

Angus Housing Association

Proposed Development at
Guthrie Street, Friockheim

Drainage Options Report

November 2022



FAIRHURST

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1.0 Introduction

Fairhurst has been appointed by Angus Housing Association (AHA) to provide advice on proposed foul and surface water drainage solutions for the redevelopment of a site at Guthrie Street, Friockheim. Refer to **Figure 1** for site location.

AHA proposals will see the existing former nursing home building demolished, and replaced with two storey semi-detached residential properties.

The following sections of this report will review the existing drainage provision surrounding the development site, along with looking at the options for both foul and surface water discharge from the redeveloped site.

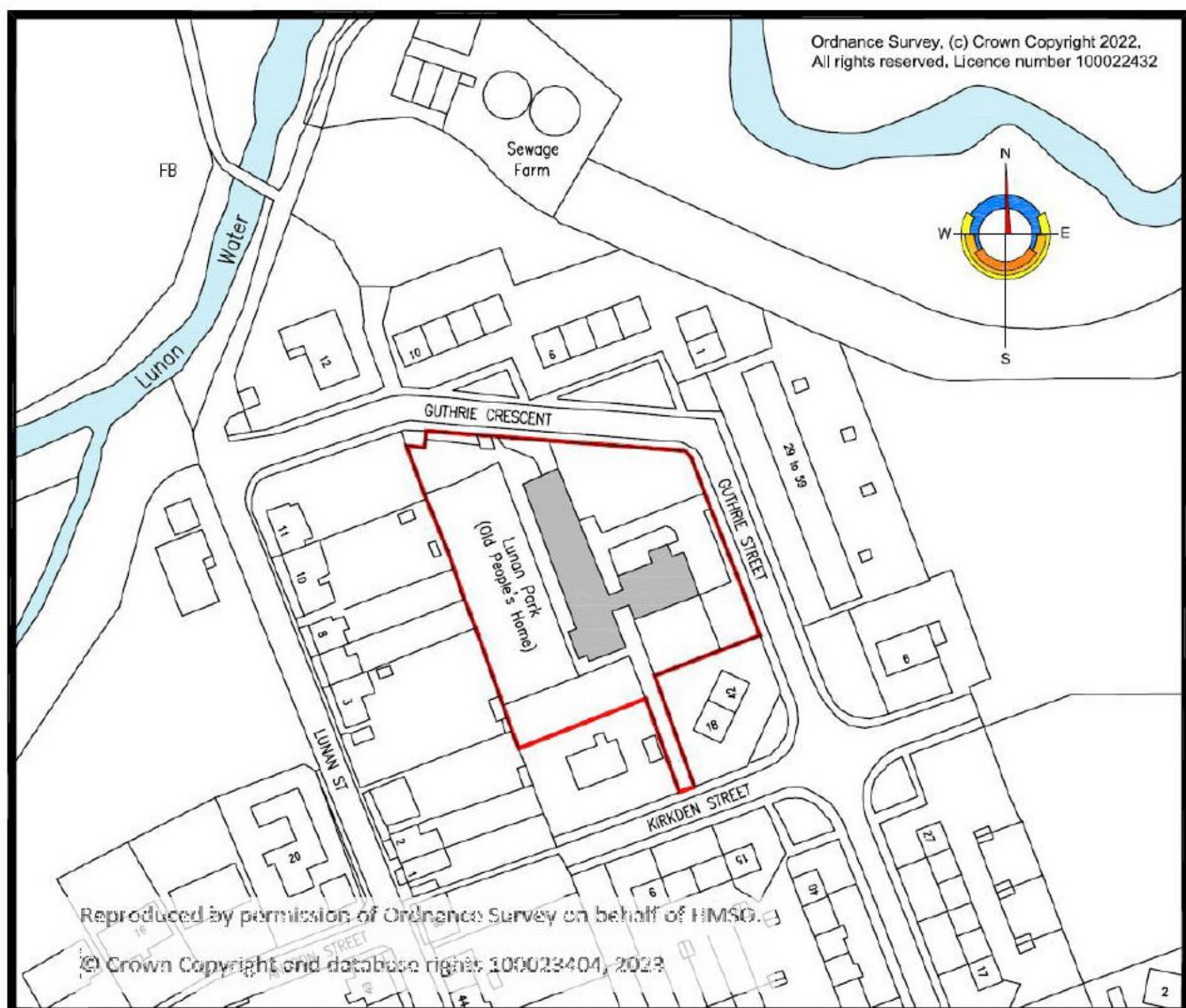


Figure 1: Site Location Plan

2.0 Current Drainage Provision

The vacant nursing home building remains in place, and connected to the existing public drainage system via numerous manholes and underground pipe work.

Figure 2 below indicates the existing private manholes, and gullies, within the development boundary, which collect both foul and surface water and are anticipated to convey flows to the existing public sewer located in Guthrie Street

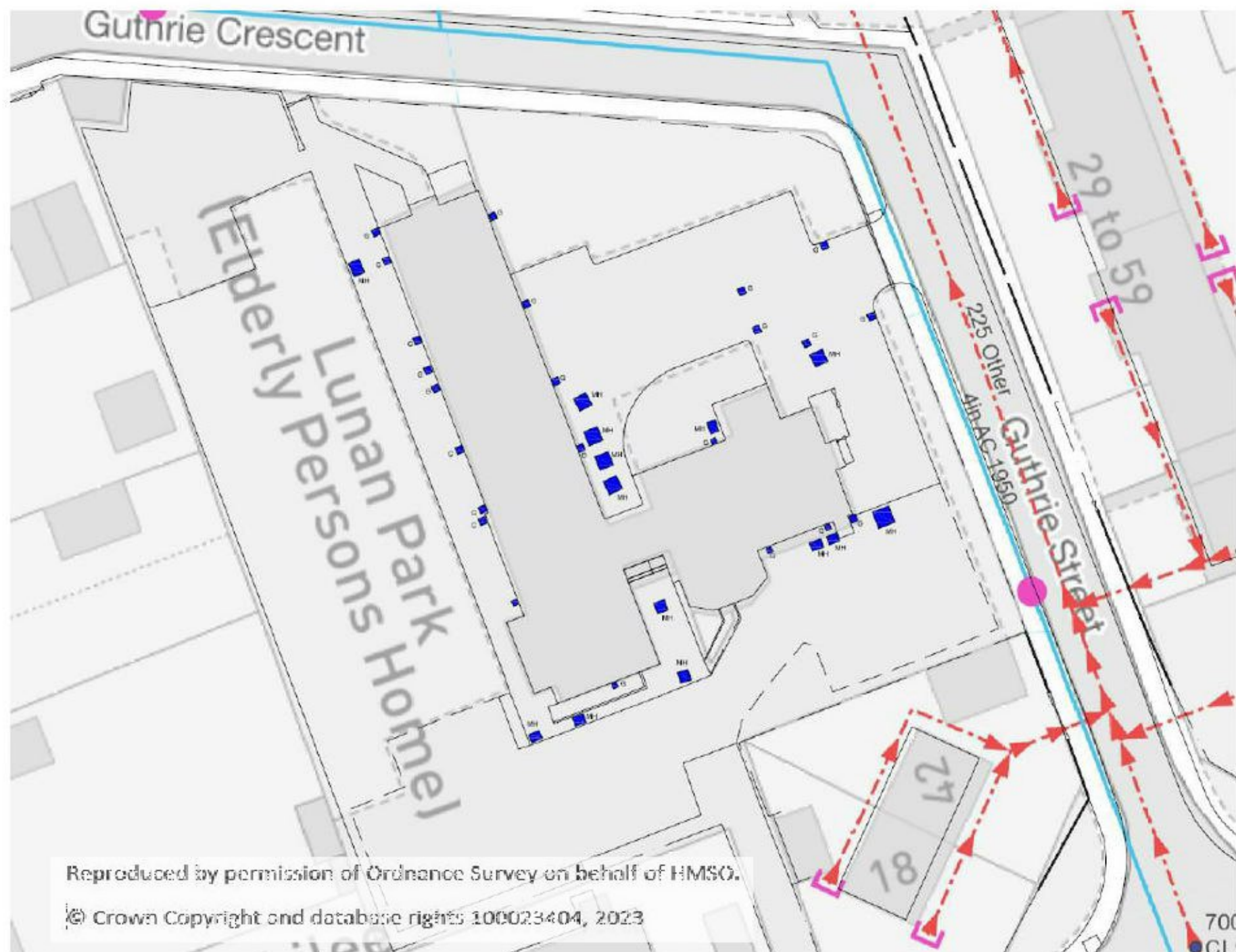


Figure 2: Existing Drainage

All surface water discharge is currently understood to be unrestricted and connected to the existing public combined sewer. The redevelopment works will see all existing drainage connections removed.

3.0 Foul Drainage

With reference to the existing Scottish Water record plan, used as the base mapping to **Figure 2**, a 225mm diameter public combined sewer is located in Guthrie Street. The existing sewer flows in a northerly direction. It is anticipated that foul flows from the development will be connected to the existing sewer via a new 150mm diameter sewer, laid through the development roads, from south to north, then extended east along Guthrie Crescent to the junction with Guthrie Street where a saddle connection will be made into the existing 225mm diameter sewer. Refer to **Figure 3** for indicative layout.

A Pre Development Enquiry (PDE) should be made to Scottish Water to confirm whether the proposed foul connection is acceptable. Upon receipt of the PDE Response Letter from Scottish Water, and subject to their acceptance of the proposed foul connection, an application for Technical Approval should be submitted.

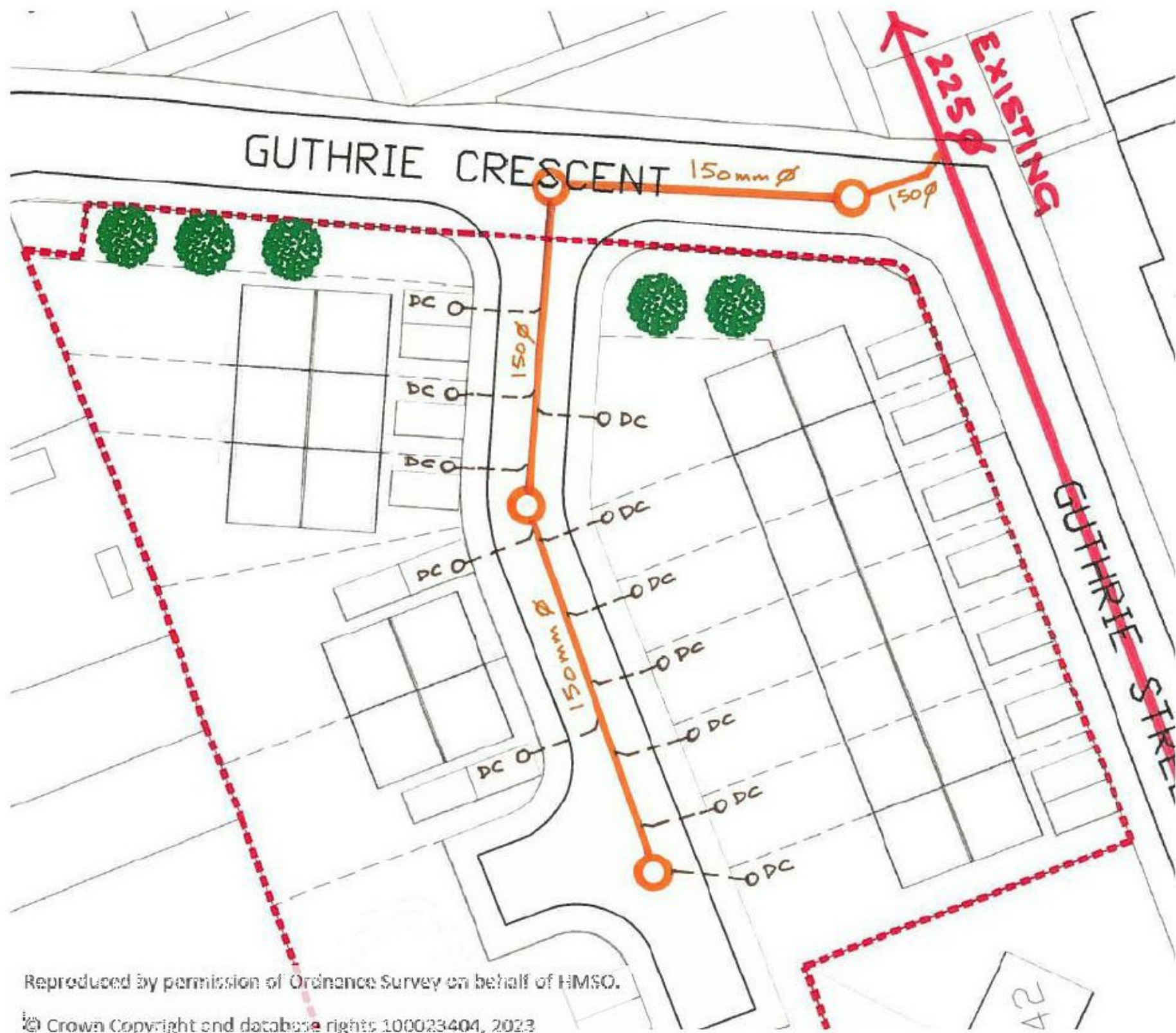


Figure 3: Schematic Foul Drainage

4.0 Surface Water

It is assumed that Angus Housing association will want to minimise the extent of privately maintained drainage, and maximise the extent of the surface water drainage system to be adopted by Scottish Water.

Scottish Water have published a “Surface Water to Combined Sewer Application Guide – Brownfield Sites”, which is intended as guide to be used when assessing applications to connect surface water for new developments on brownfield sites to the existing combined sewer network. For clarity, a “Brownfield Site” is a site at which surface water discharge to the combined sewer can be proven to have existed within five years of application to Scottish Water.

The guide outlines the minimum submission requirements to aid assessment of the combined sewer connection application and suitable justifications/relevant evidence to rule out the four preferred options of:

1. Reuse
2. Infiltration
3. outfall to a watercourse
4. outfall to a surface water sewer

The Scottish Water Surface Water Policy states, “A combined sewer connection will only be accepted when all other viable technical solutions for alternative surface water disposal have been exhausted, in addition to zero-net detriment or betterment being demonstrated”. Betterment is defined as a decrease in the overall volume of surface water discharging to the Scottish Water network and treatment works.

In consideration of the above, each of the four preferred options for controlling surface water run-off on this development site can be summarised as follow:

4.1. Reuse

Reuse would tend to require the Installation of a rainwater harvesting system to recycle surface water for flushing toilets, or in some cases, feeding washing machines. These systems tend to be an expensive option, particularly when used in low-cost affordable housing. This would only deal with the roof water run-off from each property and would not be acceptable for dealing with road water run-off. For this development, reuse is not considered an acceptable option.

The Scottish Water policy also confirms that an acceptable justification for not considering reuse is “Development is to provide affordable/low cost housing”.

Any PDE Application can therefore provide justification for not considering reuse.

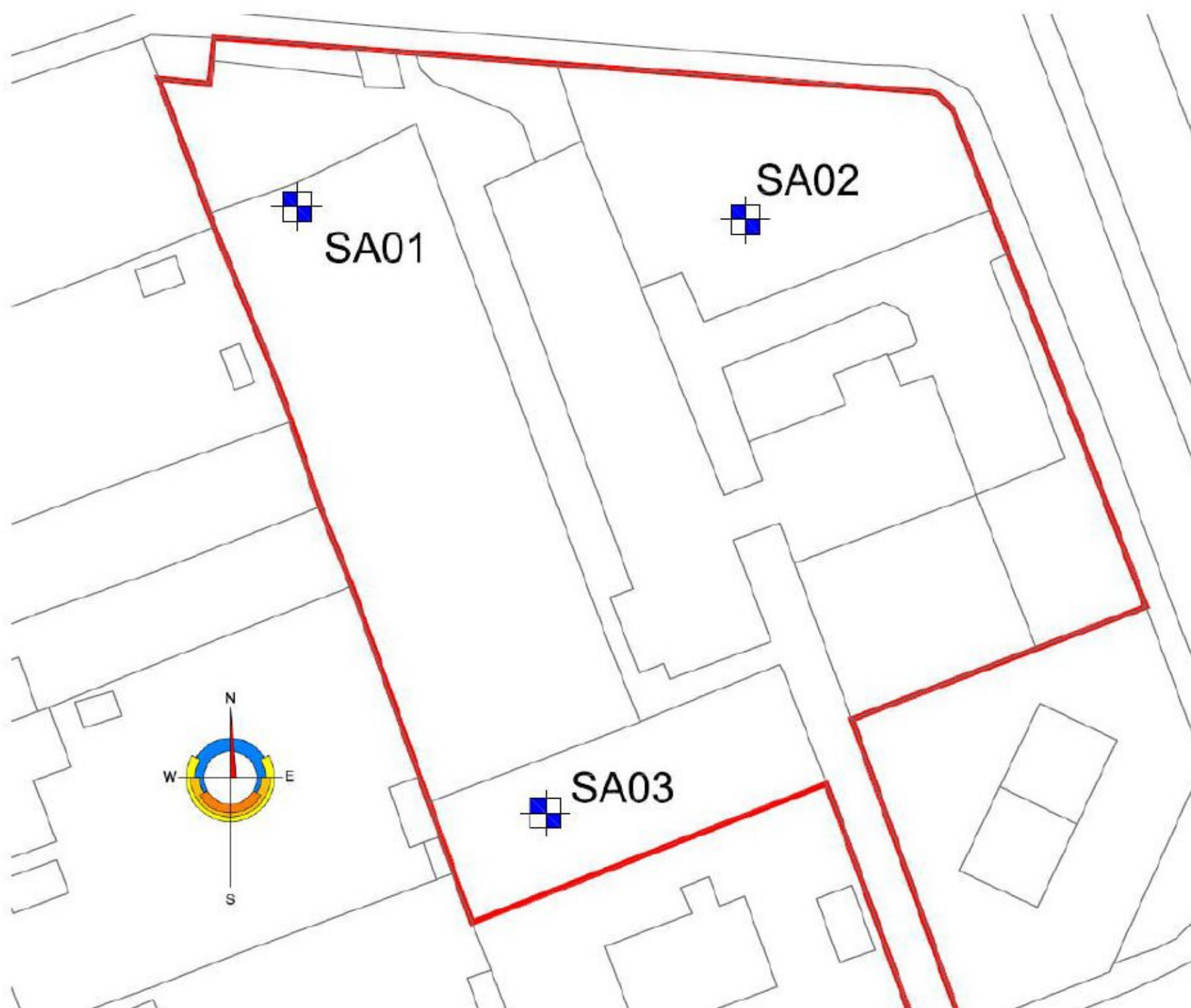
4.2. Infiltration

Infiltration of surface water run-off relies on the existing subsoil ground conditions having a sufficient permeability coefficient. On-site testing has shown the permeability to be variable across the site.

As part of the Ground Investigation works, three infiltration test pits were carried out at the locations shown in **Figure 4**.

Infiltration rates obtained were as follows:

Test Pit	Infiltration Rate
SA01	198 mm/hour
SA02	230 mm/hour
SA03	4752 mm/hour



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Figure 4: Infiltration test Location Plan

Based on the results of the infiltration testing, the ground conditions are considered to be acceptable for the use of infiltration systems.

However, due to the small, compact nature of the proposed development layout, the use of individual plot soakaways to deal with roof water run-off, would not comply with the recommendations of the current Building Regulations. Current standards suggest that soakaways should be located a minimum of 5.0m from boundaries and structures. This could not be achieved based on the currently proposed layout.

With regard to road water run-off, it is highly unlikely that Angus Council would adopt a road, which drains to an underground soakaway system. However, if the road was to remain private, and maintained by AHA, then a soakaway system may be acceptable.

If the development were to remain private, all maintenance responsibility would rest with AHA as operator, or with any residents, if properties were purchased from AHA. Retaining the development as private brings these additional burdens to AHA.

It is assumed that AHA will want to minimise any future maintenance costs, have the road adopted by Angus Council, and maximise the extent of sewer adoption by Scottish Water.

On that basis, we would suggest that an Infiltration Basin is considered as the most economical solution. The basin would be designed to deal with all roof and road water run-off, which would be directed to the basin via a conventional system of underground pipes and manholes. The basin would be sized to accommodate rainfall storm events up to and including the 1:200 year return period, plus an allowance for climate change and urban creep of 40%. It is likely that Scottish Water would request a high level overflow to be installed above the 1:200 year water level, which would have a discharge rate controlled to the equivalent 2 year greenfield flow rate. The overflow would be connected back into the existing public combined sewer.

The above solution would also be subject to undertaking detailed design calculations and simulation of multiple storm events.

With reference to the preliminary site layout plan prepared by KDM, drawing number 2825 SK_002, a notional space has been allocated for SUDS. This is shown in the southeast corner of the development. However, the area is relatively small, not particularly suited to gaining access for future maintenance, and is at the furthest point away from the existing public combined sewer where the overflow connection would be made.

Subject to further discussions with the design team, we have prepared an alternative sketch layout, [Figure 5](#), which would increase the area available for the infiltration basin, provide better access for future maintenance, and be located adjacent to the existing public combined sewer.



Figure 5: Alternative Layout

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4.3. Outfall to a Water Course

The Lunan Water is in close proximity to the site, lying 80m to the North West.

Any proposed route to an outfall would be relatively simple; however, the banks of the Lunan Water are very steep, with a vertical wall forming the channel.

The installation of an outfall would require significant temporary works and may be costly.

In addition, it is anticipated that a Flood Risk Assessment (FRA) would be required to determine the impact of the discharge on the watercourse.

Although we cannot rule out the possibility of directing all surface water run-off to the Lunan Water as an option, the likelihood of this being a cost effective solution for a small development site may be questionable.



4.4. Outfall to a Surface Water Sewer

From a review of the Scottish Water GIS Records, **Figure 5**, the closest public surface water sewer is located in Kinnell Gardens, some 180m South East of the development site.

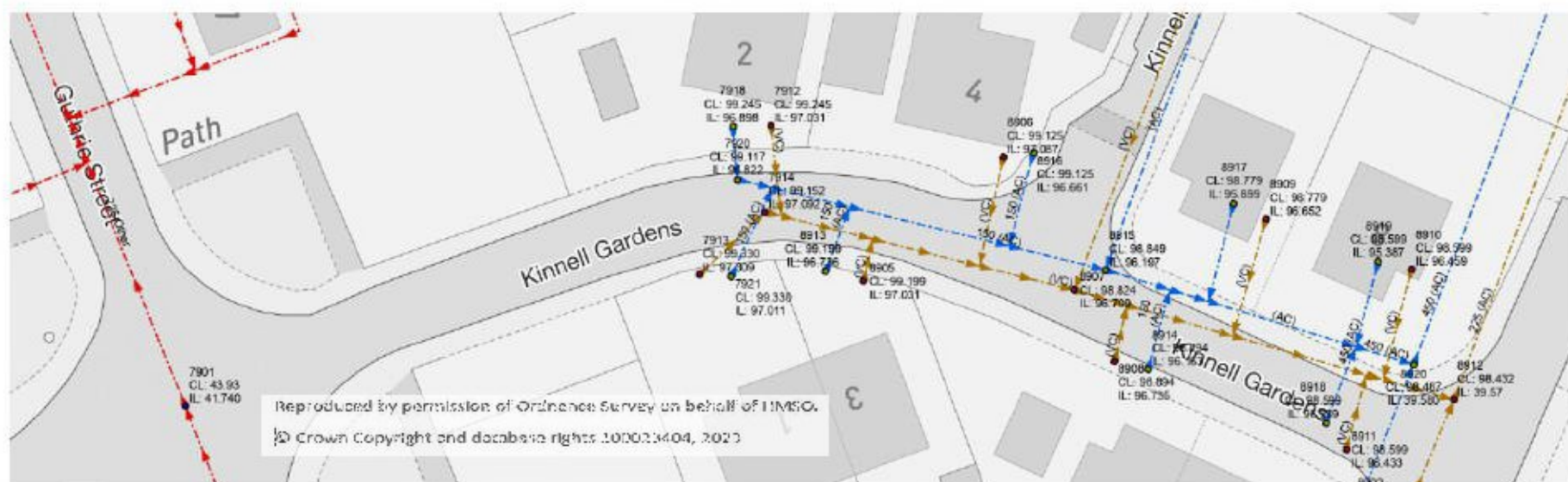


Figure 5: Extract from Scottish Water GIS

Records show that the surface water pipe work at the head of the system is 150mm diameter AC Pipe.

The route for a new surface water sewer from the development site to the existing manhole 7920, located in Kinnell Gardens may seem simple enough; however, there will be numerous existing underground services, which would need to be accurately positioned on site in order to design the location of new manholes and pipework to avoid conflict.

The installation of the off-site surface water sewer would also require road closures and significant temporary works to protect the existing services.

In addition, Scottish Water may require the existing surface water system downstream of the point of connection to be modelled to ensure there is no detriment due to the additional flows for this development site.

Although we cannot rule out the possibility of directing all surface water run-off to the existing surface water sewer in Kinnell Gardens as being an option, the likelihood of this being a cost effective solution for a small development site is small.

5.0 Summary and Conclusions

- Foul Drainage provision for this development site is anticipated to connect to the existing public combined sewer located in Guthrie Street.
- Surface Water drainage solution must comply with the current Surface Water policy, published by Scottish Water.
- Various options are available for dealing with Surface Water, however the provision of an infiltration basin in the northeast corner of the development site is seen as the most economical and justifiable solution, taking into consideration the various constraints associated with alternative solutions.
- Fairhurst would recommend making a PDE Application to Scottish Water on the basis of designing an Infiltration Basin to deal with surface water run-off from this development site.
- Further consideration from Client and Architect regarding layout of development to accommodate the suggested Infiltration Basin, would be necessary.

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