



CONSULTING ENGINEERS

**CIVIL • STRUCTURAL
GEOTECHNICAL • ENVIRONMENTAL**

**DRAINAGE MANAGEMENT AND
MAINTENANCE PLAN FOR
FORMER HORWICH GOLF CLUB
OFF VICTORIA ROAD, HORWICH
FOR
NORTHSTONE LIMITED**

17TH APRIL 2023

Job No. 22108

ROBERT E FRY & ASSOCIATES LTD.
45, Bridgeman Terrace
Wigan, WN1 1TT

Telephone: 01942 826020
Fax: 01942 230816
Email: mail@refa.co.uk
Company Registration No. 2436911



Table of Contents

1.0 Introduction.....	1
2.0 Site Details.....	1
3.0 Overview of Development Drainage	2
4.0 Maintenance Regime	4
5.0 Provision for Ongoing Maintenance	8

1.0 Introduction

We are instructed by Northstone Ltd to prepare a management and maintenance plan for the proposed residential development at the former Horwich Golf Club off Victoria Road, Horwich, Bolton BL6 5PH.

This management and maintenance plan is required to discharge condition 17 of the planning approval notice referenced 07245/19.

The purpose of this management and maintenance plan is to demonstrate how the sustainable drainage system will be managed and maintained during the lifetime of the development.

2.0 Site Details

The development site is irregular in shape and is located to the west of Bolton. The site extends to an area of approximately 10 hectares and the centre of the site is situated at National Grid Reference SD 64589 10967, this location is shown in figure 1 below.

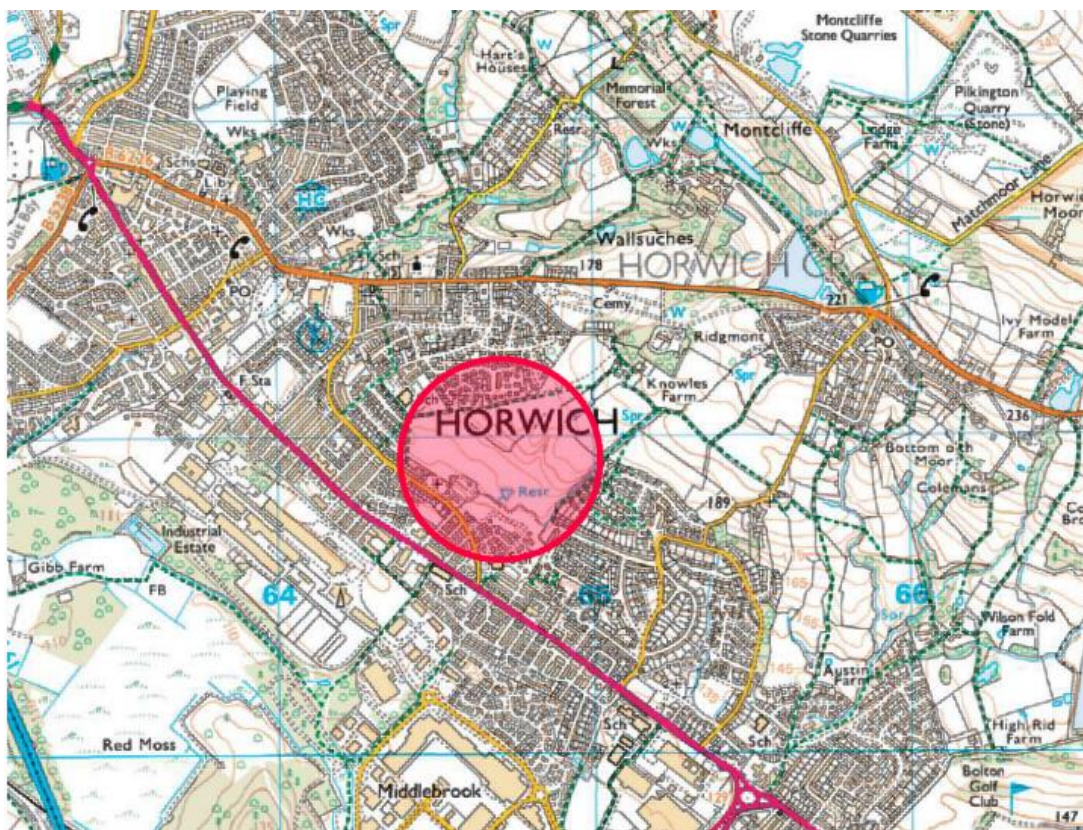


Figure 1: Location Plan

The proposed residential development will consist of 179 dwellings with associated infrastructure.

The development site is a former golf course which comprises a clubhouse, car parking and greenkeeper facilities located in the southeast area of the site which is classed as brownfield development. The wider development area's extending north, east and west make up the former golf course classified as greenfield development.

The existing topography of the site slopes from northeast to southeast at an average gradient of 1 in 6.

The development site has several existing drainage ditches which provide suitable surface water management within the golf course diverting runoff flows towards the existing pond in the south.

The closest existing drainage networks are a 450mm diameter surface water sewer and 300mm diameter foul sewer, both of which are United Utilities assets located in Victoria Road situated to the southeast of the development site.

3.0 Overview of Development Drainage

The development is drained by a separate drainage system for the foul and surface water drainage. The drainage proposals are attached (Appendix 1).

The drainage design has been developed following the Flood Risk Assessment and Drainage Strategy (FRA) prepared by Sutcliffe in support of the planning application.

The FRA consulted with the LLFA to establish permitted surface water discharge rates. The recommendation within the FRA is that surface water runoff for the development be restricted to greenfield runoff rates.

The overall drainage strategy comprises of two separate surface water networks and an independent culvert to replace the existing watercourse running from the northeast boundary to the south of the development site.

Network 1 consists of the following five elements:

- 1) Private drainage
- 2) Main gravity pipe network
- 3) Attenuation Basin
- 4) Flow through swales
- 5) Surface water flow control

The private drainage is designed in accordance with current Building Regulations and will be approved by the NHBC as the Building Control Authority. The responsibility for the management and maintenance of this component will be down to the individual homeowners on the development.

Due to the topography of the site the main piped network is designed in tiers with associated flow controls which carries the surface water runoff from the development, to and from the SuDS features and ultimately discharging to the existing surface water sewer in Victoria Road at the agreed discharge rate. The piped network has been designed in accordance with DCG as required by Independent Water Networks Limited (IWNL) who will adopt and maintain the network as part of the Section 104 agreement.

The two online attenuation basins within this network will be grassed depressions with sides slopes at a maximum gradient of 1 in 3 which will accommodate flows from the development and provide storage for surface water runoff from storm events up to and including the 1 in 100 year plus climate change event. These basins will have a continuous flow of water from the development as they form part of the main conveyance network.

The offline attenuation basin to the south of the site is a grassed depression with sides slopes at a maximum gradient of 1 in 3 which will provide additional storage for surface water runoff from the 1 in 100 year plus climate change event. This basin will typically be dry except during storms in excess of the 1 in 30 year event and immediately afterwards while the attenuation runoff discharges.

The basins have been designed in accordance with DCG. The responsibility to manage and maintain these features will be down to the management company appointed by Northstone Ltd.

The flow through swales are grassed channels with 45 degree side slopes which form part of the main conveyance network to carry surface water runoff from the development through the public open space situated down the centre of the development site. The swales have been designed in accordance with DCG. The responsibility to manage and maintain this feature will be down to the management company appointed by Northstone Ltd.

The surface water flow control manholes incorporate a hydro brake flow control device to restrict the surface water flows at the appropriate locations within the network to restrict the overall development discharge to the agreed greenfield runoff rates. These components have been designed in accordance with DCG as required by Independent Water Networks Limited (IWNL) who will adopt and maintain the network as part of the Section 104 agreement.

Network 2 consists of the following six elements:

- 1) Private drainage
- 2) Main gravity pipe network
- 3) Attenuation Basin
- 4) Flow through swales
- 5) Culvert
- 6) Surface water flow control

The private drainage is designed in accordance with current Building Regulations and will be approved by the NHBC as the Building Control Authority. The responsibility for the management and maintenance of this component will be down to the individual homeowners on the development.

The main piped network is designed as a conveyance system to carry the surface water runoff from the development to the attenuation basins. The piped network has been designed in accordance with DCG as required by Independent Water Networks Limited (IWNL) who will adopt and maintain the network as part of the Section 104 agreement.

The attenuation basins are grassed depressions with side slopes at a maximum gradient of 1 in 3 that have been designed to store runoff from storm events up to and including the 1 in 100 year plus climate change event. The basins have been designed in accordance with DCG. The responsibility to manage and maintain these features will be down to the management company appointed by Northstone Ltd.

The surface water flow control manhole incorporates a hydro brake flow control device to restrict the surface water flows from the development before they are discharged to the flow through swales before entering the culverted watercourse at manhole S119. The flow through swales are grassed channels with 45 degree side slopes. These components have been designed in accordance with DCG as required by Independent Water Networks Limited (IWNL) who will adopt and maintain the network as part of the Section 104 agreement.

The independent culvert network has been designed to replace the existing ditch running through the development site to accommodate the existing surface water flows. This network has been designed in accordance with DCG. The culverted watercourse will remain private with the responsibility of management and maintenance falling down to the management company appointed by Northstone.

4.0 Maintenance Regime

Development Drainage System

The proposed drainage system serving the development has both private and public drainage elements. IWNL will be responsible for the piped network and associated manholes including the control manholes and outfall pipework.

A management company will be appointed by Northstone Ltd to be responsible for the management and maintenance of the attenuation basins, swale’s and their associated infrastructure.

Following construction there will be a 12-month defects/maintenance period during which the principal contractor will retain responsibility.

Table 1 identifies the key management and maintenance requirements, as per the SuDS Manual CIRIA C753 for the SuDS components shown on the drainage plan. The maintenance requirements can be grouped into three categories: regular maintenance, occasional maintenance, and remedial maintenance.

Operation and Maintenance Activity	SuDS Component		
	Attenuation Basin	Swale	Proprietary Systems/Components
Regular Maintenance			
Inspection	■	■	■
Litter and Debris Removal	■	■	□
Grass Cutting	■	■	
Weed and invasive Plant Control	■		
Shrub management (including pruning)		□	
Occasional Maintenance			
Sediment Management	■	■	■
Vegetation replacement	□	□	
Remedial Maintenance			
Structure rehabilitation/repair	□	□	□
Infiltration surface reconditioning	□	□	

Table 1: SuDS Maintenance Activities

- will be required
- may be required

- Regular maintenance consists of the basic tasks that are carried out frequently and on a predictable schedule.
- Occasional maintenance consists of tasks that are predictable but are not required as frequently as those falling under the regular maintenance regime.
- Remedial maintenance is only required to rehabilitate the system when faults are identified during regular or occasional maintenance or pollution leads to contamination of the system.

After the initial hand-over inspection confirms the system has been constructed and installed as designed inspections should take place monthly for 12-months. The frequent initial inspections will help determine the optimum maintenance routine as well as identify performance issues such as silt build-up.

The operation and maintenance requirements for the SuDS features are noted in tables 2, 3 and 4.

Table 2: Attenuation Basin Operation and Maintenance Regime (source: CIRIA C753)

Maintenance schedule	Required action	Typical frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

Table 3: Attenuation Basin Operation and Maintenance Regime (source: CIRIA C753)

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
	Occasional maintenance	Reseed areas of poor vegetation growth
Prune and trim any trees and remove cuttings		Every 2 years, or as required
Remove sediment from inlets, outlets, forebay and main basin when required		Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseedling or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

Table 4: Attenuation Basin Operation and Maintenance Regime (source: CIRIA C753)

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseedling	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

The proprietary flow control devices are designed to be virtually maintenance free and should not require additional maintenance activity to that listed in the attenuation basin maintenance schedule. The flow control unit is fitted with a bypass door that will allow drain down should the control become blocked. Due to the location of the flow control devices, monthly inspections should be undertaken initially to ascertain the required inspection intervals going forwards to mitigate the risk of blockage.

Following construction and the 12-month initial maintenance period the flow control will be adopted and maintained by IWNL.

5.0 Provision for Ongoing Maintenance

The underground drainage network serving the housing development will be adopted and maintained by IWNL following a 12-month post construction maintenance period.

The maintenance of the private SuDS features will be in accordance with Table 2, 3 and 4 above by the appointed management company.

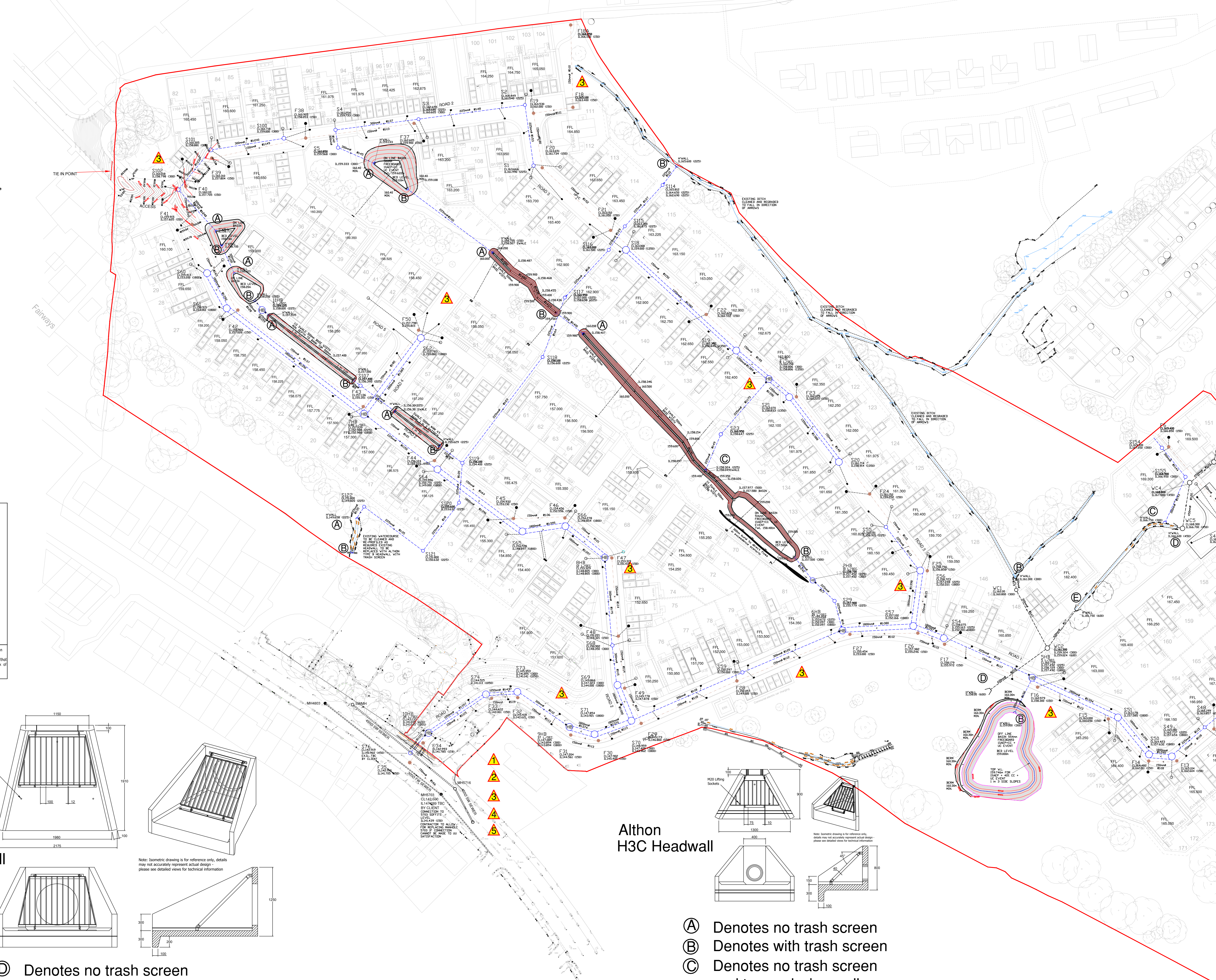
Following completion of the development a service charge will be levied on the home owners for the up keep and maintenance of the public open spaces and SuDS features to allow ongoing management by the developer or maintenance contractor.

The appointed management company will enter into a contract with specialist maintenance contractors to carry out the maintenance tasks at the required interval.

APPENDIX 1

SECTION 104 & 30 NOTES

1. All adoptable drainage works have been designed and are to be constructed in accordance with "Design and Construction Guidance" & Local Practices.
 2. All pipe work shall be Extra Strength Clayware to BS EN 295:1991 Part 1.
 3. All precast concrete pipework shall be to the class stated on the drawings in accordance with BS EN 1316:2002. All manholes and chambers shall be to BS EN 1917:2002.
 4. All plastic pipes being offered for adoption under S104 must be structural wall and must comply with BS EN 13476-1 and BS 4320:01. MAX. PIPE LENGTH TO BE 3.0m.
 5. All levels relate to an Ordnance Datum.
 6. This drawing is to be read in conjunction with all other relevant drawings.
 7. House drainage connections to sewers must be 150mm & unless otherwise stated led to the drop-out level shown.
 8. Levels given on drop out chambers are incoming pipe levels.
 9. House drainage runs to be kept within the curtilage of the plot they serve wherever possible.
 10. The Contractor shall be responsible for ensuring that any existing level levels indicated on drawings are correct before work commences.
 11. The Contractor should satisfy himself as to the position and depth of existing Statutory Undertakers' pipes which could affect the works before the works are commenced.
 12. Road gully connections are to be 150mm & connecting either directly to manholes shown, or to sewer runs using pre-fabricated junctions.
 13. All connections to adoptable sewers shall be by manufactured junction pipes. Saddle connections will not be permitted.
 14. All sewers for adoption with greater than 1.20 metres cover in roads or 0.9m metres cover in fields shall have Class 5 granular bed and surround.
 15. Any sewer for adoption with less than 1.20 metres cover in roads or 0.9m metres cover in fields shall have a minimum of 150mm S14 concrete surround. Feasibility shall be maintained by the provision of floor or similar approved joint filter levels in the concrete surround at each pipe joint.
 16. Pumping Station to be designed and constructed in accordance with Design and Construction Guidance and United Utilities Pumping Station Addendum.
- All pipes to have class "S" bed and surround unless otherwise stated.
 All concrete pipes to be class 120.
 All clay pipes to be extra strength vitrified clay.
 All u-pvc pipes to comply with BS 4660:2000 & BS EN 1411-1.
 All structural wall u-pvc pipes to comply with BS 4320-01.
 Max. pipe length to be 3.0m.
 Foundations to be designed / constructed to take into account the position and depth of adjacent sewers and drains in accordance with Design & Construction Guidance.
- Contractor to be aware of and take appropriate action to ensure de-stabilisation of any existing structures, retaining walls or other features does not occur as a result of any excavations undertaken in accordance with the designs shown on this drawing.
 If contractor is unsure about any aspect of the above he should seek advice before commencing excavation work.
 Contractor/Client should note the existence of existing buried pipes and/or overhead power cables.
 Before work commences contractor must undertake risk assessment and provide method statement for working in this area in accordance with HSE and power regulator guidelines to satisfaction of the principle designer.
 To cater for any deviations in the as constructed road / footpath levels in relation to the design levels, the proposed floor levels shown must be checked on site by the site agent or engineer in relation to as built road levels to ensure compliance with part III of the Building Regulations.
 All existing services to be located and marked in accordance with underground requirements and protected accordingly during the works.
 All existing manhole invert levels are to be located and marked prior to start on site to ensure that they are correct and also to ensure that their covers are sealed and that interpolated level levels are correct. Any discrepancy to be reported to REFA prior to start to enable any changes to be made to design that prove necessary.



SECTION 104 & 30 NOTES

- All adoptable drainage works have been designed and are to be constructed in accordance with "Design and Construction Guidance" & Local Practice.
- All pipe work shall be Extra Strength Clayware to B.S. EN 2951991 Part 1.
- All precast concrete pipework shall be to the class stated on the drawings in accordance with BS EN 13162:2002. All manholes and chambers shall be to BS EN 1917:2002.
- All plastic pipes being offered for adoption under S104 must be structural wall and must comply with BS EN 13476-1 and BS 4370:01. MAX. PIPE LENGTH TO BE 3.0m.
- All levels relate to an Ordnance Datum.
- This drawing is to be read in conjunction with all other relevant drawings.
- House drainage connections to sewers must be 150mm & unless otherwise stated set to the dropped invert level shown.
- Levels given on drop out chambers are incoming pipe levels.
- House drainage runs to be kept within the curbside of the plot they serve wherever possible.
- The Contractor shall be responsible for ensuring that any existing invert levels indicated on drawings are correct before work commences.
- The Contractor should satisfy himself as to the position and depth of any existing Statutory Undertakers plant which could affect the works before the works are commenced.
- Road gully connections are to be 150mm & connecting either directly to manholes shown, or to sewer runs using pre-fabricated junctions.
- All connections to adoptable sewers shall be by manufactured section pipes. Saddle connections will not be permitted.
- All sewers for adoption with greater than 1.20 metres cover in roads or 0.8m metres cover in fields shall have Class 5 granular bed and surround.
- Any sewer for adoption with less than 1.2 metres cover in roads or 0.8 metres cover in fields shall have a minimum of 150mm S14 concrete surround. Feasibility shall be maintained by the provision of French or similar approved joint filter levels in the concrete surround at each pipe joint.
- Pumping Station to be designed and constructed in accordance with Design and Construction Guidance and United Utilities Pumping Station Addendum. All pipes to have class "S" bed and surround unless shown otherwise. All concrete pipes to be class 120. All clay pipes to be extra strength vitrified clay. All upvc pipes to comply with BS 4680:2000 & BS EN 14011-1. All structural wall upvc pipes to comply with BS 4376-1. Max. pipe length to be 3.0m. Foundations to be designed / constructed to take into account the position and depth of adjacent sewers and drains in accordance with Design & Construction Guidance. Contractor to be aware of and take appropriate action to ensure de-stabilisation of any existing structures, retaining walls or other features does not occur as a result of any excavation works undertaken in accordance with the designs shown on this drawing. If contractor is unsure about any aspect of the above he should seek advice before commencing excavation work. Contractor/Client should note the existence of existing buried plant and overhead power cables. Before work commences contractor must undertake an assessment and provide method statement for working in this area in accordance with HSE and power supplier guidelines to satisfaction of the principle designer. To cater for any deviations in the as constructed road / footpath levels in relation to the design levels the proposed floor levels shown must be checked on site by the site agent or engineer in relation to as built road levels to ensure compliance with part II of the Building Regulations. All existing services to be located at commencement in accordance with undertakers requirements and protected accordingly during the works. All existing manhole invert levels are to be located and surveyed prior to start on site to ensure that they are correct and also to ensure that their details are noted and that interpolated levels are correct. Any discrepancy to be reported to REFA prior to start to enable any changes to be made to design that prove necessary.

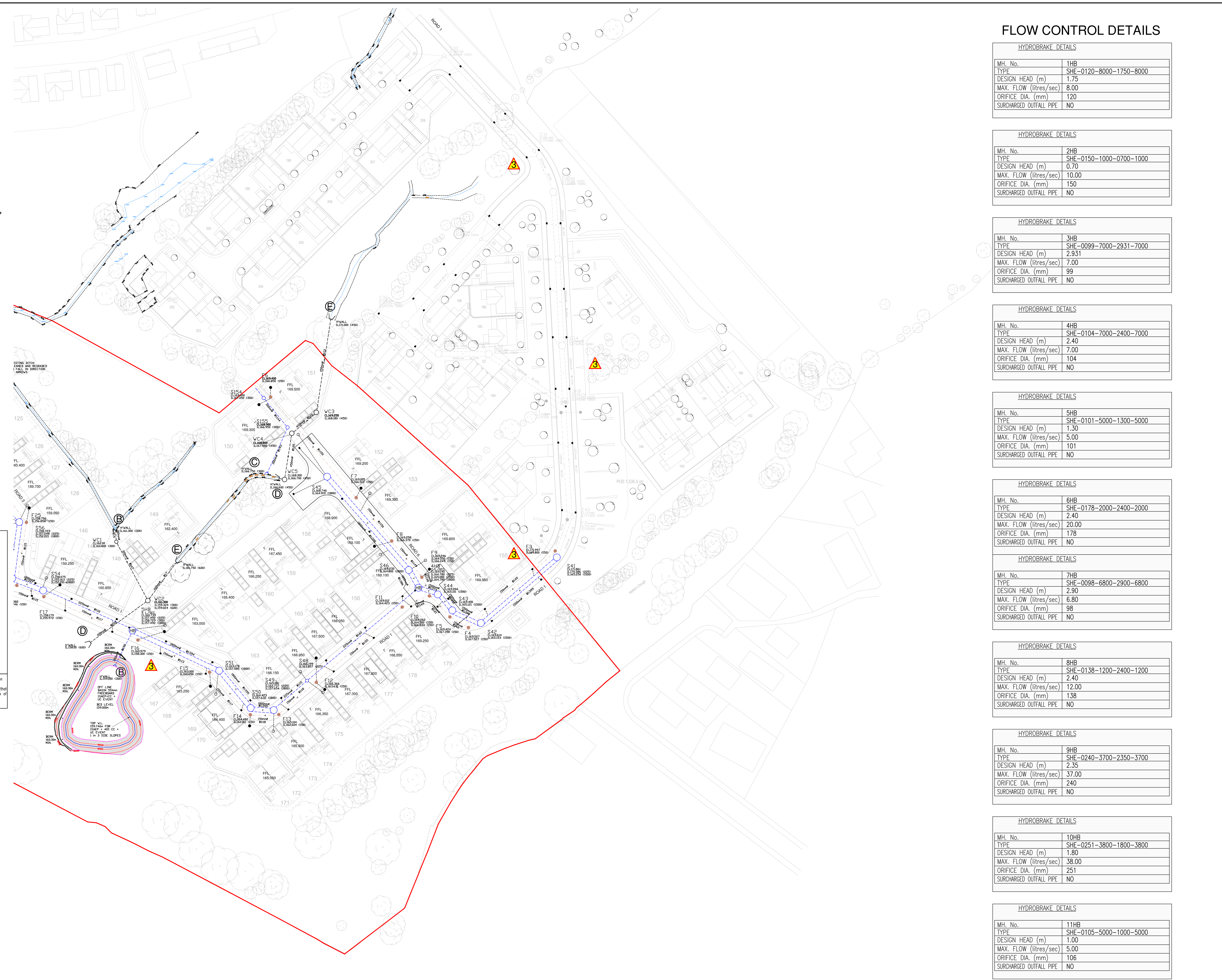
SCALE IN METRES
0 5 10 20 50

CIVILS DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:

- 1** EXISTING SERVICES
- 2** WORKING ON EXISTING ROAD
- 3** DANGER OF COLLAPSE TO ALL EXCAVATIONS - RISK TO BE ASSESSED AND MANAGED BY CONTRACTOR IN ACCORDANCE WITH HSE GUIDANCE
- 4** WORKING IN AREAS WHERE MEMBERS OF THE PUBLIC HAVE ACCESS E.G. MAIN ROAD
- 5** WORKING ADJACENT ON LIVE FOUL / COVERED SEWERS (W/S's shown)

REFA Ltd has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing. Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.



FLOW CONTROL DETAILS

HYDROBRAKE DETAILS

MH. No.	1HB
TYPE	SHE-0120-8000-1750-8000
DESIGN HEAD (m)	1.75
MAX. FLOW (litres/sec)	8.00
ORIFICE DIA. (mm)	120
SURCHARGED OUTFALL PIPE	NO

HYDROBRAKE DETAILS

MH. No.	2HB
TYPE	SHE-0150-1000-0700-1000
DESIGN HEAD (m)	0.70
MAX. FLOW (litres/sec)	10.00
ORIFICE DIA. (mm)	150
SURCHARGED OUTFALL PIPE	NO

HYDROBRAKE DETAILS

MH. No.	3HB
TYPE	SHE-0099-7000-2931-7000
DESIGN HEAD (m)	2.931
MAX. FLOW (litres/sec)	7.00
ORIFICE DIA. (mm)	99
SURCHARGED OUTFALL PIPE	NO

HYDROBRAKE DETAILS

MH. No.	4HB
TYPE	SHE-0104-7000-2400-7000
DESIGN HEAD (m)	2.40
MAX. FLOW (litres/sec)	7.00
ORIFICE DIA. (mm)	104
SURCHARGED OUTFALL PIPE	NO

HYDROBRAKE DETAILS

MH. No.	5HB
TYPE	SHE-0101-5000-1300-5000
DESIGN HEAD (m)	1.30
MAX. FLOW (litres/sec)	5.00
ORIFICE DIA. (mm)	101
SURCHARGED OUTFALL PIPE	NO

HYDROBRAKE DETAILS

MH. No.	6HB
TYPE	SHE-0178-2000-2400-2000
DESIGN HEAD (m)	2.40
MAX. FLOW (litres/sec)	20.00
ORIFICE DIA. (mm)	178
SURCHARGED OUTFALL PIPE	NO

HYDROBRAKE DETAILS

MH. No.	7HB
TYPE	SHE-0098-6800-2900-6800
DESIGN HEAD (m)	2.90
MAX. FLOW (litres/sec)	6.80
ORIFICE DIA. (mm)	98
SURCHARGED OUTFALL PIPE	NO

HYDROBRAKE DETAILS

MH. No.	8HB
TYPE	SHE-0138-1200-2400-1200
DESIGN HEAD (m)	2.40
MAX. FLOW (litres/sec)	12.00
ORIFICE DIA. (mm)	138
SURCHARGED OUTFALL PIPE	NO

HYDROBRAKE DETAILS

MH. No.	9HB
TYPE	SHE-0240-3700-2350-3700
DESIGN HEAD (m)	2.35
MAX. FLOW (litres/sec)	37.00
ORIFICE DIA. (mm)	240
SURCHARGED OUTFALL PIPE	NO

HYDROBRAKE DETAILS

MH. No.	10HB
TYPE	SHE-0251-3800-1800-3800
DESIGN HEAD (m)	1.80
MAX. FLOW (litres/sec)	38.00
ORIFICE DIA. (mm)	251
SURCHARGED OUTFALL PIPE	NO

HYDROBRAKE DETAILS

MH. No.	11HB
TYPE	SHE-0105-5000-1000-5000
DESIGN HEAD (m)	1.00
MAX. FLOW (litres/sec)	5.00
ORIFICE DIA. (mm)	106
SURCHARGED OUTFALL PIPE	NO

- GENERAL**
- All adoptable sewers and associated works are to comply fully with "Design and Construction Guidance" & Local Practice.
 - All highway works to be to adoptable standards and to comply fully with the Local Authority specification.
 - All private drainage works are to comply fully with part II of the Building Regulations.
 - All invert levels to be checked by the Contractor at the start of works and any discrepancies noted on a topographical survey information provided by others.
 - All materials to bear the relevant BSI Kitemark and comply fully with the specifications. All concrete & concrete products must use sulphate resistant and cement (unless the site investigation report proves that sulphate attack from salts and groundwater will not occur).
 - All opening notices etc. as required under highway acts etc. are to be obtained prior to commencement of works. All works are to be inspected by L.A., MESC or relevant Water Authority as applicable. C.D.M. REGULATIONS 2015. In line with the above regulations we are obliged to inform the Client of their responsibilities under section CDM 15(1), and residual risks that may be encountered in the construction of these works. All design work has been carried out with Health and Safety aspects given full consideration. Wherever possible risks have been eliminated from the design, however due to the very nature of this type of work it is not possible to remove all the risks from the design. We would also respectfully remind the Client of his obligations to take all reasonable steps in ensuring that only competent Contractors who have a valid safety policy are employed. They should also provide satisfactory responses of tender stage as to the manner in which they will deal with the elements of risk involved in this type of work and in particular those highlighted by REFA below:

- Support / treatment for all excavation work.
 - Guarding to edges of excavations to prevent pedestrians and vehicles falling into excavation.
 - Guarding of excavations outside working hours to prevent unauthorised access.
 - Underpinning to adjacent roads or structures.
 - Confined space operations.
 - Dealing with existing services.
 - Traffic management on existing highways.
 - Procedure to be followed in event of accident or emergency.
 - Method of working where contaminated ground is present on site.
 - Confirmation will be required that all operatives are adequately trained, copies of relevant training certificates to be supplied.
- The above list is by no means exhaustive but it does highlight operations that present a risk to contractors and the general public. For clarification on any item please contact REFA.

Rev	Description	By	Date
E	REVISED FOLLOWING S104 COMMENTS	RW	21/02/22
D	DRAWING POSITIONS REVISED	RW	17/02/22
C	REFERENCE TO S104 COMMENTS AND FFL'S FOLLOWING CLIENT COMMENTS	RW	08/02/22
B	FFL'S FINALISED	RW	01/02/22
A	CENTRAL DWALE REVISED	GMH	01/02/22
REV	Revision details	RevBy	Date

worksafe designer **SSIP** SAFETY SCHEDULED IN PROGRESS
www.smasitd.com

Drawing Stage	Comments	Author
Issued	Information	Construction
Approval	Approval	As Built

Client
NORTHSTONE LIMITED

Job title
HORWICH GOLF CLUB HORWICH

Drawing title
ROAD AND MAIN DRAINAGE 2 OF 2

REFA
CONSULTING ENGINEERS
CIVIL STRUCTURAL
GEOTECHNICAL ENVIRONMENTAL

Date	Scale	Drawn	Checked
2.11.22	1/500	DMH	DMH

DRAWING No 22108/104/2 Rev E

PLEASE NOTE THAT THIS DRAWING IS ISSUED FOR INFORMATION/TENDER PURPOSES ONLY UNTIL TECHNICAL APPROVAL HAS BEEN GRANTED. ANY WORK UNDERTAKEN PRIOR TO TECHNICAL APPROVAL BEING GRANTED IS AT THE CLIENTS RISK.