

## Caroline Bell

---

**From:**  
**Sent:** 21 November 2021 17:16  
**To:** Planning  
**Cc:** Johnnoblerecycling  
**Subject:** Re: Proposed Industrial Units & Office Unit, Land at Fairfield Way, Whitby for Nobel Recycling & Skip Hire Ltd.  
**Attachments:** Fairfield Way Whitby - Drainage Strategy.pdf; Application Form Page 1.jpg; Application Form Page 2.jpg; Application Form Page 3.jpg; Application Form Page 4.jpg; Application Form Page 5.jpg

**Ref No: NYM/2021/0512/FL**

Dear Sir/Madam

Please find attached an application form to discharge with condition no 2 of the above planning permission together with the engineer's Drainage Strategy for your approval.

Our client will contact your office direct to make payment of the £116.00 application fee.

Should you require any further information please do not hesitate to contact the writer.

Yours sincerely

Ursula Bradwell

*For and on behalf of*

**URSULA BRADWELL ARCHITECTS**

Church Hall

St Hildas Terrace

Whitby

North Yorkshire

YO21 3AG

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

**Subject:**Fairfield Way  
**Date:**2021-11-19 10:54  
**From:**Andy Foottit

Good morning John & Ursula

Please find attached our drainage strategy report for your submission to the LPA which should be sufficient for planning purposes.

We shall await their comments or approval before developing the design further for Construction.

Regards

Andy



**Steve Gilman**  
**Design Ltd**  
Consulting Structural & Civil Engineers

Lych Gate Barn

Church Lane

Carlton Le Moorland

Lincoln

LN5 9HS



If you would rather make this application online, you can do so on our website:  
<https://www.planningportal.co.uk/apply>

Application for removal or variation of a condition following grant of planning permission.  
Town and Country Planning Act 1990.  
Planning (Listed Buildings and Conservation Areas) Act 1990

**Privacy Notice**

This form is provided by Planning Portal and based on the requirements provided by Government for the sole purpose of submitting information to the Local Planning Authority in accordance with the legislation detailed on this form.

Please be aware that once you have downloaded this form, Planning Portal will have no access to the form or the data you enter into it. Any subsequent use of this form is solely at your discretion, including the choice to complete and submit it to the Local Planning Authority in agreement with the declaration section.

Upon receipt of this form and any supporting information, it is the responsibility of the Local Planning Authority to inform you of its obligations in regards to the processing of your application. Please refer to its website for further information on any legal, regulatory and commercial requirements relating to information security and data protection of the information you have provided.

**Local Planning Authority details:**

Planning Services  
Scarborough Borough Council  
Town Hall  
St. Nicholas Street  
Scarborough  
North Yorkshire  
YO11 2HG



planning.services@scarborough.gov.uk  
Tel: 01723 232323

**NYMNPA**  
**22/11/2021**

**Publication of applications on planning authority websites**

Information provided on this form and in supporting documents may be published on the authority's planning register and website.

Please ensure that the information you submit is accurate and correct and does not include personal or sensitive information. If you require any further clarification, please contact the Local Planning Authority directly.

If printed, please complete using block capitals and black ink.

It is important that you read the accompanying guidance notes and help text as incorrect completion will delay the processing of your application.

**1. Applicant Name and Address**

Title:  First name:

Last name:

Company (optional):

Unit:  House number:  House suffix:

House name:

Address 1:

Address 2:

Address 3:

Town:

County:

Country:

Postcode:

**2. Agent Name and Address**

Title:  First name:

Last name:

Company (optional):

Unit:  House number:  House suffix:

House name:

Address 1:

Address 2:

Address 3:

Town:

County:

Country:

Postcode:

### 3. Site Address Details

Please provide the full postal address of the application site.

Unit:  House number:  House suffix:

House name: **LAND AT FAIRFIELD WAT**

Address 1: **HAWSKER - CUM - STAINSALE**

Address 2:

Address 3:

Town: **WHITBY**

County: **NORTH YORKSHIRE**

Postcode (optional): **YO22 4PU**

Description of location or a grid reference. (must be completed if postcode is not known):

Easting:  Northing:

Description: **CHANGE OF USE OF LAND CONSTRUCTION OF SITE ACCESS AND BUILDINGS.**

### 4. Pre-application Advice

Has assistance or prior advice been sought from the local authority about this application?  Yes  No

If Yes, please complete the following information about the advice you were given. (This will help the authority to deal with this application more efficiently).

Please tick if the full contact details are not known, and then complete as much as possible:

Officer name:

Reference:

Date (DD/MM/YYYY):  (must be pre-application submission)

Details of pre-application advice received?

### 5. Description Of Your Proposal

Please provide a description of the approved development as shown on the decision letter, including the application reference number and date of decision in the sections below:

**DRAINAGE STRATEGY FOR THE SITE TO DISCHARGE WITH CONDITION NO. 2**

Reference number: **NYM/2021/0512** Date of decision (DD/MM/YYYY): **12/10/2021** (date must be pre-application submission)

Please state the condition number(s) to which this application relates:

1.		6.	
2.	<input checked="" type="checkbox"/>	7.	
3.		8.	
4.		9.	
5.		10.	

Has the development already started?  Yes  No  
If Yes, please state when the development started (DD/MM/YYYY):  (date must be pre-application submission)

Has the development been completed?  Yes  No  
If Yes, please state when the development was completed (DD/MM/YYYY):  (date must be pre-application submission)

### 6. Condition(s) - Removal

Please state why you wish the condition(s) to be removed or changed:

**DISCHARGE OF CONDITION NO. 2**

If you wish the existing condition to be changed, please state how you wish the condition to be varied:



## 7. Ownership Certificates and Agricultural Land Declaration

One Certificate A, B, C, or D, must be completed with this application form

### CERTIFICATE OF OWNERSHIP - CERTIFICATE A

#### Town and Country Planning (Development Management Procedure) (England) Order 2015 Certificate under Article 14

I certify/The applicant certifies that on the day 21 days before the date of this application nobody except myself/ the applicant was the owner\* of any part of the land or building to which the application relates, and that none of the land to which the application relates is, or is part of, an agricultural holding\*\*.

**NOTE: You should sign Certificate B, C or D, as appropriate, if you are the sole owner of the land or building to which the application relates but the land is, or is part of, an agricultural holding.**

\* "owner" is a person with a freehold interest or leasehold interest with at least 7 years left to run.

\*\* "agricultural holding" has the meaning given by reference to the definition of "agricultural tenant" in section 65(8) of the Act.

Signed - Applicant:

Or signed - Agent:

Date (DD/MM/YYYY):

### CERTIFICATE OF OWNERSHIP - CERTIFICATE B

#### Town and Country Planning (Development Management Procedure) (England) Order 2015 Certificate under Article 14

I certify/ The applicant certifies that I have/the applicant has given the requisite notice to everyone else (as listed below) who, on the day 21 days before the date of this application, was the owner\* and/or agricultural tenant\*\* of any part of the land or building to which this application relates.

\* "owner" is a person with a freehold interest or leasehold interest with at least 7 years left to run.

\*\* "agricultural tenant" has the meaning given in section 65(8) of the Town and Country Planning Act 1990

Name of Owner / Agricultural Tenant	Address	Date Notice Served

Signed - Applicant:

Or signed - Agent:

Date (DD/MM/YYYY):

**7. Ownership Certificates and Agricultural Land Declaration (continued)**

**CERTIFICATE OF OWNERSHIP - CERTIFICATE C**

**Town and Country Planning (Development Management Procedure) (England) Order 2015 Certificate under Article 14**

I certify/ The applicant certifies that:

- Neither Certificate A or B can be issued for this application
- All reasonable steps have been taken to find out the names and addresses of the other owners\* and/or agricultural tenants\*\* of the land or building, or of a part of it, but I have/ the applicant has been unable to do so.

\* "owner" is a person with a freehold interest or leasehold interest with at least 7 years left to run.

\*\* "agricultural tenant" has the meaning given in section 65(8) of the Town and Country Planning Act 1990

The steps taken were:

Name of Owner / Agricultural Tenant	Address	Date Notice Served
	N/A	

Notice of the application has been published in the following newspaper (circulating in the area where the land is situated):

Signed - Applicant:

On the following date (which must not be earlier than 21 days before the date of the application):

Or signed - Agent:

Date (DD/MM/YYYY):

**CERTIFICATE OF OWNERSHIP - CERTIFICATE D**

**Town and Country Planning (Development Management Procedure) (England) Order 2015 Certificate under Article 14**

I certify/ The applicant certifies that:

- Certificate A cannot be issued for this application
- All reasonable steps have been taken to find out the names and addresses of everyone else who, on the day 21 days before the date of this application, was the owner\* and/or agricultural tenant\*\* of any part of the land to which this application relates, but I have/ the applicant has been unable to do so.

\* "owner" is a person with a freehold interest or leasehold interest with at least 7 years left to run.

\*\* "agricultural tenant" has the meaning given in section 65(8) of the Town and Country Planning Act 1990

The steps taken were:

Notice of the application has been published in the following newspaper (circulating in the area where the land is situated):

Signed - Applicant:

On the following date (which must not be earlier than 21 days before the date of the application):

Or signed - Agent:

Date (DD/MM/YYYY):

### 8. Planning Application Requirements - Checklist

Please read the following checklist to make sure you have sent all the information in support of your proposal. Failure to submit all information required will result in your application being deemed invalid. It will not be considered valid until all information required by the Local Planning Authority (LPA) has been submitted.

The original and 3 copies\* of a completed and dated application form:

The original and 3 copies\* of the completed, dated Ownership Certificate (A, B, C or D as applicable) and Article 14 Certificate (Agricultural Holdings):

The original and 3 copies\* of other plans and drawings or information necessary to describe the subject of the application:

The correct fee:

\*National legislation specifies that the applicant must provide the original plus three copies of the form and supporting documents (a total of four copies), unless the application is submitted electronically or, the LPA indicate that a smaller number of copies is required. LPAs may also accept supporting documents in electronic format by post (for example, on a CD, DVD or USB memory stick). You can check your LPA's website for information or contact their planning department to discuss these options.

### 9. Declaration

I/we hereby apply for planning permission/consent as described in this form and the accompanying plans/drawings and additional information. I/we confirm that, to the best of my/our knowledge, any facts stated are true and accurate and any opinions given are the genuine opinions of the person(s) giving them.

Signed - Applicant:

Or signed - Agent:

Date (DD/MM/YYYY):

19/11/2021 (date cannot be pre-application)

### 10. Applicant Contact Details

Telephone numbers

Country code: National number: Extension number:

Country code: Mobile number (optional):

Country code: Fax number (optional):

Email address (optional):

### 11. Agent Contact Details

Telephone numbers

Country code: National number: Extension number:

Country code: Mobile number (optional):

Country code: Fax number (optional):

Email address (optional):

### 12. Site Visit

Can the site be seen from a public road, public footpath, bridleway or other public land?  Yes  No

If the planning authority needs to make an appointment to carry out a site visit, whom should they contact? (Please select only one)  Agent  Applicant  Other (if different from the agent/applicant's details)

If Other has been selected, please provide:

Contact name:

Telephone number:

Email address:





**Steve Gilman**  
**Design Ltd**  
Consulting Structural & Civil Engineers

Fairfield Way,  
Whitby

## Drainage Strategy

NYMNPA

22/11/2021

Project No. 7772

November 2021



**Registered Office:** Lych Gate Barn, Church Lane, Carlton Le Moorland, Lincoln, LN5 9HS

**Directors:** S.Gilman B.Eng, C.Eng, M.I.Struct.E. A.M.Foottit I.Eng, A.M.I.Struct.E.

**Company Secretary:** H.L.Gilman B.A.(Hons).

Registered in England. Registration Number: 5337463 V.A.T. Registration Number: 852 7676 88

The *Institution*  
of *Structural*  
*Engineers*





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## Drainage Strategy

### Introduction

This drainage strategy has been developed as part of the planning application to show the site is being developed in a sustainable manor.

This report is to accompany Steve Gilman Design Ltd drawing 7772-010 (Proposed Drainage Layout), and its purpose is to support and explain the methodology behind the drainage strategy for the site.

The following sections describes in detail the methods and assumptions behind the drainage strategy and how the site is proposed to drain in a sustainable manor.

### Site Description

The site is on land off Fairfield Way, Whitby, and is currently greenfield land. The site is bounded by commercial/industrial units. The total site is approximately 1.7 Ha in area.

The site does not currently benefit from highway access, however the development proposes highway access via Fairfield Way.

### Development Proposals

Steve Gilman Design Ltd have been appointed to provide consultancy services for a proposed industrial development located on land off Fairfield Way, Whitby. The centre of the site is located at approximately NZ 91020 09515. The proposed development is for the erection of 4 no. buildings with associated parking and landscaping for waste recycling and skip hire operations.

### Surface Water Drainage

For new developments there is a requirement to apply sustainable drainage principles (SuDS) to the disposal of surface water from the site. Generally, the aim should be to discharge surface water as high up the following hierarchy of drainage options as reasonably practicable:

1. Into the ground (infiltration);
2. To a surface water body;
3. To a surface water sewer or highway drain;
4. To a combined sewer.

### Infiltration

Infiltration is the preferred method of water disposal as this reflects the natural ground conditions, recharges aquifers, lowers the risk of flooding as a result of urbanisation and lowers the chance of 'flash flooding'.



Historic borehole logs and records indicate the site is underlain with stiff boulder clay, which is not expected to be conducive to infiltration. Infiltration is therefore not considered a viable option for disposing of surface water runoff.

The bedrock geology local to the development site is identified as the Long Nab Member, consisting of sandstone, siltstone and mudstone.

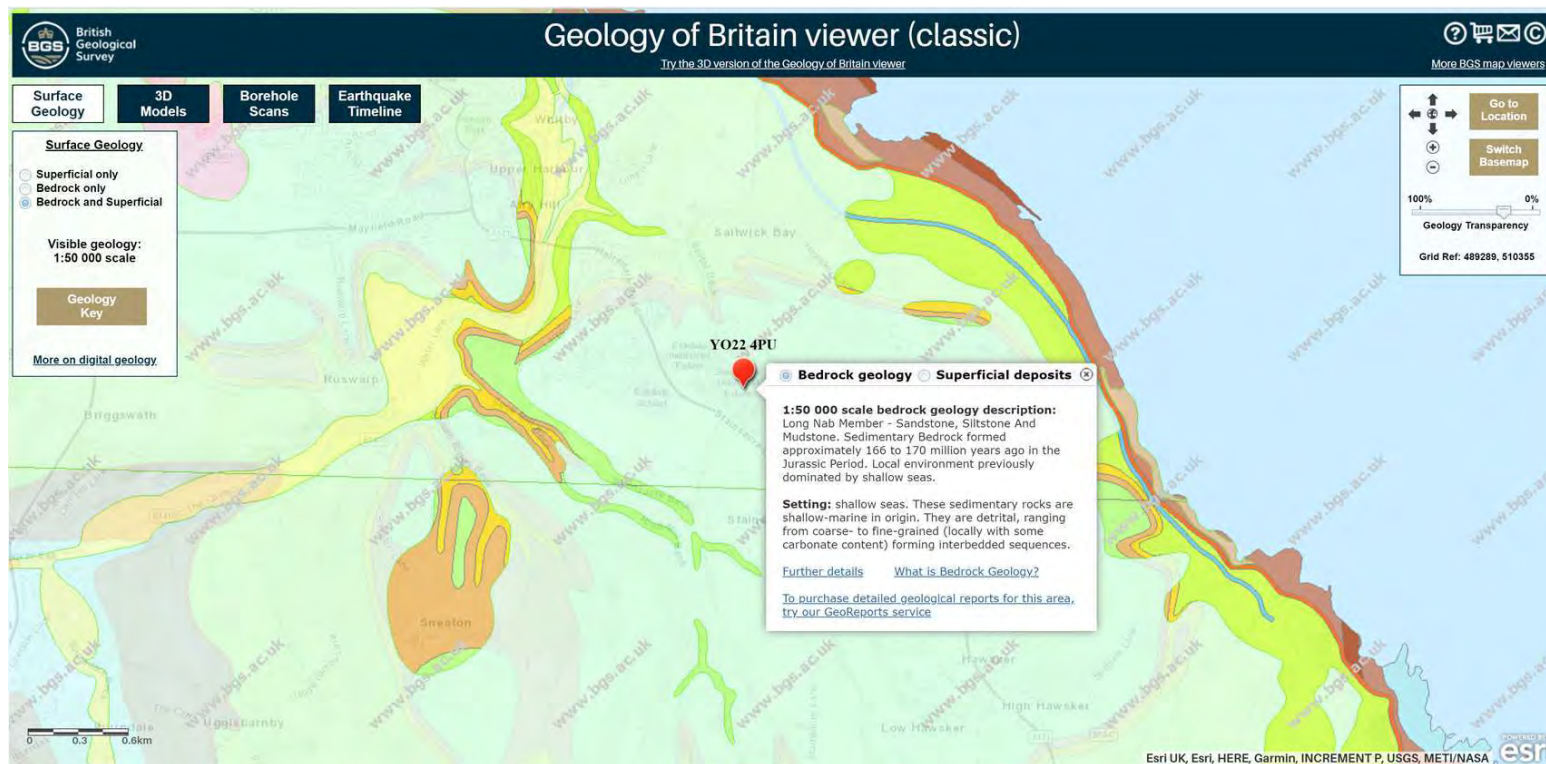


Figure 1 – Geological Map (Source: BGS Maps)

A search of the DEFRA 'Magic Map' shows that the development site is not within the vicinity of a 'Source Protection Zone'. Figure 2 below is an extract from the DEFRA 'Magic Map' showing 'Source Protection Zone' indicatively presented in coloured layers.

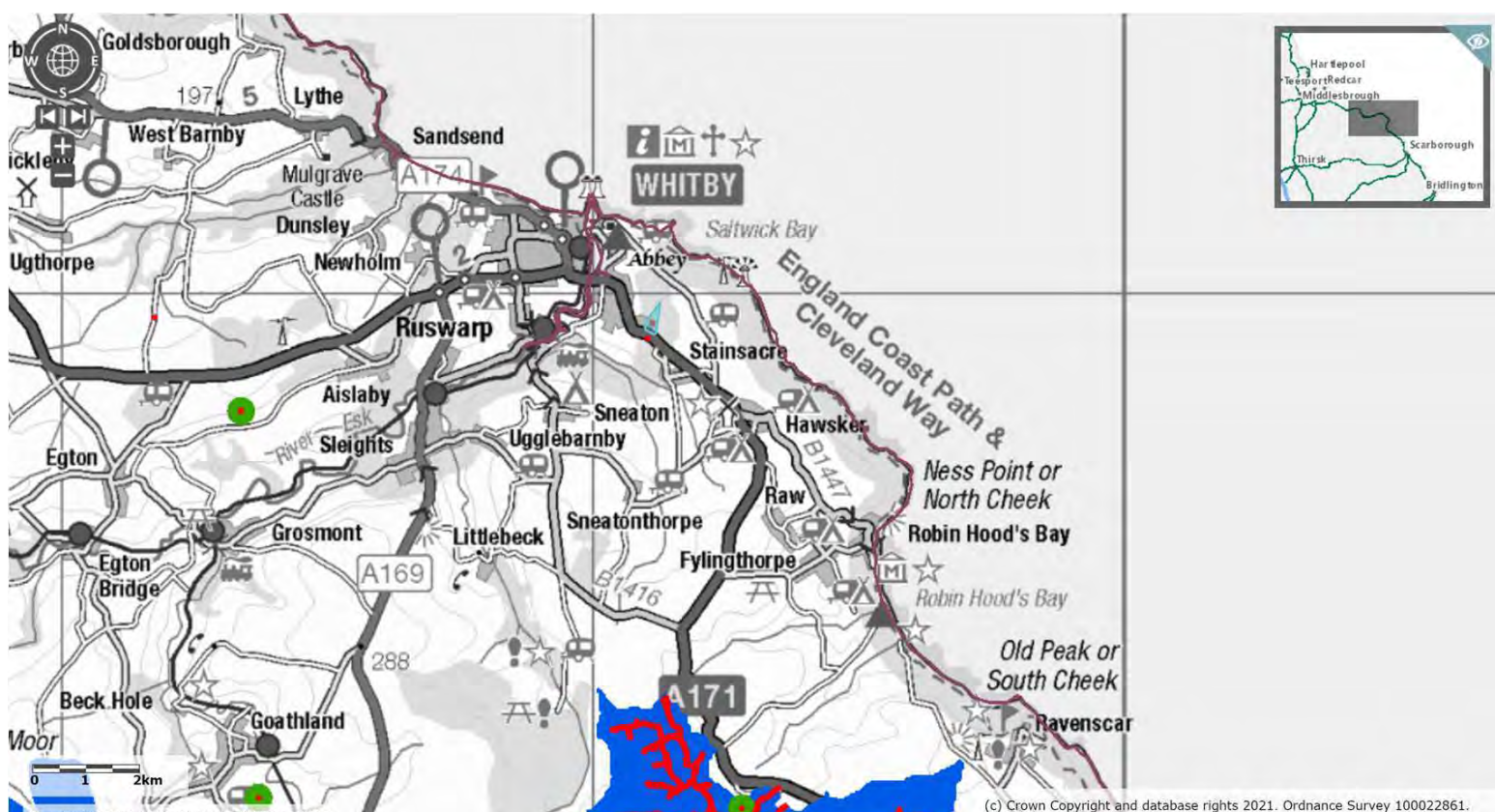


Figure 2 - Source Protection Zones (Source: DEFRA Magic Map)





## Alternative Drainage Options

It is assumed that infiltration is not a viable means for disposing of surface water, therefore an alternative method will need to be identified, as per the hierarchy for disposing of surface water.

The north-western corner of the site is adjacent to the Spital Beck, an ordinary watercourse. A connection is proposed to the Spital Beck, and the proposed development would discharge at a restricted rate (as close as is reasonably practicable to greenfield runoff rate), subject to consent from the Drainage Authority.

## Drainage Elements

### Surface Water – Parking Areas/Access Road

Some areas of the site have been identified for construction using permeable specification, such as 6F5 or 6F2, for parking areas and storage. Other areas of site requiring concrete pavement construction will be directed towards linear drains which will then discharge to below ground gravity drainage system, with a restricted discharge into the Spital Beck and attenuation in the form of a pond.

### Surface Water - Roofs

Roof water will be collected via traditional gutters from the proposed buildings and directed towards downpipes. The downpipes from the roof water will discharge into a below ground gravity drainage system, with a restricted discharge into the Spital Beck and attenuation in the form of a pond.

### Proposed Site Discharge Rates

In accordance with the guidance in Building Regulations and within CIRIA's SuDS Manual, surface water discharge from proposed developments should be limited as close as is reasonably practicable to greenfield runoff rates. The greenfield runoff rate for the proposed development is 7.34 l/s (QBar). A flow control device will be specified to limit discharge from the proposed development to 7.3 l/s.

## Water Quality

The methods of surface water disposal mentioned above have included provisions for water quality. In accordance with CIRIA C753, the pollution hazard features for the drainage areas are;

- Other roofs - Low
- Sites with heavy pollution - High

To reduce the risk of pollution, CIRIA have developed 'Pollution Hazard Indices' and the 'Mitigation Indices' that the SuDS components provide, further details of these are found in the figures below.



Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.6 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways <sup>1</sup>	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways <sup>1</sup>	High	0.8 <sup>2</sup>	0.8 <sup>2</sup>	0.9 <sup>2</sup>

Figure 3 - Pollution Hazard Indices for Different Land use Classifications (Source: CIRIA 753)

Type of SuDS component	Mitigation indices <sup>1</sup>		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 <sup>2</sup>	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.6	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond <sup>2</sup>	0.7 <sup>2</sup>	0.7	0.5
Wetland	0.8 <sup>2</sup>	0.8	0.8
Proprietary treatment systems <sup>2,3</sup>	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Figure 4 - Indicative SuDS Mitigation Indices for Discharging Surface Water (Source: CIRIA 753)

To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each containment type) that equals or exceeds the pollution hazard index (for each contaminant type):

$$\text{Total SuDS mitigation index} \geq \text{pollution hazard index}$$

(for each contaminant type) (for each contaminant type)

Where the mitigation index of an individual component is insufficient, two components (or more) in series will be required where:



$$\text{Total SuDS mitigation index} = \text{mitigation index}_1 + 0.5 (\text{mitigation index}_2)$$

Where:

$$\text{Mitigation index}_n = \text{mitigation index for component } n$$

Provided the total SuDS mitigation index exceeds the pollution hazard indices, then sufficient water quality will be provided.

For the calculations below the hazards are represented by;

Total suspended solids = Red

Metals = Blue

Hydrocarbons = Green

The figures are presented to show the actual achieved in the right-hand side column. The right-hand side's total must be higher than the left-hand side.

#### Roofs

0.2 0.2 0.05 = Oil Separator 0.85 0.64 0.99 + Pond 0.7 0.7 0.5

The mitigation provided by the oil separator exceeds all the pollution indices alone, and the pond will offer additional benefit, therefore sufficient treatment has been provided.

#### Parking Areas/Access Road

0.8 0.8 0.9 = Oil Separator 0.85 0.64 0.99 + Pond 0.7 0.7 0.5

The mitigation provided by the oil separator and the pond exceeds all the pollution indices, therefore sufficient treatment has been provided.

#### Fire Suppression System

A fire suppression system will be specified by a specialist supplier and will drain to the proposed surface water network. A specialist M & E design will include a penstock to the chamber immediately downstream of pond, which will close upon triggering of the fire suppression system. The proposed pond will have an impermeable liner, and after a fire suppression event the pond and surface water network will be completely emptied of contaminated effluent prior to resetting/opening of the penstock.

#### Vehicle Washdown

The proposed vehicle washdown will be covered, to separate surface water runoff and washdown effluent. The vehicle washdown bay will drain to a water recycling plant for re-use in the washdown, and therefore no discharge is anticipated from the washdown. The washdown recycling system will be designed by a specialist supplier, however if discharge





from the water recycling system is required then this will be to the foul sewer and potentially subject to a trade effluent agreement with Yorkshire Water.

### Finished Floor Levels

In line with best practice and in accordance with Building Regulations, the finished floor levels of the office building will generally be raised 150mm above proposed levels, and due to access requirements to the other buildings will be level with proposed ground levels.

### Maintenance

It is crucial that the elements mentioned in the drainage elements and water quality are maintained to a sufficient standard to ensure that the devices can still function. Generally, the maintenance requirements are either from CIRIA 753, or manufacturer’s guidance.

### Pond/Wetland Maintenance

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices, eg penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1 m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water’s edge to a minimum of 1 m above water level	Annually
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay.	Every 1–5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays.	Every 5 years, or as required
	Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows.	As required

Figure 5 – Pond/Wetland Maintenance Requirements (Source: CIRIA 753)



## Foul Proposal

In contrast to surface water drainage, the preferred method of foul water disposal is via sewers, which will connect into the Yorkshire Water foul water sewer network before eventually reaching a wastewater recycling centre where the water will receive treatment.

In some instances other disposal methods such as drainage fields, private waste treatment plants, cesspits or septic tanks can be considered, but given the proximity of the combined sewer it is unlikely that these will be considered an option and therefore a sewer will be proposed.

There is a foul water sewer adjacent to the southern boundary of the site, onto which a direct connection could be made, subject to agreement with Yorkshire Water.

The design proposal is for the foul effluent to be collected from the proposed buildings via below ground drainage and gravity falls to connect onto the existing sewer located adjacent to the site.

In accordance with 'Design and Construction Guidance' the proposed peak foul flows have been calculated as follows:

0.6 l/s/Ha for domestic design flows from commercial development

$$1.7 \text{ Ha} \times 0.6 \text{ l/s} = \underline{1.02 \text{ l/s}}$$

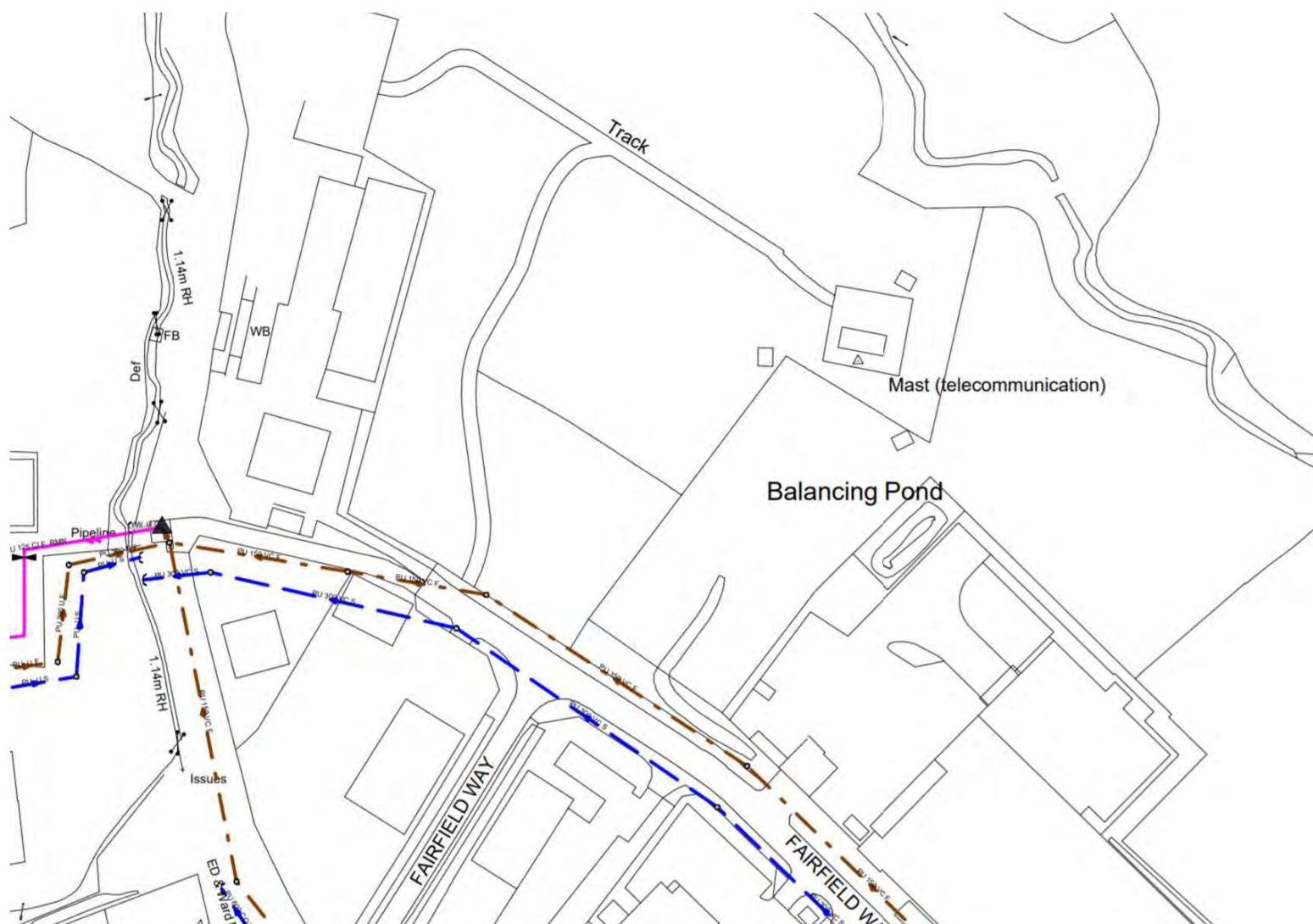


Figure 5 - Existing sewers in the proximity of the site (Source: Yorkshire Water)



## Conclusion

- The above drainage strategy demonstrates that the site can be drained appropriately including the use of a Sustainable Drainage System.
- All storm water, up to and including the 1 in 100 year event + 40% climate change events are stored below ground.
- The proposals do not increase the risk of flooding and are therefore compatible with the requirements of NPPF.
- Infiltration is considered not viable due to the underlying geology consisting of stiff boulder clay (to be confirmed by ground investigation).
- A maintenance schedule of the proposed drainage network will be devised based upon the information included in this document.
- A preliminary proposed drainage layout can be found on NC29 Ltd drawing 7772-010.
- Finished floor levels of the proposed office building will be set at a minimum of 150mm above proposed ground levels, and finished floor levels of other buildings will be level with proposed ground levels. The finished floor levels shown on the drawings are indicative only and are subject to change to suit the specific drainage.
- The site is not located in a Source Protection Zone.

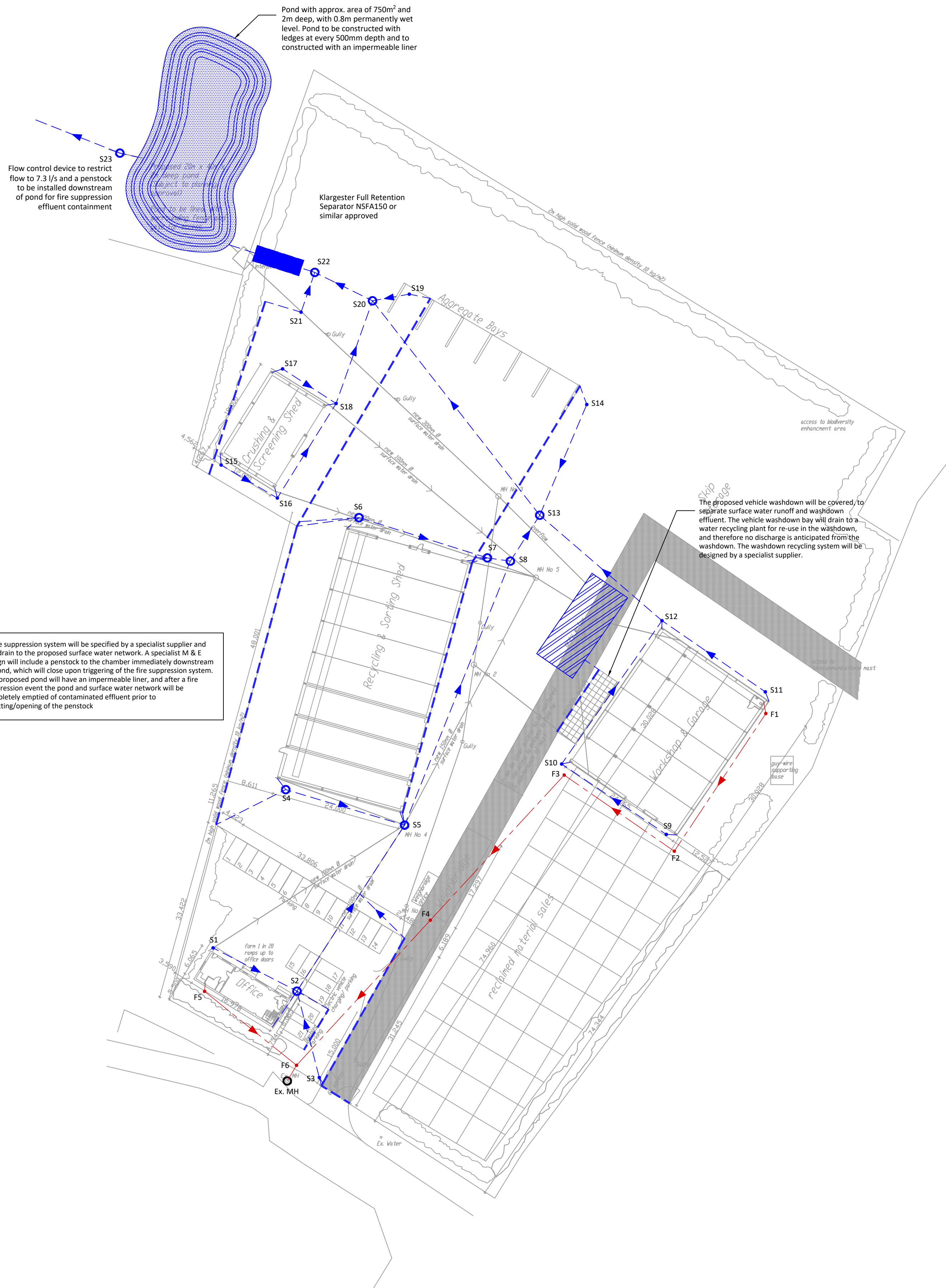




**Steve Gilman**  
**Design Ltd**  
Consulting Structural & Civil Engineers

## Appendices

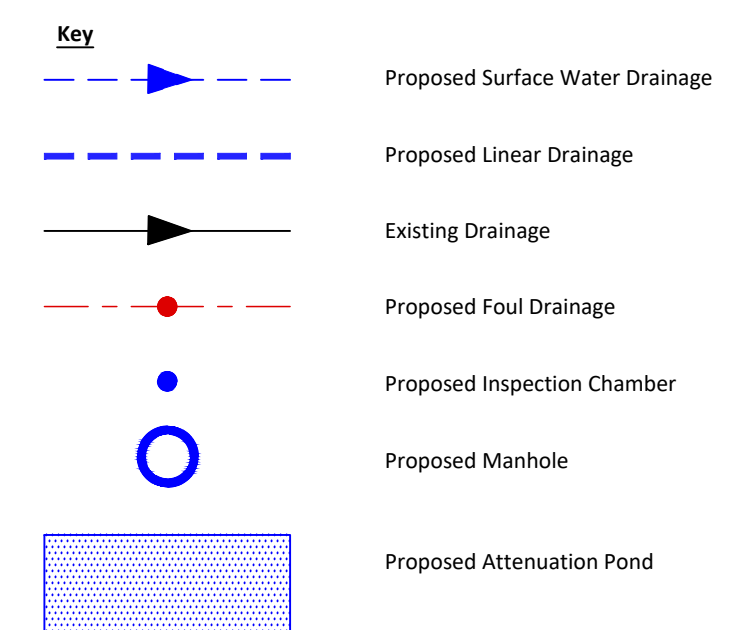
### Appendix A – Proposed Drainage Layout



A fire suppression system will be specified by a specialist supplier and will drain to the proposed surface water network. A specialist M & E design will include a penstock to the chamber immediately downstream of pond, which will close upon triggering of the fire suppression system. The proposed pond will have an impermeable liner, and after a fire suppression event the pond and surface water network will be completely emptied of contaminated effluent prior to resetting/opening of the penstock.

- Notes**
1. Do not scale this drawing.
  2. This drawing is to be read in conjunction with all other project drawings and specifications.
  3. All dimensions are in millimetres unless stated otherwise.
  4. Should there be any conflict between the details indicated on this drawing and those indicated on other drawings the Project Engineer shall be informed prior to construction.
  5. Until technical approval has been obtained from the relevant authority, it should be understood that all drawings issued are preliminary and not for construction. Should the contractor commence site work prior to such approval being given, it is entirely at their own risk.
  6. All 1000 proposed drainage pipes shown are to be laid at a minimum gradient of 1:80.
  7. All 1500 proposed drainage pipes shown are to be laid at a minimum gradient of 1:150.
  8. All existing land drains encountered on site during construction are to be re-connected.
  9. Temporary protection to be provided to drainage work during construction as necessary.
  10. Topographical information and architectural layout based on third party information.
  11. Anticipated foul flow rates calculated using discharge unit method to BS EN 12056-2.
  12. Drawing to be read in conjunction with Causeway Flow design pack.
  13. Pipes to be structured walled to BS EN 13476. Polypropylene to BE EN 1852 or PVC-U to BS EN 1401.
  14. Both clay and concrete pipes shall be strength class 120 (100/150mm min crushing strength 28kN/m). Thermoplastic pipes shall have a minimum ring stiffness of SN4.
  15. Pipes which run adjacent to buildings shall be installed in strict accordance with Building Regulations Part H, clauses 2.23 to 2.25.
  16. Class 2 concrete bed and surround to all foul and surface water pipes with less than 900mm cover depth. Type S granular bed and surround to all foul and surface water pipes with greater than 900mm cover depth.
  17. All manholes and inspection chambers subject to vehicular trafficking to have D400 load-rated covers and frames to BS EN 124. All manholes and inspection chambers not subject to vehicular trafficking to have B125 load-rated covers and frames to BS EN 124.
  18. Concrete to be GEN1 unless specified otherwise.
  19. The first flexible joint in pipes adjoining a manhole shall be a maximum length of 600mm from the inside face of the manhole, connecting to a rocker pipe. The length of the rocker pipe shall be 600mm.
  20. All foul and surface water pipes to be constructed to Building Regulations Part H.
  21. Geo-cellular units to be PolyStorm PSM1A or similar approved.
  22. Hydro-Brake devices or similar approved to achieve flow restrictions as shown.

**CDM Requirements**  
**Risk - Deep excavation**  
**Control method** - Contractor to design trench support to depths shown on drawings and in the manhole schedule, appropriate to the ground conditions.  
**Risk - Water ingress into excavations, including ground water**  
**Control method** - Contractor to specify method of dealing with ingress of water into excavations, in particular if ground water is experienced. Contractor to undertake trench inspections prior to entry into any excavation, and again if left overnight or if conditions change.



Revision	Details	Date
 <b>Steve Gilman Design Ltd.</b> Lych Gate Barn, Church Lane Carlton Le Moorland, Lincoln, LN5 9HS Tel : 01522 788000 Email : mail@stevegilmansdesign.co.uk		
Project	Proposed Industrial Units Fairfield Way, Whitby	
Client	Noble Recycling & Skip Hire Ltd	
Title	Proposed Drainage Layout	
Drawn	CC	Checked AF
Date	Nov 2021	Scale 1:500
Number	7772-010	Status Preliminary



**Steve Gilman**  
**Design Ltd**  
Consulting Structural & Civil Engineers

## Appendix B – Surface Water Calculations



### Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	2.000
Ratio-R	0.400	Preferred Cover Depth (m)	0.600
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

### Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
S1	0.009	4.00	57.850	450	0.700
S2	0.009	4.00	57.850	1200	1.118
S3	0.031	4.00	58.000	450	0.750
S4	0.104	4.00	58.000	1500	0.900
S5	0.122	4.00	58.000	1500	1.708
S6	0.104	4.00	58.000	1200	0.975
S7	0.122	4.00	58.000	1200	1.052
S8			58.000	1500	1.837
S9	0.017	4.00	59.500	450	0.750
S10	0.017	4.00	59.500	450	0.981
S11	0.017	4.00	59.500	450	0.750
S12	0.017	4.00	59.500	450	1.302
S13			58.000	1500	1.862
S14	0.021	4.00	58.000	450	0.750
S15	0.017	4.00	58.000	450	0.750
S16	0.017	4.00	58.000	450	0.869
S17	0.017	4.00	58.000	450	0.750
S18	0.017	4.00	58.000	450	1.073
S19	0.078	4.00	58.000	450	0.750
S20			58.000	1500	1.986
S21	0.077	4.00	58.000	450	0.750
S22			58.000	1800	2.091
S23			56.400	1200	1.268
POND OUTLET		4.00	56.400		1.210
POND INLET			56.400		1.198

**Links**

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S2	17.400	0.600	57.150	56.857	0.293	59.4	100	4.29	50.0
2.000	S3	S2	16.500	0.600	57.250	56.807	0.443	37.2	150	4.17	50.0
1.001	S2	S5	36.500	0.600	56.732	56.517	0.215	169.8	225	4.90	50.0
3.000	S4	S5	22.800	0.600	57.100	56.442	0.658	34.7	300	4.14	50.0
1.002	S5	S8	52.500	0.600	56.292	56.163	0.129	407.0	450	5.77	50.0
4.000	S6	S7	24.800	0.600	57.025	56.948	0.077	322.1	375	4.41	50.0
4.001	S7	S8	4.300	0.600	56.948	56.238	0.710	6.1	375	4.42	50.0
1.003	S8	S13	10.100	0.600	56.163	56.138	0.025	404.0	450	5.94	50.0
5.000	S9	S10	23.300	0.600	58.750	58.519	0.231	100.9	150	4.39	50.0
5.001	S10	S12	32.300	0.600	58.519	58.198	0.321	100.6	150	4.93	50.0
6.000	S11	S12	23.100	0.600	58.750	58.198	0.552	41.8	150	4.25	50.0
5.002	S12	S13	29.800	0.600	58.198	56.438	1.760	16.9	150	5.13	50.0
7.000	S14	S13	22.200	0.600	57.250	56.438	0.812	27.3	150	4.19	50.0
1.004	S13	S20	50.200	0.600	56.138	56.014	0.124	404.8	450	6.77	50.0
8.000	S15	S16	12.000	0.600	57.250	57.131	0.119	100.8	150	4.20	50.0
8.001	S16	S18	20.500	0.600	57.131	56.927	0.204	100.5	150	4.54	50.0
9.000	S17	S18	11.800	0.600	57.250	56.927	0.323	36.5	150	4.12	50.0
8.002	S18	S20	20.100	0.600	56.927	56.314	0.613	32.8	150	4.73	50.0
10.000	S19	S20	6.900	0.600	57.250	56.314	0.936	7.4	150	4.03	50.0
1.005	S20	S22	11.900	0.600	56.014	55.984	0.030	396.7	450	6.97	50.0
11.000	S21	S22	7.800	0.600	57.250	56.284	0.966	8.1	150	4.04	50.0
1.006	S22	POND INLET	16.700	0.600	55.909	55.275	0.634	26.3	525	7.03	50.0
12.000	POND OUTLET	S23	3.400	0.600	55.190	55.132	0.058	58.6	100	4.06	50.0














Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.001	7.9	1.2	0.600	0.893	0.009	0.0	27	0.730
2.000	1.654	29.2	4.2	0.600	0.893	0.031	0.0	38	1.180
1.001	1.000	39.8	6.6	0.893	1.258	0.049	0.0	62	0.745
3.000	2.679	189.4	14.1	0.600	1.258	0.104	0.0	55	1.589
1.002	1.001	159.3	37.3	1.258	1.387	0.275	0.0	147	0.822
4.000	1.004	110.9	14.1	0.600	0.677	0.104	0.0	90	0.695
4.001	7.401	817.4	30.6	0.677	1.387	0.226	0.0	49	3.601
1.003	1.005	159.8	67.9	1.387	1.412	0.501	0.0	204	0.965
5.000	1.000	17.7	2.3	0.600	0.831	0.017	0.0	37	0.693
5.001	1.001	17.7	4.6	0.831	1.152	0.034	0.0	52	0.846
6.000	1.560	27.6	2.3	0.600	1.152	0.017	0.0	29	0.944
5.002	2.460	43.5	9.2	1.152	1.412	0.068	0.0	47	1.954
7.000	1.933	34.2	2.8	0.600	1.412	0.021	0.0	29	1.170
1.004	1.004	159.7	80.0	1.412	1.536	0.590	0.0	225	1.005
8.000	1.000	17.7	2.3	0.600	0.719	0.017	0.0	37	0.693
8.001	1.002	17.7	4.6	0.719	0.923	0.034	0.0	52	0.841
9.000	1.670	29.5	2.3	0.600	0.923	0.017	0.0	28	0.998
8.002	1.764	31.2	9.2	0.923	1.536	0.068	0.0	56	1.541
10.000	3.734	66.0	10.6	0.600	1.536	0.078	0.0	41	2.758
1.005	1.014	161.3	99.7	1.536	1.566	0.736	0.0	256	1.065
11.000	3.568	63.0	10.4	0.600	1.566	0.077	0.0	41	2.655
1.006	4.376	947.3	110.2	1.566	0.600	0.813	0.0	120	2.972
12.000	1.008	7.9	0.0	1.110	1.168	0.000	0.0	0	0.000

### Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	17.400	59.4	100	Circular	57.850	57.150	0.600	57.850	56.857	0.893
2.000	16.500	37.2	150	Circular	58.000	57.250	0.600	57.850	56.807	0.893
1.001	36.500	169.8	225	Circular	57.850	56.732	0.893	58.000	56.517	1.258
3.000	22.800	34.7	300	Circular	58.000	57.100	0.600	58.000	56.442	1.258
1.002	52.500	407.0	450	Circular	58.000	56.292	1.258	58.000	56.163	1.387
4.000	24.800	322.1	375	Circular	58.000	57.025	0.600	58.000	56.948	0.677
4.001	4.300	6.1	375	Circular	58.000	56.948	0.677	58.000	56.238	1.387
1.003	10.100	404.0	450	Circular	58.000	56.163	1.387	58.000	56.138	1.412
5.000	23.300	100.9	150	Circular	59.500	58.750	0.600	59.500	58.519	0.831
5.001	32.300	100.6	150	Circular	59.500	58.519	0.831	59.500	58.198	1.152
6.000	23.100	41.8	150	Circular	59.500	58.750	0.600	59.500	58.198	1.152
5.002	29.800	16.9	150	Circular	59.500	58.198	1.152	58.000	56.438	1.412
7.000	22.200	27.3	150	Circular	58.000	57.250	0.600	58.000	56.438	1.412
1.004	50.200	404.8	450	Circular	58.000	56.138	1.412	58.000	56.014	1.536
8.000	12.000	100.8	150	Circular	58.000	57.250	0.600	58.000	57.131	0.719
8.001	20.500	100.5	150	Circular	58.000	57.131	0.719	58.000	56.927	0.923
9.000	11.800	36.5	150	Circular	58.000	57.250	0.600	58.000	56.927	0.923
8.002	20.100	32.8	150	Circular	58.000	56.927	0.923	58.000	56.314	1.536
10.000	6.900	7.4	150	Circular	58.000	57.250	0.600	58.000	56.314	1.536
1.005	11.900	396.7	450	Circular	58.000	56.014	1.536	58.000	55.984	1.566
11.000	7.800	8.1	150	Circular	58.000	57.250	0.600	58.000	56.284	1.566
1.006	16.700	26.3	525	Circular	58.000	55.909	1.566	56.400	55.275	0.600
12.000	3.400	58.6	100	Circular	56.400	55.190	1.110	56.400	55.132	1.168













Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	450	Manhole	Adoptable	S2	1200	Manhole	Adoptable
2.000	S3	450	Manhole	Adoptable	S2	1200	Manhole	Adoptable
1.001	S2	1200	Manhole	Adoptable	S5	1500	Manhole	Adoptable
3.000	S4	1500	Manhole	Adoptable	S5	1500	Manhole	Adoptable
1.002	S5	1500	Manhole	Adoptable	S8	1500	Manhole	Adoptable
4.000	S6	1200	Manhole	Adoptable	S7	1200	Manhole	Adoptable
4.001	S7	1200	Manhole	Adoptable	S8	1500	Manhole	Adoptable
1.003	S8	1500	Manhole	Adoptable	S13	1500	Manhole	Adoptable
5.000	S9	450	Manhole	Adoptable	S10	450	Manhole	Adoptable
5.001	S10	450	Manhole	Adoptable	S12	450	Manhole	Adoptable
6.000	S11	450	Manhole	Adoptable	S12	450	Manhole	Adoptable
5.002	S12	450	Manhole	Adoptable	S13	1500	Manhole	Adoptable
7.000	S14	450	Manhole	Adoptable	S13	1500	Manhole	Adoptable
1.004	S13	1500	Manhole	Adoptable	S20	1500	Manhole	Adoptable
8.000	S15	450	Manhole	Adoptable	S16	450	Manhole	Adoptable
8.001	S16	450	Manhole	Adoptable	S18	450	Manhole	Adoptable
9.000	S17	450	Manhole	Adoptable	S18	450	Manhole	Adoptable
8.002	S18	450	Manhole	Adoptable	S20	1500	Manhole	Adoptable
10.000	S19	450	Manhole	Adoptable	S20	1500	Manhole	Adoptable
1.005	S20	1500	Manhole	Adoptable	S22	1800	Manhole	Adoptable
11.000	S21	450	Manhole	Adoptable	S22	1800	Manhole	Adoptable
1.006	S22	1800	Manhole	Adoptable	POND INLET		Junction	
12.000	POND OUTLET		Junction		S23	1200	Manhole	Adoptable

**Manhole Schedule**

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	57.850	0.700	450				
					0	1.000	57.150 100
S2	57.850	1.118	1200				
					1	2.000	56.807 150
					2	1.000	56.857 100
					0	1.001	56.732 225
S3	58.000	0.750	450				
					0	2.000	57.250 150
S4	58.000	0.900	1500				
					0	3.000	57.100 300
S5	58.000	1.708	1500				
					1	3.000	56.442 300
					2	1.001	56.517 225
					0	1.002	56.292 450
S6	58.000	0.975	1200				
					0	4.000	57.025 375
S7	58.000	1.052	1200				
					1	4.000	56.948 375
					0	4.001	56.948 375
S8	58.000	1.837	1500				
					1	4.001	56.238 375
					2	1.002	56.163 450
					0	1.003	56.163 450
S9	59.500	0.750	450				
					0	5.000	58.750 150
S10	59.500	0.981	450				
					1	5.000	58.519 150
					0	5.001	58.519 150
S11	59.500	0.750	450				
					0	6.000	58.750 150
S12	59.500	1.302	450				
					1	6.000	58.198 150
					2	5.001	58.198 150
					0	5.002	58.198 150
S13	58.000	1.862	1500				
					1	7.000	56.438 150
					2	5.002	56.438 150
					3	1.003	56.138 450
					0	1.004	56.138 450



**Manhole Schedule**

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S14	58.000	0.750	450				
				0	7.000	57.250	150
S15	58.000	0.750	450				
				0	8.000	57.250	150
S16	58.000	0.869	450				
				1	8.000	57.131	150
				0	8.001	57.131	150
S17	58.000	0.750	450				
				0	9.000	57.250	150
S18	58.000	1.073	450				
				1	9.000	56.927	150
				2	8.001	56.927	150
				0	8.002	56.927	150
S19	58.000	0.750	450				
				0	10.000	57.250	150
S20	58.000	1.986	1500				
				1	10.000	56.314	150
				2	8.002	56.314	150
				3	1.004	56.014	450
				0	1.005	56.014	450
S21	58.000	0.750	450				
				0	11.000	57.250	150
S22	58.000	2.091	1800				
				1	11.000	56.284	150
				2	1.005	55.984	450
				0	1.006	55.909	525
S23	56.400	1.268	1200				
				1	12.000	55.132	100
POND OUTLET	56.400	1.210					
				0	12.000	55.190	100
POND INLET	56.400	1.198					
				1	1.006	55.275	525

### Simulation Settings

Rainfall Methodology FSR FSR Region England and Wales M5-60 (mm) 20.000 Ratio-R 0.400 Summer CV 0.750 Winter CV 0.840	Analysis Speed Normal Skip Steady State x Drain Down Time (mins) 240 Additional Storage (m <sup>3</sup> /ha) 20.0 Check Discharge Rate(s) x Check Discharge Volume x
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### Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	40	0	0

### Node S23 Online Hydro-Brake® Control

Flap Valve x Replaces Downstream Link ✓ Invert Level (m) 55.132 Design Depth (m) 1.200 Design Flow (l/s) 7.3	Objective (HE) Minimise upstream storage Sump Available ✓ Product Number CTL-SHE-0123-7300-1200-7300 Min Outlet Diameter (m) 0.150 Min Node Diameter (mm) 1200
--	--

### Node POND OUTLET Flow through Pond Storage Structure

Base Inf Coefficient (m/hr) 0.00000 Side Inf Coefficient (m/hr) 0.00000 Safety Factor 2.0	Porosity 1.00 Invert Level (m) 55.190 Time to half empty (mins)	Main Channel Length (m) 12.100 Main Channel Slope (1:X) 1000.0 Main Channel n 0.600
---	---	---

### Inlets

#### POND INLET

Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )
0.000	443.0	0.0	1.200	745.0	0.0

**Results for 2 year Critical Storm Duration. Lowest mass balance: 99.59%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	S1	10	57.182	0.032	1.7	0.0134	0.0000	OK
15 minute winter	S2	10	56.807	0.075	9.4	0.0965	0.0000	OK
15 minute winter	S3	10	57.298	0.048	6.0	0.0469	0.0000	OK
15 minute winter	S4	10	57.168	0.068	20.0	0.2761	0.0000	OK
15 minute winter	S5	11	56.480	0.188	52.6	0.6003	0.0000	OK
15 minute summer	S6	10	57.134	0.109	20.0	0.3545	0.0000	OK
15 minute summer	S7	10	57.006	0.058	43.5	0.2005	0.0000	OK
15 minute winter	S8	11	56.454	0.291	92.0	0.5138	0.0000	OK
15 minute winter	S9	10	58.794	0.044	3.3	0.0268	0.0000	OK
15 minute winter	S10	10	58.584	0.065	6.6	0.0330	0.0000	OK
15 minute winter	S11	10	58.785	0.035	3.3	0.0215	0.0000	OK
15 minute winter	S12	10	58.255	0.057	13.1	0.0241	0.0000	OK
15 minute winter	S13	11	56.422	0.284	104.2	0.5022	0.0000	OK
15 minute winter	S14	10	57.285	0.035	4.0	0.0254	0.0000	OK
15 minute winter	S15	10	57.294	0.044	3.3	0.0268	0.0000	OK
15 minute summer	S16	10	57.196	0.065	6.6	0.0355	0.0000	OK
15 minute winter	S17	10	57.284	0.034	3.3	0.0207	0.0000	OK
15 minute winter	S18	10	56.998	0.071	13.2	0.0336	0.0000	OK
15 minute winter	S19	10	57.303	0.053	15.0	0.1177	0.0000	OK
15 minute winter	S20	11	56.319	0.305	130.2	0.5397	0.0000	OK
15 minute winter	S21	10	57.303	0.053	14.8	0.1174	0.0000	OK
15 minute winter	S22	11	56.052	0.143	143.1	0.3651	0.0000	OK
180 minute winter	S23	148	55.354	0.222	7.0	0.2515	0.0000	OK
180 minute winter	POND OUTLET	148	55.414	0.224	20.8	0.0000	0.0000	SURCHARGED
180 minute winter	POND INLET	148	55.415	0.212	34.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	S1	1.000	S2	1.7	0.791	0.215	0.0372	
15 minute winter	S2	1.001	S5	9.1	0.811	0.229	0.4122	
15 minute winter	S3	2.000	S2	6.0	1.280	0.205	0.0774	
15 minute winter	S4	3.000	S5	20.0	1.725	0.106	0.2643	
15 minute winter	S5	1.002	S8	48.5	0.630	0.304	4.4872	
15 minute summer	S6	4.000	S7	20.0	1.101	0.181	0.4618	
15 minute summer	S7	4.001	S8	43.5	2.461	0.053	0.1594	
15 minute winter	S8	1.003	S13	88.1	0.847	0.551	1.0798	
15 minute winter	S9	5.000	S10	3.3	0.573	0.186	0.1354	
15 minute winter	S10	5.001	S12	6.5	0.965	0.369	0.2187	
15 minute winter	S11	6.000	S12	3.3	0.737	0.120	0.1076	
15 minute winter	S12	5.002	S13	12.9	2.117	0.297	0.1817	
15 minute winter	S13	1.004	S20	104.9	0.953	0.657	5.5233	
15 minute winter	S14	7.000	S13	4.0	1.284	0.117	0.0691	
15 minute winter	S15	8.000	S16	3.3	0.576	0.187	0.0692	
15 minute summer	S16	8.001	S18	6.6	0.857	0.373	0.1578	
15 minute winter	S17	9.000	S18	3.3	0.622	0.112	0.0657	
15 minute winter	S18	8.002	S20	13.1	1.650	0.421	0.1597	
15 minute winter	S19	10.000	S20	15.0	2.874	0.227	0.0360	
15 minute winter	S20	1.005	S22	130.1	1.261	0.807	1.2263	
15 minute winter	S21	11.000	S22	14.8	2.784	0.235	0.0415	
15 minute winter	S22	1.006	POND INLET	143.1	3.120	0.151	0.7665	
180 minute winter	S23	Hydro-Brake®		7.0				132.1
180 minute winter	POND OUTLET	12.000	S23	7.0	0.898	0.888	0.0266	
180 minute winter	POND INLET	Flow through pond	POND OUTLET	20.8	0.006	0.011	102.9045	



**Results for 30 year Critical Storm Duration. Lowest mass balance: 99.59%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	S1	10	57.196	0.046	3.3	0.0193	0.0000	OK
15 minute summer	S2	10	56.840	0.108	17.9	0.1391	0.0000	OK
15 minute summer	S3	10	57.318	0.068	11.3	0.0667	0.0000	OK
15 minute summer	S4	9	57.191	0.091	38.0	0.3715	0.0000	OK
15 minute winter	S5	11	56.798	0.506	100.9	1.6167	0.0000	SURCHARGED
15 minute winter	S6	10	57.174	0.149	38.1	0.4878	0.0000	OK
15 minute winter	S7	9	57.031	0.083	82.7	0.2861	0.0000	OK
15 minute winter	S8	11	56.753	0.590	162.7	1.0420	0.0000	SURCHARGED
15 minute winter	S9	10	58.811	0.061	6.2	0.0374	0.0000	OK
15 minute winter	S10	10	58.615	0.096	12.4	0.0488	0.0000	OK
15 minute summer	S11	10	58.798	0.048	6.2	0.0296	0.0000	OK
15 minute winter	S12	10	58.279	0.081	24.7	0.0339	0.0000	OK
15 minute winter	S13	11	56.701	0.563	191.9	0.9940	0.0000	SURCHARGED
15 minute summer	S14	10	57.298	0.048	7.7	0.0348	0.0000	OK
15 minute summer	S15	10	57.311	0.061	6.2	0.0374	0.0000	OK
15 minute winter	S16	10	57.228	0.096	12.4	0.0531	0.0000	OK
15 minute summer	S17	10	57.297	0.047	6.2	0.0286	0.0000	OK
15 minute summer	S18	10	57.032	0.105	24.8	0.0500	0.0000	OK
15 minute summer	S19	9	57.327	0.077	28.5	0.1721	0.0000	OK
15 minute winter	S20	11	56.480	0.466	237.7	0.8239	0.0000	SURCHARGED
15 minute summer	S21	10	57.328	0.078	28.2	0.1730	0.0000	OK
15 minute winter	S22	11	56.109	0.200	260.1	0.5078	0.0000	OK
240 minute winter	S23	232	55.575	0.443	7.4	0.5009	0.0000	OK
240 minute winter	POND OUTLET	232	55.638	0.448	29.8	0.0000	0.0000	SURCHARGED
240 minute winter	POND INLET	232	55.638	0.436	52.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	S1	1.000	S2	3.3	0.943	0.419	0.0607	
15 minute summer	S2	1.001	S5	18.3	0.912	0.460	1.0331	
15 minute summer	S3	2.000	S2	11.3	1.510	0.387	0.1235	
15 minute summer	S4	3.000	S5	38.2	1.871	0.202	0.9843	
15 minute winter	S5	1.002	S8	89.8	0.645	0.564	8.3183	
15 minute winter	S6	4.000	S7	38.1	1.341	0.344	0.7249	
15 minute winter	S7	4.001	S8	82.7	2.703	0.101	0.2737	
15 minute winter	S8	1.003	S13	162.1	1.023	1.014	1.6003	
15 minute winter	S9	5.000	S10	6.2	0.669	0.351	0.2180	
15 minute winter	S10	5.001	S12	12.3	1.136	0.695	0.3495	
15 minute summer	S11	6.000	S12	6.2	0.866	0.225	0.1682	
15 minute winter	S12	5.002	S13	24.6	2.280	0.565	0.4064	
15 minute winter	S13	1.004	S20	190.3	1.201	1.192	7.9539	
15 minute summer	S14	7.000	S13	7.7	1.405	0.225	0.2500	
15 minute summer	S15	8.000	S16	6.2	0.666	0.351	0.1123	
15 minute winter	S16	8.001	S18	12.4	0.994	0.700	0.2556	
15 minute summer	S17	9.000	S18	6.2	0.722	0.210	0.1053	
15 minute summer	S18	8.002	S20	25.2	1.846	0.810	0.3005	
15 minute summer	S19	10.000	S20	28.5	3.324	0.432	0.0849	
15 minute winter	S20	1.005	S22	235.6	1.570	1.460	1.7119	
15 minute summer	S21	11.000	S22	28.2	3.245	0.447	0.0678	
15 minute winter	S22	1.006	POND INLET	257.9	3.622	0.272	1.1892	
240 minute winter	S23	Hydro-Brake®		7.3				180.5
240 minute winter	POND OUTLET	12.000	S23	7.4	0.941	0.930	0.0266	
240 minute winter	POND INLET	Flow through pond	POND OUTLET	29.8	0.008	0.015	220.7355	

**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.59%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	S1	12	57.813	0.663	9.0	0.2756	0.0000	FLOOD RISK
15 minute winter	S2	11	57.724	0.992	26.4	1.2821	0.0000	FLOOD RISK
15 minute winter	S3	11	57.903	0.653	20.6	0.6437	0.0000	FLOOD RISK
15 minute winter	S4	11	57.711	0.611	69.1	2.4932	0.0000	FLOOD RISK
15 minute winter	S5	11	57.631	1.339	158.5	4.2793	0.0000	SURCHARGED
15 minute winter	S6	11	57.574	0.549	69.1	1.7914	0.0000	SURCHARGED
15 minute winter	S7	11	57.547	0.599	144.3	2.0664	0.0000	SURCHARGED
15 minute winter	S8	11	57.496	1.333	274.2	2.3554	0.0000	SURCHARGED
15 minute winter	S9	12	59.004	0.254	11.3	0.1554	0.0000	SURCHARGED
15 minute winter	S10	11	58.945	0.426	22.2	0.2155	0.0000	SURCHARGED
15 minute winter	S11	10	58.817	0.067	11.3	0.0409	0.0000	OK
15 minute winter	S12	11	58.626	0.428	41.1	0.1796	0.0000	SURCHARGED
15 minute winter	S13	11	57.347	1.209	317.1	2.1366	0.0000	SURCHARGED
15 minute winter	S14	11	57.442	0.192	14.0	0.1381	0.0000	SURCHARGED
15 minute winter	S15	11	57.865	0.615	11.3	0.3764	0.0000	FLOOD RISK
15 minute winter	S16	11	57.831	0.700	19.1	0.3852	0.0000	FLOOD RISK
15 minute winter	S17	11	57.654	0.404	11.3	0.2473	0.0000	SURCHARGED
15 minute winter	S18	11	57.619	0.691	35.6	0.3292	0.0000	SURCHARGED
15 minute winter	S19	11	57.451	0.201	51.9	0.4503	0.0000	SURCHARGED
15 minute winter	S20	11	56.754	0.740	396.4	1.3070	0.0000	SURCHARGED
15 minute winter	S21	10	57.375	0.125	51.2	0.2756	0.0000	OK
15 minute winter	S22	11	56.183	0.274	440.5	0.6971	0.0000	OK
360 minute winter	S23	360	56.003	0.871	7.4	0.9853	0.0000	OK
360 minute winter	POND OUTLET	360	56.051	0.861	38.3	0.0000	0.0000	SURCHARGED
360 minute winter	POND INLET	360	56.051	0.849	69.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	S1	1.000	S2	6.2	1.047	0.791	0.1361	
15 minute winter	S2	1.001	S5	29.0	0.983	0.730	1.4516	
15 minute winter	S3	2.000	S2	16.7	1.642	0.570	0.2905	
15 minute winter	S4	3.000	S5	57.0	1.847	0.301	1.6056	
15 minute winter	S5	1.002	S8	151.8	0.958	0.953	8.3183	
15 minute winter	S6	4.000	S7	63.3	1.374	0.571	2.7354	
15 minute winter	S7	4.001	S8	127.3	2.796	0.156	0.4743	
15 minute winter	S8	1.003	S13	273.1	1.724	1.708	1.6003	
15 minute winter	S9	5.000	S10	10.9	0.733	0.619	0.4102	
15 minute winter	S10	5.001	S12	18.8	1.253	1.061	0.5686	
15 minute winter	S11	6.000	S12	11.3	0.986	0.410	0.2910	
15 minute winter	S12	5.002	S13	37.4	2.407	0.861	0.5246	
15 minute winter	S13	1.004	S20	315.9	1.994	1.978	7.9539	
15 minute winter	S14	7.000	S13	13.1	1.384	0.384	0.3908	
15 minute winter	S15	8.000	S16	9.2	0.716	0.521	0.2113	
15 minute winter	S16	8.001	S18	16.9	1.059	0.954	0.3609	
15 minute winter	S17	9.000	S18	9.3	0.751	0.316	0.2077	
15 minute winter	S18	8.002	S20	33.9	1.925	1.087	0.3539	
15 minute winter	S19	10.000	S20	50.4	3.395	0.763	0.1215	
15 minute winter	S20	1.005	S22	395.9	2.499	2.454	1.8561	
15 minute winter	S21	11.000	S22	51.2	3.579	0.812	0.1110	
15 minute winter	S22	1.006	POND INLET	440.5	4.131	0.465	1.7810	
360 minute winter	S23	Hydro-Brake®		7.3				205.1
360 minute winter	POND OUTLET	12.000	S23	7.4	0.946	0.935	0.0266	
360 minute winter	POND INLET	Flow through pond	POND OUTLET	38.3	0.008	0.020	471.1165	



**Steve Gilman**  
**Design Ltd**  
Consulting Structural & Civil Engineers

## Appendix C – Yorkshire Water Maps



## YORKSHIRE WATER PROTECTION OF MAINS AND SERVICES

1. The position of Yorkshire Water Services Ltd (YWS) apparatus shown on the existing mains record drawing(s) indicates the **general** position and nature of our apparatus and the accuracy of this information cannot be guaranteed. Any damage to YWS apparatus as a result of your works may have serious consequences and you will be held responsible for all costs incurred. Prior to commencing major works, the exact location of apparatus must be determined on site, if necessary by excavating trial holes. The actual position of such apparatus and that of service pipes which have not been indicated must be established on site by contacting the Customer Helpline on 0845 124 24 24 for both water and sewerage.
2. The public sewer and water network is lawfully retained in its existing position and the sewerage and water undertaker is entitled to have it remain so without any disturbance. The provisions of section 159 of the Water Industry Act 1991 provides that the undertaker may "inspect, maintain, adjust, repair or alter" the network. Those rights are given to enable the undertaker to perform its statutory duties. Any development of the land or any other action that unacceptably hindered the exercise of those rights would be unlawful. The provisions contained in Section 185 of the Water Industry Act 1991 state that where it is reasonable to do so, a person may require the water supply undertaker to alter or remove a pipe where it is necessary to enable that person to carry out a proposed change of use of the land. The provisions contained in Section 185 also require the person making the request to pay the full cost of carrying out the necessary works.
3. Ground levels over existing YWS apparatus are to be maintained. Sewers in highways will **generally** be laid to give 1200mm of cover from finished ground level working to kerb races, other permanent identification of the limits of the road or to an agreed line and level. Substantial increases or decreases to this 1200mm depth of cover will result in the sewer being re-laid at your expense. Water mains and services will **generally** be laid with a minimum of 750mm depth of cover however some mains and services usually those installed over 50 years ago may have less ground cover.
4. If surface levels are to be decreased / increased significantly the effects on existing water supply apparatus will be carefully considered and if any alterations are necessary, the costs of the alterations will be recharged to you in full. Outlets on fire hydrants must be no more than 300mm below the new levels and all surface boxes must be adjusted as part of the scheme.
5. To enable future repair works to be carried out without hindrance; any pipe, cable, duct, etc. installed parallel to a water main or service pipe should not be installed directly over or within 300mm of a water main or service pipe or 1000mm of a waste water asset. Where a pipe, cable, duct, etc. crosses a main or service it should preferably cross perpendicular or at an angle of no less than 45° and with a minimum clearance of 150mm. These requirements apply to activities within an existing highway and are relevant to the installation of pipes, cables, ducts, etc. up to and including 250mm in diameter (*see illustration below*). Necessary protection measures for installations greater than 250mm in diameter and/or in private land will need to be agreed on an individual basis. Installations within a new development site must comply with the National Joint Utilities Group publication Volume 2: NJUG Guidelines On The Positioning Of Underground Utilities Apparatus For New Development Sites.
6. All excavation works near to YW apparatus should be by hand digging only.
7. Backfilling with a suitable material to a minimum 300mm above YW apparatus is required.
8. Adequate support must be provided where any works pass under YW apparatus.
9. Jointing chambers, lighting columns and other structures must be installed in such a way that future repair or maintenance works to YW apparatus will not be hindered.
10. Apparatus such as; railings, sign posts, etc. must not be placed in such a way that they prevent access to or full operation of controlling valves, hydrants or similar apparatus. YWS surface boxes must not be covered or buried. Any adjustment, alteration or replacement of manhole covers must be agreed on site prior to the commencement of the works with a YWS Inspector who may be contacted via our Call Centre on 0845 124 24 24.
11. Explosives shall not be used within 100 metres of any Yorkshire Water Services apparatus or installations.
12. Vibrating plant should not be used directly over any apparatus. Movement or operation by vehicles or heavy plant is not to be permitted in the immediate vicinity of YWS plant or apparatus unless there has been prior consultation and, if necessary, adequate protection provided without cost to YWS.
13. **Under no circumstances** should thrust boring or similar trenchless techniques commence until the actual position of the Company's mains/services along the proposed route have been confirmed by trial holes.
14. Any alterations to the highway should be notified following the procedures outlined in the New Road and Street Works Act 1991 Code of Practice; Measures Necessary Where Apparatus Is Affected By Major Works (Diversionary Works).
15. You will be held responsible for any damage or loss to YWS apparatus during and after completion of work, caused by yourselves, your servant or agent. Any damage caused or observed to YWS plant or apparatus should be immediately reported to YWS. Should YW incur any costs as a result of non-compliance with the above, all costs will be rechargeable in full.
16. You should ensure that nothing is done on the site to prejudice the safety or operation of YWS employees, plant or apparatus.
17. In accordance with the New Roads and Street Works Act 1991, Chapter 22, Part 3, Section 80. The location of any identified YW asset "*which is not marked, or is wrongly marked, on the records made available*" should be communicated back to Yorkshire Water. The location of the apparatus should be identified on copies of the supplied plans which should be returned to Yorkshire Water (Asset Records Team) with photographic supporting evidence where possible.
18. The Government has decided that responsibility for private sewers serving two or more properties and lateral drains (the section of pipe beyond the boundary of a single property, connecting it to the public sewer) will be transferred to the water companies on Oct 1 2011.












Private pumping stations will also transfer during the period 1 October 2011 – 1 Oct 2016. Records of these assets may not yet be shown on the existing mains record drawing(s). If you encounter any of these assets you must inform Yorkshire Water Services Ltd (YWS).

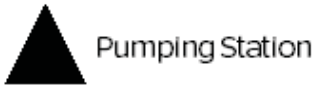
19. Please note that the information supplied on the enclosed plans is reproduced from Ordnance Survey material with the permission of the Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office, © Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Licence Number 1000019559.
20. This information is for guidance only and the position and depth of any YW apparatus is approximate only. Likewise, the nature and condition of any YW apparatus cannot be guaranteed. YW has no responsibility for recording the locations of privately owned apparatus. As of 1 October 2011, there may be some lateral drains and/or public sewers which are not documented on YW records but may still be present. For the avoidance of doubt, this information is not a substitute for appropriate professional and/or legal advice. YW accepts no responsibility for any inaccuracy or omissions in this information. The actual position of YW apparatus must be determined on site by excavating trial holes by hand. YW requires a minimum of two working days' written notice of the intention to excavate any trial holes before any excavation can be undertaken. If there are any queries in this respect please contact Yorkshire Water on 0845 124 24 24.

# Property Identifier









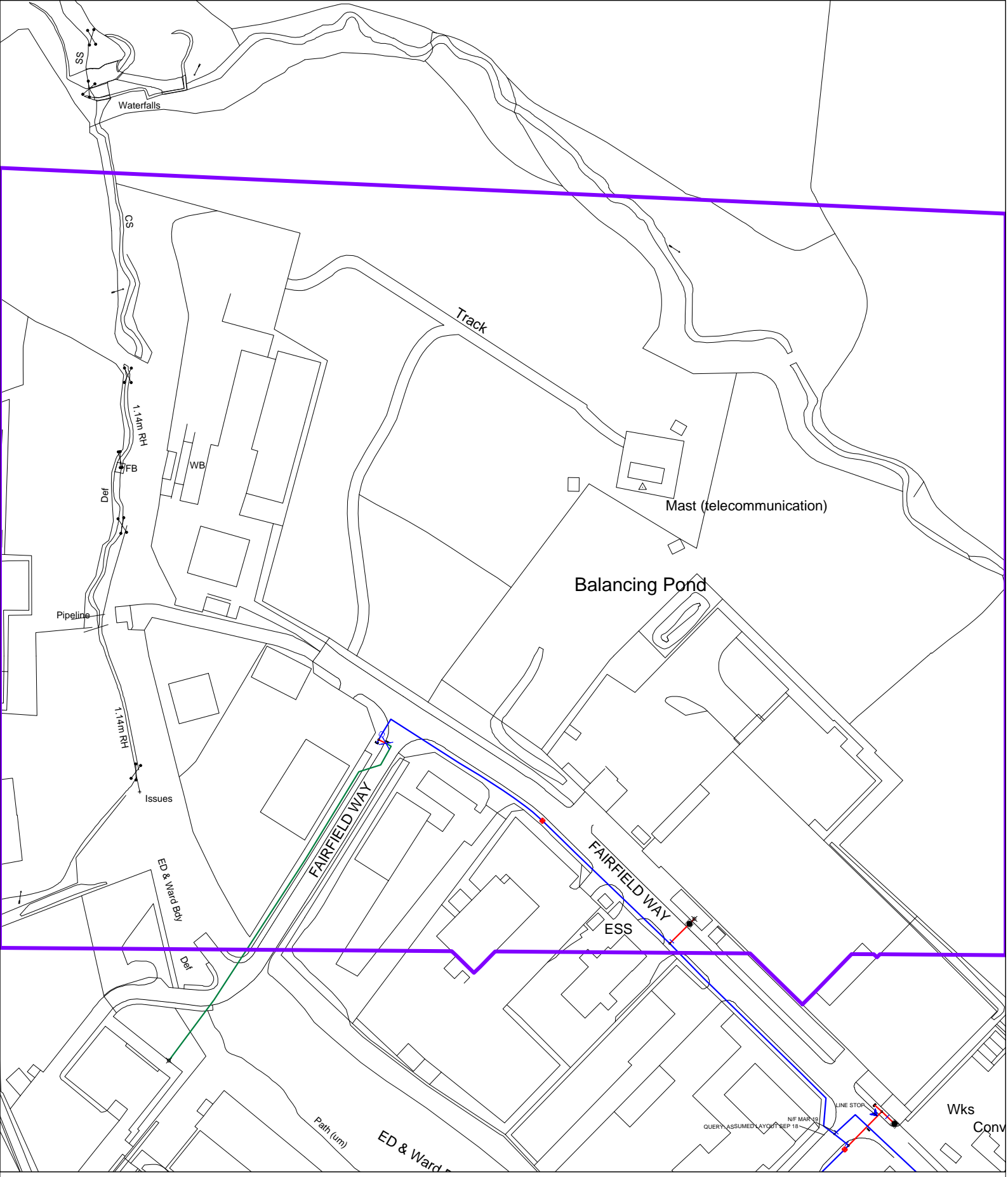
## Sewer Legend

-  Combined Sewer
-  S24 Combined Sewer
-  Surface Water Sewer
-  S24 Surface Water Sewer
-  Foul Sewer
-  S24 Foul Sewer
-  Section 104 Sewer
-  Rising Main
-  Overflow Sewer
-  Abandoned Sewer
-  Syphone Sewer & Vacuum Sewer



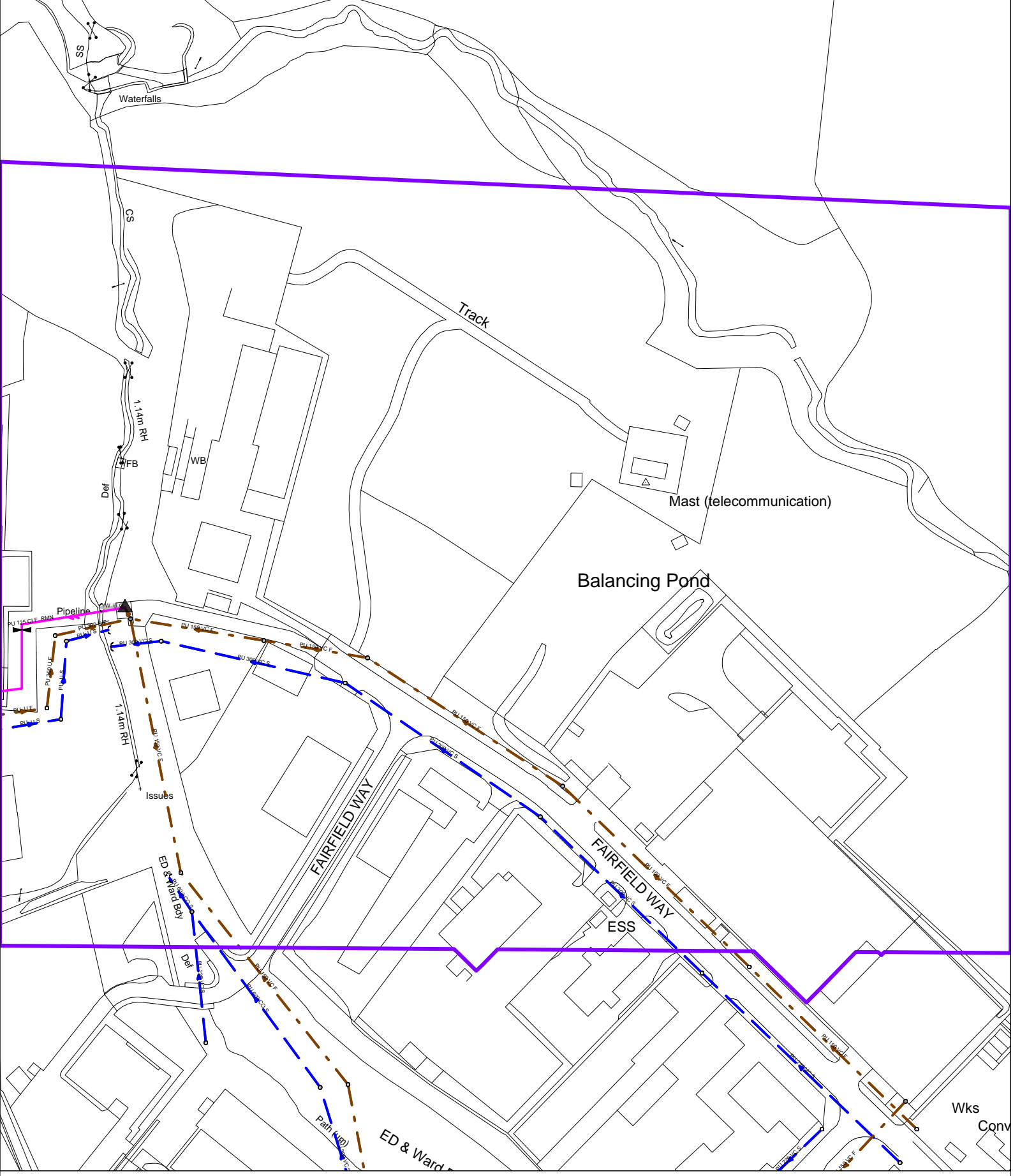
## Water Legend

-  Water Main 4" and below
-  Water Main 4" and above
-  Raw Water Main
-  Private Water Main
-  Fire Hydrant
-  Pumping Station



Public Clean Water Network 24/10/2021 15:19:11 OS Grid Coordinates: 490890 : 509314 Map Name : NZ9009SE svcGISSafeMovePD





Public Waste Water Network 24/10/2021 15:19:16 OS Grid Coordinates: 490890 : 509314 Map Name : NZ9009SE svcGISSafeMovePD