FLOOD RISK CONSULTANCY LIMITED

Drainage Impact Assessment & Sustainable Drainage Strategy

Former British Legion, Longridge

Client: Mr & Mrs. Hardacre

Report No: 20076-01 Revision A

Date: 29th October 2020

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Contract

This report describes work commissioned by Michael Sproston on behalf of Mr & Mrs Hardacre. Lisa Aspinall of The Flood Risk Consultancy carried out the work.

Prepared by..... Lisa Aspinall (Flood Risk Consultant)

Checked by..... Donna Metcalf (Managing Director)

Approved by..... Donna Metcalf (Managing Director)

Disclaimer

This document has been prepared solely as a Drainage Impact Assessment & Sustainable Drainage Strategy for Mr & Mrs Hardacre. The Flood Risk Consultancy accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

Executive Summary

This report has been prepared to support development at the former British Legion site off Towneley Road in the Lancashire Town known as Longridge.

The site involves demolition of the existing building; and construction of an apartment building to accommodate 13no residential units.

In accordance with the NPPF and Building Regulations Approved Document H, surface water runoff from new development should be managed in a sustainable manner, applying the following hierarchy (n order of preference):

- Infiltration i.e. dissipation to ground
- Discharge to watercourse
- Discharge to surface water sewer
- Discharge to combined sewer

The feasibility of the preferred surface water management strategies has been investigated; via the undertaking of a desk-top study. The data obtained indicates poor drainage characteristics, typified by clay strata with relatively shallow groundwater. Hence disposal of surface water runoff via infiltration methods is unlikely to be feasible.

It is highlighted that there are no culverted or open channel watercourses within a reasonable distance to the site, which could accommodate a dedicated outfall. Consequently, discharge to watercourse is also considered to be unfeasible.

Reviewing the sewer record plans, there are no public sewers shown to be located within proximity to the site; however, a manhole has been identified within the highway adjacent to the north-west corner of the site; which is likely to form part of the adopted sewer network.

Foul and surface water flows from the site and the neighbouring residential development to the north side of the development are understood to discharge to this manhole.

Therefore, it is proposed that both foul and surface water flows generated by the new site; will discharge to the existing combined sewer.

The existing drainage network has been hydraulically modelled; and it is estimated that surface water discharge from the British Legion site is 3.1l/s; 8.7l/s; and 11.2l/s for the 1 in 1-year; 30-year; and 100-year rainfall events respectively.

It is not believed that there are any flow controls or attenuation structures within the existing drainage network, which would impact the modelled flows.

In accordance with current requirements, the discharge rate for flows leaving the site has been set at 2.6l/s; which permits the minimum flow control size of 75mm to minimise the risk of flooding at the development due to blockage.

Undertaking an assessment of SUDS features, which may be incorporated into the proposed development, it is identified that the paved area to the rear of the new apartment building is suitable for the application of permeable paving.

Underlying soil conditions, space constraints, roof design; and development type i.e. apartment units limit other source control measures and other SUDS methods which may be utilised at the site.

The permeable paving will provide a storage volume within the sub-base layer which can be used to attenuated flow prior to discharge from the site.

Rainwater pipes direct runoff from roof area to a drainage system formed by manholes and pipes, which direct runoff to the rear of the building.

Flows from the drainage system, which include discharge from the permeable paving area, are regulated using a Hydrobrake or similar flow control device; with flows discharged to the existing combined sewer located adjacent to the north boundary of the site.

Given the small volume of storage requires, surface water runoff is attenuated via the pipes, manholes and permeable paving.

Hydraulic modelling confirms that discharge rates leaving the development do not exceed 2.6l/s.

The pollution risk associated with the site is deemed to be very low.

Undertaking calculations to investigate exceedance, by providing a 1m surcharge at the outfall into the existing manhole, it was observed that although surcharging or an increase in surcharging occurs, with a corresponding reduction in outflow from the site during the 1 in 1 year and 1 in 30-year rainfall event; some minor flooding totalling <3m^3 is anticipated during the 1 in 100-year plus 40% climate change event.

Foul flows will be drained by gravity with connections to the existing foul drain located adjacent to the west site boundary; and also, to the combined sewer located adjacent to the north boundary of the development area.

It is highlighted that new connections to the public sewer are subject to approval from United Utilities via a Section 106 agreement in accordance with the Water Industry Act 1991.

The drainage system will remain under private ownership; and therefore, the maintenance responsibility will remain with the Developer. It is recommended that a maintenance contract is set up to ensure that the drainage system maintains efficacy over the lifetime of the site. A typical management and maintenance plan has been prepared for the site.

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Tables

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1.0 Introduction

This report has been prepared to provide a drainage impact assessment and sustainable drainage strategy for residential development Towneley Road, Longridge, in accordance with the requirements specified by the Lead Local Flood Authority (Lancashire County Council).

The document provides an assessment of surface water runoff and its management using sustainable techniques.

The site of the former British Legion covers an area of **0.0334 Hectares.**

The development proposals are considered to fall under the MAJOR category; and therefore, in accordance with the NPPF, a consideration of how surface water runoff will be manged sustainably within the development must be undertaken.

2.0 Surface Water Runoff

2.0 Existing Sewers

United Utilities sewer records indicate that there are no public sewers located within immediate proximity of the British Legion site. However, given the significant amount of development within Towneley Road; and Auction Court, it is considered that there are likely to be a number of sewers which were transferred from private to public ownership in 2011.

The public sewers which are indicated within the asset plan provided, indicate that there are no surface water sewers within the area; and only a small number of combined sewers, which are shown to discharge into the foul drainage system.

Undertaking a visual inspection, there is a manhole located within the highway, adjacent to the north west corner of the existing building. It is presumed for assessment purposes, that this manhole is connected to the public sewer.

An extract from the sewer record map is provided overleaf for reference.

2.1 Existing Site Drainage Regime

Reviewing the topographical survey, and from visual inspection, it is identified that foul and surface water flows from the existing site are directed to existing manholes located within the Towneley Road public footpath along the front of the building.

It is believed that the drainage system serving the building discharges foul and surface water flows to the combined manhole located in the highway adjacent to the north-west corner of the site.

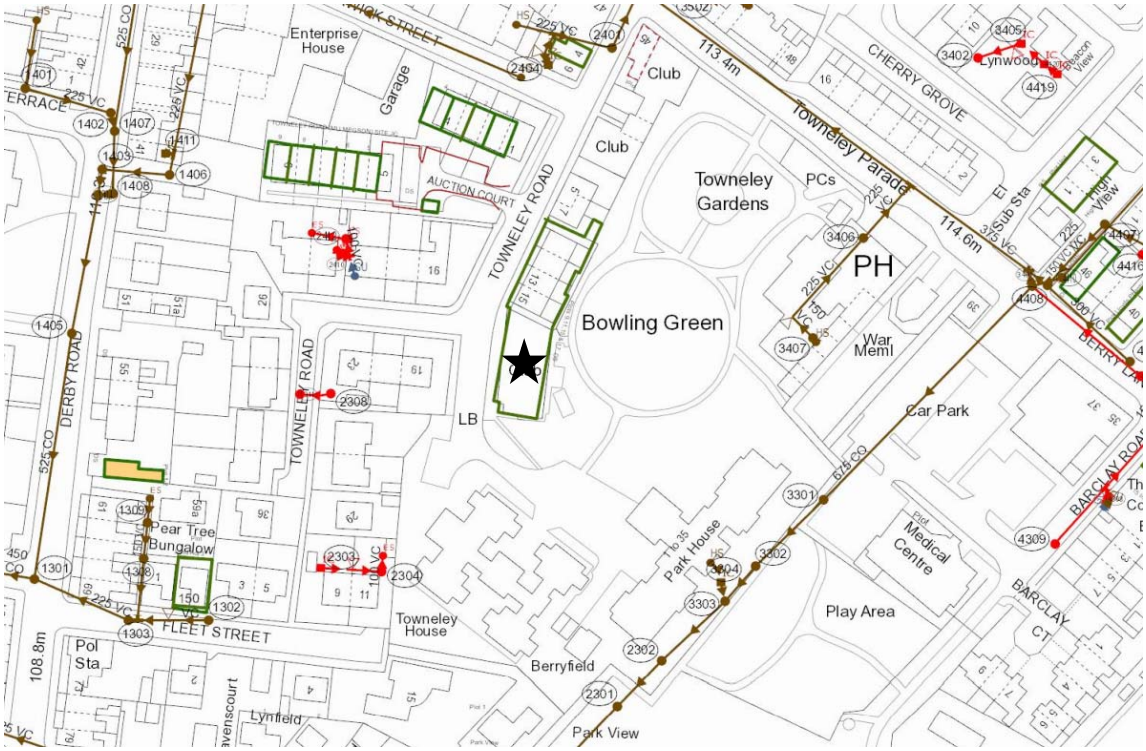
2.2 Surface Water Drainage Hierarchy

The hierarchy for disposal of surface water from new developments is outlined within the Building Regulations Approved Document H and specifies the following methods in order of preference:

- Infiltration via soakaway or other suitable infiltration device
- Discharge to watercourse
- Discharge to public surface water sewer

- Discharge to public combined sewer

Figure 2.1: Extract from the UU Sewer Map



Source: United Utilities

Figure 2.2: Figure 2.3: Front of Existing Building (South-West Face)

Source: United Utilities

Figure 2.4: Figure 2.5: Front of Existing Building (North-West Face)

Source: United Utilities

Infiltration

Percolation testing in accordance with BRE Digest 365 has not yet been undertaken at the development, and therefore to assess the potential suitability for disposing of surface water runoff using soakaway or other infiltration method, a desk-top study has been undertaken.

Reviewing the National Soil Resources Institute Maps known as Soilscape Maps, indicates that the area comprising the site contains Soil Type 18, which is characterised as slowly permeable, seasonally wet, slightly acid but base rich loamy and clayey soils.

This soil type typically is known to drain naturally to stream or river networks; and provides an initial indication that the dissipation of surface water to ground is unlikely to be feasible.

An extract from the map is provided for reference overleaf.

To investigate further a review of data from the British Geological Survey has be undertaken.

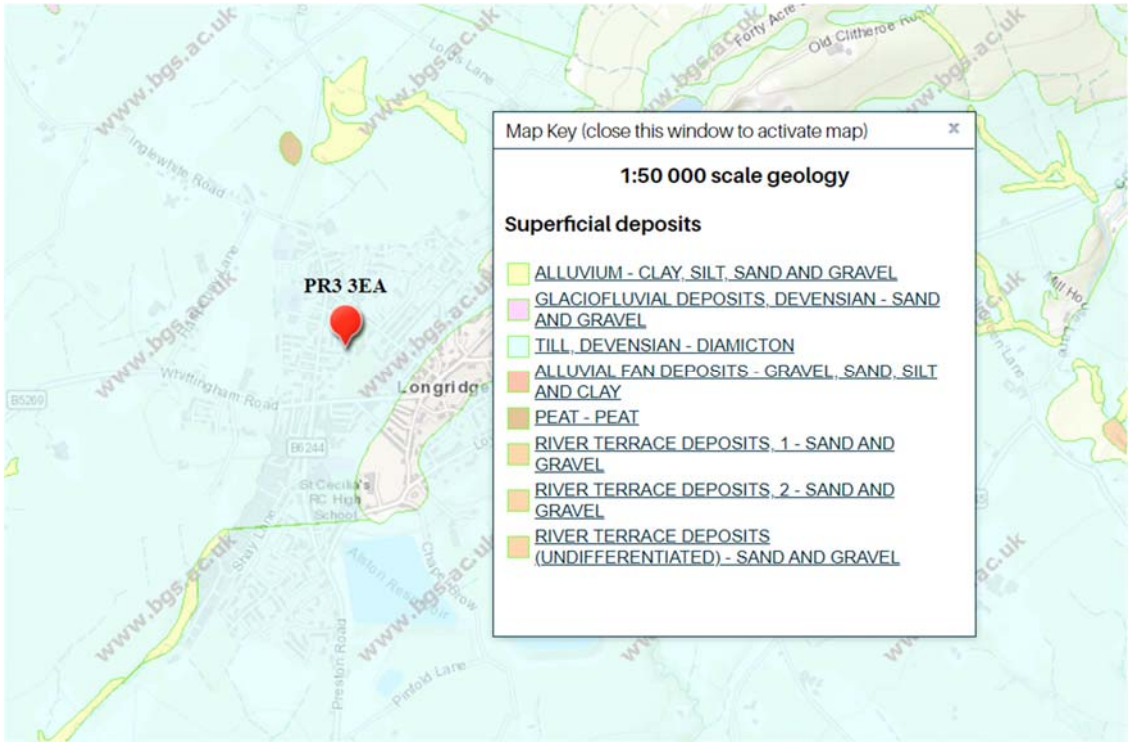
- Superficial Deposits – Till, Devensian - Diamicton
- Bedrock – Pendle Grit Member, Sandstone and Siltstone, interbedded.

Figures 2.7 & 2.8 overleaf provide extract from the Surface Geology maps for the area surrounding the proposed development.

Figure 2.6: Soilscape Map

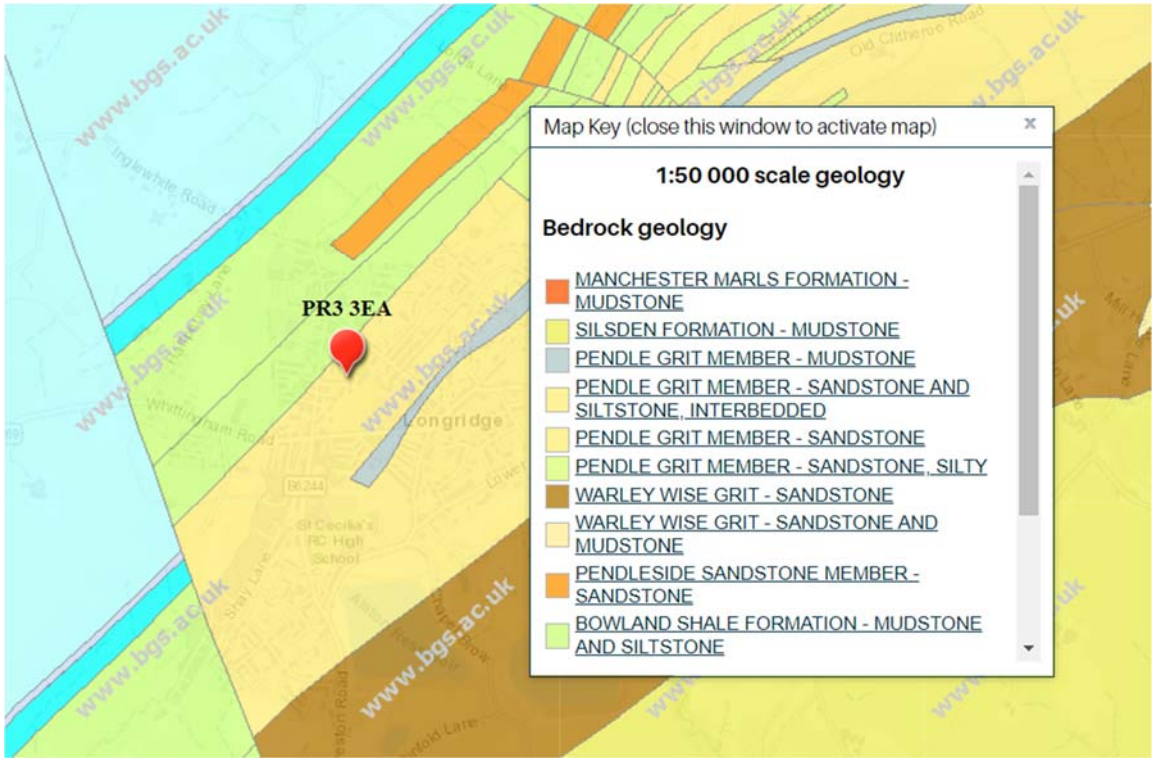
Source: http://www.landis.org.uk/soilscapes/

Figure 2.7: Superficial Surface Geology



Source: http://mapapps.bgs.ac.uk

Figure 2.8: Superficial Surface Geology



Source: http://mapapps.bgs.ac.uk

Undertaking a review of historic borehole logs for the area surrounding the development site; a number of sites are shown to be in close proximity to the development.

- Borehole SD63NW10 – Singletons Dairy
  - Glenrate Ltd 25/10/2004
  - Coordinates: 360180, 437000
  - Depth unkown
  - No geology available
  - Rest Water level 2.74m

- Borehole SD63NW90 – LAN 0127 Chapel Hill Industrial Estate Longridge 1
  - Dunelm Drilling Co. September 1997
  - Coordinates: 360371, 436867
  - 6m Depth
  - 0m – 0.2m Topsoil
  - 0.2 – 2.2m Firm to stiff brown sandy silty clay
  - 2.2 – 6m Firm to stiff brown fine stoned silty clay (Glacial till)
  - Groundwater struck at 2.4m

- Borehole SD63NW91 – LAN 0127 Chapel Hill Industrial Estate Longridge 2
  - Dunelm Drilling Co. September 1997
  - Coordinates: 360367, 436866
  - 5m Depth
  - 0m – 0.3m Topsoil
  - 0.3 – 2m Firm to stiff brown sandy silty clay
  - 2 – 6m Firm to stiff brown fine stoned silty clay (Glacial till)
  - Groundwater struck at 2.3m

The borehole records indicate that the area comprising the application site is underlain by clay soils, with relatively shallow depth to groundwater.

Furthermore, it is identified that due to space constraints, the required 5m distance between building and infiltration devices in accordance with CIRIA C753 The SUDS Manual, is not achievable.

It is considered overall, that the use of soakaways or other infiltration methods alone to manage surface water runoff from the development at Longridge is not feasible.

Watercourse: The nearest watercourse to the site is Savick Brook, which is located approximately 570 metres to the south west; and therefore, discharge to watercourse is not considered to be feasible.

Sewer: Combined public sewer located adjacent to the application site.

Proposed Discharge Point: Public sewer network, subject to agreement with United Utilities.

2.3 Sustainable Urban Drainage Systems (SUDS)

SUDS act to reduce the impact of surface water runoff from the development by limiting runoff volumes and rates from leaving the site.

Undertaking an assessment using the SUDS Planner Module within MicroDrainage Windes revealed that a number of different methods could incorporated into development. A summary of the results is tabulated below:

Table 1: SUDS Planner

SUDS Criteria	Rank 1	Rank 2	Rank 3
Hydrological	Pervious Pavements	Green Roof	Infiltration Trench / Soakaway; Infiltration Basin
Land Use	Online or Offline Storage	Wet Pond/ Stormwater Wetland/ Dry detention	Bioretention Area/ Filtration Techniques
Site Features	Pervious Pavements; Green Roof/ Filtration Techniques/ Infiltration Trench or Soakaway/ Online or Offline Storage	Filter Drains; Bioretention Area	Grassed Swales; Grassed Filter Strips
Community & Environment	Online or Offline Storage	Grassed Filter Strips; Bioretention Area	Pervious Pavements; Grassed Swales; Infiltration Trench/Soakaway; Filter Drains; Filtration Techniques

Economics & Maintenance	Wet Ponds	Grassed Filter Strip/ Dry Detention/ Green Roof	Pervious Pavements/ Grassed Swales/ Stormwater Wetland
Total	**Pervious Pavements/ Online or Offline Storage**	**Infiltration Trench or Soakaway**	**Green Roof**

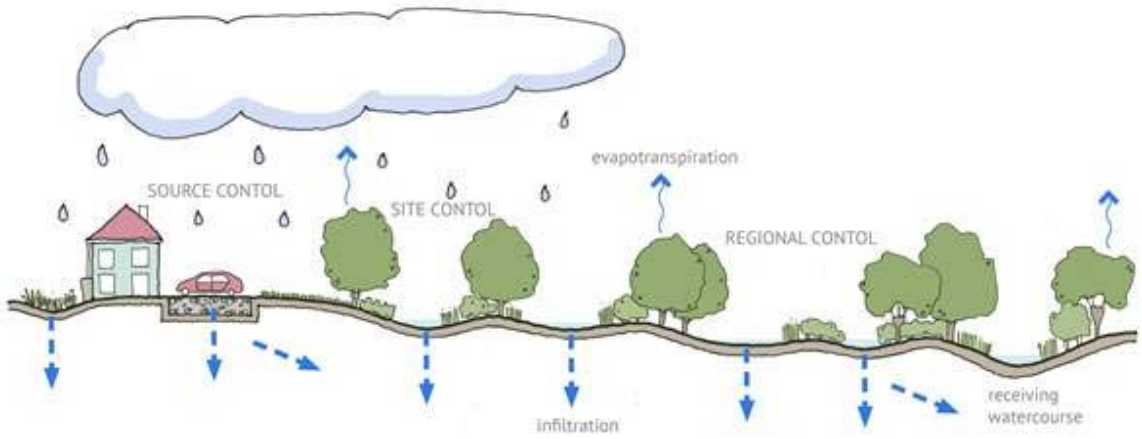
The SuDS treatment train uses a logical sequence of SuDS features; which allows stormwater runoff to pass through several different SuDS before reaching the receiving sewer, watercourse or water bodies.

By using the treatment train, run-off will encounter different passive treatment processes that are active in different types of facilities.

The treatment train comprises four stages:

1. Prevention
2. Source control
3. Site control
4. Regional control

Figure 2.9: The SuDS Treatment Train



Source: https://www.susdrain.org/delivering-suds/using-suds/suds-principles/management-train.html

1. Source Control

The inclusion of source control in SUDS schemes is one of the more important principles of SUDS design, and source control components should be upstream of any pond, wetland or other SUDS component.

Source control can help provide interception storage which can handle and treat some of the more frequent but smaller, polluting events (at least 5mm).

Most source control components could be located within the curtilage of private properties or highway areas. Their purpose is to manage rainfall close to where it falls, not allowing it to become a problem elsewhere.

The main types of source control include:

- Green roofs
- Rainwater harvesting
- Permeable paving
- Other permeable surfaces

Source control methods look to maximize permeability within a site to promote attenuation, treatment and infiltration, thereby reducing the need for off-site conveyance.

a) Permeable Paving

Pervious surfaces can be either porous or permeable. The important distinction between the two is:

Porous surfacing is a surface that infiltrates water across the entire surface. Permeable surfacing is formed of material that is itself impervious to water but, by virtue of voids formed through the surface, allows infiltration through the pattern of voids.

Pervious surfaces provide a surface suitable for pedestrian and/or vehicular traffic, while allowing rainwater to infiltrate through the surface and into underlying layers.

The water can be temporarily stored before infiltration to the ground, reused, or discharged to a watercourse or other drainage system. Surfaces with an aggregate sub-base can provide good water quality treatment.

The following types of permeable paving are commonly utilised within residential development:

- Block paving
- Asphalt
- Resin-bound gravel
- Grasscrete

For the application site off Towneley Road, it is noted that there is a paved area shown at the rear of the proposed apartment block; where pervious surfacing could be applied, in order to minimise the area, which is drained to the public sewer network.

b) Green Roofs

Green roof solutions generally comprise of a multi-layered system that covers the roof of a building with vegetation cover, and/or landscaping over a drainage layer, designed to intercept and retain rainfall.

The incorporation of green roofs is to be decided by the architect/developers during the final design stage and is largely dependent on the final building design.

Reviewing the plans for the new building, the structure is designed with a pitched roof arrangement; and therefore, unlikely that the inclusion of a green roof has been considered by the architect, during the design process.

Overall, it is considered that due to the post-development maintenance burden; along with the increased cost in ensuring that proposed roof structures have sufficient load bearing capability to cope with the additional weight, green roof solutions have not been incorporated within the drainage strategy for this development.

2. Site Control

a) Online / Offline Storage

Online and offline storage can be provided to help store rainfall runoff on-site, so that discharge rates to receiving watercourses or sewers can be restricted to ensure that they do not become overwhelmed during significant storm events.

This process is referred to as attenuation; and the method of storage may be concrete tanks; geocellular crate systems, large diameter pipes; or open storage systems such as detention basins.

Due to the limited space availability, any attenuation assets will need to be placed underground within the paved area to the rear of the proposed building.

b) Infiltration Trench or Soakaway

Not considered to be suitable for application at this site.

2.4 Existing Runoff Rates

Rainwater pipes drain roofwater from the front and rear of the pitched roof building and the flat roof extension on the south side; to a positive drainage system, which discharges to the sewer within Towneley Road.

A small white brick building adjacent to the extension on the south side of the main building is observed to have a flat tin roof, with no rainwater pipes; and one of the rainwater pipes serving the flat roof extension to the north side of the building is shown to drain to a gravel splash strip along the north face of the building. Both of these roof areas, along with concrete and stone slab paving to the rear of the building.

There does not appear to be any regulation or attenuation of flows leaving the site.

In order to assess surface water discharge rates to the sewer network, it is preferable to hydraulically model any positive drainage systems.

It is highlighted that there is limited information with regard to the exiting drainage system, however, using engineering judgement; along with small diameter pipes, and gradients set to satisfy self-cleansing velocities a hydraulic model using MicroDrainage Windes has been prepared, which calculates the following surface water discharge rates from the existing site:

- Cumulative drained area: 0.03Ha
- 1 in 1-year: 3.1l/s
- 1 in 30-year: 8.7l/s
- 1 in 100-year: 11.2l/s

2.5 Greenfield Runoff Rates

Using the HR Wallingford UK SUDS Greenfield Runoff Tool, over the minimum site area of 0.1Ha; and using lH124 methodology, the greenfield runoff rates at the application site are:

- QBAR = 0.88l/s x 0.58 (site area - ratio) = 0.51l/s
- 1 in 1-year = 0.77l/s x 0.58 (site area - ratio) = 0.45l/s
- 1 in 30-year = 1.5l/s x 0.58 (site area - ratio) = 0.87l/s

- 1 in 100-year = 1.84l/s x 0.58 (site area - ratio) = 1.07l/s

2.6 Management of Water Quantity

Approach 1 – Volume control / Long Term Storage (Technical Standards S2/3, S4/5)

- *The attenuated runoff volume for the 1 in 100-year 6-hour event (plus climate change allowance) is limited to the greenfield runoff volume for the 1 in 100-year 6-hour event, with any additional runoff volume utilising long term storage and either infiltrated or released at 2 l/s/ha*
- *The discharge rate for the critical duration 1 in 1-year event is restricted to the 1 in 1-year greenfield runoff rate*
- *The discharge rate for the critical duration 1 in 100-year event (plus climate change allowance) is restricted to the 1 in 100-year greenfield runoff rate*

Approach 1 (Long Term Storage) controls discharge rate and discharge volume by providing long-term storage, allowing an attenuated volume equivalent to the 1 in 100-year 6-hour greenfield event to be discharged at the greenfield 1 in 100-year rate for the 1 in 100-year 6-hour event (plus an allowance for climate change).

Additional post-development runoff volume should be infiltrated into the ground or released at a rate no greater than 2 l/s/ha.

Therefore, in accordance with Standard S2 and S3 of Defra's Technical Standards for Sustainable Drainage Systems for greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1-year rainfall event and the 1 in 100-year rainfall event should never exceed the peak greenfield runoff rate for the same event.

Approach 1 is the preferred approach but is only appropriate when the volume of surface water discharged from the site for the 1 in 100 (plus climate change) 6-hour event is limited to the greenfield equivalent. This is achieved through the use of long-term storage (if the actual greenfield volume cannot be achieved) which will either be infiltrated into the ground or released at a rate no greater than 2 l/s/ha.

Approach 2 – QBAR (Technical Standards S6)

- *Justification has been provided that the provision of volume control/long term storage is not appropriate and an attenuation only approach is proposed. All events up to the critical duration 1 in 100-year event (plus climate change allowance) are limited to QBAR (1 in 2-year greenfield rate) or 2 l/s/ha, whichever is greater.*

Approach 2 (Attenuation Only) provides an alternative where the greenfield runoff volume cannot be achieved and/or it can be demonstrated that long term storage is unachievable.

In accordance with S6 of Defra's Technical Standards for Sustainable Drainage Systems, which requires runoff volume to be discharged at a rate that does not adversely affect flood risk, rainfall events up to and including the 1:100-year (plus climate change) event should be attenuated and released at the greenfield QBAR rate.

To mitigate for climate change, the proposed 1 in 100-year (plus climate change allowance) rainfall event must be no greater than the existing 1 in 100-year rainfall event runoff rate.

If this cannot be achieved, surface water flood risk increases under climate change.

In terms of the management of water quantity approach 1 has been utilised.

2.7 Surface Water Storage Requirements

The HR Wallingford UK SUDS Surface Water Storge Tool has been used to assess the storage and attenuation requirements for the British Legion Site at Longridge.

The estimation tool indicates that a minimum flow rate of 5l/s should be set; however, it is acknowledged that lower flows are achievable with a flow control with an aperture of 75mm.

Note: 75mm is the smallest aperture size considered appropriate to miminise the risk of flooding as a result of blockage.

A design flow of 2.6l/s has therefore been applied in order to meet this criterion, which results in the following:

- Attenuation Storage: 9.0m³
  - Provided to enable runoff rates from the site to the receiving sewer to be reduced to an acceptable rate to protect against erosion and/or potential flooding downstream. The attenuation volume is a function of the degree of development relative to the limiting discharge rate.

- Long Term Storage: 0.0m³
  - Long term storage similar to attenuation storage, specifically addresses the additional volume of runoff caused by development in comparison to pre-development runoff. It is specifically aimed at runoff from extreme events to limit flood impact downstream and does not apply when SPR values are small resulting in minimum discharge rates being set at 2l/s/ha; and/or site areas are so small (as in this instance) that the minimum flow rates from the site are larger than the greenfield runoff rates.

- **Total Storage: 9.0m³**

2.8 Urban Creep

Given the type of development proposed, it is considered that the application of additional rainfall to account for urban creep is not necessary.

2.9 Climate Change Allowance

Current guidance indicates that 40% should be applied to rainfall figures to accommodate for climate change over the lifetime of the development.

2.10 Interception

Interception drainage involves the capture and retention on site of the first 5mm (or other specified depth) of the majority of all rainfall events; and can be achieved using green roof solutions, rainwater harvesting; or infiltration methods.

Due to the end-use and design of the new building, neither green roof or rainwater harvesting is considered to be practical; and underlying round conditions i.e. clay and relatively shallow groundwater, indicate that infiltration will be feasible for application at the site.

As such an element for interception has not been incorporated within the drainage strategy for the application site.

2.11 Flow Controls

In order to minimise the risk of blockage the aperture of flow controls must not be less than 75mm.

2.12 Runoff Volumes

The runoff volume for a site is typically estimated for the 6-hour duration, 1 in 100-year rainfall event.

Existing Building:

Area of roof & hardstanding (drained & undrained areas) = 0.047Ha = 470m^2

Average rainfall intensity for the 1 in 100-year, 6-hour duration rainfall event = 11.323mm/hour

Total depth of rainfall = 11.323 x 6 = 67.938mm

Volume = 420 x (67.938/1000) = **28.5m^3**

Proposed Building:

Area of roof & hardstanding (drained & undrained areas) = 0.042Ha = 420m^2

Average rainfall intensity for the 1 in 100-year, 6-hour duration rainfall event + 40%CC = 15.852mm/hour

Total depth of rainfall = 15.852 x 6 = 95.112mm

Volume = 470 x (95.112/1000) = **44.7m^3**

The increase in volume is 44.7 – 28.5 = **16.2m^3**

2.13 Residual Flood Risk

The proposed drainage system should be designed such that attenuation will be provided to accommodate surface water runoff for storms with a return period of up to the 1 in 30-year event with no surface flooding.

Some surface flooding is permitted for the 1 in 100 year plus 40% climate change storm event, however flooding must not affect the proposed properties, or be directed offsite where it may potentially increase flood risk for others.

No surface flooding is indicated to occur during all modelled return period storm events.

2.14 Proposed Surface Water Drainage Strategy

Surface Water runoff will be directed from the roof area; and directed to an underground drainage system comprising manholes and pipes, with exception to the rainwater pipes along the east side of the proposed building. These rainwater pipes will be directed to discharge to an area of permeable paving.

The large communal patio/paved area to the rear of the new building will be permeably paved; with attenuation volume for runoff provided within the sub-base layer.

A sub-base depth of 0.32m provides a storage volume of 9m³. Attenuation volume is also available within the manholes and pipes provided within the drainage network; which increases the total volume for attenuation of 12m³.

Flow will be controlled for discharge to the public sewer network adjacent to the north boundary of the site, using a Hyrobrake or similar flow control.

The storage volume available within the drainage system is 3.2m³; and aligns with the indicative volumes estimated within Section 2.9.

Hydraulic modelling using MicroDrainage Windes indicates that the resulting discharge rates are:

- 1 in 1-year: 2.5l/s
- 1 in 30-year: 2.6l/s
- 1 in 100-year + 40% climate change: 2.6l/s

The model indicates that discharge rates calculated for the existing British Legion site have not been exceeded, with a betterment noted for the higher magnitude design storm events.

2.15 Exceedance Routes

The drainage strategy has been designed to accommodate flows up to and including the 1 in 100-year + 40% climate change event with no surface flooding, to prevent migration beyond the site boundary.

In the event that the receiving sewer is surcharged, with a depth above invert of 1m, over the course of a 1-day period it is observed from the hydraulic model results that:

- Outflow from the site during the 1 in 1-year event is reduced to 0.7l/s, however there is no surface flooding evident on-site.
- During the 1 in 30-year event, outflow reduces to 2.2l/s and there is no surface water flooding anticipated.
- During the 1 in 100-year plus 40% climate change event, outflow is maintained at 2.6l/s with minor flooding noted to occur from 2no manholes within the proposed drainage system. Total volume of flooding is 2.109m³

2.16 Pollution Control

The development comprises residential roof area; and an area of non-trafficked permeable paving' with is located away from any other trafficked areas.

In accordance with Table 4.3 of CIRIA C753 The SUDS Manual the drained surfaces within the application site present a very low risk in terms of pollution and required the removal of gross solids and sediments.

It is noted that the drainage system incorporates a silt trap to prevent the transportation of silt or solids material from the permeable paving to the drainage system.

Similarly, the flow control chamber incorporates a sump, for collection of silt and solid material, to minimise the risk of blockage an transference downstream to the receiving sewer system.

3.0 Foul Drainage

It is proposed that foul flows from the development are directed for discharge to:

- The existing foul sewer within the footpath adjacent to the west boundary of the site
- The public combined sewer located adjacent to the north boundary of the site

4.0 Maintenance

The surface water and foul drainage systems serving the development will remain under private ownership; and as such the maintenance responsibilities will lie with the Developer.

It is recommended that a maintenance contract is set up by the Developer, with an experienced contractor, which will ensure the efficacy of the drainage system over the lifetime of the development.

Maintenance should be undertaken in accordance with CIRIA C753 The SUDS Manual and manufacturer's advice and instruction for proprietary drainage assets.

A draft management & maintenance plan is provided within Appendix D of this report.

5.0 Consents/Approvals

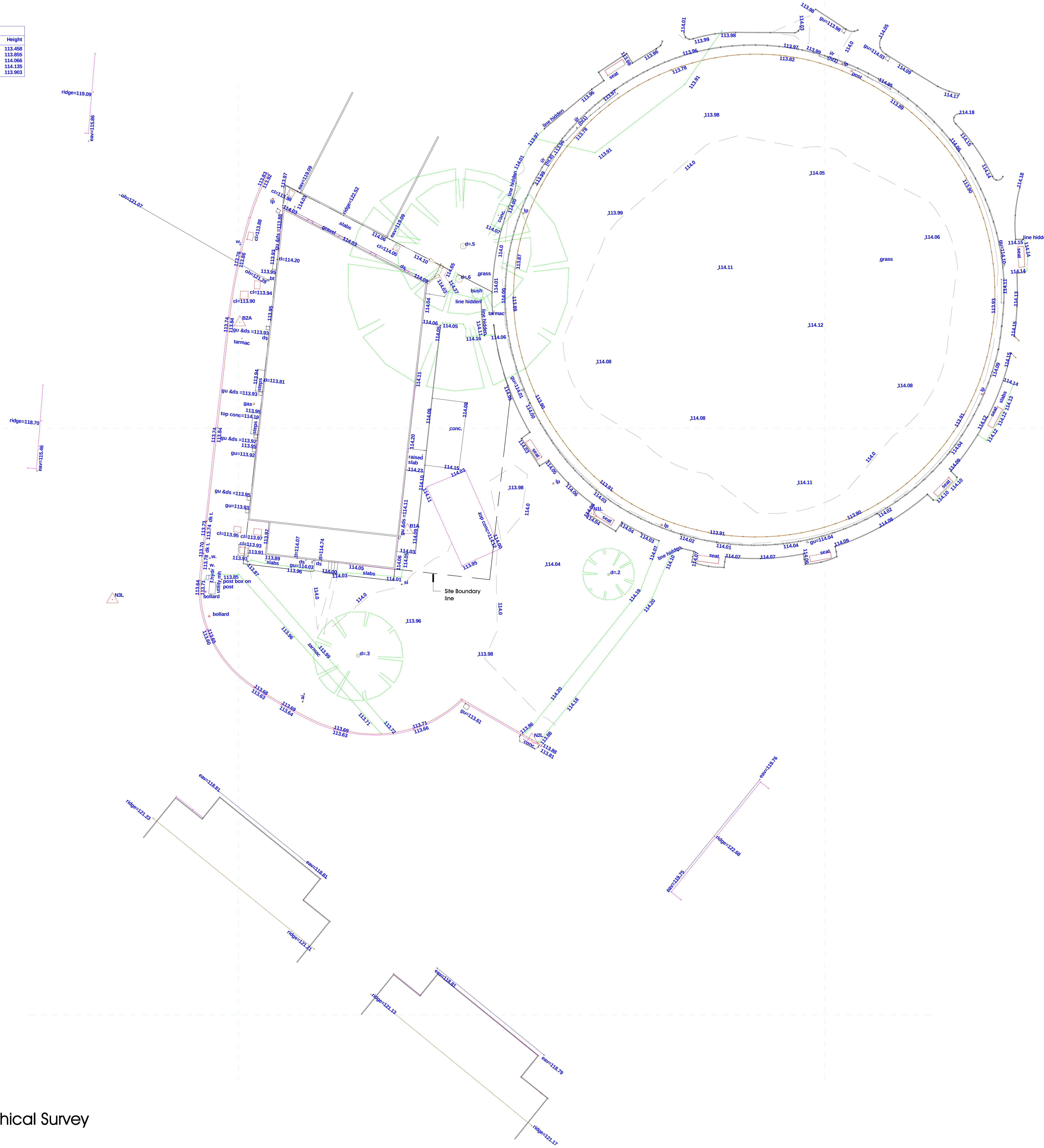
Consent to discharge to the public sewer will require approval from United Utilities via a Section 106 agreement (Water Industry Act 1991) for each connection.

APPENDICES

Appendix A: - Existing Site Plans

NOTES:
1: Do not scale this drawing, use figured dimensions only   2: The Contractor, Sub Contractor or specialist supplier are responsible for confirming site dimensions prior to fabrication   3: Any dimensional discrepancies are to be reported to the Architect immediately

SF- TO 1			
Code	Easting	Northing	Height
N3L	360239.283	437385.417	113.458
N2L	360275.048	437373.468	113.855
N1L	360280.106	437392.774	114.066
B1A	360264.430	437391.321	114.135
B2A	360250.145	437409.046	113.903



Existing Site / Topographical Survey

1 : 200

0 1 5 10m

Proposed Apartmets
Former British Legion,
Townley Road, Longridge
Mr & Mrs Hardacre

Pre-Application Advice
Existing Site

DATE Feb 2020

JOB NO 3039
DRAWING NO SK100
REVISION
SCALE 1 : 200 @ A1

PGB ARCHITECTURAL SERVICES LTD

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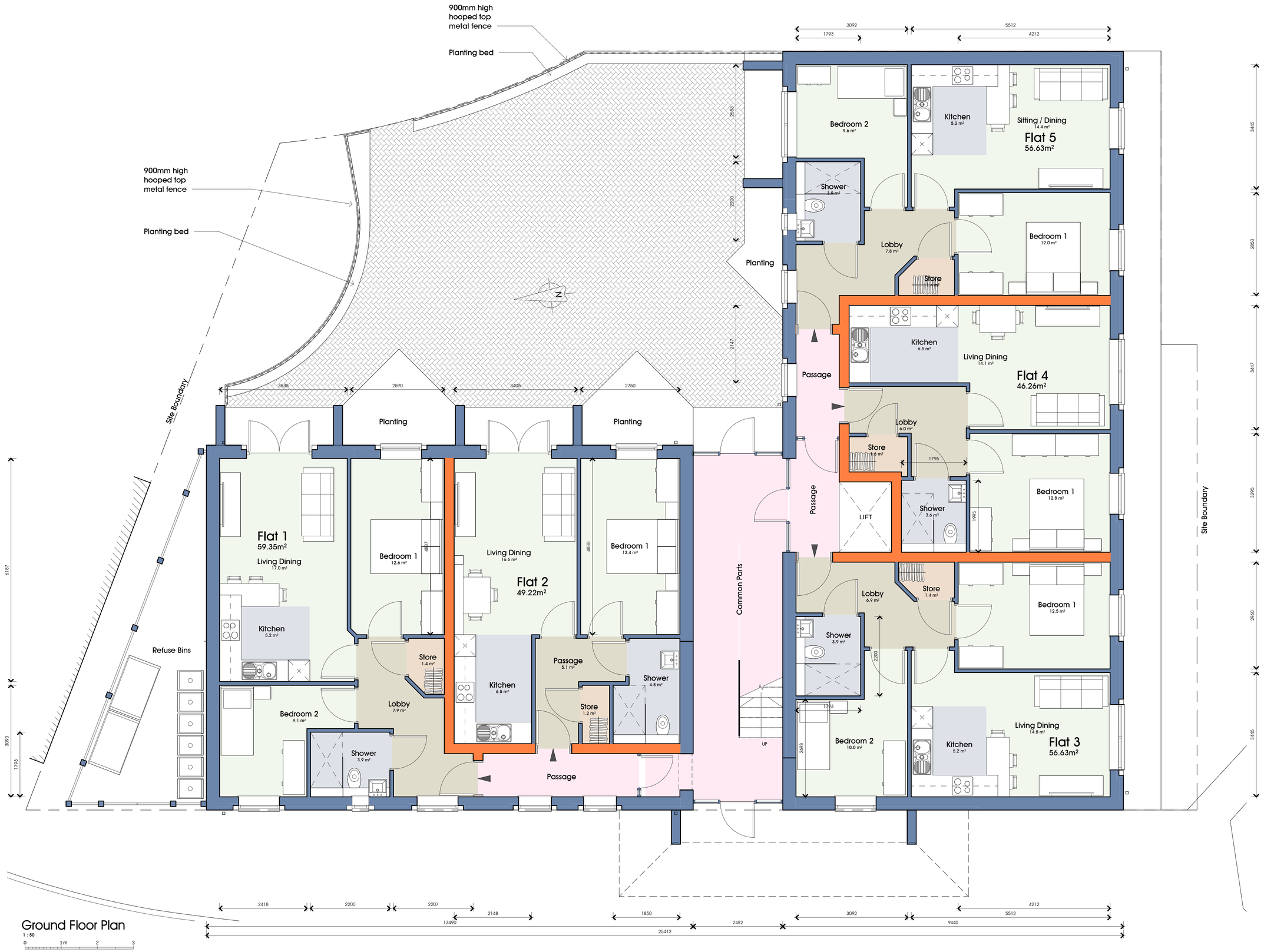
Appendix B: - Development Proposals

NOTES:
1: Do not scale this drawing, use figured dimensions only 2: The Contractor, Sub Contractor or specialist supplier are responsible for confirming site dimensions prior to fabrication 3: Any dimensional discrepancies are to be reported to the Architect immediately



Ground Floor Plan

1 : 50

0 1m 2 3

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Proposed Apartmets
Former British Legion,
Townley Road, Longridge
Mr & Mrs Hardacre

Pre-Application Advice
Ground Floor Plan

DATE Feb 2020

JOB NO 3039
DRAWING NO SK110
REVISION
SCALE 1 : 50 @ A1

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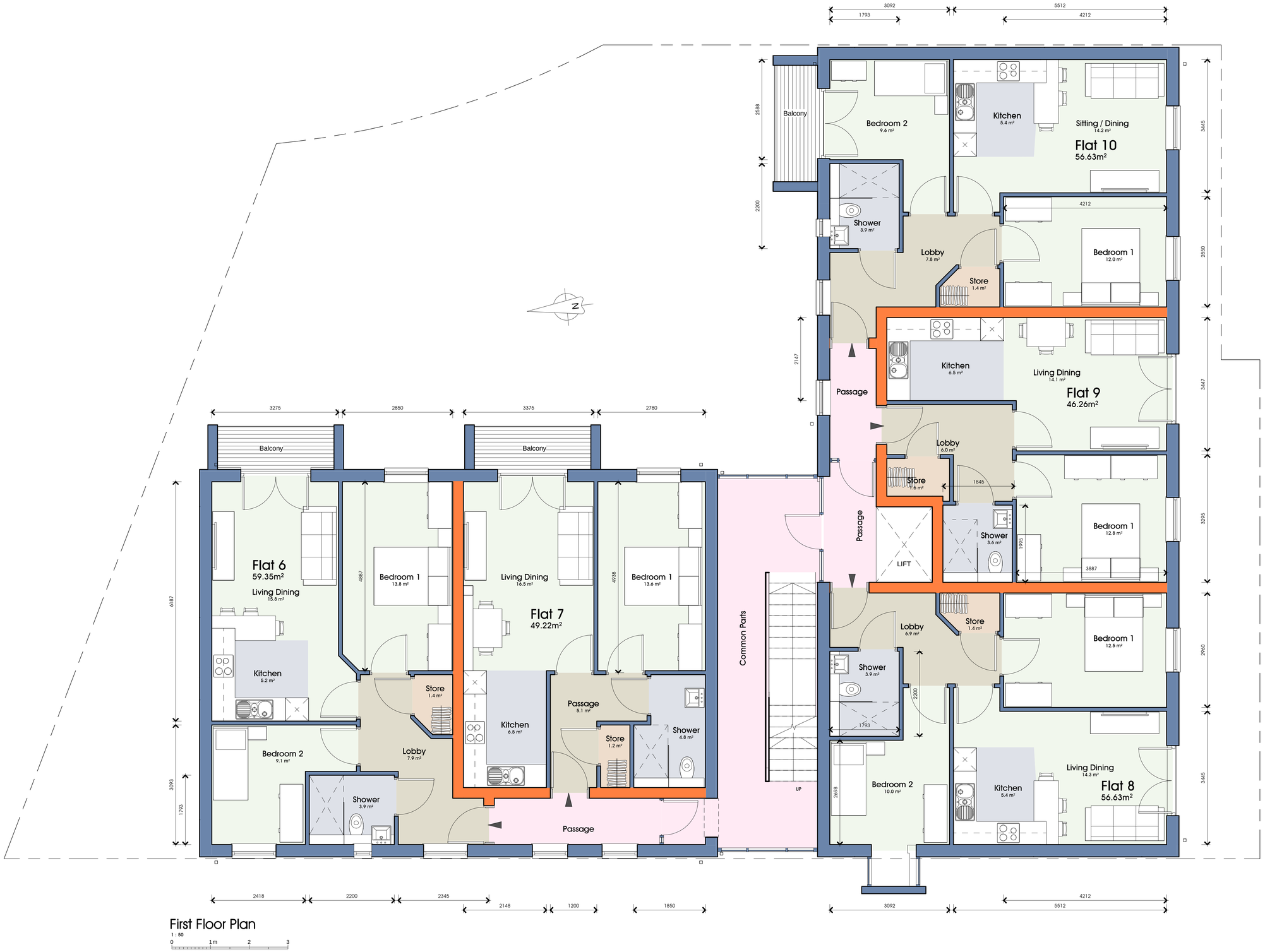

First Floor Plan

1 : 50

0 1m 2 3

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Proposed Apartmets
Former British Legion,
Townley Road, Longridge
Mr & Mrs Hardacre

Pre-Application Advice
First Floor Plan

DATE Feb 2020

JOB NO 3039
DRAWING NO SK120
REVISION
SCALE 1 : 50 @ A1

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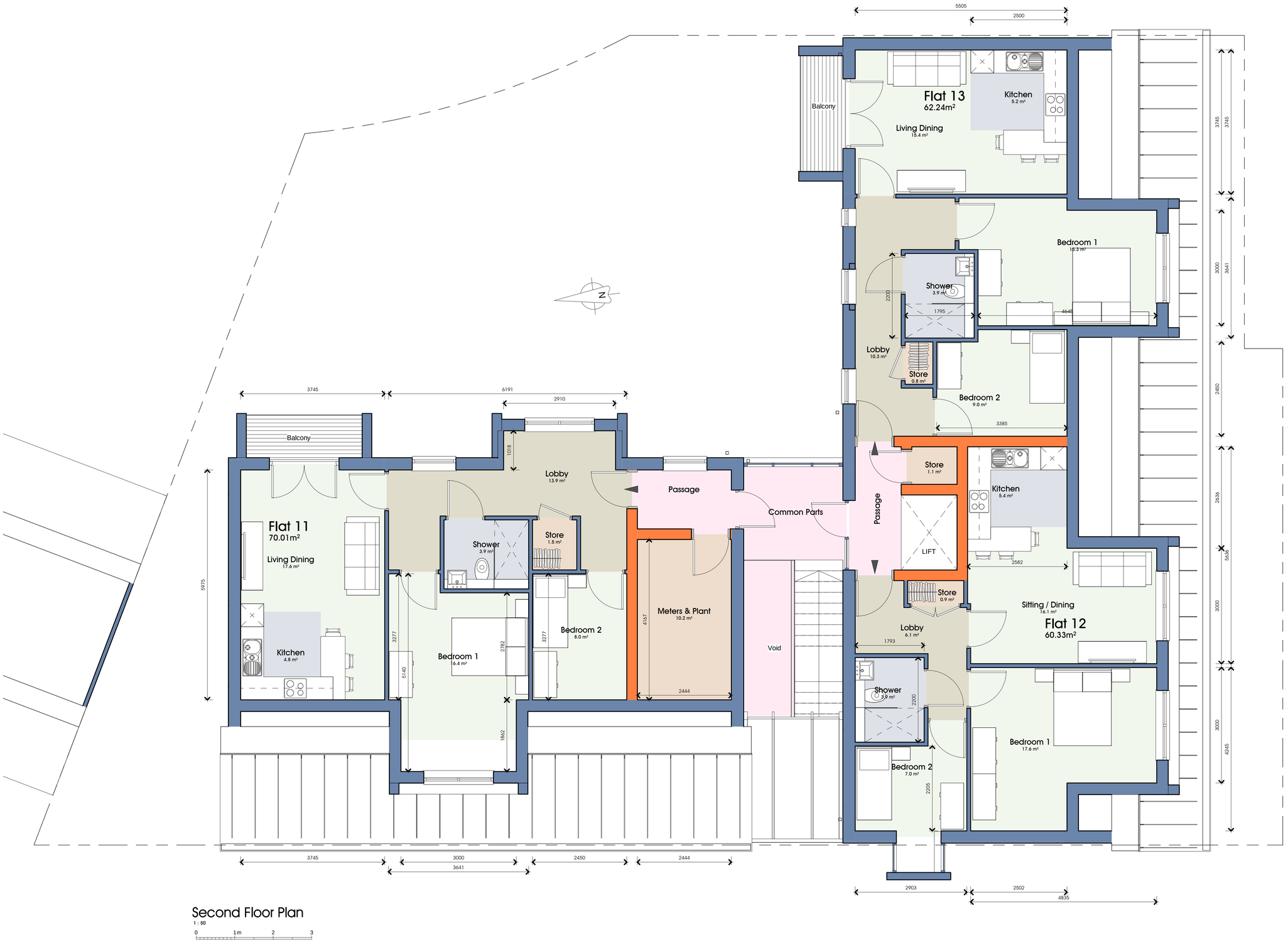

Second Floor Plan

1 : 50

0 1m 2 3

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Proposed Apartments
Former British Legion,
Towneley Road, Longridge
Mr & Mrs Hardacre

Pre-Application Advice
Second Floor Plan

DATE Feb 2020

JOB NO 3039
DRAWING NO SK130
REVISION
SCALE 1 : 50 @ A1

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NOTES:
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West Elevation
1 : 100
0 1 2 3 4 5m

South Elevation
1 : 100

East Elevation
1 : 100

North Elevation
1 : 100

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Proposed Apartmets
Former British Legion,
Towneley Road, Longridge
Mr & Mrs Hardacre

Pre-Application Advice
Elevations & Images

DATE Feb 2020

JOB NO 3039
DRAWING NO SK140
REVISION
SCALE 1 : 100 @ A1

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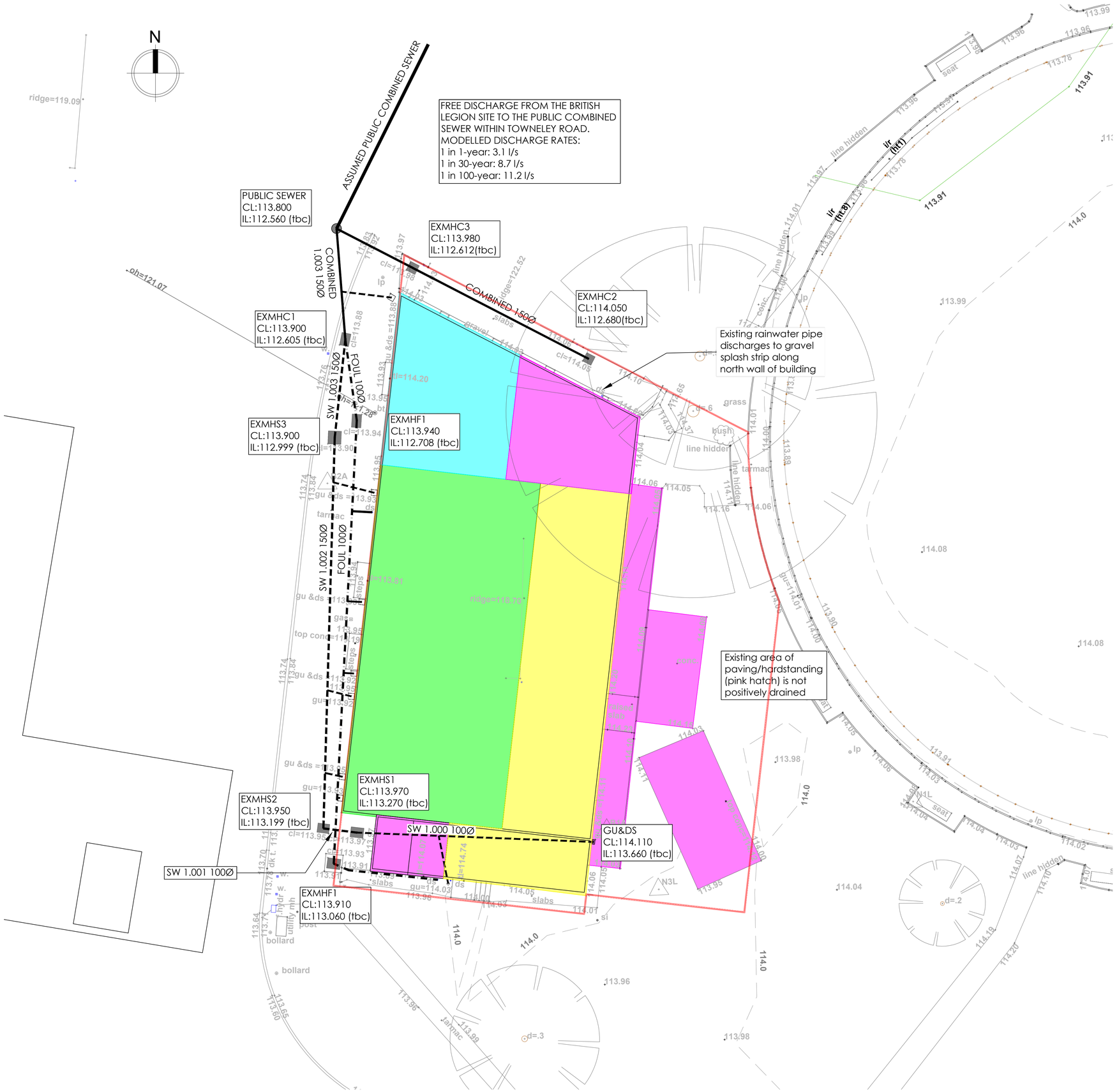
Building
Name


Residents
Parking Only

Appendix C: -Existing Surface Water Discharge Rate Calculations



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6. ALL EXISTING DRAINAGE PIPE SIZES & INVERT LEVEL MUST BE CONFIRMED ON-SITE PRIOR TO THE DETAILED DESIGN STAGE OF THE PROJECT

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS, RISKS NORMALLY ASSOCIATED WITH THE TYPE OF CONSTRUCTION WORK OR RELATED STRUCTURAL WORK DETAILED ON THIS DRAWING, THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION HAVE BEEN NOTED.

RISKS LISTED HERE ARE SIGNIFICANT, AND ASSOCIATED WITH THE CONSTRUCTION WORK OR RELATED STRUCTURAL WORK.

HAZARDOUS SUBSTANCE - SKIN CONTACT WITH HOT BITUMEN AND CEMENTITIOUS MATERIAL.

DUST - AIRBORNE DUST PARTICLES FROM GRANULAR SUB BASE AND CUTTING OF CONCRETE.

PUBLIC - STRUCK BY MOVING PLANT.

FOR INFORMATION RELATING TO END USE, MAINTENANCE, AND DEMOLITION WORKS, REFER TO THE CDM HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORK WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, AND WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

THE TABLE BELOW IDENTIFIES IN MORE DETAIL THE POTENTIAL RISKS ASSOCIATED WITH DIFFERENT TASKS.

ITEM	RECOMMENDATION
1. EXCAVATION ADJACENT TO BOUNDARIES	CARE TO BE TAKEN WITH DEEP EXCAVATIONS IN ORDER TO PREVENT SIDEWALL COLLAPSE / SUPPAGE. CONTRACTOR TO PROVIDE METHOD STATEMENTS WHERE NECESSARY. EXCAVATIONS TO BE SAFELY CORDONED OFF AND ENSURE SAFE PEDESTRIAN AND VEHICLE ACCESS IS MAINTAINED TO ADJACENT BUILDINGS. ENSURE EXCAVATIONS/PLANT AND MACHINERY ARE MADE SECURE OUTSIDE WORKING HOURS TO PREVENT INJURY TO THE PUBLIC.
2. CONSTRUCTING NEW M.H'S AND ALTERATIONS TO EXISTING MANHOLES	CONTRACTOR TO PROVIDE METHOD STATEMENT FOR SAFE CONSTRUCTION WHEN WORKING IN CONFINED SPACES. ALL PERSONNEL AFFECTED TO BE TRAINED AND BRIEFED ON THE RELEVANT METHOD STATEMENT.
3. PLACING AND HANDLING CUT AND BENT REINFORCEMENT	CONTRACTOR TO ENSURE WEIGHTS OF MATERIALS ARE INLINE WITH CURRENT REGULATIONS. NO PROJECTING BARS DETAILED. LENGTH OF BARS LIMITED TO MANAGEABLE SECTIONS.
4. EXCAVATION NEAR TO EXISTING SERVICES.	NEW CAVITY WALL LEAVES TO BE CONSTRUCTED SIMULTANEOUSLY THROUGHOUT CONSTRUCTION TO REDUCE RISK OF COLLAPSE AND PREVENTS EXPOSURE OF PROTRUDING WALL TIES. WALLS TO BE CONSTRUCTED IN SUITABLE LIFTS TO MAINTAIN FRESH MORTAR STABILITY. ISSUE AVAILABLE SERVICE RECORDS TO THE CONTRACTOR.
5. WORKING NEAR TO LIVE TRAFFIC.	CONTRACTOR TO PROVIDE METHOD STATEMENT FOR TRAFFIC MANAGEMENT/TEMPORARY WORKS. CONTRACTOR TO PROVIDE APPROPRIATE PROTECTION BARRIERS IF REQUIRED. WORKERS TO WEAR HIGH VISIBILITY CLOTHING TO AVOID BEING STRUCK BY PASSING VEHICLES OR PLANT.
6. GENERAL PUBLIC; EXISTING RESIDENTS; OR CHILDREN ON SITE.	ENSURE THAT THE SITE IS PROPERLY SECURE TO PREVENT INJURY FROM SLIPS, TRIPS, FALLS, FALLING FROM HEIGHT, UNCOVERED MANHOLES/TRENCHES. PROVIDE ADVANCE WARNING TO RESIDENTS REGARDING THE START OF CONSTRUCTION. IDENTIFY DIVERSIONS TO PUBLIC RIGHTS OF WAY, ESTABLISHED AND CLEARLY SIGNED IF REQUIRED.
7. NOISE, DUST AND VIBRATION RESULTING FROM CONSTRUCTION WORKS	METHOD STATEMENT TO BE PROVIDED. SITE STAFF TO BE PROVIDED WITH APPROPRIATE PPE. WORK MAY HAVE TO BE UNDERTAKEN AT SPECIFIC TIMES IN SENSETIVE AREAS TO MINIMISE DISRUPTION TO ADJACENT PROPERTIES.
8.0 WORKING NEAR WATER	CONTRACTOR TO PROVIDE DETAILED METHOD STATEMENT IN ACCORDANCE WITH THE APPROVED LAND DRAINAGE CONSENT, TO ENSURE SAFE WORKING ARRANGEMENTS AROUND AREAS OF OPEN OR FLOWING WATER; AND TO ENSURE THAT SUITABLE SITE OPERATION PROCEDURES ARE IN PLACE TO ELIMINATE THE RISK OF POLLUTION TRANSFER TO THE WATER ENVIRONMENT FROM PLANT & SITE MATERIALS.

KEY:

- EXISTING SURFACE DRAIN
- EXISTING FOUL DRAIN
- EXISTING MANHOLE (SURVEYED/PRIVATE)
- EXISTING MANHOLE (HIGHWAY/PUBLIC SEWER)

CONTRIBUTING DRAINAGE AREAS:

- ROOF & HARDSTANDING AREA NOT POSITIVELY DRAINED = 0.012 Hectares
- ROOF AREA TO SW 1.000 = 0.010 Hectares
- ROOF AREA TO SW 1.002 = 0.015 Hectares
- ROOF AREA TO SW 1.002 = 0.005 Hectares

REVISION	COMMENT	DATE	BY
A	RED-LINE BOUNDARY ADDED TO PLAN	30.10.20	DM

FLOOD RISK CONSULTANCY LTD
APPRAISING, MANAGING & REDUCING FLOOD RISK
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Turner Road, Nelson
Lancashire, BB9 7DR
TEL: 01282 797609
EMAIL: INFO@FLOODRISKCONSULT.COM
WEBSITE: WWW.FLOODRISKCONSULT.COM

CLIENT:	Mr & Mrs Hardacre
DATE:	27/10/2020
STATUS:	Draft
DRAWN BY:	DM
PROJECT:	Former British Legion, Towneley Road, Longridge
SCALE:	1:100
DRAWING TITLE:	Existing Foul & Surface Water Drainage Plan
SIZE:	A1
DRAWING REFERENCE:	20076-02
REVISION:	A

Time Area Diagram for Existing

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.025	4-8	0.005

Total Area Contributing (ha) = 0.030

Total Pipe Volume (m□) = 0.651

Existing Network Details for Existing

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	12.100	0.390	31.0	0.010	5.00	0.0	0.600	o	100	Pipe/Conduit
1.001	1.700	0.021	80.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit
1.002	20.000	0.200	100.0	0.015	0.00	0.0	0.600	o	150	Pipe/Conduit
1.003	5.000	0.394	12.7	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit
1.004	5.700	0.045	126.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
1.000	113.660	0.010	0.0	1.39	10.9
1.001	113.270	0.010	0.0	0.86	6.8
1.002	113.199	0.025	0.0	1.00	17.8
1.003	112.999	0.030	0.0	2.84	50.2
1.004	112.605	0.030	0.0	0.89	15.8

Manhole Schedules for Existing

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
GU&DS	114.110	0.450	Open Manhole	100	1.000	113.660	100				
EXMHS1	113.970	0.700	Open Manhole	600	1.001	113.270	100	1.000	113.270	100	
EXMHS2	113.950	0.751	Open Manhole	600	1.002	113.199	150	1.001	113.249	100	
EXMHS3	113.900	0.901	Open Manhole	600	1.003	112.999	150	1.002	112.999	150	
EXMHC1	113.880	1.275	Open Manhole	600	1.004	112.605	150	1.003	112.605	150	
PUBLIC SEWER	113.800	1.240	Open Manhole	1200		OUTFALL		1.004	112.560	150	

No coordinates have been specified, layout information cannot be produced.

Free Flowing Outfall Details for Existing

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.004	PUBLIC SEWER	113.800	112.560	0.000	1200	0

Volume Summary (Static)

Length Calculations based on True Length

Pipe Number	USMH Name	Manhole Volume (m□)	Pipe Volume (m□)	Storage Structure Volume (m□)	Total Volume (m□)
1.000	GU&DS	0.004	0.092	0.000	0.096
1.001	EXMHS1	0.198	0.009	0.000	0.207
1.002	EXMHS2	0.212	0.343	0.000	0.555
1.003	EXMHS3	0.255	0.078	0.000	0.333
1.004	EXMHC1	0.360	0.085	0.000	0.445
Total		1.029	0.606	0.000	1.635

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m□/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 18.800	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.282	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	GU&DS	15 Winter	1	+0%					113.682	-0.078
1.001	EXMHS1	15 Winter	1	+0%					113.307	-0.063
1.002	EXMHS2	15 Winter	1	+0%					113.239	-0.110
1.003	EXMHS3	15 Winter	1	+0%					113.027	-0.122
1.004	EXMHC1	15 Winter	1	+0%					112.654	-0.101

PN	US/MH Name	Flooded Volume (m□)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	GU&DS	0.000	0.11		1.2	OK	
1.001	EXMHS1	0.000	0.28		1.2	OK	
1.002	EXMHS2	0.000	0.16		2.6	OK	
1.003	EXMHS3	0.000	0.08		3.1	OK	
1.004	EXMHC1	0.000	0.24		3.1	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m□/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model		FSR M5-60 (mm)	18.800	Cv (Summer)	0.750
Region	England and Wales	Ratio R	0.282	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	GU&DS	15 Winter	30	+0%					113.696	-0.064
1.001	EXMHS1	15 Winter	30	+0%					113.333	-0.037
1.002	EXMHS2	15 Winter	30	+0%					113.269	-0.080
1.003	EXMHS3	15 Winter	30	+0%					113.047	-0.102
1.004	EXMHC1	15 Winter	30	+0%					112.696	-0.059

PN	US/MH Name	Flooded Volume (m□)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	GU&DS	0.000	0.28		2.8	OK	
1.001	EXMHS1	0.000	0.69		2.8	OK	
1.002	EXMHS2	0.000	0.44		7.3	OK	
1.003	EXMHS3	0.000	0.22		8.7	OK	
1.004	EXMHC1	0.000	0.67		8.7	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m□/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 18.800	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.282	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	GU&DS	15 Winter	100	+0%					113.701	-0.059
1.001	EXMHS1	15 Winter	100	+0%					113.345	-0.025
1.002	EXMHS2	15 Winter	100	+0%					113.281	-0.068
1.003	EXMHS3	15 Winter	100	+0%					113.054	-0.095
1.004	EXMHC1	15 Winter	100	+0%					112.714	-0.041

PN	US/MH Name	Flooded Volume (m□)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	GU&DS	0.000	0.36		3.7	OK	
1.001	EXMHS1	0.000	0.89		3.6	OK	
1.002	EXMHS2	0.000	0.56		9.4	OK	
1.003	EXMHS3	0.000	0.29		11.2	OK	
1.004	EXMHC1	0.000	0.86		11.2	OK	

Appendix D: - Greenfield Runoff & Volume Calculations

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Donna Metcalf
Site name:	British Legion Site
Site location:	Longridge

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.83126° N
Longitude:	2.60544° W
Reference:	3212757784
Date:	Oct 29 2020 13:34

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.1

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	1172	1172
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	0.88	0.88
1 in 1 year (l/s):	0.77	0.77
1 in 30 years (l/s):	1.5	1.5
1 in 100 year (l/s):	1.84	1.84
1 in 200 years (l/s):	2.09	2.09

Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	18.800
Ratio R	0.282
Areal Reduction Factor	1.00
Area (ha)	0.042
SAAR (mm)	1054
CWI	123.486
Urban	0.000
SPR	0.000

Results

Percentage Runoff (%)	4.25
Greenfield Runoff Volume (m□)	1.213

Appendix E: - Storage Volume Calculations

HR Wallingford
Working with water

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Donna Metcalf
Site name:	British Legion Site
Site location:	Preston

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	53.83124° N
Longitude:	2.60544° W
Reference:	3273015482
Date:	Oct 29 2020 13:25

Site characteristics

Total site area (ha):	0.058
Significant public open space (ha):	0.011
Area positively drained (ha):	0.047
Impermeable area (ha):	0.047
Percentage of drained area that is impermeable (%):	100
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	100
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.05
Net impermable area for storage volume design (ha):	0.05
Pervious area contribution to runoff (%):	0

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	70
Rainfall 100 yrs 12 hrs:	--	99.96
FEH / FSR conversion factor:	1.19	1.19
SAAR (mm):	1172	1172
M5-60 Rainfall Depth (mm):	20	20
'r' Ratio M5-60/M5-2 day:	0.3	0.3
Hydological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 10 year:	1.38	1.38
Growth curve factor 30 year:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Q_{BAR} for total site area (l/s):	0.51	0.51
Q_{BAR} for net site area (l/s):	0.41	0.41

Design criteria

Climate change allowance factor:	1.4
Urban creep allowance factor:	1.0
Volume control approach	Use long term storage
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	3.1

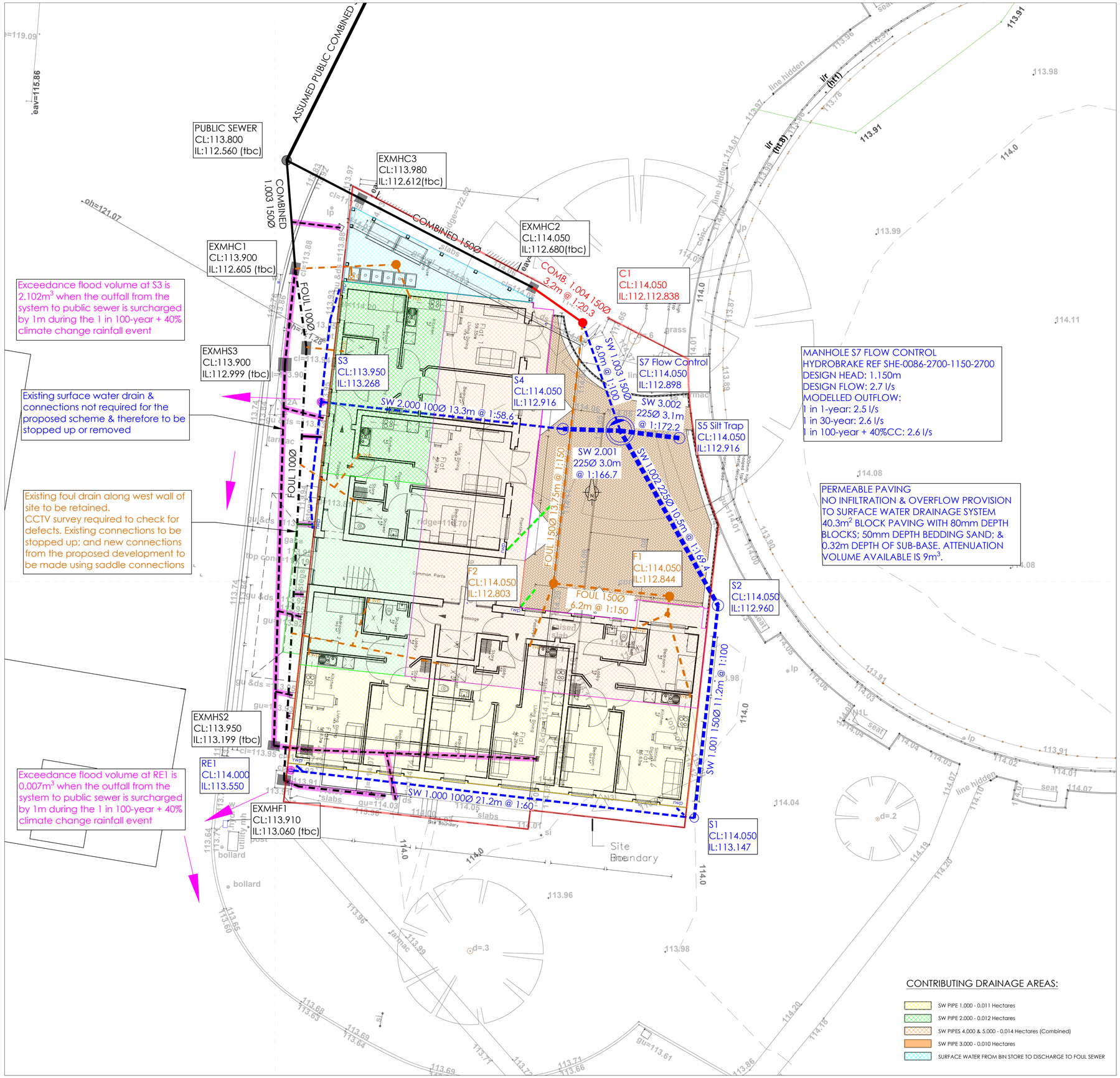
Site discharge rates

	Default	Edited
1 in 1 year (l/s):	3.1	3.1
1 in 30 years (l/s):	3.1	3.1
1 in 100 year (l/s):	3.1	3.1

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m^3):	4	4
Long term storage 1/100 years (m^3):	0	0
Total storage 1/100 years (m^3):	4	4

Appendix F: - Proposed Drainage Strategy



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5. NO DIMENSIONS TO BE SCALED FROM THIS DRAWING.
6. ALL EXISTING DRAINAGE PIPE SIZES & INVERT LEVEL MUST BE CONFIRMED ON-SITE PRIOR TO THE DETAILED DESIGN STAGE OF THE PROJECT

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS, RISKS NORMALLY ASSOCIATED WITH THE TYPE OF CONSTRUCTION WORK OR RELATED STRUCTURAL WORK DETAILED ON THIS DRAWING, THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION HAVE BEEN NOTED.

RISKS LISTED HERE ARE SIGNIFICANT, AND ASSOCIATED WITH THE CONSTRUCTION WORK OR RELATED STRUCTURAL WORK.

HAZARDOUS SUBSTANCE - SKIN CONTACT WITH HOT BITUMEN AND CEMENTITIOUS MATERIAL.

DUST - AIRBORNE DUST PARTICLES FROM GRANULAR SUB BASE AND CUTTING OF CONCRETE.

PUBLIC - STRUCK BY MOVING PLANT.

FOR INFORMATION RELATING TO END USE, MAINTENANCE, AND DEMOLITION WORKS, REFER TO THE CDM HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORK WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, AND WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

THE TABLE BELOW IDENTIFIES IN MORE DETAIL THE POTENTIAL RISKS ASSOCIATED WITH DIFFERENT TASKS.

ITEM	RECOMMENDATION
1. EXCAVATION ADJACENT TO BOUNDARIES	CARE TO BE TAKEN WITH DEEP EXCAVATIONS IN ORDER TO PREVENT SIDEWALL COLLAPSE / SLIPPAGE. CONTRACTOR TO PROVIDE METHOD STATEMENTS WHERE NECESSARY. EXCAVATIONS TO BE SAFELY CORDONED OFF AND ENSURE SAFE PEDESTRIAN AND VEHICLE ACCESS IS MAINTAINED TO ADJACENT BUILDINGS. ENSURE EXCAVATIONS/PLANT AND MACHINERY ARE MADE SECURE OUTSIDE WORKING HOURS TO PREVENT INJURY TO THE PUBLIC.
2. CONSTRUCTING NEW M.H'S AND ALTERATIONS TO EXISTING MANHOLES	CONTRACTOR TO PROVIDE METHOD STATEMENT FOR SAFE CONSTRUCTION WHEN WORKING IN CONFINED SPACES. ALL PERSONNEL AFFECTED TO BE TRAINED AND BRIEFED ON THE RELEVANT METHOD STATEMENT.
3. PLACING AND HANDLING CUT AND BENT REINFORCEMENT	CONTRACTOR TO ENSURE WEIGHTS OF MATERIALS ARE INLINE WITH CURRENT REGULATIONS. NO PROJECTING BARS DETAILED. LENGTH OF BARS LIMITED TO MANAGEABLE SECTIONS.
4. EXCAVATION NEAR TO EXISTING SERVICES.	NEW CAVITY WALL LEAVES TO BE CONSTRUCTED SIMULTANEOUSLY THROUGHOUT CONSTRUCTION TO REDUCE RISK OF COLLAPSE AND PREVENTS EXPOSURE OF PROTRUDING WALL TIES. WALLS TO BE CONSTRUCTED IN SUITABLE LIFTS TO MAINTAIN FRESH MORTAR STABILITY. ISSUE AVAILABLE SERVICE RECORDS TO THE CONTRACTOR.
5. WORKING NEAR TO LIVE TRAFFIC.	CONTRACTOR TO PROVIDE METHOD STATEMENT FOR TRAFFIC MANAGEMENT/TEMPORARY WORKS. CONTRACTOR TO PROVIDE APPROPRIATE PROTECTION BARRIERS IF REQUIRED. WORKERS TO WEAR HIGH VISIBILITY CLOTHING TO AVOID BEING STRUCK BY PASSING VEHICLES OR PLANT.
6. GENERAL PUBLIC; EXISTING RESIDENTS; OR CHILDREN ON SITE.	ENSURE THAT THE SITE IS PROPERLY SECURE TO PREVENT INJURY FROM SLIPS, TRIPS, FALLS, FALLING FROM HEIGHT, UNCOVERED MANHOLES/TRENCHES. PROVIDE ADVANCE WARNING TO RESIDENTS REGARDING THE START OF CONSTRUCTION. IDENTIFY DIVERSIONS TO PUBLIC RIGHTS OF WAY, ESTABLISHED AND CLEARLY SIGNED IF REQUIRED.
7. NOISE, DUST AND VIBRATION RESULTING FROM CONSTRUCTION WORKS	METHOD STATEMENT TO BE PROVIDED. SITE STAFF TO BE PROVIDED WITH APPROPRIATE PPE. WORK MAY HAVE TO BE UNDERTAKEN AT SPECIFIC TIMES IN SENSETIVE AREAS TO MINIMISE DISRUPTION TO ADJACENT PROPERTIES.
8.0 WORKING NEAR WATER	CONTRACTOR TO PROVIDE DETAILED METHOD STATEMENT IN ACCORDANCE WITH THE APPROVED LAND DRAINAGE CONSENT, TO ENSURE SAFE WORKING ARRANGEMENTS AROUND AREAS OF OPEN OR FLOWING WATER; AND TO ENSURE THAT SUITABLE SITE OPERATION PROCEDURES ARE IN PLACE TO ELIMINATE THE RISK OF POLLUTION TRANSFER TO THE WATER ENVIRONMENT FROM PLANT & SITE MATERIALS.

KEY:

- EXISTING SURFACE DRAIN (RETAINED)
- EXISTING SURFACE WATER DRAIN (STOPPED UP/REMOVED)
- EXISTING FOUL DRAIN (RETAINED)
- EXISTING FOUL DRAIN (STOPPED UP/REMOVED)
- EXISTING MANHOLE (SURVEYED/PRIVATE)
- EXISTING MANHOLE (HIGHWAY/PUBLIC SEWER)
- PROPOSED SURFACE WATER DRAIN/SEWER
- PROPOSED SURFACE WATER MANHOLE/INSPECTION CHAMBER
- SURFACE FLOODING (EXCEEDANCE)
- DIRECTION OF EXCEEDANCE FLOW
- PROPOSED RODDING EYE
- PROPOSED RAINWATER PIPE
- PROPOSED HYDROBRAKE FLOW CONTROL
- PROPOSED PERMEABLE PAVING
- PROPOSED FOUL DRAIN/SEWER
- PROPOSED FOUL MANHOLE/INSPECTION CHAMBER
- PROPOSED SOIL VENT PIPE
- PROPOSED COMBINED SEWER/DRAIN
- PROPOSED COMBINED MANHOLE/INSPECTION CHAMBER
- RAINWATER PIPES DISCHARGING TO PERMEABLE PAVING

REVISION	COMMENT	DATE	BY
A	RED-LINE BOUNDARY ADDED TO PLAN & PROPOSED SW SYSTEM AMENDED	30.10.20	DM

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CLIENT: Mr & Mrs Hardacre

DATE: 27/10/2020

STATUS: Draft

DRAWN BY: DM

PROJECT: Former British Legion, Towneley Road, Longridge

SCALE: 1:250

DRAWING TITLE: Preliminary Foul & Surface Water Drainage Plan

SIZE: A1

DRAWING REFERENCE: 20076-03

REVISION: A

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	18.800	Add Flow / Climate Change (%)	0
Ratio R	0.282	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	150	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.032	4-8	0.015

Total Area Contributing (ha) = 0.047

Total Pipe Volume (m□) = 1.339

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	21.200	0.353	60.0	0.011	5.00	0.0	0.600	o	100	Pipe/Conduit	
1.001	11.200	0.112	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	10.500	0.062	169.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	13.300	0.227	58.6	0.012	5.00	0.0	0.600	o	100	Pipe/Conduit	
2.001	3.000	0.018	166.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.000	1.500	0.000	0.0	0.010	5.00	0.0	0.600	o	100	Pipe/Conduit	
4.000	1.500	0.000	0.0	0.007	5.00	0.0	0.600	o	100	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	42.04	5.35	113.550	0.011	0.0	0.0	0.0	1.00	7.8	1.3
1.001	41.47	5.54	113.147	0.011	0.0	0.0	0.0	1.00	17.8	1.3
1.002	40.96	5.72	112.960	0.011	0.0	0.0	0.0	1.00	39.8	1.3
2.000	42.46	5.22	113.268	0.012	0.0	0.0	0.0	1.01	7.9	1.4
2.001	42.31	5.27	112.916	0.012	0.0	0.0	0.0	1.01	40.2	1.4
3.000	42.02	5.36	113.820	0.010	0.0	0.0	0.0	0.07	0.5□	1.1
4.000	42.02	5.36	113.820	0.007	0.0	0.0	0.0	0.07	0.5□	0.8

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
5.000	1.500	0.000	0.0	0.007	5.00	0.0	0.600	o	100	Pipe/Conduit	
3.001	1.500	0.025	60.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
3.002	3.100	0.018	172.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	6.000	0.060	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	3.200	0.158	20.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
5.000	42.02	5.36	113.820	0.007	0.0	0.0	0.0	0.07	0.5	0.8
3.001	41.95	5.38	113.600	0.024	0.0	0.0	0.0	1.00	7.8	2.7
3.002	41.79	5.44	112.916	0.024	0.0	0.0	0.0	0.99	39.5	2.7
1.003	40.67	5.81	112.898	0.047	0.0	0.0	0.0	1.00	17.8	5.2
1.004	40.60	5.84	112.838	0.047	0.0	0.0	0.0	2.25	39.7	5.2

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
RE1	114.000	0.450	Open Manhole	100	1.000	113.550	100				
S1	114.050	0.903	Open Manhole	450	1.001	113.147	150	1.000	113.197	100	
S2	114.050	1.090	Open Manhole	450	1.002	112.960	225	1.001	113.035	150	
S3	113.950	0.682	Open Manhole	250	2.000	113.268	100				
S4	114.050	1.134	Open Manhole	450	2.001	112.916	225	2.000	113.041	100	
DUMMY	114.050	0.230	Open Manhole	100	3.000	113.820	100				
DUMMY	114.050	0.230	Open Manhole	100	4.000	113.820	100				
DUMMY	114.050	0.230	Open Manhole	100	5.000	113.820	100				
PERM PAV	114.050	0.450	Junction		3.001	113.600	100	3.000	113.820	100	220
								4.000	113.820	100	220
								5.000	113.820	100	220
S5	114.050	1.134	Open Manhole	450	3.002	112.916	225	3.001	113.575	100	534
S7 FLOW CONTROL	114.050	1.152	Open Manhole	1200	1.003	112.898	150	1.002	112.898	225	
								2.001	112.898	225	
								3.002	112.898	225	
C1	114.050	1.212	Open Manhole	600	1.004	112.838	150	1.003	112.838	150	
	114.050	1.370	Open Manhole	0		OUTFALL		1.004	112.680	150	

No coordinates have been specified, layout information cannot be produced.

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S7 FLOW CONTROL, DS/PN: 1.003, Volume (m³): 1.9

Unit Reference	MD-SHE-0076-2700-1150-2700
Design Head (m)	1.150
Design Flow (l/s)	2.7
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	76
Invert Level (m)	112.898
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.150	2.7	Kick-Flo®	0.678	2.1
Flush-Flo™	0.333	2.6	Mean Flow over Head Range	-	2.3

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.1	1.200	2.8	3.000	4.2	7.000	6.3
0.200	2.5	1.400	3.0	3.500	4.5	7.500	6.5
0.300	2.6	1.600	3.1	4.000	4.8	8.000	6.7
0.400	2.6	1.800	3.3	4.500	5.1	8.500	6.9
0.500	2.5	2.000	3.5	5.000	5.3	9.000	7.0
0.600	2.4	2.200	3.6	5.500	5.6	9.500	7.2
0.800	2.3	2.400	3.8	6.000	5.8		
1.000	2.5	2.600	3.9	6.500	6.0		

Storage Structures for Storm

Porous Car Park Manhole: PERM PAV, DS/PN: 3.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.9
Membrane Percolation (mm/hr)	1000	Length (m)	8.7
Max Percolation (l/s)	26.3	Slope (1:X)	174.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	113.600	Membrane Depth (mm)	130

Volume Summary (Static)

Length Calculations based on True Length

Pipe Number	USMH Name	Manhole Volume (m□)	Pipe Volume (m□)	Storage Structure Volume (m□)	Total Volume (m□)
1.000	RE1	0.004	0.164	0.000	0.168
1.001	S1	0.144	0.190	0.000	0.334
1.002	S2	0.173	0.385	0.000	0.558
2.000	S3	0.033	0.102	0.000	0.135
2.001	S4	0.180	0.086	0.000	0.267
3.000	DUMMY	0.002	0.011	0.000	0.013
4.000	DUMMY	0.002	0.011	0.000	0.013
5.000	DUMMY	0.002	0.011	0.000	0.013
3.001	PERM PAV	0.000	0.010	9.104	9.114
3.002	S5	0.180	0.090	0.000	0.271
1.003	S7 FLOW CONTROL	1.303	0.090	0.000	1.393
1.004	C1	0.343	0.051	0.000	0.394
Total		2.366	1.203	9.104	12.673

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m□/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model		FSR	M5-60 (mm)	18.800	Cv (Summer) 0.750
Region	England and Wales		Ratio R	0.282	Cv (Winter) 0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	RE1	15 Winter	1	+0%	30/15 Summer				113.578
1.001	S1	15 Winter	1	+0%	30/15 Summer				113.175
1.002	S2	30 Winter	1	+0%	30/15 Summer				113.088
2.000	S3	15 Winter	1	+0%	30/15 Summer				113.297
2.001	S4	30 Winter	1	+0%	30/15 Summer				113.088
3.000	DUMMY	15 Winter	1	+0%	100/15 Summer				113.857
4.000	DUMMY	15 Winter	1	+0%	100/60 Winter				113.851
5.000	DUMMY	15 Winter	1	+0%	100/60 Winter				113.851
3.001	PERM PAV	15 Winter	1	+0%	30/30 Winter				113.643
3.002	S5	30 Winter	1	+0%	30/15 Summer				113.088
1.003	S7 FLOW CONTROL	30 Winter	1	+0%	1/15 Summer				113.088
1.004	C1	30 Winter	1	+0%					112.870

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m□)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	RE1	-0.072	0.000	0.17		1.3	OK	
1.001	S1	-0.122	0.000	0.08		1.3	OK	
1.002	S2	-0.097	0.000	0.03		1.0	OK	
2.000	S3	-0.071	0.000	0.19		1.4	OK	
2.001	S4	-0.053	0.000	0.04		1.1	OK	
3.000	DUMMY	-0.063	0.000	0.29		1.1	FLOOD RISK	
4.000	DUMMY	-0.069	0.000	0.20		0.8	FLOOD RISK	
5.000	DUMMY	-0.069	0.000	0.20		0.8	FLOOD RISK	
3.001	PERM PAV	-0.057	0.000	0.39		1.7	OK*	
3.002	S5	-0.053	0.000	0.06		1.7	OK	
1.003	S7 FLOW CONTROL	0.040	0.000	0.17		2.5	SURCHARGED	
1.004	C1	-0.118	0.000	0.10		2.5	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m□/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 18.800	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.282	Cv (Winter) 0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	RE1	30 Winter	30	+0%	30/15 Summer				113.734
1.001	S1	60 Winter	30	+0%	30/15 Summer				113.721
1.002	S2	60 Winter	30	+0%	30/15 Summer				113.721
2.000	S3	60 Winter	30	+0%	30/15 Summer				113.724
2.001	S4	60 Winter	30	+0%	30/15 Summer				113.720
3.000	DUMMY	15 Winter	30	+0%	100/15 Summer				113.884
4.000	DUMMY	15 Winter	30	+0%	100/60 Winter				113.871
5.000	DUMMY	15 Winter	30	+0%	100/60 Winter				113.871
3.001	PERM PAV	60 Winter	30	+0%	30/30 Winter				113.714
3.002	S5	60 Winter	30	+0%	30/15 Summer				113.720
1.003	S7 FLOW CONTROL	60 Winter	30	+0%	1/15 Summer				113.720
1.004	C1	240 Winter	30	+0%					112.870

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m□)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	RE1	0.084	0.000	0.34		2.6	FLOOD RISK	
1.001	S1	0.424	0.000	0.10		1.6	SURCHARGED	
1.002	S2	0.536	0.000	0.04		1.4	SURCHARGED	
2.000	S3	0.356	0.000	0.26		1.9	FLOOD RISK	
2.001	S4	0.579	0.000	0.06		1.6	SURCHARGED	
3.000	DUMMY	-0.036	0.000	0.71		2.8	FLOOD RISK	
4.000	DUMMY	-0.049	0.000	0.50		2.0	FLOOD RISK	
5.000	DUMMY	-0.049	0.000	0.50		2.0	FLOOD RISK	
3.001	PERM PAV	0.014	0.000	0.72		3.2	SURCHARGED*	
3.002	S5	0.579	0.000	0.11		2.8	SURCHARGED	
1.003	S7 FLOW CONTROL	0.672	0.000	0.18		2.6	SURCHARGED	
1.004	C1	-0.118	0.000	0.11		2.6	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m□/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 18.800	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.282	Cv (Winter) 0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	RE1	120 Winter	100	+40%	30/15 Summer				113.970
1.001	S1	120 Winter	100	+40%	30/15 Summer				113.965
1.002	S2	120 Winter	100	+40%	30/15 Summer				113.964
2.000	S3	120 Winter	100	+40%	30/15 Summer				113.948
2.001	S4	120 Winter	100	+40%	30/15 Summer				113.964
3.000	DUMMY	15 Winter	100	+40%	100/15 Summer				113.950
4.000	DUMMY	60 Winter	100	+40%	100/60 Winter				113.948
5.000	DUMMY	60 Winter	100	+40%	100/60 Winter				113.948
3.001	PERM PAV	120 Winter	100	+40%	30/30 Winter				113.920
3.002	S5	120 Winter	100	+40%	30/15 Summer				113.962
1.003	S7 FLOW CONTROL	120 Winter	100	+40%	1/15 Summer				113.964
1.004	C1	600 Summer	100	+40%					112.870

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m□)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	RE1	0.320	0.000	0.27		2.1	FLOOD RISK	
1.001	S1	0.668	0.000	0.13		2.0	FLOOD RISK	
1.002	S2	0.779	0.000	0.06		2.0	FLOOD RISK	
2.000	S3	0.580	0.000	0.31		2.3	FLOOD RISK	
2.001	S4	0.823	0.000	0.08		2.3	FLOOD RISK	
3.000	DUMMY	0.030	0.000	1.28		5.0	FLOOD RISK	
4.000	DUMMY	0.028	0.000	0.54		2.1	FLOOD RISK	
5.000	DUMMY	0.028	0.000	0.54		2.1	FLOOD RISK	
3.001	PERM PAV	0.220	0.000	0.65		2.9	FLOOD RISK*	
3.002	S5	0.821	0.000	0.10		2.6	FLOOD RISK	
1.003	S7 FLOW CONTROL	0.916	0.000	0.18		2.6	FLOOD RISK	
1.004	C1	-0.118	0.000	0.11		2.6	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m□/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 18.800	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.282	Cv (Winter) 0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	RE1	600 Summer	1	+0%	1/30 Winter	100/30 Summer			113.726
1.001	S1	600 Summer	1	+0%	1/15 Summer				113.725
1.002	S2	600 Summer	1	+0%	1/15 Summer				113.725
2.000	S3	600 Summer	1	+0%	1/15 Summer	100/60 Winter			113.728
2.001	S4	600 Summer	1	+0%	1/15 Summer				113.724
3.000	DUMMY	15 Winter	1	+0%	100/15 Summer				113.857
4.000	DUMMY	15 Winter	1	+0%	100/30 Winter				113.851
5.000	DUMMY	15 Winter	1	+0%	100/30 Winter				113.851
3.001	PERM PAV	360 Winter	1	+0%	1/180 Winter				113.716
3.002	S5	480 Winter	1	+0%	1/15 Summer				113.724
1.003	S7 FLOW CONTROL	600 Summer	1	+0%	1/15 Summer				113.724
1.004	C1	600 Summer	1	+0%	1/15 Summer				113.681

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m□)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	RE1	0.076	0.000	0.04		0.3	FLOOD RISK	2
1.001	S1	0.428	0.000	0.02		0.3	SURCHARGED	
1.002	S2	0.540	0.000	0.01		0.3	SURCHARGED	
2.000	S3	0.360	0.000	0.05		0.3	FLOOD RISK	7
2.001	S4	0.583	0.000	0.01		0.3	SURCHARGED	
3.000	DUMMY	-0.063	0.000	0.29		1.1	FLOOD RISK	
4.000	DUMMY	-0.069	0.000	0.20		0.8	FLOOD RISK	
5.000	DUMMY	-0.069	0.000	0.20		0.8	FLOOD RISK	
3.001	PERM PAV	0.016	0.000	0.11		0.5	SURCHARGED*	
3.002	S5	0.583	0.000	0.02		0.4	SURCHARGED	
1.003	S7 FLOW CONTROL	0.676	0.000	0.05		0.7	SURCHARGED	
1.004	C1	0.693	0.000	0.03		0.7	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m□/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 18.800	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.282	Cv (Winter) 0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	RE1	120 Winter	30	+0%	1/30 Winter	100/30 Summer			113.830
1.001	S1	120 Winter	30	+0%	1/15 Summer				113.826
1.002	S2	120 Winter	30	+0%	1/15 Summer				113.825
2.000	S3	120 Winter	30	+0%	1/15 Summer	100/60 Winter			113.828
2.001	S4	120 Winter	30	+0%	1/15 Summer				113.824
3.000	DUMMY	15 Winter	30	+0%	100/15 Summer				113.884
4.000	DUMMY	15 Winter	30	+0%	100/30 Winter				113.871
5.000	DUMMY	15 Winter	30	+0%	100/30 Winter				113.871
3.001	PERM PAV	120 Winter	30	+0%	1/180 Winter				113.817
3.002	S5	120 Winter	30	+0%	1/15 Summer				113.823
1.003	S7 FLOW CONTROL	120 Winter	30	+0%	1/15 Summer				113.824
1.004	C1	120 Winter	30	+0%	1/15 Summer				113.683

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m□)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	RE1	0.180	0.000	0.15		1.1	FLOOD RISK	2
1.001	S1	0.529	0.000	0.07		1.1	FLOOD RISK	
1.002	S2	0.640	0.000	0.03		1.1	FLOOD RISK	
2.000	S3	0.460	0.000	0.17		1.3	FLOOD RISK	7
2.001	S4	0.683	0.000	0.05		1.2	FLOOD RISK	
3.000	DUMMY	-0.036	0.000	0.71		2.8	FLOOD RISK	
4.000	DUMMY	-0.049	0.000	0.50		2.0	FLOOD RISK	
5.000	DUMMY	-0.049	0.000	0.50		2.0	FLOOD RISK	
3.001	PERM PAV	0.117	0.000	0.38		1.7	FLOOD RISK*	
3.002	S5	0.682	0.000	0.06		1.6	FLOOD RISK	
1.003	S7 FLOW CONTROL	0.776	0.000	0.15		2.2	FLOOD RISK	
1.004	C1	0.695	0.000	0.09		2.2	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m□/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 18.800	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.282	Cv (Winter) 0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	RE1	30 Summer	100	+40%	1/30 Winter	100/30 Summer			114.000
1.001	S1	120 Winter	100	+40%	1/15 Summer				113.988
1.002	S2	120 Winter	100	+40%	1/15 Summer				113.986
2.000	S3	180 Winter	100	+40%	1/15 Summer	100/60 Winter			113.952
2.001	S4	120 Winter	100	+40%	1/15 Summer				113.983
3.000	DUMMY	120 Winter	100	+40%	100/15 Summer				113.987
4.000	DUMMY	120 Winter	100	+40%	100/30 Winter				113.986
5.000	DUMMY	120 Winter	100	+40%	100/30 Winter				113.986
3.001	PERM PAV	240 Winter	100	+40%	1/180 Winter				113.920
3.002	S5	120 Winter	100	+40%	1/15 Summer				113.985
1.003	S7 FLOW CONTROL	120 Winter	100	+40%	1/15 Summer				113.985
1.004	C1	120 Winter	100	+40%	1/15 Summer				113.684

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m□)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	RE1	0.350	0.007	0.61		4.6	FLOOD	2
1.001	S1	0.691	0.000	0.13		2.0	FLOOD RISK	
1.002	S2	0.801	0.000	0.06		2.0	FLOOD RISK	
2.000	S3	0.584	2.102	0.28		2.1	FLOOD	7
2.001	S4	0.842	0.000	0.09		2.3	FLOOD RISK	
3.000	DUMMY	0.067	0.000	0.50		2.0	FLOOD RISK	
4.000	DUMMY	0.066	0.000	0.35		1.4	FLOOD RISK	
5.000	DUMMY	0.066	0.000	0.35		1.4	FLOOD RISK	
3.001	PERM PAV	0.220	0.000	0.50		2.2	FLOOD RISK*	
3.002	S5	0.844	0.000	0.10		2.6	FLOOD RISK	
1.003	S7 FLOW CONTROL	0.937	0.000	0.18		2.6	FLOOD RISK	
1.004	C1	0.696	0.000	0.11		2.6	SURCHARGED	

Appendix G: -Maintenance & Management Plan

FLOOD RISK CONSULTANCY LIMITED

Drainage Management & Maintenance Strategy

Former British Legion Site @ Towneley Road, Longridge

Client: Mrs & Mrs Hardacre

Report No: 20076-004

Date: 30/10/2020

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APPRAISING, MANAGING & REDUCING FLOOD RISK

Document Control

Document Title:	Drainage Management & Maintenance Strategy
Project Number:	20076

Revision	Date	Issued to	Status	Comments
/	30/10/2020	Michael Sproston	First Issue	

Contract

This report describes work commissioned by Mrs & Mrs Hardacre. Donna Metcalf of Flood Risk Consultancy Limited (FRC) carried out the work.

Prepared by……..Donna Metcalf (Managing Director)

Disclaimer

This document has been prepared solely as a Drainage maintenance & Management Straegy to support planning application. Flood Risk Consultancy Limited accepts no responsibility or liability for any use that is made of this document other than by the Clients for the purposes for which it was originally commissioned and prepared.

Contents

1.0 Introduction

This management strategy has been prepared by Flood Risk Consultancy Ltd on Mr & Mrs Hardacre, to support a planning application for residential scheme at the former British Legion site at Towneley Road in Longridge.

The SUDS considered for the purposes of this statement include drainage features that will be employed to reduce and manage surface water runoff from the development to a design return period of one hundred years plus 40% climate change.

This is required so that the development will not increase the risk of flooding to the site and its environs.

SUDS features included within the drainage strategy for the scheme include:

- Attenuation storage tank

This document outlines the long-term maintenance of the proposed surface water systems and will make reference to the following documents, some of which provide further detail on the maintenance operations required:

- CIRIA Report C753 'The SUDS Manual', 2015
- CIRIA Report C625 'Model Agreements for Sustainable Water Management Systems', 2004
- Supplier recommendations

2.0 Maintenance Responsibilities

Responsibility for drainage within England and Wales rests with various bodies.

For the Development, the responsibility of the maintenance will be on the following:

Private Landowner – Northern Estates Ltd will employ a management company for the development to maintain the green roof, storm water attenuation tanks, outfalls and any associated flow controls within communal areas.

The maintenance will be undertaken in accordance with the recommendations outlined within the SUDS Manual and the supplier recommendations. However, it should be noted that if the Flood and Water Management Act 2010 is ever fully implemented this allows a surface water drainage system to be vested to the SUDS approving body (SAB). This would be reviewed at the time of any implementation of the act.

3.0 Maintenance Regime

As the maintenance of the communal SUDS features will be carried out via a management company, the form of agreement should include the required maintenance listed below. Should the maintenance be transferred at a later date to a public body, then the model agreement SUDS MA1 should be used, details of which can be found in the CIRIA guidance C625.

The following section describes the required maintenance for each feature in turn. The SUDS Maintenance requirements listed below should be reviewed after the first 5 years, with a view to agreeing a new regime for the ongoing maintenance.

Notwithstanding the routine inspections and maintenance requirements, after severe storm events all features shall be inspected to clear debris and repair damaged structures or features.

Records of the maintenance carried out shall be prepared by the management company.

Storage Tanks:

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

4.0 Inspection Checklist

The objective of an inspection checklist is to:

- Confirm that appropriate routine maintenance of the system is being undertaken
- Confirm that the system is continuing to operate effectively
- Identify any remedial works required
- Provide a consistent record of the condition and performance of the system.

The checklist facilitates the consistent inspection of the condition of the system; and should be able to be used by any organisation responsible for the long-term maintenance of the SuDS system as a recording process, or by a sub-contracted organisation as part of their client reporting procedures.

Inspections should comply with all relevant Health and Safety legislation (Health and Safety at Work Regulations, 1999) including the development of risk assessments for working close to or in water.

Inspections should ideally be carried out monthly (and no less than 3 monthly), at the

same time as other routine maintenance activities.

An example of the SUDS Maintenance Inspection Checklist is provided for reference overleaf.

GENERAL INFORMATION			
Site ID			
Site Location and co-ordinates (GIS if appropriate)			
Elements forming the SuDS scheme		Approved Drawing Reference(s)	
Inspection frequency		Approved Specification Reference	
Type of development		Specific purpose of any parts of the scheme (e.g. biodiversity, wildlife and visual aspects)	

	Inspection date				Inspection date			
	Details	Y/N	Action required	Date Completed	Details	Y/N	Action required	Date Completed
GENERAL INSPECTION ITEMS								
Is there any evidence of erosion, channelling, ponding (where not desirable) or other poor hydraulic performance?								
Is there any evidence of accidental spillages, oils, poor water quality, odours, nuisance insects?								
Have any health and safety risks been identified to either the public or maintenance operatives?								
Is there any deterioration in the surface of permeable or porous surfaces (e.g. rutting, spreading of blocks or signs of ponding water)?								

	Inspection date				Inspection date			
	Details	Y/N	Action required	Date Completed	Details	Y/N	Action required	Date Completed
SILT/SEDIMENT ACCUMULATION								
Is there any sediment accumulation at inlets (or other defined accumulation zones such as the surface of filter drains or infiltration basins and within proprietary devices)? If yes, state depth (mm) and extent Is removal required? If yes, state waste disposal requirements and confirm all waste management requirements have been complied with (consult Environment Agency or SEPA).								
Is surface clogging visible (potentially problematic where water has to soak into the underlying construction or ground (e.g. under-drained swale or infiltration basin)?								
Does permeable or porous surfacing require sweeping to remove silt?								
SYSTEM BLOCKAGES / LITTER BUILD UP								
Is there evidence of litter accumulation in the system? If yes, is this a blockage risk?								

Is there any evidence of any other clogging/blockage of outlets or drainage paths?								
VEGETATION								

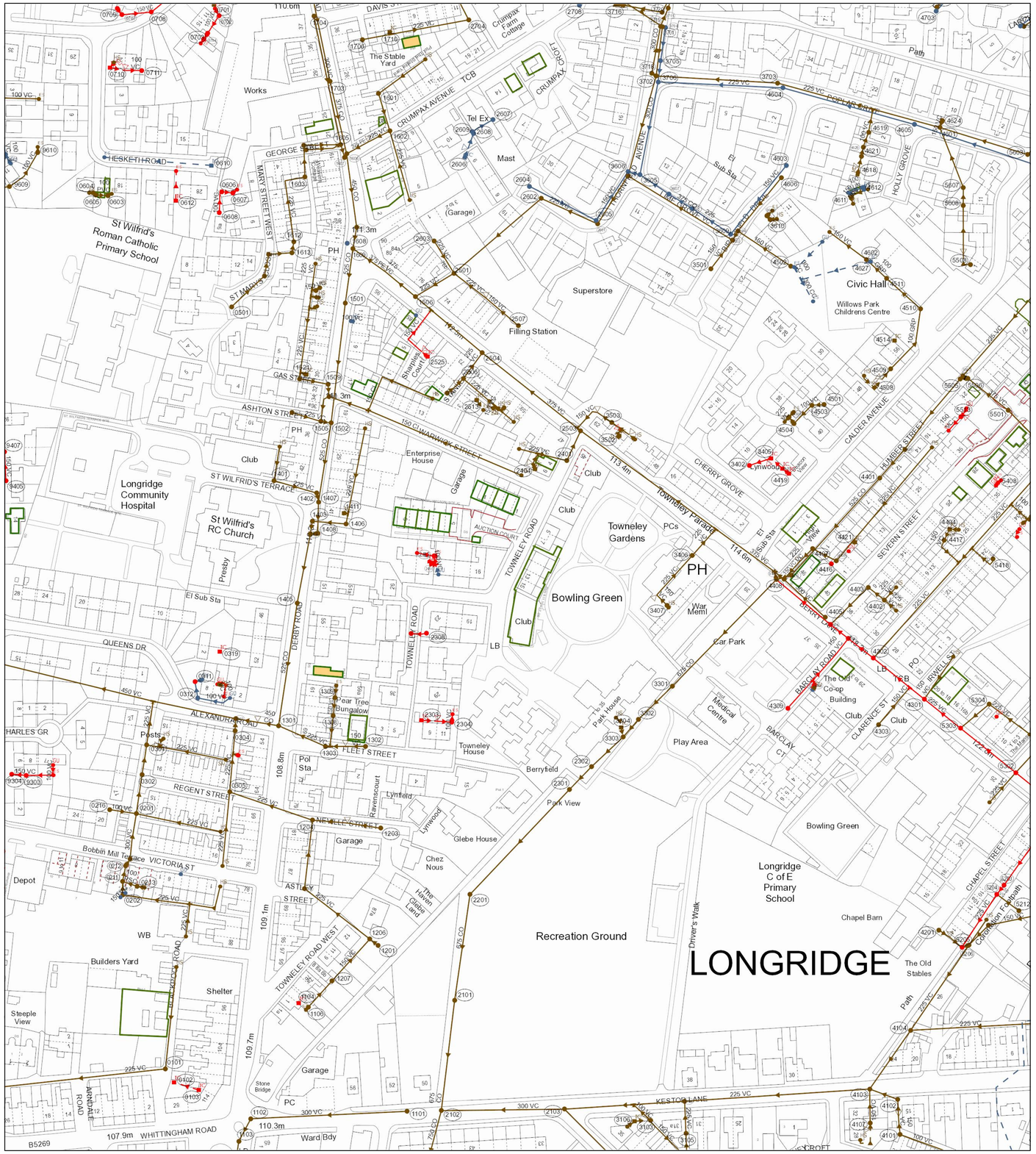
	Inspection date				**Inspection date**			
	Details	**Y/N**	**Action required**	**Date Completed**	**Details**	**Y/N**	**Action required**	**Date Completed**
Is the vegetation condition satisfactory (density, weed growth, coverage etc.)? (Check against approved planting regime.)								
Does any part of the system require weeding / pruning / mowing? (Check against maintenance frequency stated in approved design.)								
Is there any evidence of invasive species becoming established? If yes, state action required.								

INFRASTRUCTURE								
Are any check dams or weirs in good condition?								
Is there evidence of any accidental damage to the system (e.g. wheel ruts?)								
Is there any evidence of cross connections or other unauthorised inflows?								
Is there any evidence of tampering with the flow controls?								
Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity and visual aspects? (Specify.)								

OTHER OBSERVATIONS								
Information appended (e.g. photos)								

	Inspection date				**Inspection date**			
	Details	**Y/N**	**Action required**	**Date Completed**	**Details**	**Y/N**	**Action required**	**Date Completed**
SUITABILITY OF CURRENT MAINTENANCE REGIME								
Continue as current Increase maintenance Decrease maintenance								
NEXT INSPECTION								
Proposed date for next inspection								

Appendix H: - UU Sewer Records



The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
4601	116.2	FO	113.06	225			VC	93.42165	1 in 84
3608	111.86	SW	110.15	375			CO	15.12744	1 in 72
0213		FO		100			PSC	8.432238	
1606	111.12	FO	105.04	450			CO	41.2379	1 in 275
1106		FO		150			VC	19.76796	
3303	114.75	FO	112.46	675			CO	24.13902	1 in 186
2507	113.01	FO	111.51	150			VC	23.41669	1 in 23
1103	110.11	FO	107.45	300			VC	143.7413	1 in 48
4621		FO		100			VC	5.201306	
4103	120.03	FO	117.88	225			VC	102.9734	1 in 33
2601	111.86	FO	110.2	225			VC	34.30517	1 in 191
4510		FO		100			GRP	25.27619	
2504	112.57	FO	109.45	375			VC	48.55407	1 in 99
5607		FO		0			VC	35.84957	
2501	112.35	FO	109.55	225			VC	25.063	1 in 56
4102	123.22	FO	120.12	225			VC	16.66449	1 in 8
4605	115.79	SW	113.15	225			VC	75.72449	1 in 90
3718	111.29	FO	109.35	300			CO	26.39581	1 in 189
1603	111.09	FO	108.67	225			VC	17.70793	1 in 77
3501	112.75	FO	111.87	150			VC	19.99182	
2704	110.25	FO	108.38	225			VC	33.16764	1 in 38
2604	111.78	SW	110.65	150			VC	41.53919	1 in 81
2708	108.63	SW	0	150			VC	23.02613	
5205	122.45	FO	121.24	225			VC	4.031935	1 in 24
4308		CO		150			VC	3.151418	
0607		CO		100			VC	3.007249	
9609		FO		100			VC	25.12638	
4402	117.87	FO	116.37	225			VC	11.40175	1 in 32
0211	107.43	FO	105.81	225			VC	8.799503	1 in 220
0704		CO		100			VC	2.979906	
2605	111.89	SW	110.1	150			VC	32.34308	1 in 54
1503	111.48	FO	108.57	225			VC	15.71643	1 in 16
2201	113.76	FO	111.27	675			CO	59.44518	1 in 96
0605		FO		100			PVC	6.563926	
1101	110.63	FO	107.81	300			VC	86.80735	
2102	111.07	FO	109.05	750			CO	45.70753	1 in 90
5710	118.39	SW	117.03	150			VC	17.90251	1 in 45
1401	110.78	FO	109.49	225			VC	24.68121	1 in 43
2505	112.64	FO	111.01	150			VC	6.41718	1 in 24
3601	111.25	FO	110.33	225			VC	31.59238	1 in 351
1403	110.81	FO	0	525			CO	7.060029	
1613		FO	0	225			VC	6.101033	
1206		FO	0	225			VC	45.83313	
3603		FO	0	225			VC	68.35542	
4406	117	FO	115.45	225			VC	14.83079	1 in 27
1618		FO		100			VC	18.53101	
2302	114.57	FO	112.33	675			CO	17.62337	
0703		CO		100			VC	3.779378	
5204	123.62	CO	122.17	225			VC	35.36616	1 in 27
0202	107.48	FO	105.84	225			VC	7.500375	1 in 250
1506	111.94	FO	108.95	375			CO	21.68821	1 in 64
3704	111.38	SW	109.9	300			CO	18.7181	1 in 267
1402	110.99	FO	108.83	225			VC	5.052623	1 in 16
3103		FO		100			VC	12.91743	
0702		CO		100			VC	11.64062	
4107		FO		150			VC	18.96157	
3609	112.25	SW	110.55	375			CO	25.6772	1 in 68
1308		FO	0	150			VC	17.19714	
5502	118.76	FO	116.75	525			CO	2.466898	1 in 15
3401	115.31	FO	113.97	225			VC	4.411315	
2503	113.24	FO	110.21	375			VC	69.64352	1 in 94.1128708
2101	113.05	FO	110.64	675			CO	61.63344	1 in 39
4604	113.29	SW	110.55	225			VC	69.42062	1 in 90
5212	125.51	FO	122.99	150			VC	15.24602	1 in 21
1408	110.65	FO	104.39	525			CO	4.045768	1 in 202.288389
1602	111.32	FO	108.96	225			VC	13.59121	1 in 30
1301	109.07	FO	104.05	450			CO	11.78418	1 in 236
4504		FO		225			VC	4.496673	
1607	111.12	FO	105.14	300			VC	2.252487	
1604	110.82	FO	108.38	225			VC	20.51316	1 in 64
3720	111.3	FO	109.12	300			CO	18.59436	1 in 143
1610	111.39	FO	104.86	525			CO	11.92921	1 in 298
3503		FO		150			VC	9.635487	
0201	107.73	FO	105.64	225			VC	21.87223	1 in 547
1507		FO	0	225			VC	12.22588	
3702	111.34	FO	109.4	300			CO	2.841666	1 in 95
2401	113.34	FO	111.03	225			VC	18.33589	1 in 26
4703	116.58	SW	115.21	150			VC	19.8346	1 in 25
4311	117.3	CO	114.5	225			VC	12.52945	1 in 26
1505	111.36	FO	107.54	225			CO	5.730428	
1703	110.86	FO	105.1	375			CO	41.24154	1 in 825
4410	115.31	FO	113.11	525			VC	8.656471	
5304		FO	0	225			VC	20.76483	
3401	115.31	FO	113.12	675			CO	82.68137	1 in 140
4511		FO		100			GRP	15.34319	
3702	111.34	FO	110.58	225			VC	57.58796	1 in 240
4624		FO		150			VC	4.071491	
0303	108.54	FO	103.96	450			VC	151.0422	1 in 290
2412		FO		225			CO	9.667905	
0501	111.4	FO	110.17	150			VC	25.00991	
0604		FO		100			PVC	1.985033	
1501	111.49	FO	104.73	525			CO	67.09435	1 in 216
1601	111.21	FO	109.33	225			VC	21.61719	1 in 68
1203	111.15	FO	110.26	150			VC	18.75247	1 in 11
0101	107.8	FO	106.47	225			VC	94.93578	
1504	111.4	FO	107.97	225			VC	16.75262	1 in 38
3101	116.51	FO	113.96	225			VC	66.85561	1 in 28
1207		FO		150			VC	31.33726	
4409		FO	0	525			CO	21.18221	
4104	121.65	FO	119.38	225			VC	39.77292	1 in 28
1405	109.97	FO	104.21	525			CO	68.77026	1 in 382
3706	111.43	SW	109.78	300			CO	52.52019	1 in 350
9610		FO		100			VC	3.09579	
1614		FO	0	225			VC	12.93567	
4417		FO		150			VC	16.94288	
0603		FO		100			PVC	2.588549	
2603	112.22	FO	0	525			VC	21.09502	
4303	119.39	FO	117.96	150			VC	26.93937	
4503		FO		100			VC	14.14653	
3301	115.17	FO	112.52	675			CO	26.50403	1 in 379
1509		FO	0	225			VC	6.639437	
4401	117.41	FO	115.21	525			CO	72.91776	1 in 36
3604		FO	0	150			VC	5.907453	
5505	118.6	FO	116.56	525			CO	49.67284	
4501		FO		100			VC	6.808883	
0312		SW		100			VC	9.243166	
1609	111.49	FO	104.82	525			CO	30.50609	1 in 305
4201	121.84	FO	120.97	225			VC	7.363647	1 in 105
2304		CO		100			VC	4.391719	
1508		FO	0	225			VC	16.14921	
4619		FO		100			VC	13.00908	
3714	111.23	FO	108.5	150			VC	21.77916	
0608		CO		100			VC	12.07729	
1406	111.19	FO	109.77	225			VC	18.77164	
1502	111.33	FO	104.42	525			CO	44.48736	
3302	114.91	FO	112.45	675			CO	12.8316	
5213	125.52	FO	124.01	225			VC	15.57783	1 in 6
4620		FO		100			VC	8.776371	
1302	110.13	FO	108.93	150			VC	11.25002	1 in 31
5303	121.34	CO	118.84	225			VC	25.74777	1 in 16
3406		FO		225			VC	19.63435	
3607	111.62	SW	109.91	375			CO	19.45058	1 in 61
3701	111.32	FO	110.74	225			VC	27.58969	1 in 212
1303	109.47	FO	108.21	225			VC	26.51207	1 in 27
5203	123.91	CO	122.43	225			VC	6.401581	1 in 25
4309		CO		150			VC	51.26764	
5603	118.53	FO	115.49	225			VC	50.9864	1 in 86
4302	118.03	FO	115.02	225			VC	17.72478	1 in 34
4405	116.41	FO	115.03	300			VC	31.16528	1 in 31
1605	111.06	FO	105.04	300			CO	7.382039	
2103	113.94	FO	111.28	300			VC	68.3848	1 in 37
0707		CO		150			VC	16.55463	
1102	110.35	FO	107.81	300			VC	14.16413	1 in 35
1519		FO		150			VC	2.282727	
1704	110.63	FO	105.3	300			VC	72.90147	
3719	111.32	FO	109.19	300			CO	11.10807	1 in 222
4505		FO		225			VC	3.569967	
1309		FO	0	150			VC	9.982234	
1612		FO	0	225			VC	45.48633	
2506	112.67	FO	110.52	225			VC	17.79897	1 in 20
1706	110.96	FO	109.51	225			VC	60.01118	1 in 65
2602	111.73	FO	110	225			VC	63.84481	1 in 278
3705	111.43	SW	109.82	300			CO	11.79497	1 in 393
4408	115.51	FO	113.98	300			VC	6.571819	
4702	116.65	FO	114.85	150			VC	15.85962	1 in 17
4301	119.57	CO	117.19	225			VC	36.27003	1 in 23
5709	118.4	FO	116.6	150			VC	18.55334	1 in 84
5608		FO		0			VC	9.932199	
4403	117.43	FO	116	225			VC	29.44442	1 in 26
1201		FO	0	225			VC	5.661903	
3605	111.34	SW	109.57	375			CO	6.856486	1 in 86
4404	116.68	CO	113.98	225			VC	39.09097	1 in 51
1404	110.62	FO	104.28	525			CO	39.28348	1 in 982.087042
4509		FO		100			GRP	39.21664	
1202	109.68	FO	108	225			VC	36.23633	1 in 93
5302	123.78	CO	121.17	225			VC	39.35262	1 in 16.6748383
3703	113.14	FO	111.3	225			VC	67.52071	1 in 98
4407	116.54	FO	114.16	225			VC	11.32078	1 in 283
1407	110.96	FO	104.42	525			CO	17.47529	
3407		FO		150			VC	8.037781	
2301	114.8	FO	112.37	675			CO	80.2365	1 in 74
0212	107.58	FO	105.77	300			VC	4.547798	1 in 227
0709		CO		150			VC	4.265381	
0210	107.57	FO	105.75	300			VC	25.42532	1 in 254
0301	107.75	FO	105.5	225			VC	24.55943	
4606	112.74	FO	111.41	150			VC	38.18579	
3610		FO		100			VC	2.921118	
3602		FO		100			VC	4.190497	
5501	120.43	FO	117.64	375			VC	28.51817	1 in 34
5506	118.8	FO	116.86	450			CO	4.36829	1 in 15
4602	114.13	FO		150			VC	25.5624	
5513		CO		150			VC	10.39056	
9405		CO		150			VC	16.10588	
1204	109.61	FO	106.99	225			VC	48.60524	1 in 76
0305	108.56	FO	106.3	225			VC	34.1321	1 in 107
0302	107.82	FO	105.58	225			VC	16.68537	1 in 278
9407		CO		150			VC	9.122193	
4101	123.81	FO	122.88	150			VC	9.957313	1 in 71
9617		SW		100			VC	20.21279	
3716		FO	0	150			VC	3.783385	
2308		CO		150			VC	8.567352	
0304	108.59	FO	105.95	225			VC	6.677275	
2609		SW		100			VC	1.342788	
0708		CO		150			VC	66.36448	
9303		CO		150			VC	8.214932	
4603	112.85	SW	111.19	150			VC	49.12521	1 in 78
4502		FO	0	150			VC	35.29168	
2608		SW		100			VC	13.41465	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned — Foul — Surface Water — Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

All point assets follow the standard colour convention:
red - combined, blue - surface water, brown - foul, purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
PE	Polyethylene
RP	Reinforced Plastic Matrix
CO	Concrete
CSB	Concrete Segment Bolted
CSU	Concrete Segment Unbolted
CC	Concrete Box Culverted
PSC	Plastic / Steel Composite
GRC	Glass Reinforced Plastic
DI	Ductile Iron
PVC	Polyvinyl Chloride
CI	Cast Iron
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
PP	Polypropylene
PF	Pitch Fibre
MAC	Masonry, Coursed
MAR	Masonry, Random
U	Unspecified

Address or Site Reference:

british legion,

Scale: 1:1250 **Date:** 26/10/2020

Sheet: 1 of 1

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West

Appendix I: - North West SUDS Proforma

NORTH WEST SuDS PRO-FORMA

This pro-forma is a requirement for any planning application for major development[1].

It supports applicants in summarising and confirming how surface water from a development will be managed sustainably under current and future conditions.

Your sustainable drainage system should be designed in accordance with **CIRIA The SuDS Manual C753** and any necessary adoption standards.

HOW TO COMPLETE

Blue Box	Instruction/ Question
Orange Box	Evidence Required
White Box	To be completed by Developer / Consultant

1. Complete ALL white boxes
2. Submit this pro-forma to the Local Planning Authority, along with:

- Sustainable Drainage Strategy
- Site Specific Flood Risk Assessment (if required)
- Minimum supporting evidence, as indicated in orange boxes of this pro-forma.

GUIDANCE TO SUPPORT YOU

The pro-forma should be completed in conjunction with 'Completing your SuDS Pro Forma Guide.'

The pro-forma can be completed using freely available tools such as **Tools for Sustainable Drainage Systems** or approved industry standard surface water management design software.

[1] *as defined in Section 2 of **Statutory Instrument 2015 No. 595** or on sites of 0.5 hectares in Critical Drainage Areas.*

SECTION 1. APPLICATION & DEVELOPMENT DETAILS

Planning Application Reference *(if available)*	TBC	
State type of planning application *i.e. Pre-application, Outline, Full, Hybrid, Reserved Matters* *Information only required if drainage is to be considered as part of reserved matters application*	Full	
Developer(s) Name:	Mr & Mrs Hardacre	
Consultant(s) Name:	Donna Metcalf Flood Risk Consultancy Ltd	
Development Address *(including postcode)*	The British Legion Site. Towneley Road, Longridge	
Development Grid Reference *(Eastings/Northings)*	E:360258 N:437403	
Total Development Site Area (Ha)	0.058	
Drained Area (Ha)* of Development	0.030 (Existing) 0.047 (Proposed)	
Please indicate the flood zone that your development is in. Tick all that apply. *Based on the Environment Agency Flood Map for Planning and the relevant Local Authority Strategic Flood Risk Assessment (to identify Flood Zones 3a/3b).*	Flood Zone 1 ☒ Flood Zone 2 ☐ Flood Zone 3a ☐ Flood Zone 3b ☐	
What is the surface water risk of the site? Tick all that apply. *Based on the Environment Agency Surface Water Flood Map.*	High ☐ Medium ☐ Low ☒	
Have you submitted a Site Specific Flood Risk Assessment (FRA)? *See separate guidance notes for clarification on when a FRA is required*	Yes ☐ No ☒	
Have you submitted a Sustainable Drainage Strategy?	Yes ☒ No ☐	
Does your drainage proposal provide multi-functional benefits via SuDS?	Yes ☐ No ☒	
Expected Lifetime of Development *(years)* *Refer to Planning Practice Guidance "Flood Risk and Coastal Change" Paragraph 026*	100 years	
Development Type:		**State Proposed Number of Units**
Greenfield Site • *Site is wholly undeveloped, and a new drainage system will be installed*	☒	13No apartments
Previously Developed/ Brownfield Site • *Site is already developed, and the entirety of the existing surface water drainage system will be used to serve the new development (evidence must be provided to prove existing surface water drainage system is reusable);* ***OR*** • *Where records of the previously developed system are not available so that the hydraulic characteristics of the system cannot be determined or where the drainage system is not in reasonable working order i.e. broken, blocked or no longer operational for other reasons, then one of the approaches outlined in Section 24.5 of The SuDS Manual (C753) should be adopted.*	☐	
Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 1.	FRC Ltd Drainage Impact Assessment Report Ref 20076-01 Revision A	

	Drawing Ref. 20076-02 Revision A Existing Foul & Surface Water Drainage Plan Drawing Ref. 20076-03 Revision A Preliminary Foul & Surface Water Drainage Plan

SECTION 2: IMPERMEABLE AREA AND EXISTING DRAINAGE

	Existing (E)	Proposed (P)	Change (P – E)
State Impermeable Area (Ha)	0.030 (Drained) 0.042 (Total)	0.047	0.017 (Drained) 0.005 (Total)
Evidence Required: Plans showing development layout of site with existing and proposed impermeable areas.			☒

Are there existing sewers, watercourses, water bodies, highway drains, soakaways or filter drains on the site?	Yes ☒ No ☐ Don't Know ☐
Evidence Required: Plan(s) showing existing layout to include all: • Watercourses, open and culverted • Water bodies – ponds, swales etc. • Sewers, including manholes • Highway drains, include manholes, gullies etc. • Infiltration features - soakaways, filter drains etc.	☒

Drainage Design *Outline planning applications should be able to demonstrate that a suitable drainage system is achievable.* *All other type of planning application should provide full details or reference to previous planning application where drainage details have been submitted or approved.*	
Select which design approach you are taking to manage water quantity *(refer to Section 3.3 SuDS Manual)* **Approach 1 – Volume control / Long Term Storage (Technical Standards S2/3, S4/5)** • *The attenuated runoff volume for the 1 in 100 year 6 hour event (plus climate change allowance) is limited to the greenfield runoff volume for the 1 in 100 year 6 hour event, with any additional runoff volume utilising long term storage and either infiltrated or released at 2 l/s/ha* • *The discharge rate for the critical duration 1 in 1 year event is restricted to the 1 in 1 year greenfield runoff rate* • *The discharge rate for the critical duration 1 in 100 year event (plus climate change allowance) is restricted to the 1 in 100 year greenfield runoff rate* **Approach 2 – Qbar (Technical Standards S6)** • *Justification has been provided that the provision of volume control/long term storage is not appropriate and an attenuation only approach is proposed. All events up to the critical duration 1 in 100 year event (plus climate change allowance) are limited to Qbar (1 in 2 year greenfield rate) or 2 l/s/ha, whichever is greater.*	☐ ☒
Evidence Required: Plans showing: • Existing flow routes and flood risks • Modified flow routes • Contributing and impermeable areas • Current (if any) and proposed 'source control' and 'management train' locations of sustainable drainage components (C753 Chapter 7) • Details of drainage ownership	☒

• Details of exceedance routes (Technical Standards S9) • Topographic survey • Locations and number of existing and proposed discharge points *Note consideration should be given to manage surface water from both impermeable and permeable surfaces (including gardens and verges) likely to enter the drainage system.*	

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 2.	FRC Ltd Drainage Impact Assessment Report Ref 20076-01 Revision A Drawing Ref. 20076-02 Revision A Existing Foul & Surface Water Drainage Plan Drawing Ref. 20076-03 Revision A Preliminary Foul & Surface Water Drainage Plan

SECTION 3: PEAK RUNOFF RATES – TECHNICAL STANDARDS S2, S3 AND S6 (UNLESS S1 APPLIES)

Rainfall Event	Existing Rate (l/s)	Greenfield Rate (l/s)	Proposed Rate (l/s) *Previously developed sites - In line with S3 should be equivalent to Greenfield runoff rates – discuss with LLFA if this is not achievable pre-application*
Qbar *(Approach 2)*		0.51	
1 in 1 Year Event *(Approach 1)*	3.1 (Modelled)	0.45	2.5
1 in 30 Year Event	8.7 (Modelled)	0.87	2.6
1 in 100 Year Event* *(Approach 1)*	11.2 (Modelled)	1.07	2.6
** Total discharge at the 1 in 100 year rate should be restricted to the greenfield runoff volume for the 1 in 100 Year 6 hour event with additional volumes (long-term storage volume) released at a rate no greater than 2 l/s/ha where infiltration is not possible. The climate change allowance should only be applied to the proposed rate and not the existing or greenfield rate.*			

Evidence Required: Methodology used to calculate peak runoff rate clearly stated and justified.	☒
Impermeable areas plan, supported by topographical survey confirming positive drainage.	☒
Hydraulic calculations and details of software used.	☒

State the hydraulic method used in your calculations *(Refer to Table 24.1 of The SuDS Manual)*	Existing Rates – Hydraulically modelled using MicroDrainage Windes Greenfield Rates – IH124 UK SUDS (HR Wallingford) Proposed Rates - Hydraulically modelled using MicroDrainage Windes

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 3.	FRC Ltd Drainage Impact Assessment Report Ref 20076-01 Revision A Drawing Ref. 20076-02 Revision A Existing Foul & Surface Water Drainage Plan Drawing Ref. 20076-03 Revision A Preliminary Foul & Surface Water Drainage Plan

SECTION 4: DISCHARGE VOLUME – TECHNICAL STANDARDS S4, S5 AND S6 (UNLESS S1 APPLIES)

Rainfall Event	Existing Volume (m^3)	Greenfield Volume (m^3)	Proposed Volume (m^3)
1 in 100 Year 6 Hour Event *(Approach 1)*	28.5	1.213	44.7
Does the below statement apply to your development proposal? Long term storage is not achievable on this site and, in accordance with S6 of the Non Statutory Technical Standards for SuDS, the surface water discharge rates for events up to and including the 1 in 100 year critical event are limited to Qbar (Approach 2)			Yes ☐ No ☒
Evidence Required: Approach to managing the quantity of surface water leaving the site clearly stated and justified Methodology used to calculate discharge volume clearly stated and justified. Hydraulic calculations and details of software used.			☒ ☒ ☒

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 4.	Drawing Ref. 20076-02 Revision A Existing Foul & Surface Water Drainage Plan Drawing Ref. 20076-03 Revision A Preliminary Foul & Surface Water Drainage Plan

SECTION 5: STORAGE – TECHNICAL STANDARDS S7 AND S8

State climate change allowance used (%)	40%
State housing density (houses per ha)	13No apartments – 0.058Ha Density = 13 x (1/0.058) = 224
State urban creep allowance used (%)	0%
Evidence Required: State / used in approved industry standard surface water management design software.	☒

State storage volume required (m^3) *(excluding non-void spaces)* *Must include an allowance for climate change and urban creep*	9.104 (Permeable paving) 12.673 (total system)

Have you incorporated interception into your design? *(Refer to Chapter 24 of The SuDS Manual C753)* *Where possible, infiltration or other techniques are to be used to try and achieve zero discharge to receiving waters for rainfall depths up to 5mm.*	Yes ☐ No ☒
Evidence Required: Drainage plans showing location of attenuation and all flow control devices and supporting calculations.	☒

Summarise how storage will be provided for 1 in 30 year event on site. *Storage must be designed to ensure that at no flooding occurs onsite in a 1 in 30 year event except in designed areas **and** no flooding occurs offsite in a 1 in 100 year (plus climate change allowance) event.*	Modelling indicates surcharge, but no surface flooding. Attenuation is provided by the pipes and manholes; and also within the sub-base of permeable paving
Summarise how storage will be provided for 1 in 100 year (plus climate change) event on site. *Where storage above the 1 in 30 year rainfall event is provided in designated areas designed to accommodate excess surface water volumes, plans showing storage locations and surface water depths and supported by calculations used in approved industry standard surface water management design software. It is important to run a range of duration events to ensure the worst case condition is found for each drainage element on the site*	Modelling indicates that there is surcharging but no surface flooding. Attenuation is provided by the pipes and manholes; and also within the sub-base of permeable paving.
Evidence Required: Plans showing size and location of storage and supporting calculations. Where there is controlled flooding, extents and depths must be indicated.	☒

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 5.	Drawing Ref. 20076-02 Revision A Existing Foul & Surface Water Drainage Plan Drawing Ref. 20076-03 Revision A Preliminary Foul & Surface Water Drainage Plan

SECTION 6: WATER QUALITY PROTECTION

Contaminated surface water run-off can have negative impacts on the quality of receiving water bodies. The potential level of contamination will influence final the design of an appropriate treatment train as part of your sustainable drainage system.

Is the proposal site known to be or potentially contaminated?	Yes ☐ No ☒
• *If the site is contaminated, it should be demonstrated that the sustainable drainage system will not increase the risk of pollution to controlled waters though the mobilisation of contaminants and/or creation of new pollution pathways.*	

Confirm the *Pollution Hazard Level* of the proposed development - Tick ALL that apply

Refer to Pollution Hazard Indices for different Land Use Classifications in Table 26.2 of The SuDS Manual C753 for further guidance.

Pollution Hazard Level *Tick ALL that apply*		**Surface water run-off from the proposed development will drain from:**
VERY LOW	☒	• Residential roofs
LOW	☐	• Other roofs (typically commercial/industrial roofs)

		• Individual property driveways, residential car parks, low traffic roads (e.g. cul de sacs, home-zones and general access roads) • Non-residential car parking with infrequent change (e.g. schools, offices) i.e. < 300 traffic movements/day
MEDIUM	☐	• Commercial yard and delivery areas • Non-residential car parking with frequent change (e.g. hospitals, retail) • All roads except low traffic roads and trunk roads/motorways[2]
HIGH	☐	• Sites with heavy pollution (e.g. 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[1]

If the development's Pollution Hazard Level is 'Very Low' or 'Low', has the sustainable drainage design been risk assessed and appropriate mitigation measures included?	Yes ☒ No☐
• *If the proposed development has a very low or low polluting potential, you should design your sustainable drainage system to include an appropriate treatment train in accordance with The SuDS Manual (C753).*	

If the development's Pollution Hazard Level is 'Medium' or 'High', is the application supported by a detailed water quality risk assessment?	Yes ☐ No☐
• *If the proposed development has a high polluting potential, a detailed risk assessment will be required to identify an appropriate SuDS treatment train and ensure compliance with Paragraph 170 of the National Planning Policy Framework.* • *If the proposed development has a medium polluting potential, a detailed risk assessment may be required depending on the nature, scale and location of the development.*	

Has pre-application advice on water quality been obtained from the Environment Agency?	Yes ☐ No☒
If YES, provide details:	

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 6.	Drawing Ref. 20076-02 Revision A Existing Foul & Surface Water Drainage Plan Drawing Ref. 20076-03 Revision A Preliminary Foul & Surface Water Drainage Plan

SECTION 7: DETAILS OF YOUR SUSTAINABLE DRAINAGE SYSTEM

a) Function of your Sustainable Drainage System

Do your proposals store rainwater for later use (as a resource)?	Yes ☐ No ☒
Evidence Required: Please provide a brief sentence in the adjacent white box to describe how this function has been achieved.	

Do your proposals promote source control to manage rainfall close to where it falls? (e.g. promoting natural losses through soakage, infiltration and evapotranspiration)	Yes ☐ No ☒

[2] Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).

Evidence Required: Please provide a brief sentence in the adjacent white box to describe how this function has been achieved.	

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 7a.	Drawing Ref. 20076-02 Revision A Existing Foul & Surface Water Drainage Plan Drawing Ref. 20076-03 Revision A Preliminary Foul & Surface Water Drainage Plan

b) Hierarchy of Drainage Options – Planning Practice Guidance

The proposed method of discharge are set out within order of priority. Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

Proposed method of surface water discharge		**Is this proposed?**	
Hierarchy Level 1: Into the ground (via infiltration)		Yes ☐ No ☒	
If YES - Evidence Required		**If NO – Evidence Required** **Tick ALL that apply**	
☐	**A.** Completed Infiltration Checklist from The SuDS Manual (C753) Appendix B *An editable version of this form is available on SusDrain website.*	☐	A. Site investigation to demonstrate that the ground is not free draining. Test results to be provided in accordance with: • The methodology within BRE 365 (2016), ***OR*** • Falling head permeability tests BS EN ISO 22282-2: 2012
☐	**B.** British Geological Survey (BGS) Infiltration SuDS Map	☒	B. NOTE: where an applicant is unable to access a site to undertake testing, e.g. where unable to access a site for an outline application, they can submit a *SuDS GeoReport or similar*.
☐	**C.** Infiltration testing to BRE 365 (2016) or falling head permeability tests to BS EN ISO 2228-2: 2012 ***(optional for outline)***	☐	C. Evidence to confirm that infiltration to ground would result in a risk of deterioration to ground water quality.
☐	'Plan B' sustainable drainage plan and statement of approach with an alternative discharge method, in case infiltration proposals are proven not feasible upon further site specific ground investigation e.g. to consider seasonal variations to groundwater.	☐	D. Geotechnical advice from a competent person* which determines that infiltration of water to ground would pose an unacceptable risk of geohazards to the site and/or local area. **Note: Competent person may include a Chartered Engineer, Chartered Geologists, Registered Ground Engineering Professionals (RoGEP).*

Proposed method of surface water discharge		**Is this proposed?**	
Hierarchy Level 2: To a surface water body *(select type)* ***NOTE:*** *Consent from LLFA or Permit from Environment Agency may be required – refer to guidance*		Yes ☐ No ☒ N/A ☐ ☐ Main river ☐ Canal ☐ Ordinary watercourse ☐ Other water body	
If YES - Evidence Required		**If NO – Evidence Required** **Tick ALL that apply**	
☐	Surface water body / watercourse survey and report	☒ ☒	Plan showing nearby watercourses and waterbodies **AND** Statement providing justification in your Sustainable Drainage Strategy

			Note: *Where third party land is cited as a barrier, you should provide visibility of discussions held to date with the riparian landowner of the waterbody.*

Proposed method of surface water discharge		**Is this proposed?**	
Hierarchy Level 3: To a surface water sewer or highway drain *(select type)*		Yes ☐ No ☒ N/A ☐	
		☐ Surface water sewer	☐ Highway drain
If YES - Evidence Required		**If NO – Evidence Required** **Tick ALL that apply**	
☐	Written correspondence from Water and Sewerage Company/ Highway Authority regarding proposed connection.	☒ ☒	Plan showing nearby sewers and highway drains **AND** Statement providing justification in your Sustainable Drainage Strategy

Proposed method of surface water discharge		**Is this proposed?**
Hierarchy Level 4: To combined sewer		Yes ☒ No ☐ N/A ☐
If YES - Evidence Required		**If NO – Evidence Required**
☐	Written correspondence from Water and Sewerage Company	N/A

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 7b.	Drawing Ref. 20076-02 Revision A Existing Foul & Surface Water Drainage Plan Drawing Ref. 20076-03 Revision A Preliminary Foul & Surface Water Drainage Plan

c) Proposed SuDS Component Types

	Tick ALL that apply				
Within property boundary	☐ Rainwater harvesting	☐ Green/ blue roofs	☒ Pervious pavements *[**Type:** A ☐ B ☐ C ☒]*	☐ Soakaway	☐ Bio retention systems

	Tick ALL that apply				
Within development site boundary *(not property)*	☐ Infiltration system *[**Type:** ☐ Surface level ☐ Below ground]*		☐ Filter strips	☐ Filter drains	☐ Swales
	☐ Bio retention system	☐ Detention basins	☐ Ponds and wetlands	☐ Attenuation tanks/ Oversized pipes	☐ Other (state below)
	If 'Other' please state:				

Off site *(not within the boundary of the proposed development)*	***Please state:***

I confirm that the above selected components have been designed in accordance with The SuDS Manual (C753).	I confirm ☒
I confirm that the management of flows resulting from rainfall in excess of a 1 in 100 year plus climate change rainfall event, and their exceedance route(s), has been fully considered in order to minimise the risks to people, property (new and existing) and infrastructure.	I confirm ☒

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 7c.	Drawing Ref. 20076-02 Revision A Existing Foul & Surface Water Drainage Plan Drawing Ref. 20076-03 Revision A Preliminary Foul & Surface Water Drainage Plan

SECTION 8: OPERATION AND MAINTENANCE – TECHNICAL STANDARD S12 AND NATIONAL PLANNING POLICY FRAMEWORK

The applicant is responsible to ensure that ALL components selected in Section 7 can be maintained for the design life of the development. This information is required so the Local Planning Authority can ensure the maintenance and management of the sustainable drainage system. The Local Planning Authority will discuss how this will be secured (e.g. via planning condition or planning obligation).

	Information Provided?
Management Plan	Yes ☐ No ☒
Evidence Required: **Plan/ drawing provided to show the position of the different SuDS components with:** • Key included to identify any of the adopting bodies that you will be offering your sustainable drainage components for adoption *(relates to maintenance and management arrangements below).* • Plan/ drawing to identify any areas where certain activities are prohibited, detailing reasons why. **Action plan for accidental pollutant spillages.**	☐ ☐

	Information Provided?
Maintenance Schedule	Yes ☒ No ☐
Evidence Required: A copy of the maintenance schedule including: 1. **Proactive and preventative maintenance** Detailing regular, occasional and remedial maintenance activities including recommendations for inspection and monitoring. This should include recommended frequencies, advice on plant/ machinery required and an explanation of the objectives for the maintenance proposed and potential implications of not meeting them. 2. **Reactive and corrective maintenance** (e.g. product repair and replacement). Including advice on excavations, or similar works, in locations that could affect the SuDS components/ adjacent structures.	☐

	Information Provided?
Maintenance and Management Arrangements	Yes ☒ No ☐
Evidence Required: Evidence of formal agreement with the party responsible for undertaking maintenance. Please select any of the adopting bodies that you will be offering your sustainable drainage components for adoption. Tick all that apply. ☐ **Water and Sewerage Company** *Section 104 agreement (Water Industry Act 1991)* ☐ **Highway Authority** *Section 278/38 agreement (Highways Act 1980)* ☐ **Local Authority Public Open Space** *[Refer to Local Authority Policy]* Please select the arrangement(s) for all non-adopted sustainable drainage components. Tick all that apply. ☒ **Management Company** ☐ **Property Owner** *(for SuDS components within property boundary only)* ☐ **Other** (please state)	☒

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 8.	Drawing Ref. 20076-02 Revision A Existing Foul & Surface Water Drainage Plan Drawing Ref. 20076-03 Revision A Preliminary Foul & Surface Water Drainage Plan

DECLARATION AND SUBMISSION

This pro-forma has been completed using evidence from information which has been submitted with the planning application.

The information submitted in the Sustainable Drainage Strategy and site-specific Flood Risk Assessment (FRA), where submitted, is proportionate to the site conditions, flood risks and magnitude of development and I agree that this information can be used as evidence to this sustainable drainage approach.

Submitter Details			
Completed by	D Metcalf	**Email Address**	info@floodriskconsult.com
		Telephone Number(s)	07399029095
Signed off by	D Metcalf	**Accreditation(s) and/or Qualification(s) of Signatory**	BEng Civil Engineering
Date *(dd/mm/yyyy)*	29/10/20	**Company**	Flood Risk Consultancy Ltd

Client Details			
Name	Mr& Mrs Hardacre	**Company**	