6	-0.111	0.000	0.15		1.8	OK	
2.002	PP2.1	-0.121	0.000	0.08		1.8	OK*	
2.003	PP2.2	-0.033	0.000	0.18		1.9	OK*	
3.000	FD	0.111	0.000	0.13		1.4	SURCHARGED	
2.004	8	0.209	0.000	0.20		3.2	SURCHARGED	
1.005	5	0.414	0.000	0.23		3.1	SURCHARGED	
1.006	6	0.529	0.000	0.19		2.5	SURCHARGED	

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	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.298
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360
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	60 Winter	100	+45%					14.298
1.001	2	60 Winter	100	+45%					14.297
1.002	3	60 Winter	100	+45%	100/30 Winter				14.303
1.003	PP1.1	60 Winter	100	+45%					14.271
1.004	PP1.2	60 Winter	100	+45%	100/15 Winter				14.304
2.000	5	60 Winter	100	+45%					14.309
2.001	6	60 Winter	100	+45%					14.307
2.002	PP2.1	60 Winter	100	+45%					14.288
2.003	PP2.2	60 Winter	100	+45%	100/15 Summer				14.303
3.000	FD	60 Winter	100	+45%	30/15 Summer				14.309
2.004	8	60 Winter	100	+45%	30/15 Summer				14.381
1.005	5	60 Winter	100	+45%	30/15 Summer				14.587
1.006	6	60 Winter	100	+45%	30/15 Summer				14.758

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.112	0.000	0.06		0.8	OK	
1.001	2	-0.033	0.000	0.12		1.5	OK	
1.002	3	0.025	0.000	0.25		2.7	SURCHARGED	
1.003	PP1.1	0.000	0.000	0.17		2.6	SURCHARGED*	
1.004	PP1.2	0.095	0.000	0.08		2.2	SURCHARGED*	
2.000	5	-0.081	0.000	0.08		1.1	OK	
2.001	6	-0.023	0.000	0.16		2.0	OK	
2.002	PP2.1	0.000	0.000	0.08		1.8	SURCHARGED*	
2.003	PP2.2	0.135	0.000	0.15		1.6	SURCHARGED*	
3.000	FD	0.280	0.000	0.17		1.9	SURCHARGED	
2.004	8	0.383	0.000	0.14		2.2	SURCHARGED	
1.005	5	0.697	0.000	0.23		3.1	FLOOD RISK	
1.006	6	0.915	0.000	0.19		2.5	FLOOD RISK	

APPENDIX F

DRAINAGE MAINTENANCE SCHEDULE

CONSULTING

Project:	Former Women's Institute, Newton-By-The-Sea	Client:	Jonathan Sutherland
Subject:	SuDS Maintenance Plan & Inspection Check List	Date:	04/08/2023

INTRODUCTION

A 2 No. dwelling development in Newton-by-the-sea has been designed to incorporate a Sustainable Drainage System (SuDS) to collect, manage and dispose of rainfall on the development in an environmentally friendly manner. SuDS aim to:

Control the flow, volume and frequency of water leaving the development.
Prevent pollution by intercepting silt and cleaning runoff from hard surfaces.
Provide attractive surroundings for the community.
Create opportunities for wildlife.

The SuDS strategy for the development has been designed to incorporate the following features:

Flows from rooftop will be collected by traditional rainwater pipes and discharged into the pipe network via gravity. The piped network will then discharge into the permeable paving sub-base through a permavoid diffuser unit.

Flows from property parking area will be drained through permeable paving and discharged into the pipe network via gravity.

Flows from the access track will be drained to a filter trench. The filter trench is shown as suitable for partial infiltration with any exceedance of flows discharging into the pipe network via an overflow pipe.

Surface water flows will be discharged to the existing NWL surface water culverted watercourse network via gravity at an existing chamber.

Peak flows in excess of the restricted discharge rate of 2.5 l/s during storms up to 1 in 100 years, plus 45% for climate change and 10% urban creep will be attenuated on-site to ensure there is no flooding of the proposed site or flooding off site.

The SuDS features have been designed to be easily maintained in accordance with the approved drainage strategy, including:

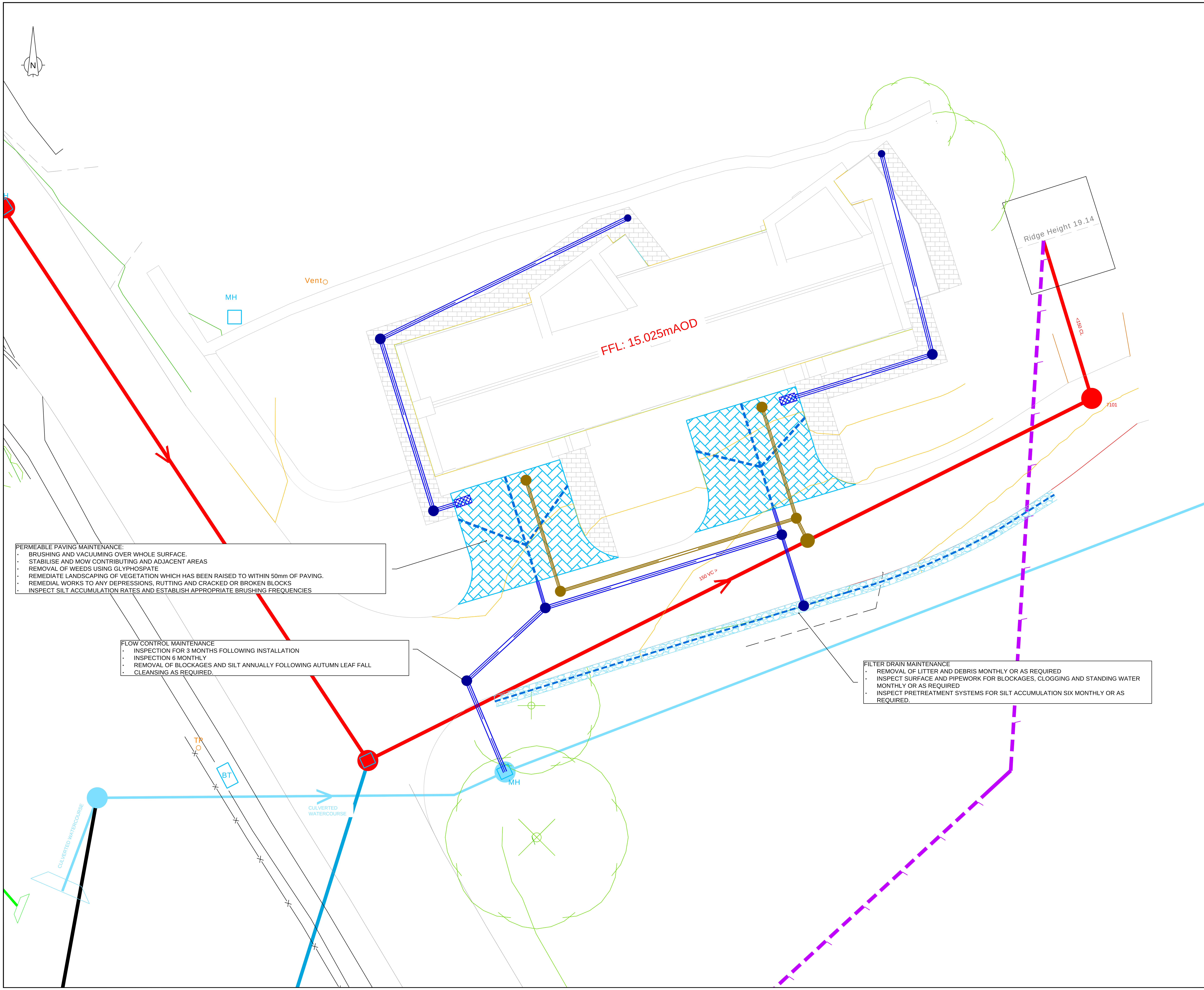
Regular day to day maintenance, such as removal of debris.
Occasional maintenance, such as the removal of sediment.
Remedial actions, such as reinstating areas of erosion.

Appendix A includes a SuDS Maintenance Plan identifying SuDS features.
Appendix B includes a SuDS Inspection Checklist
Appendix C includes the Maintenance Schedule.

It is the responsibility of Jonathan Sutherland, and will transfer to the landowner in the event of any future sale, and operator of the site to carry out the inspection and maintenance of all SuDS features.

APPENDIX A

SuDS MAINTENANCE PLAN



NOTES

1. EXISTING SEWER INFORMATION FROM NWL PDF PLAN AND TOPOGRAPHICAL SURVEY RECEIVED DOES NOT COINCIDE WITH EACH OTHER. ASSUMPTION BASED ON NWL PLAN ON PDF AND USING KNOWN MANHOLE COVERS SHOWN ON THE TOPOGRAPHICAL SURVEY.
2. REFER TO ARCHITECTS DRAWINGS FOR CONFIRMATION OF LANDSCAPING ARRANGEMENTS.

DRAWING INFORMATION

3. EXISTING SITE INFORMATION BASED ON TOPOGRAPHICAL SURVEY CARRIED OUT BY PROJECT NORTH GEOMATICS, DRAWING No. A92-001, DATED 30/03/23.
4. PROPOSED SITE INFORMATION BASED ON GEORGE F WHITE ARCHITECTURAL DRAWINGS RECEIVED.
5. DRAINAGE DESIGN BASED ON DISCHARGE RATE OF 2.5 l/s.

LEGEND:

- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED FOUL WATER DRAINAGE
- EXISTING NWL COMBINED NETWORK SEWER
- EXISTING NWL SURFACE WATER - CULVERTED WATERCOURSE
- EXISTING NWL COMBINED - PUMPED
- PROPOSED PERMEABLE PAVING WITH 100mm Ø PERFORATED PIPE
- PROPOSED FILTER DRAIN WITH 75mm Ø PERFORATED PIPE AS OVERFLOW OUTLET

Rev	Description	Drawn	Check'd	Date
P1	INITIAL ISSUE FOR PLANNING	RJ	AS	04/08/23

Drawing Status:

PLANNING

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Client:
MR JONATHAN SUTHERLAND

Project:
FORMER WOMEN'S INSTITUTE, NEWTON-BY-THE-SEA

Drawing Title:
SUDS MAINTENANCE PLAN

Scale:	Drawn:	Checked:	Date:
1:75	RJ	AS	04/08/23

Job Number:	Drawing Number:	Rev:	Size:
JCC23 - 111	C - SK - 100	P1	A1

APPENDIX B

SuDS INSPECTION CHECKLIST

General Information	
Site ID	Former Women's Institute, Newton-By-The-Sea, Alnwick
Site Location	NU 23700 251196
Items To Be Inspected	Traditional Sewerage Components Outfall Flow Control Permeable Paving Filter Drain
Inspection Frequency	Annually
SuDS Maintenance Plan	JCC23-111-100 SuDS Maintenance Plan

SuDS Maintenance Inspection Checklist				
	Details	Y/N	Action Required	Date Completed
Sewerage Items				
Inspect and identify any areas that are not operating correctly including checking for blockages, if required, take remedial action.				
Remove debris from the catchment surface (where it may cause risk to performance).				
Remove sediment from access chambers.				
Inspect all inlets, outlets, flow control, headwall, overflows and vents to ensure they are operating as designed.				
Survey inside of pipework for sediment build up.				

SuDS Maintenance Inspection Checklist				
	Details	Y/N	Action Required	Date Completed
Permeable Paving				
Brushing and Vacuuming (standard cosmetic sweep over whole surface)				
Stabilise and mow contributing and adjacent areas				
Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying				

Remediate and landscaping which, through vegetation maintenance or soil slip, which has been raised to within 50mm of the level of the paving				
Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replacing lost jointing material.				
Rehabilitation of surface and upper substructure by remedial sweeping				
Initial inspection				
Inspect for evidence of poor operation and/or weed growth – if required, take remedial action				
Inspect silt accumulation rates and establish appropriate brushing frequencies				
Monitor inspection chamber				

SuDS Maintenance Inspection Checklist				
	Details	Y/N	Action Required	Date Completed
Filter Drain				
Remove litter (including leaf litter) and debris.				
Cut the grass – to retain grass height within specified design range.				
Manage other vegetation and remove nuisance plants.				
Inspect inlets, outlets and overflows for blockages and clear as required.				
Inspect vegetation coverage				
Inspect inlets and facility surface for silt accumulation rates and establish appropriate removal frequencies.				
Reseed areas of poor vegetation growth, alter plant types to better suit conditions if required.				
Repair erosion or other damage by returfing or reseeding.				
Relevel uneven surfaces and reinstate design levels.				
Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface.				
Remove build up of sediment on upstream gravel trench, flow spreader or at the top of drain.				
Remove and dispose of oils or petrol residues using safe standard practices				

APPENDIX C

MAINTANCE SCHEDULE

DRAINAGE MAINTENANCE SCHEDULE

Maintenance of all drainage features not adopted by the local water authority will be the responsibility of the Jonathan Sutherland and will transfer to the landowner in the event of any future sale of the site. The works will need to be carried out by a competent contractor.

SEWERAGE MAINTENANCE SCHEDULE

This sewerage maintenance schedule covers collection gullies, pipework, chambers and flow control devices.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Removal of blockages to surface collection features and removal of silt from catch pits. Brushing and Vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequent as required, based on site-specific observations of clogging or manufacturer's recommendations – paying particular attention to areas where water runs onto permeable surfacing from adjacent impermeable areas as this is the most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As Required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As Required – once per year on less frequently used pavements
Remedial Actions	Remediate and landscaping which, through vegetation maintenance or soil slip, which has been raised to within 50mm of the level of the paving	As Required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replacing lost jointing material.	As Required

	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for 3 months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three monthly, 48 hours after large storms in first 6 months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chamber	Annually

PERMEABLE PAVING MAINTENANCE SCHEDULE

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and Vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequent as required, based on site-specific observations of clogging or manufacturer's recommendations – paying particular attention to areas where water runs onto permeable surfacing from adjacent impermeable areas as this is the most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As Required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As Required – once per year on less frequently used pavements
Remedial Actions	Remediate and landscaping which, through vegetation maintenance or soil slip, which has been raised to within 50mm of the level of the paving	As Required

	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replacing lost jointing material.	As Required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for 3 months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three monthly, 48 hours after large storms in first 6 months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chamber	Annually

FILTER DRAIN SCHEDULE

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surface and access chambers.	Monthly (or as required)
	Inspect filter drain surface, inlet/ outlet pipework and control systems for blockages, clogging, standing water and structural damage.	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation and establish appropriate silt removal frequencies.	Six Monthly
	Remove sediment from pre-treatment devices.	Six Monthly
Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods.	As required

	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium.	Five yearly, or as required
	Clear perforated pipework of blockages	As required

As required by CDM 2015 designs have been produced to ensure that all maintenance risks have been identified, eliminated, reduced and/ or controlled where appropriate.

Any manufacturer specific maintenance requirements are to be included as part of the site health and safety file.