



## **SEWER IMPACT STUDY**

**X4503 –1052**

**SMG 1651**

**PROPOSED CONNECTION AT  
GREEN LANE, BICESTER**

**FOUL AND SURFACE WATER SYSTEM**

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## 1.0 Introduction

The following report was commissioned by Thames Water's Developer Services to investigate the capacity within the existing foul and surface water network and to ascertain the impact of a proposed new connection on the foul and surface water network at Green Lane, Bicester.

The scope of the study is to undertake a preliminary desktop study based upon an existing verified hydraulic model.

The scope of the study includes:

- Check the current performance of the existing network during both dry and wet weather events.
- Add development flows to the model and check the impact of additional flow to the sewer network during both dry and wet weather events.
- Suggest possible options to allow flows to be accepted into the existing network with no detriment to existing levels of service. It should be noted that these options are indicative and are likely to be subject to change based on site conditions, other utilities and requirements of third parties. However, the options indicate the feasibility of connecting the site to the sewerage system and the ability of the sewerage system to accept the development.

## 2.0 Background

The proposed new development is on a Greenfield site and the Developer proposes to accommodate 45 new housing units. The development area is situated in the village of Chesterton, located to the southwest of Bicester.

The development area is bounded by Green Lane to the south and the A4095 to the west.

The foul flow from the development area has been calculated, using the latest Thames Water guidelines, as a pumped flow of 2.1l/s. The surface water flow is connected by gravity to the existing surface water network and is restricted by a flow control to a peak flow of 5l/s as provided by the Developer.

The preferred connection manholes have been identified as SP55217601, located to the north of the development site, for the foul flows and a new manhole on the existing surface water sewer between manholes SP55218203 and SP55218204 for the surface water flows. The foul connection manhole is located to the north of the development site and the surface water connection location is to the south of the development site.

A plan showing the location of the development and connection points is provided in Appendix A.

### **3.0 Existing Sewerage System and Treatment Works**

The area in the vicinity of the development site is served by a separate foul and surface water sewer network.

From the development site, foul flows in the development area gravitate in a south-easterly direction towards Audley House Sewage Pumping Station (SPS), from where they are pumped to the gravity network draining to Fire Station (Chesterton) SPS.

From here, flows are lifted directly to Bicester Sewage Treatment Works (STW), located approximately 3.2km southeast of the development site.

Foul flows travel through sewers ranging from 100mm diameter to 250mm diameter from the development area towards Bicester STW.

Surface water flows in the development area gravitate in a south-easterly direction along Green Lane before discharging to Gagle Brook.

Surface water flows travel through sewers ranging from 225mm diameter to 600mm diameter from the development area towards Gagle Brook.

The local foul and surface water sewers are shown in the plan provided in Appendix B.

### **4.0 Thames Water Drainage Requirements**

It is necessary to provide separate foul and surface water drainage systems and to ensure that each system is connected to an appropriate drainage system.

This study considers the impact of both foul and surface water flows discharging from the new development.

Additional development flows should not cause new or additional flood risk to the existing system in either dry or wet weather.

### **5.0 Sewer Impact Assessment**

Assessment of the hydraulic loading of the foul and surface water network was carried out by means of an existing verified hydraulic model.

The proposed new development area and connection point details were added to the model and the assessment completed to identify the impact of the proposed new development.

The analysis of the catchment indicates that the foul and surface water networks are responsive to rainfall, with flooding being a risk in the catchment.

The impact of the proposed foul and surface water connection was assessed based on the design flows detailed in Section 2.0.

## 5.1 Foul Sewers

### 5.1.1 Assessment of Existing Catchment

The hydraulic model indicates that the existing foul network does not have available capacity downstream of the proposed connection manhole. The hydraulic model has been used to assess wet weather scenarios of various durations. During these wet weather events, the hydraulic model predicts network surcharge and flooding to occur.

### 5.1.2 Assessment of Development Catchment

An analysis has been completed to assess the impact of connecting the flows from the development into the public sewer. An allowance of 2.1l/s pumped flow was used to represent the development.

**Table 1: Proposed Development Connection Details**

Connection	Manhole	Diameter of Outgoing Sewer
Development Site	SP55217601	100mm

### 5.1.3 Foul Water System Improvement Works

The hydraulic model indicates that the foul network does not have available capacity downstream of the proposed connection manhole to accept the proposed development flows. On inclusion of the additional flows from the development site, an increase in the predicted volume of flooding and surcharge on the downstream sewer network is predicted to occur.

One indicative option has been developed to prevent the detrimental impact on the existing system, and allow the development site to connect to the existing sewer network. This option has been developed during a preliminary desktop investigation, using the hydraulic model only. The solution identified is intended to indicate the likely extent and magnitude and the network enhancement required to mitigate the predicted detriment and thus inform negotiations between the Developer and Thames Water over the feasibility and likely cost of the connection. A detailed design is required to confirm the size, location and performance of the indicative option before proceeding with any construction. Detailed design may also indicate alternative options.

The solution identified is intended to indicate the likely extent and magnitude and the network enhancement required to mitigate the predicted detriment and thus inform negotiations between the Developer and Thames Water over the feasibility and likely cost of the connection.

**The presented option is not equal to an outline design as, amongst other investigations, no feasibility or buildability assessment was undertaken. Outline design and subsequent detailed design is required to confirm the size, location and performance of the indicative options before proceeding with any construction. Outline design may also indicate alternative options.**

#### Option – On-line Storage (See Appendix C for Plan )

- Connect development flows to manhole SP55217601.
- Provide approximately 26m<sup>3</sup> on-line storage by laying a 525mm diameter sewer between manholes SP55218702 and SP55219601, located on Alchester Road, for a length of 120m.

- Provide approximately 35m<sup>3</sup> on-line storage by laying a 450mm diameter sewer between manholes SP56214401 and SP56215201, located in the green field to the east of Gagle Brook, for a length of 222m.
- Provide approximately 19m<sup>3</sup> on-line storage by laying a 375mm diameter sewer between manholes SP56216102 and SP56217001, located in the green field off Green Lane, for a length of 175m.

## 5.2 Surface Water Sewers

### 5.2.1 Assessment of Existing Catchment

The hydraulic model indicates that the existing surface water network has available capacity downstream of the proposed connection manhole. The hydraulic model has been used to assess wet weather scenarios of various durations. During these wet weather events, the hydraulic model does not predict network surcharge or flooding to occur.

### 5.2.2 Assessment of Development Catchment

An analysis has been completed to assess the impact of connecting the surface water flows from the development into the surface water sewer. An allowance of 5l/s gravity flow was used to represent the development.

**Table 2: Proposed Development Connection Details**

Connection	Manhole	Diameter of Outgoing Sewer
Development Site	New MH* (modelled reference)	225mm

\*New connection manhole between existing manholes SP55218203 and SP55218204

### 5.2.3 Surface Water System Improvement Works

The hydraulic model indicates that the surface water network has available capacity downstream of the proposed connection manhole to accept the proposed development flows.

Therefore, improvements to the existing surface water network system are not required.

## 6.0 Risks and Issues

**It is suspected that a flow restriction downstream of the proposed surface water connection location (upstream of the 600mm pipe) exists which restricts flows to 5l/s coming from the Woodlands Estate; therefore, if this is the case, the connection point may need to be revised or a solution may be required to accommodate the additional flows from this development site. This will need to be investigated further during detailed design.**

The proposed development site is located within the Environment Agency's Risk of Flooding from Surface Water and the drainage of the site is therefore at risk of surface water ingress. The Developer should undertake necessary measures to ensure that the foul sewers are adequately protected against surface water ingress.

## 7.0 Conclusions

The desktop study has successfully investigated and identified the implications of the proposed new development on a Greenfield site at Green Lane, Bicester to the existing foul and surface water networks.

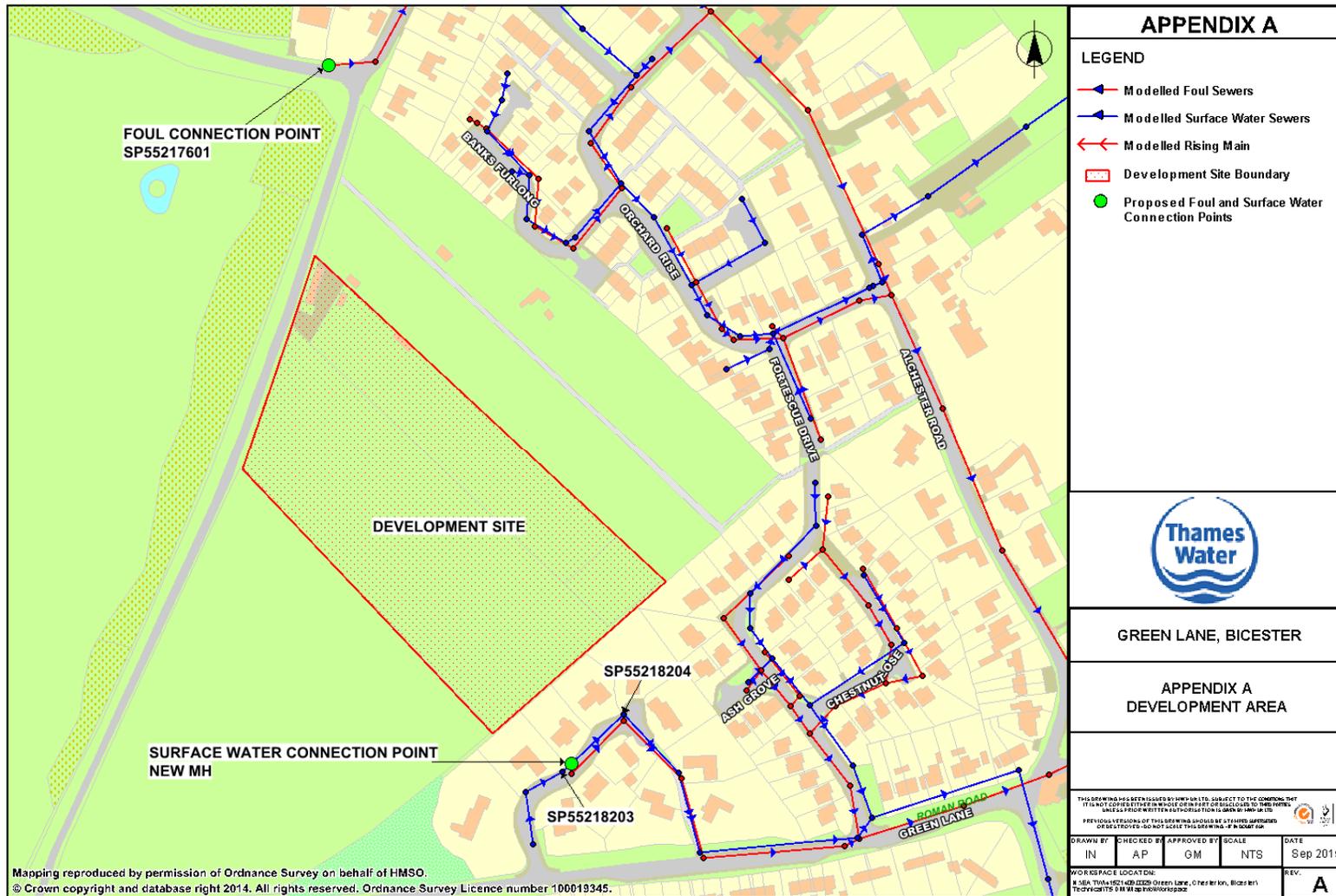
The hydraulic model indicates that the foul network does not have available capacity downstream of the proposed connection manhole to accept the proposed development flows.

Improvements to the existing foul network are required to enable the proposed connection to the sewer network, without causing any detriment to the level of service provided. The proposed indicative option resolves the modelled increase in flooding and surcharge on the sewer network.

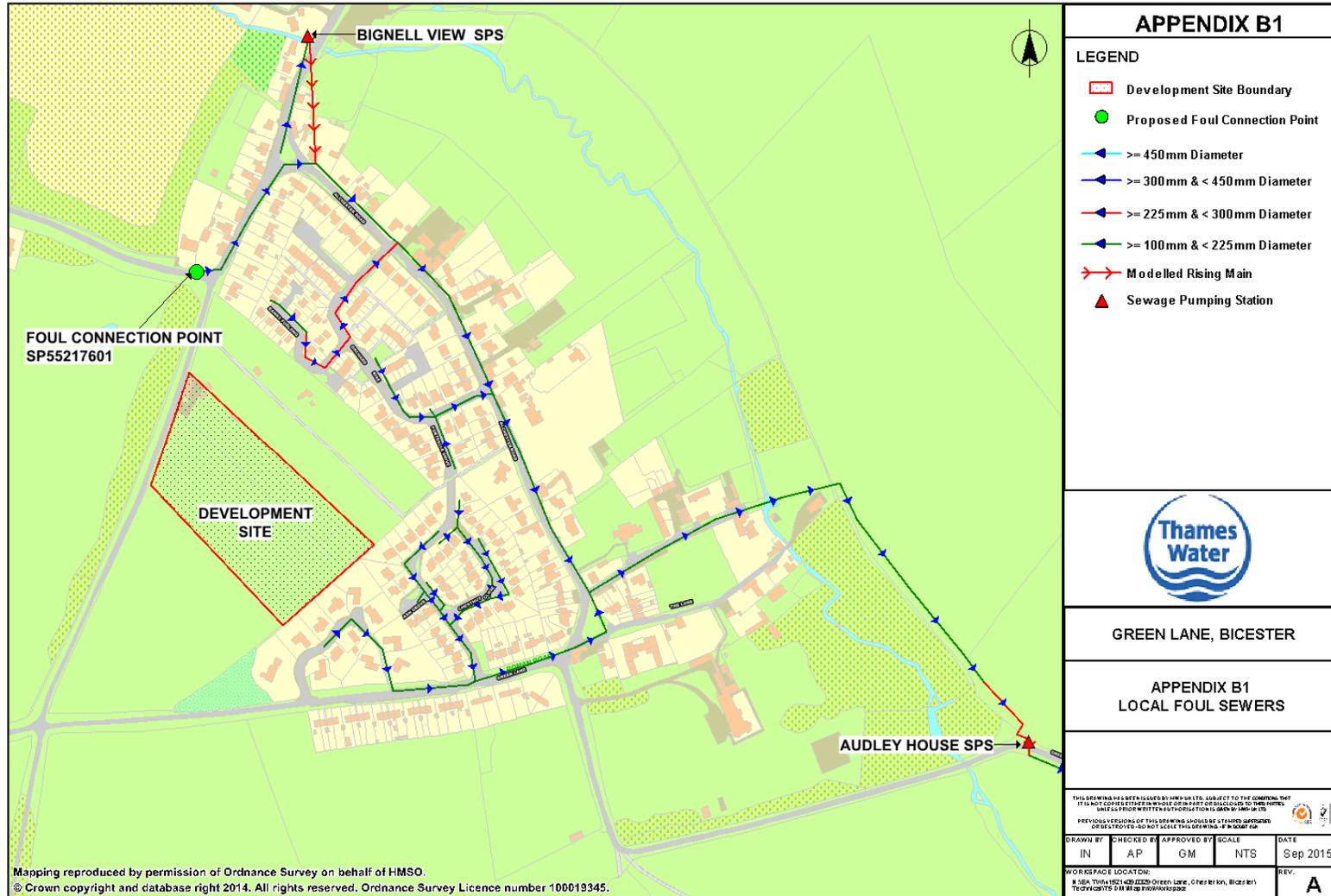
The hydraulic model indicates that the existing surface water network has available capacity downstream of proposed connection manhole, to accept proposed development flows. Therefore, improvements to the surface water network system are not required.

The issues highlighted and discussed throughout this report are recommendations to Thames Water Utilities and may be altered/added to based upon local operational knowledge of the system.

Appendix A – Site Plan



Appendix B1 – Local Foul Sewers



**APPENDIX B1**

**LEGEND**

- Development Site Boundary
- Proposed Foul Connection Point
- ←  $\geq 450$  mm Diameter
- ←  $\geq 300$  mm &  $< 450$  mm Diameter
- ←  $\geq 225$  mm &  $< 300$  mm Diameter
- ←  $\geq 100$  mm &  $< 225$  mm Diameter
- Modelled Rising Main
- ▲ Sewage Pumping Station



GREEN LANE, BICESTER

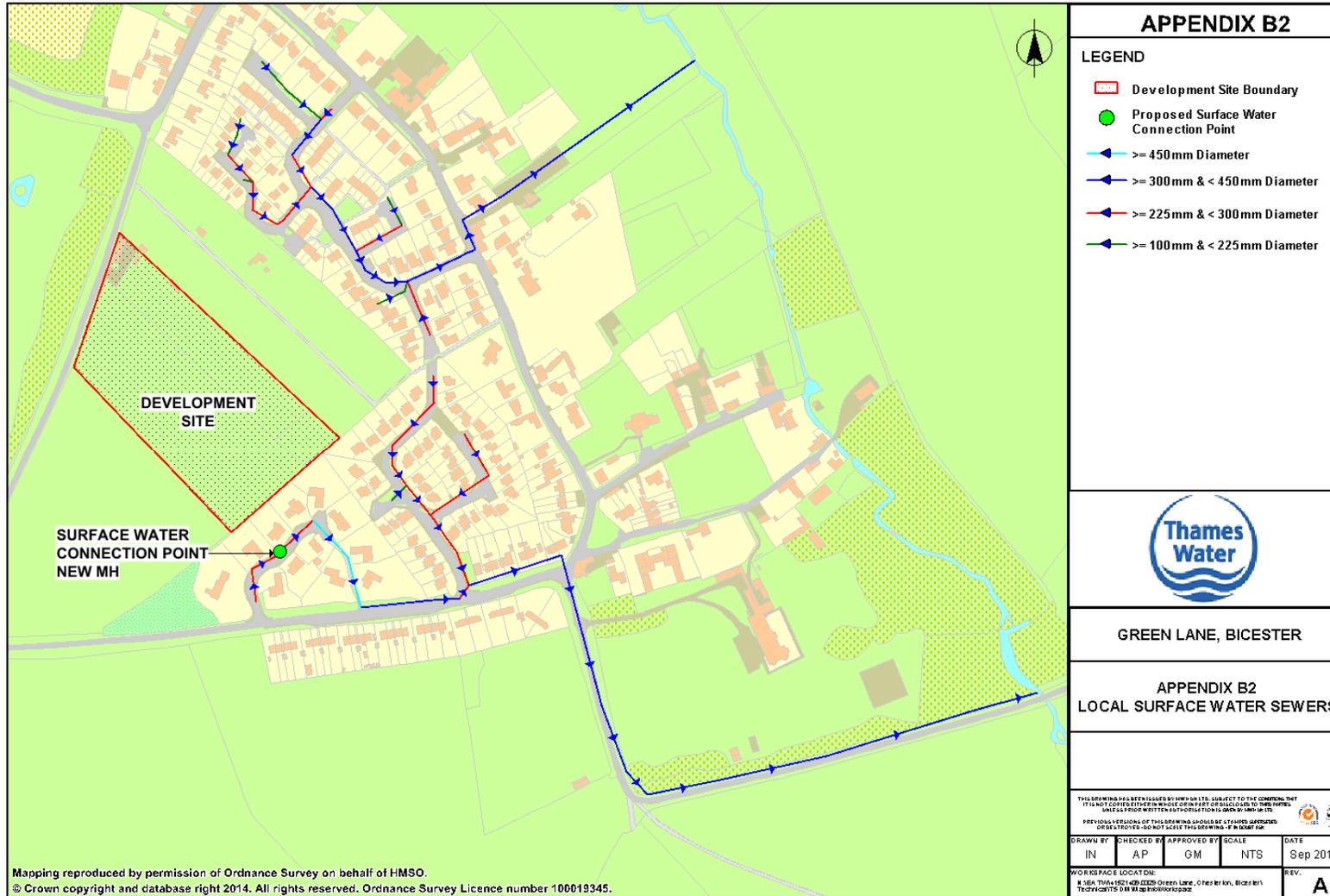
APPENDIX B1  
LOCAL FOUL SEWERS

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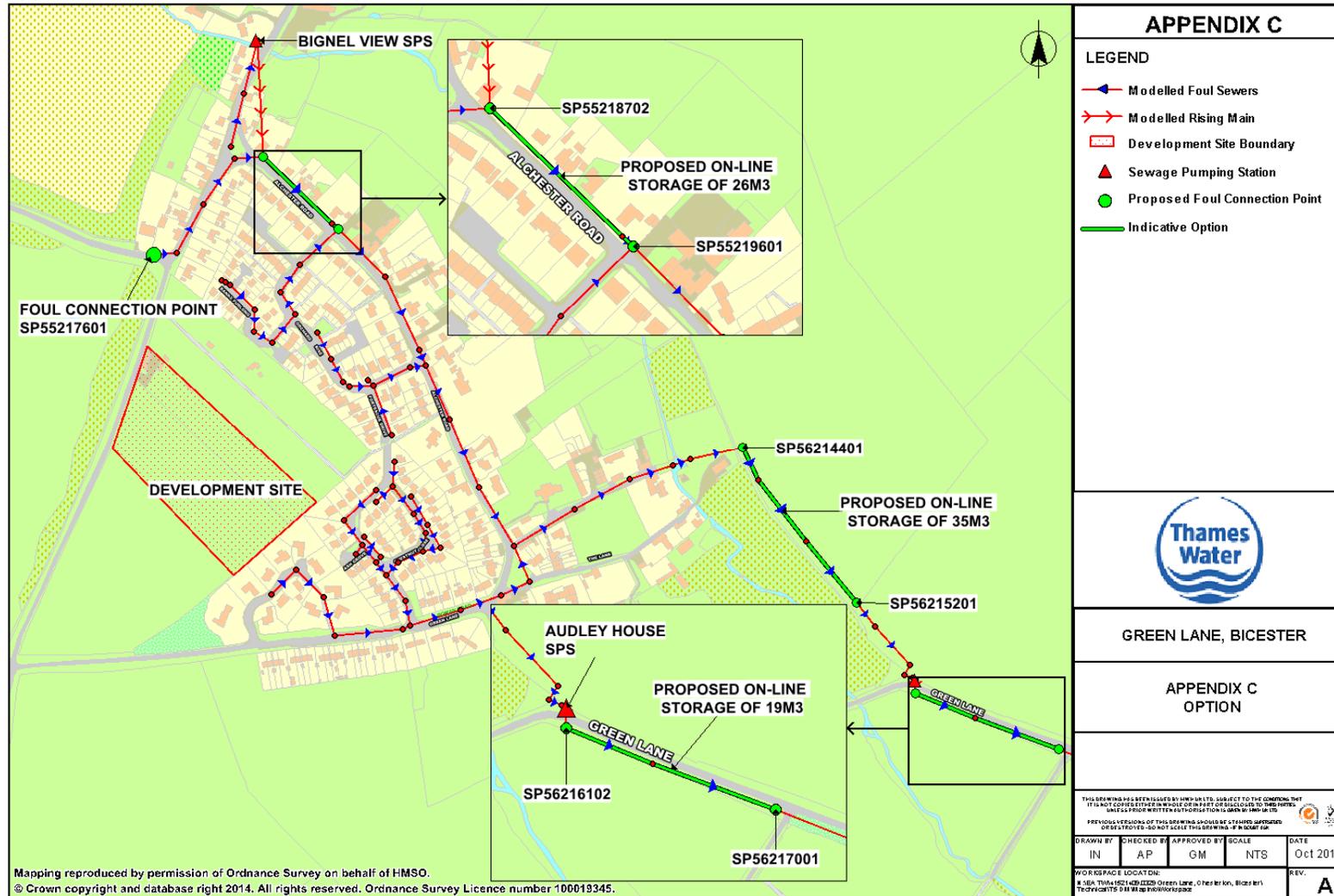
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IN	AP	GM	NTS	Sep 2015
WORKSPACE LOCATION: SEA, THAMES WATER, Green Lane, Okeford Park, Bicester TECHNICALS TEAM PROJECTS				REV. <b>A</b>

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Appendix B2 – Local Surface Water Sewers



Appendix C – Connections and Improvements – Option



Appendix D - Project Inputs Provided by the Developer

