APPENDIX D – THAMES WATER MPACT REPORT X4503-627

SEWER IMPACT STUDY

X4503 – 627

SMG 1483

PROPOSED CONNECTION AT HORSHAM ROAD, CRANLEIGH

FOUL SYSTEM

V3.0 April 2015

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Appendices

1.0 Introduction

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

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

The scope of the study includes:

- Carry out a manhole survey, pumping station survey and a short-term flow survey
- Model enhancement with manhole and pumping station survey data
- Verify the model using flow survey data
- 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 262 new housing units. The development area is situated in the village of Cranleigh. Cranleigh is a village in the borough of Waverley, located approximately 13km to the southeast of Guildford, Surrey.

The development area is bounded by Nightingales to the northwest, Horsham Road to the northeast, and Vachery Lane to the southeast.

The foul flow from the development area has been calculated, using the latest Thames Water guidelines, as a pumped flow of 12.01l/s.

The preferred connection point was determined by the Developer as manhole TQ06384201, located to the northeast of the development site.

A plan showing the location of the development and connection point 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, flows would gravitate in a north-westerly direction towards Cranleigh Sewage Treatment Works (STW), which is located approximately 3.2km downstream of the development site.

Flows travel through sewers ranging from 225mm diameter to 525mm diameter from the development area towards Cranleigh STW.

The local foul 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.

As the Developer proposes to connect only foul flows into the existing network, this report only covers the impact of the foul sewage flows from the proposed development on the existing foul sewer networks adjacent to and downstream of the proposed development. Surface water flows from the proposed development are not considered in this report and should not be connected to the foul sewer network.

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 network was carried out by means of a verified hydraulic model.

The model was enhanced with the results of a manhole and pumping station survey carried out in the study area. A flow survey was also completed to enable a verification exercise to be completed, and to confirm the current flows in the sewer network.

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 impact of the proposed foul 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 an increase in 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 12.01l/s pumped flow was used to represent the development.

Table 1: Proposed Development Connection Details

Connection	Manhole	Diameter of Outgoing Sewer
Development Site	TQ06384201	225mm

5.1.3 Foul 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.

Two indicative options have been developed to prevent the detrimental impact on the existing system, and allow the development site to connect to the existing sewer network. The options have been developed during a preliminary desktop investigation, using the hydraulic model only. The solutions identified are 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 options before proceeding with any construction. Detailed design may also indicate alternative options.

Option1 – On-Site Storage (See Appendix C1 for Plan)

This option is to provide an adoptable pumping station, which would serve the development site. The pumping station would be controlled by a telemetry arrangement, which would only allow the pump to operate during dry weather flow, or when the depths in the receiving sewer are low enough to accept pumped discharge without causing detriment.

Connect development flows to manhole TQ06384201. The manhole TQ06384201 has been identified as a suitable location to house the telemetry equipment. The telemetry should be set-up so that the pumping station can only operate when the depths in this manhole are below soffit level of the outgoing pipe.

Model predictions have shown that during the critical duration 1 in 20 year return period event, the pumps would be switched off for a maximum of 19 hours. However, this should be confirmed as part of detailed design, as storage of greater than 12 hours may lead to septicity, and measures to control this may need to be considered.

It is the Developer's responsibility to size the storage tank accordingly to the final calculated foul flow from the site. However, based on the calculated average 6DWF of 12.01l/s, a storage volume of 821m^3 would be required to store flows for 19 hours.

Option 2 – Alternative Connection Point; Off-line Storage (See Appendix C2 for Plan)

- Connect development flows to manhole TQ06380202.
- Provide off-line storage of 1216m^3 at MH TQ05388701 by providing weir at crest level 50.15 (m AD).

6.0 Risks and Issues

Current understanding of the hydrology of urban environments recognises that the effective pervious area (the pervious proportion of the catchment that produces surface runoff and generates flow in the sewer) is likely to exhibit a dynamic nature in relation to increasing volumes of rainfall, i.e. the more rainfall the greater the resulting effective pervious area is likely to be.

Whilst the hydrological models deployed attempt to simulate this dynamic behaviour, there is a risk that the model, when extrapolated to storm events, will not accurately predict the flows in the system. Therefore, any potential error is multiplied when the system is tested against a large design storm.

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.

This analysis for Option 1 has indicated that flows may need to be stored for up to 19 hours. This should be confirmed as part of detailed design, as storage of greater than 12 hours may lead to septicity, and measures to control this may need to be considered.

7.0 Conclusions

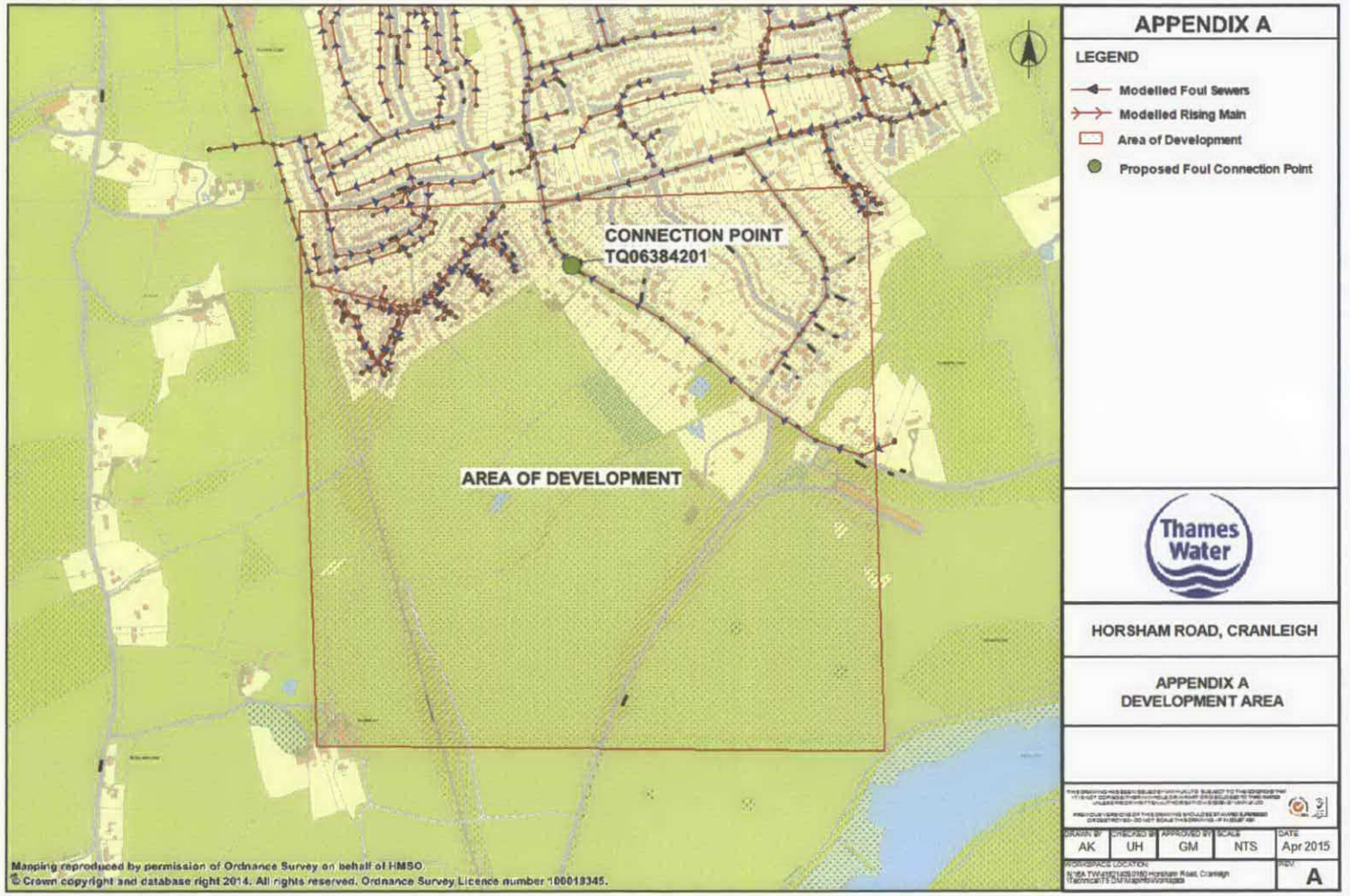
The desktop study has successfully investigated and identified the implications of the proposed new development on a Greenfield site at Horsham Road, Cranleigh to the existing foul network.

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.

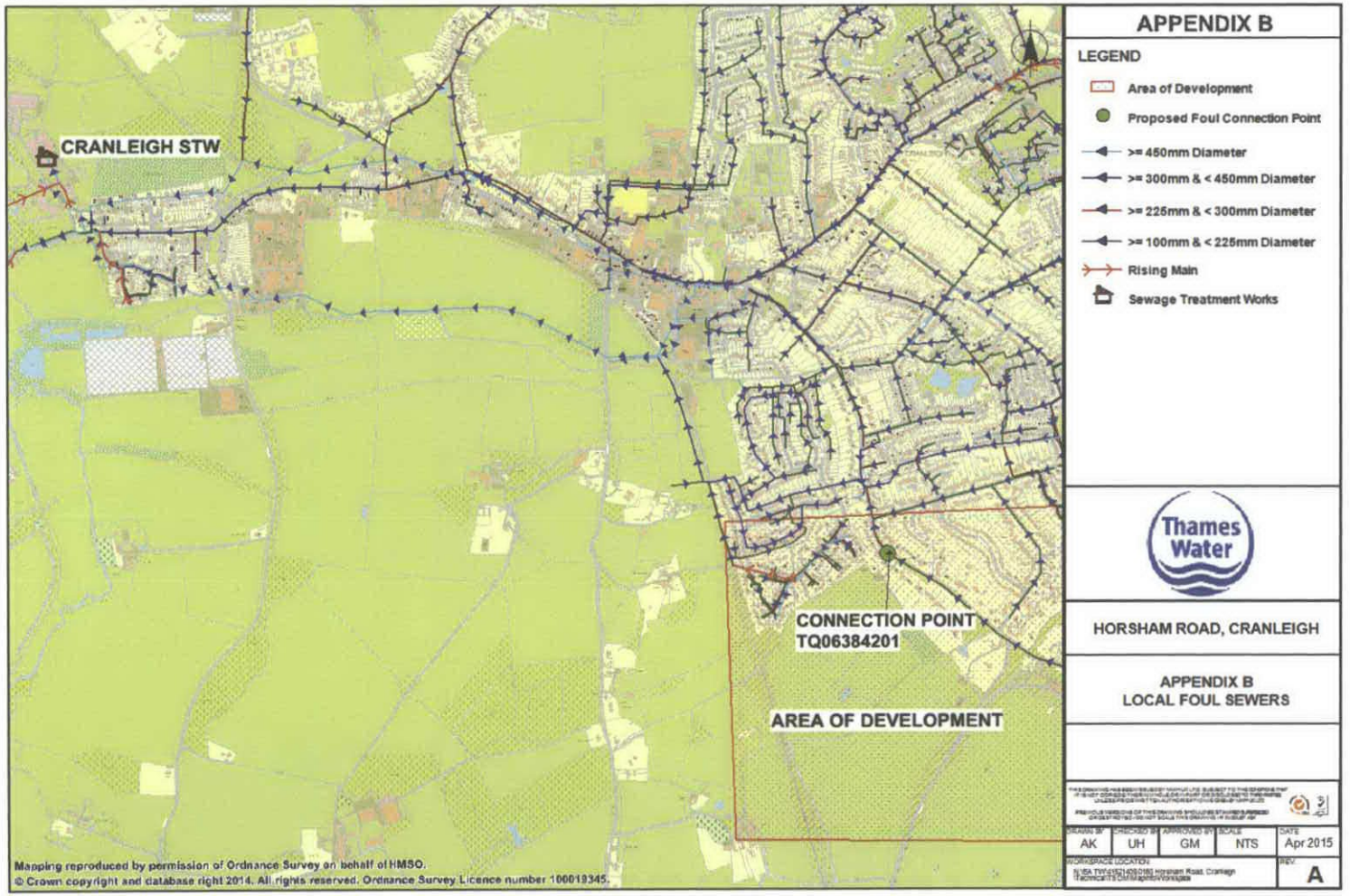
Improvements to the existing foul network are required to enable the proposed connection to the sewer network, without causing any detriment to the level of service provided. The proposed indicative option resolves the modelled increase in flooding and surcharge on the sewer network.

The 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.

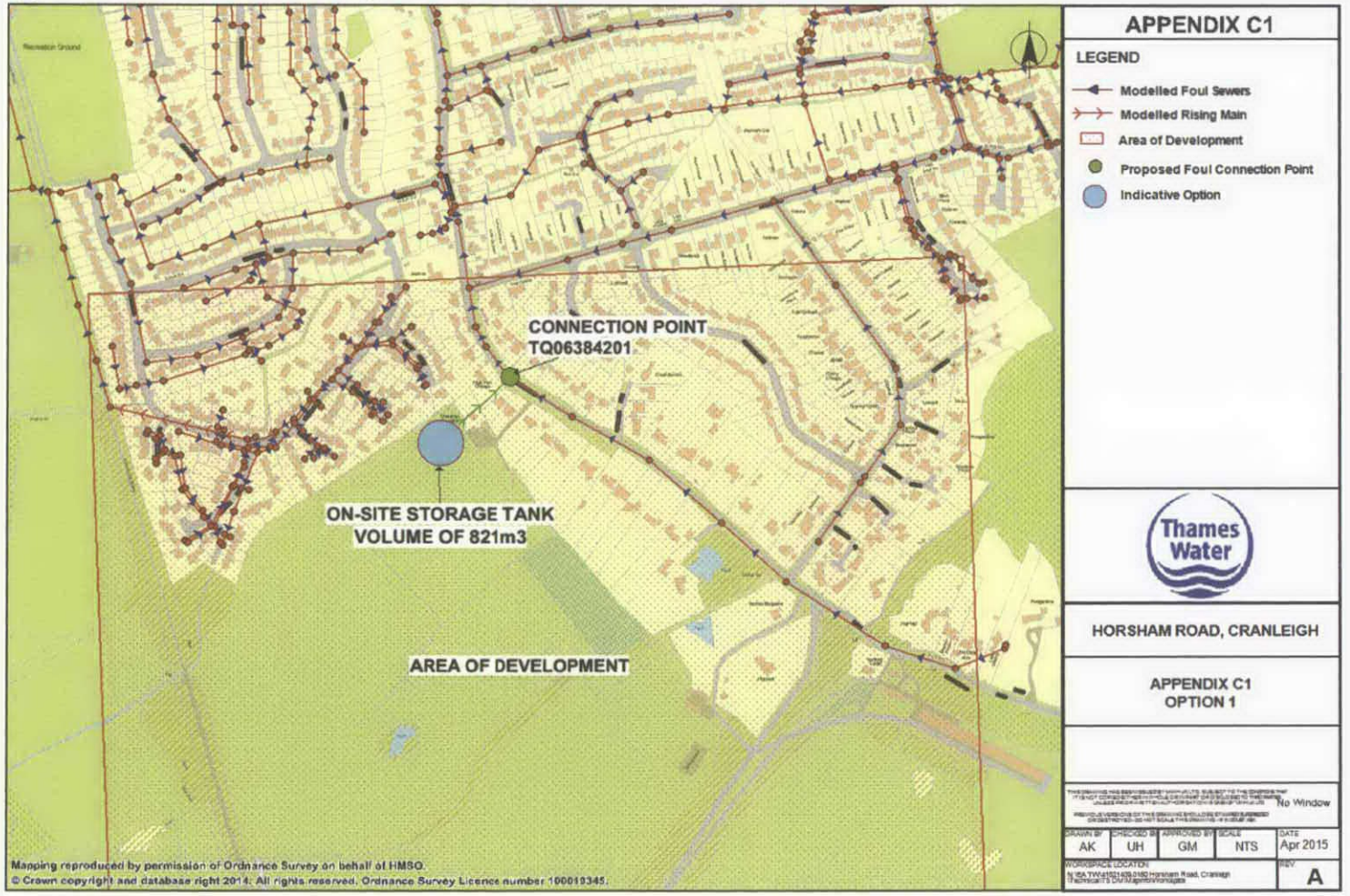
Appendix A – Site Plan



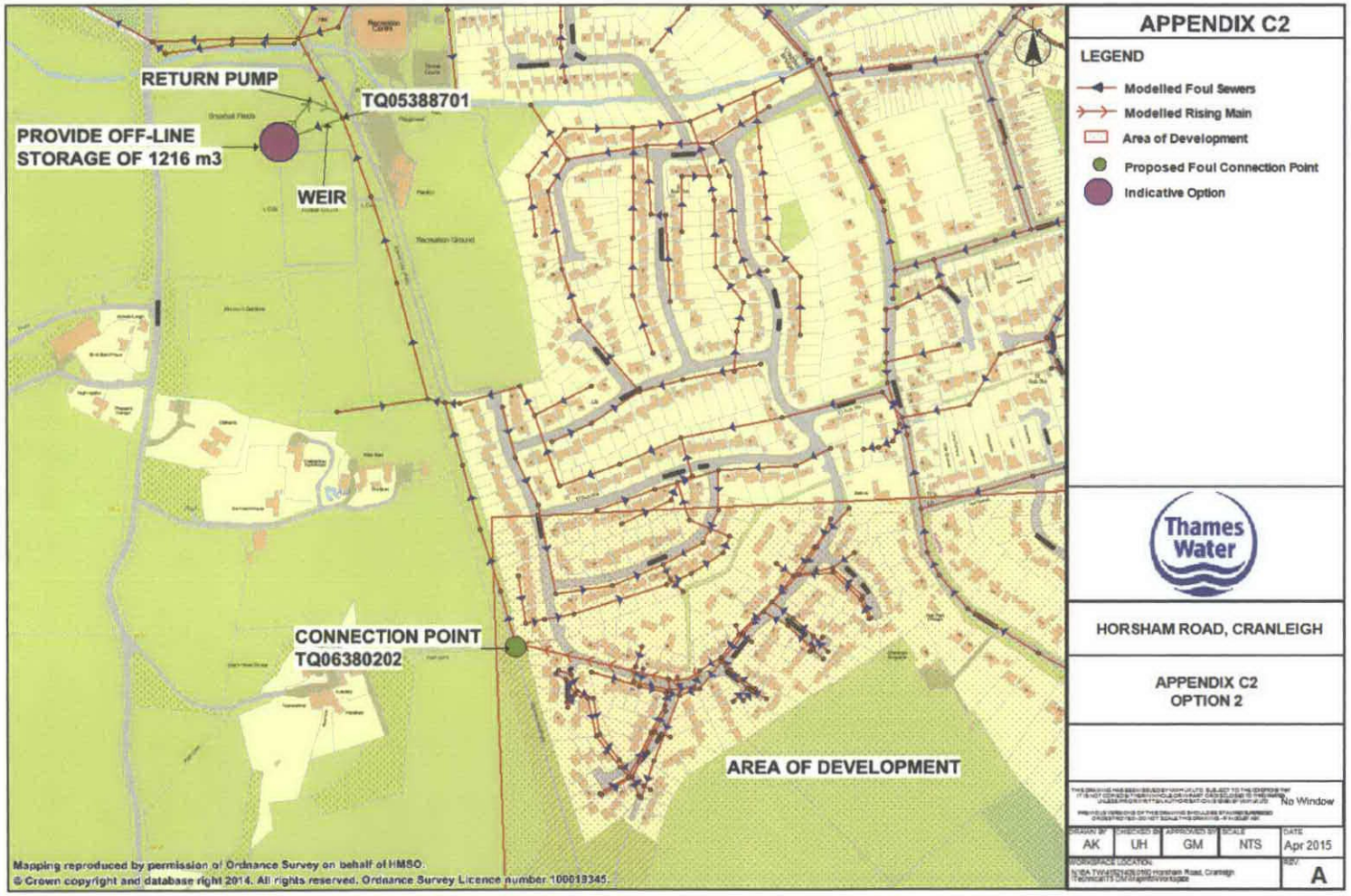
Appendix B – Local Sewers



Appendix C1 – Connections and Improvements – Option 1



Appendix C2 – Connections and Improvements – Option 2



APPENDIX E –THAMES WATER ASSET SEARCH