Typology	**Units (No.) / Area (m2)**	**People**	**Benchmark** ***Sewers for Adoption 'The Code' & Urban Drainage – Butler & Davis.***	**Average Daily Demand AADD (l/s)**	**Peaking Factor** ***Urban Drainage – Butler & Davis.***	**Infiltration**	**Total Peak Hourly Demand (l/s)**
from use schedule)							
Primary School 2FE (Pupils)	NA	640	100 l/pers/day	0.74	6.00	10%	4.44
Secondary School 6FE (Pupils)	NA	900	100 l/pers/day	1.042	6.00	10%	6.34
Public Real, Retail & Community Uses	2,000	NA	10 l/pers/day	2.79	6.00	10%	16.73
Total Development Potable Water Demand							**181.87**

*This is based on the assumption that the 215,000sqm GEA of residential floorspace would equate to 1,800 homes.

6.3 Foul Water Drainage Network

The foul water network is split by development area and will utilise gravity pipework as well as lift pump stations and rising mains, where necessary to convey flows to the proposed point of connection (POC).

Development in the north of the Site is proposed to connect to the Thames Water existing manhole 4804 to the immediate east of the existing pump station adjacent to Rowell Brook. To connect the remainder of the site to the network there is a second proposed pump station in the southeast of the Site.

Given the limited number of alternative discharge options and relative cost effectiveness, it is believed that this proposal for discharge to the existing Thames Water network is the most beneficial solution. Flows from the existing pump station are then conveyed via a rising main to the southeast corner of the Site where they will converge with flows from the proposed pump station in this area. From here, the foul water will pass beneath the Network Rail line via a proposed rising main and discharge into the existing gravity system.

The capacity of the existing pump station and rising main is critical to the function of the proposed network. As such, confirmation from Thames Water on the capacity of this infrastructure has been requested. TW have advised of approval to connect to their existing northern pump station.

At this stage of design, it is estimated that gravity pipework no larger than 300mm diameter will be required to sufficiently convey foul water flows to their required connection points - based on network modelling in Microdrainage. Sizing of the infrastructure for the proposed pump stations and rising main will be carried out during the detailed stages of design.

All sewerage assets would be designed in line with the design criteria set out in the Water UK Design and Construction for Foul and Surface Water Sewers Industry Guidance (The Code). The network would be put forward for adoption by Thames Water under Section 104 of the Water Industry Act 1991.

Figure 6—1 Indicative Sitewide Foul Water network layout

6.4 Foul Water Adoptable Pumping Station

The typical layout of an adoptable Type 3 pumping station is defined in the Water UK Design and Construction industry guidance. This requires an approximate 8m x 12m land take that allows access for a tanker. The typical layout, taken from The Code can be seen overleaf. It is assumed that the compound will require fencing to prevent unauthorised access. The compound is required to accommodate the inlet manhole, pump wet well chamber and the

valve chamber. A kiosk for operation of the pump will also be required. Most of the plant within the compound will be located below ground, with the kiosk being presented above ground.

As per Thames Water's Local Practices to Support Code for Adoption Sewerage document, a minimum of 4 hours of emergency storage will be provided at all of the proposed foul water pump stations.

Figure D 3
Typical Type 3 pumping station layout

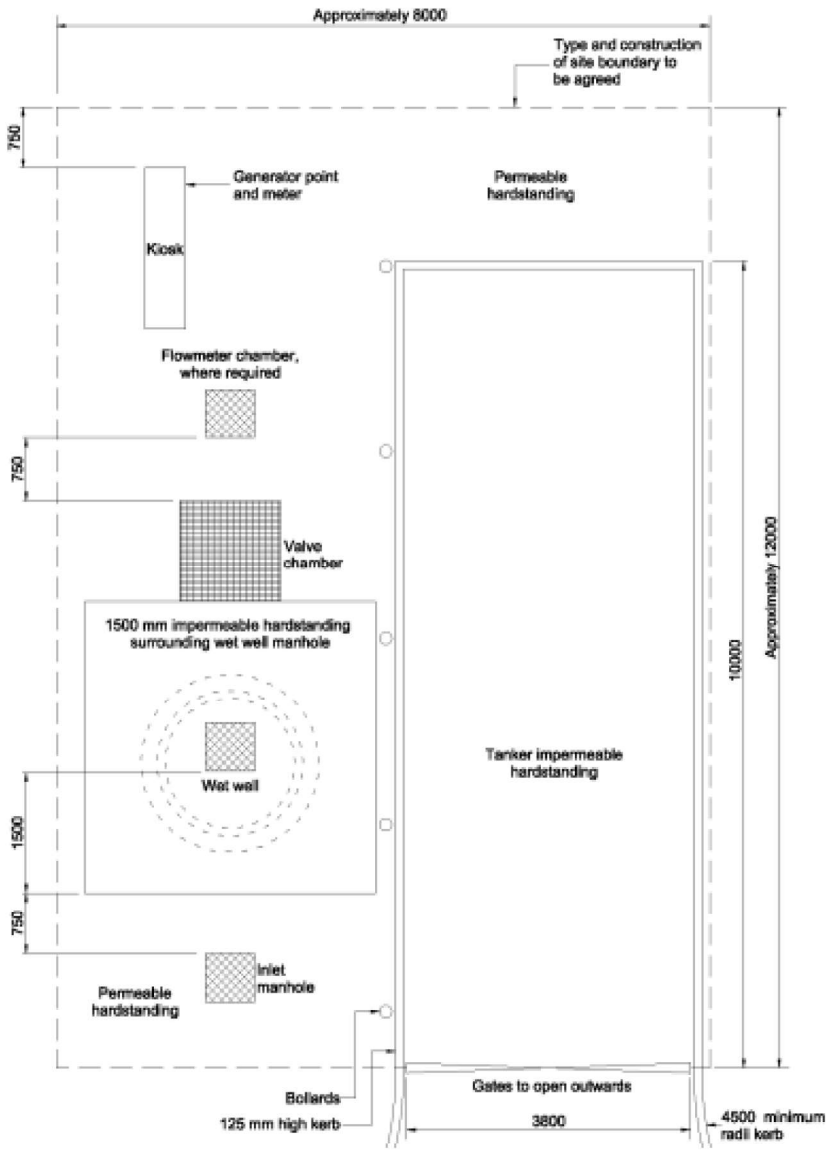


Figure 6—2 Typical Pumping Station Detail (The Code V2.0, 2020)

7 Summary and Conclusion

This drainage strategy has been carried out on behalf of OUD as part of the Outline Planning Application for the proposed mixed-use development on the current site of Begbroke Science Park, Begbroke, Kidlington. The Proposed Development consists of the expansion of the existing Science Park, residential and associated amenity, education and community uses.

The surface water drainage strategy for the proposed development will aim to replicate the predevelopment surface water runoff regime. This is achieved by capturing, filtering and harvesting (where possible) surface water as close to source as possible through source control SuDS features. The SuDS hierarchy will be used to design the Site drainage in the most sustainable way, building upon OUD's vision for sustainable places. Wherever possible, SuDS features will be specified over traditional piped drainage to maximise water quality benefits and site amenity.

The foul water strategy is split by development area and will utilise gravity pipework as well as lift pump stations and rising mains, where necessary to convey flows to the proposed points of connection (POC). For the north western part of the site, the proposed POC is Thames Water existing manhole 4804 to the immediate east of the existing pump station in the north of the Site. Flows from the existing pump station are then conveyed via a rising main to the southeast corner of the Site where they will converge with flows from the rest of the site at another proposed pump station in this area.

For the southern section of the site flows will be conveyed to this proposed south eastern pump station via gravity pipework. From here, the foul water will pass beneath the Network Rail line via a proposed rising main and discharge into the existing gravity system.

The information provided in this drainage strategy will be used to in inform more detailed design proposals as the project develops.

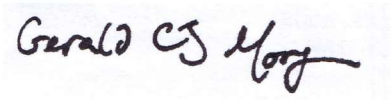
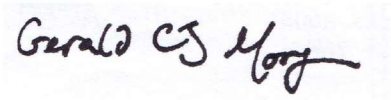
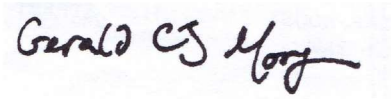
Appendix F Proposed Secondary School Site Hydraulic Modelling Technical Note

MAY 30TH 2023

Proposed School Site Modelling

Project Name Begbroke Innovation District
Project Number EVY1077
Prepared For Buro Happold

Document Control

Written by	 Dr. Gerald C J Morgan	May 30th 2023
Checked by	 Dr. Gerald C J Morgan	May 30th 2023
Approved by	 Dr. Gerald C J Morgan	May 30th 2023

Revision	Issued to	Date
A	Buro Happold	May 30, 2023

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1. Introduction

1.1 Project Requirements

Edenvale Young Associates have been commissioned by Buro Happold to undertake hydraulic modelling at a site west of Kidlington, Oxfordshire. The results of this hydraulic modelling will be used to inform a Flood Risk Assessment (FRA) for the proposed Begbroke Innovation District—a mixed use development incorporating the existing Begbroke Science Park.

The Begbroke Innovation District incorporates a proposed school site and it is a project requirement that this school site be free of flooding in the design flood events. Accordingly it is proposed to re-grade the land within the school site so that flood risk from outside that land is eliminated and to manage the rainfall incident on the site via surface water drainage.

1.2 Purpose of this Note

This technical note outlines the results of hydraulic modelling work to assess the impacts associated with re-grading the school site. The location of the school site is shown in figure 1.1.

This note will not recapitulate the baseline hydraulic modelling and should be read in conjunction with the main hydraulic modelling report, "Hydraulic Modelling Report - Begbroke Innvoation District" revision B.

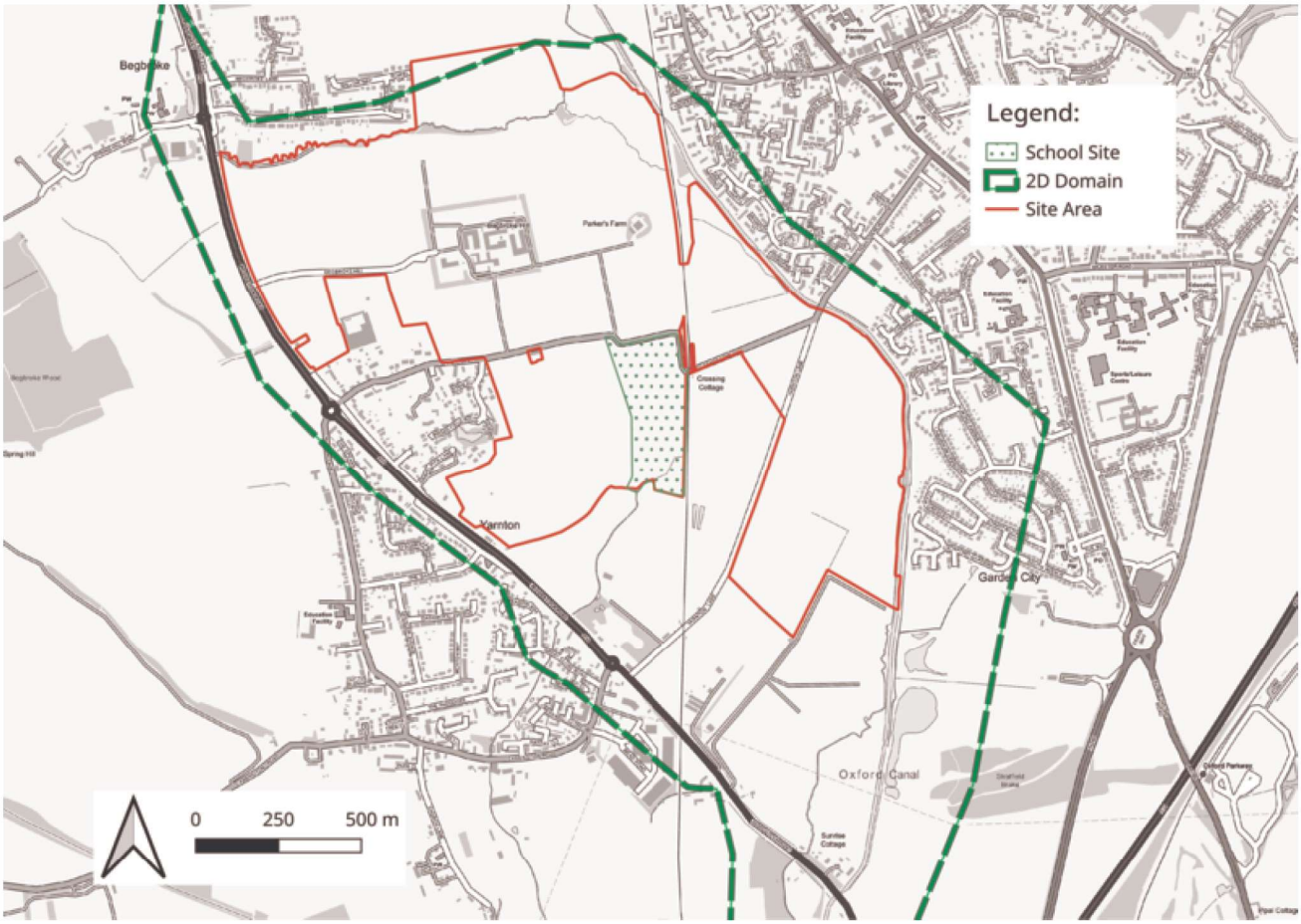

Figure 1.1: *School site location within the wider Begbroke Innvoation District red line.*

2. Hydraulic Modelling

2.1 Baseline Modelling

The latest version of the baseline model as described in revision B of "Hydraulic Modelling Report - Begbroke Innovation District" has been used. The effect of the re-grading has been modelled for three design events: two 1% AEP events with 26% and 41% allowance for climate change (the "Central" and "Higher" estimates for the 2080s epoch, respectively); and the 0.1% AEP "present day" event. An 11-hour storm duration has been used in each case.

2.2 Land Raising

It is proposed to re-grade the school site by raising the ground levels sufficiently to prevent flood water backing up onto the site from the southern drainage ditch. In the model, the school site has been raised to a level above the highest modelled flood levels and the hydrological inflow location for the southern drainage ditch has been moved downstream to the edge of the school site. These model changes are representative of the proposed works under the following assumptions:

- The proposed grading of the school site does not significantly alter the drainage directions of ground and surface water, which continues to drain from the existing catchments to the southern drainage ditch.
- The reaches of the southern drainage ditch currently crossing the school site are backfilled as part of the re-grading process.
- Excess rainfall on the school site is handled by the surface water drainage system and drains to the southern drainage ditch at approximately green-field run-off rates.

2.3 Connectivity

The proposed land-raising across the school site would necessitate the filling-in of an existing tributary reach of the southern drainage ditch across the southwest corner of the site. This would severely limit connectivity with this area and is likely to cause significant downstream disbenefit. Accordingly, a replacement channel is proposed along the boundary of the school site to maintain the connectivity of the southern drainage ditch. The route of this channel is shown in figure 2.1. This has been simulated through land-lowering in the 2D model. It should be noted that, as the existing ditch falls within the school site, it is assumed to be backfilled and the replacement channel will follow the boundary of the site, to the southwest.

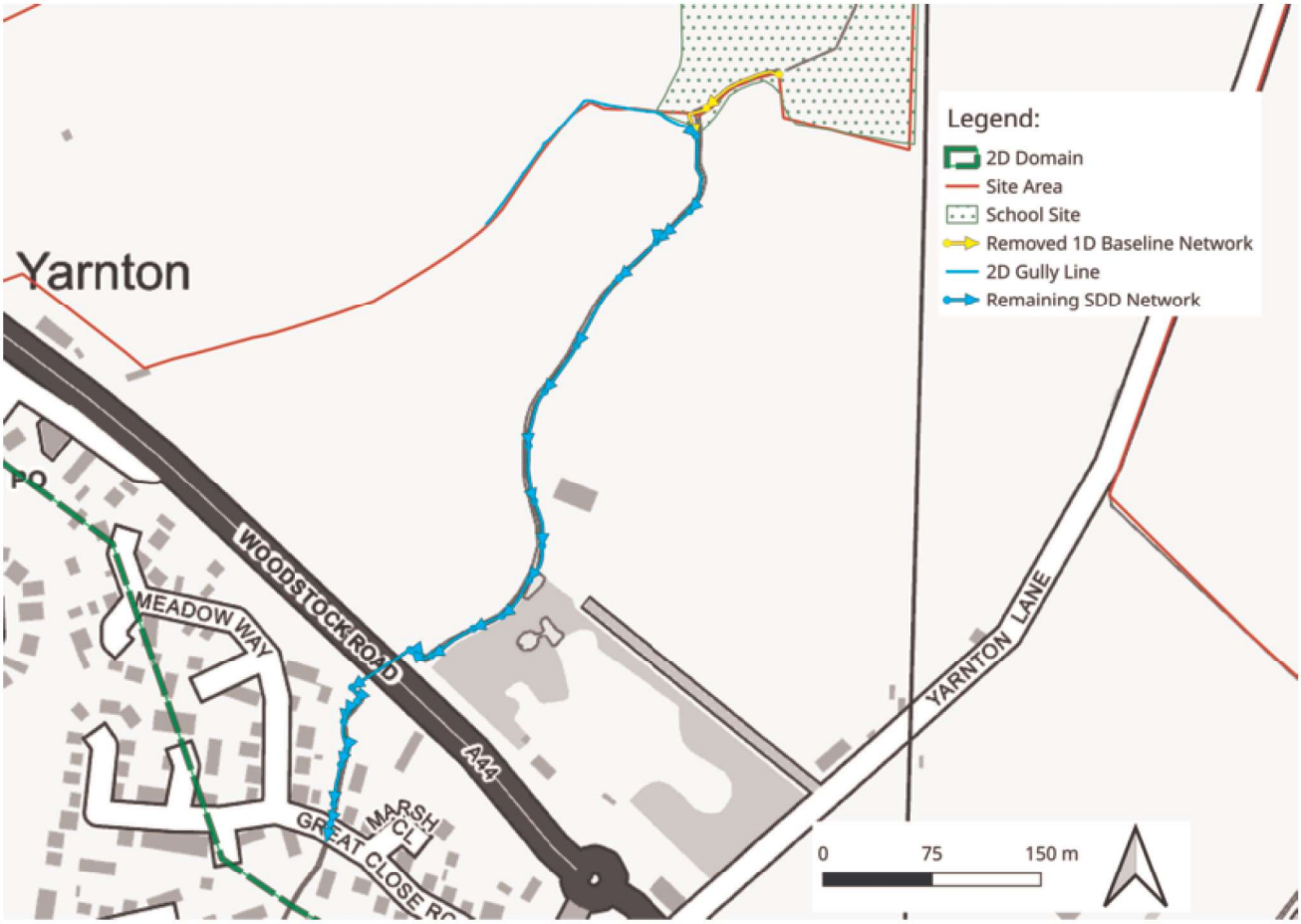

Figure 2.1: *Plan showing changes between the baseline channel schematisation and the proposed condition.*

3. Results

Maximum Depth

Figures 3.1–3.3 show the maximum depth results in the proposed condition for each of the three design events.

It can be seen that the school site is flood free in all of the events and the peak water level results from this model may therefore be used to inform the required levels for re-grading the site.

Flood Level Differences

Figures 3.4–3.6 show the differences in maximum flood level and extent between the proposed school re-grading scenario and the baseline model. It can be seen that a substantial amount of floodwater has been displaced from the school site and that mitigation will be required.

Figure 3.1: *Maximum modelled depths for the 1% AEP event with 26% climate change allowance.*

Figure 3.2: *Maximum modelled depths for the 1% AEP event with 41% climate change allowance.*

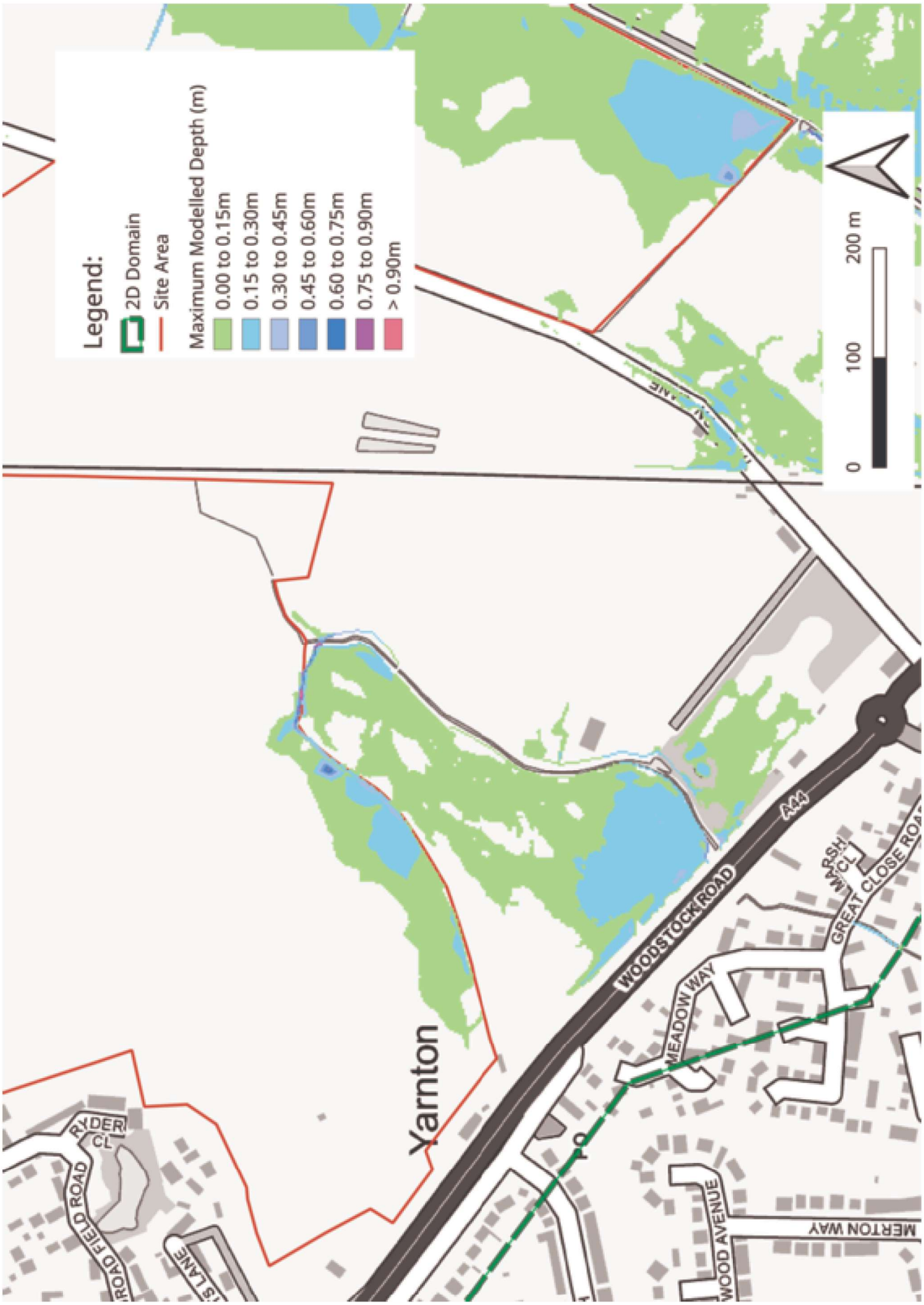

Figure 3.3: *Maximum modelled depths for the 0.1% AEP present-day event.*

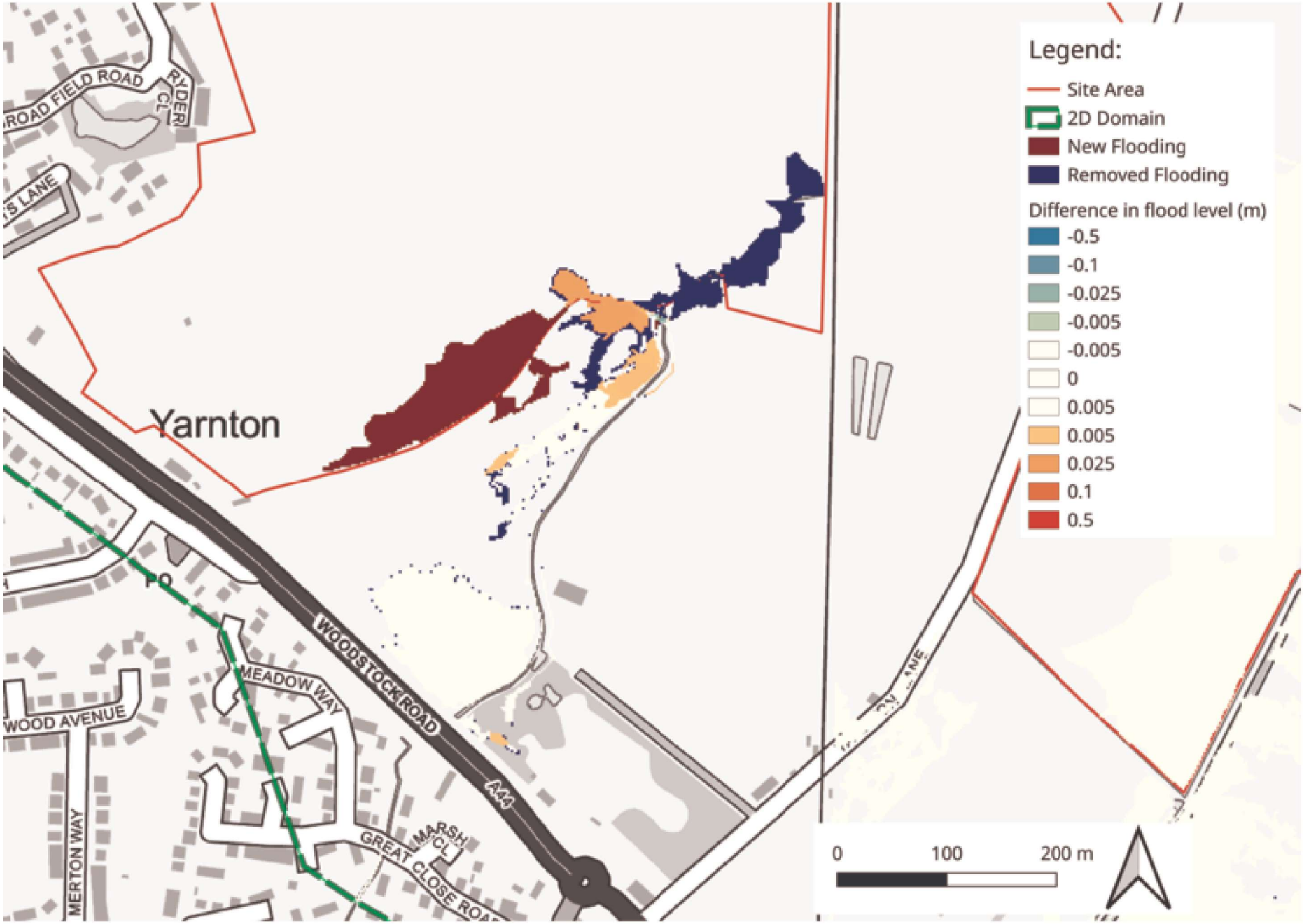

Figure 3.4: *Peak water level differences between the proposed and baseline conditions for the 1% AEP event with 26% climate change allowance.*

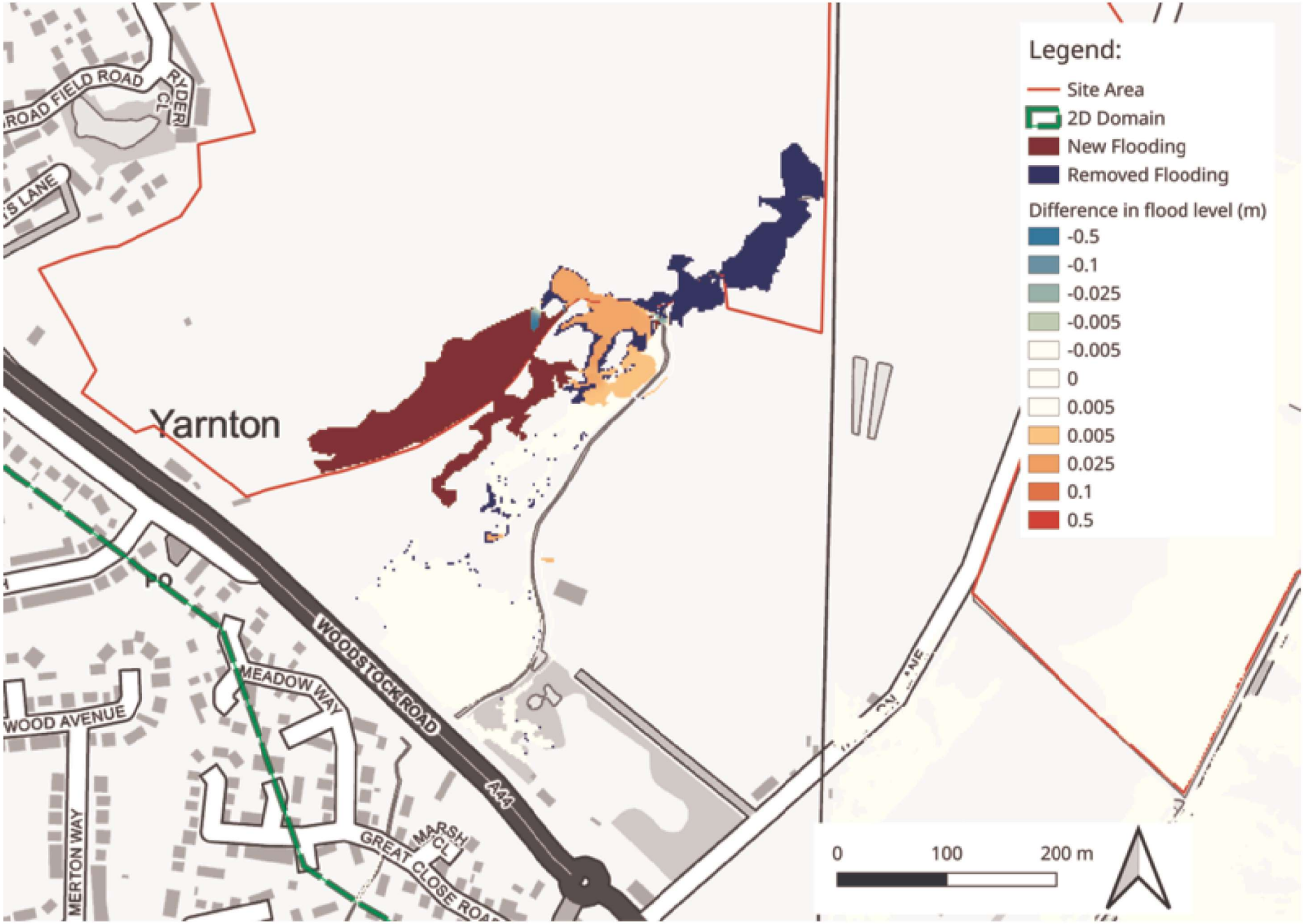

Figure 3.5: *Peak water level differences between the proposed and baseline conditions for the 1% AEP event with 41% climate change allowance.*

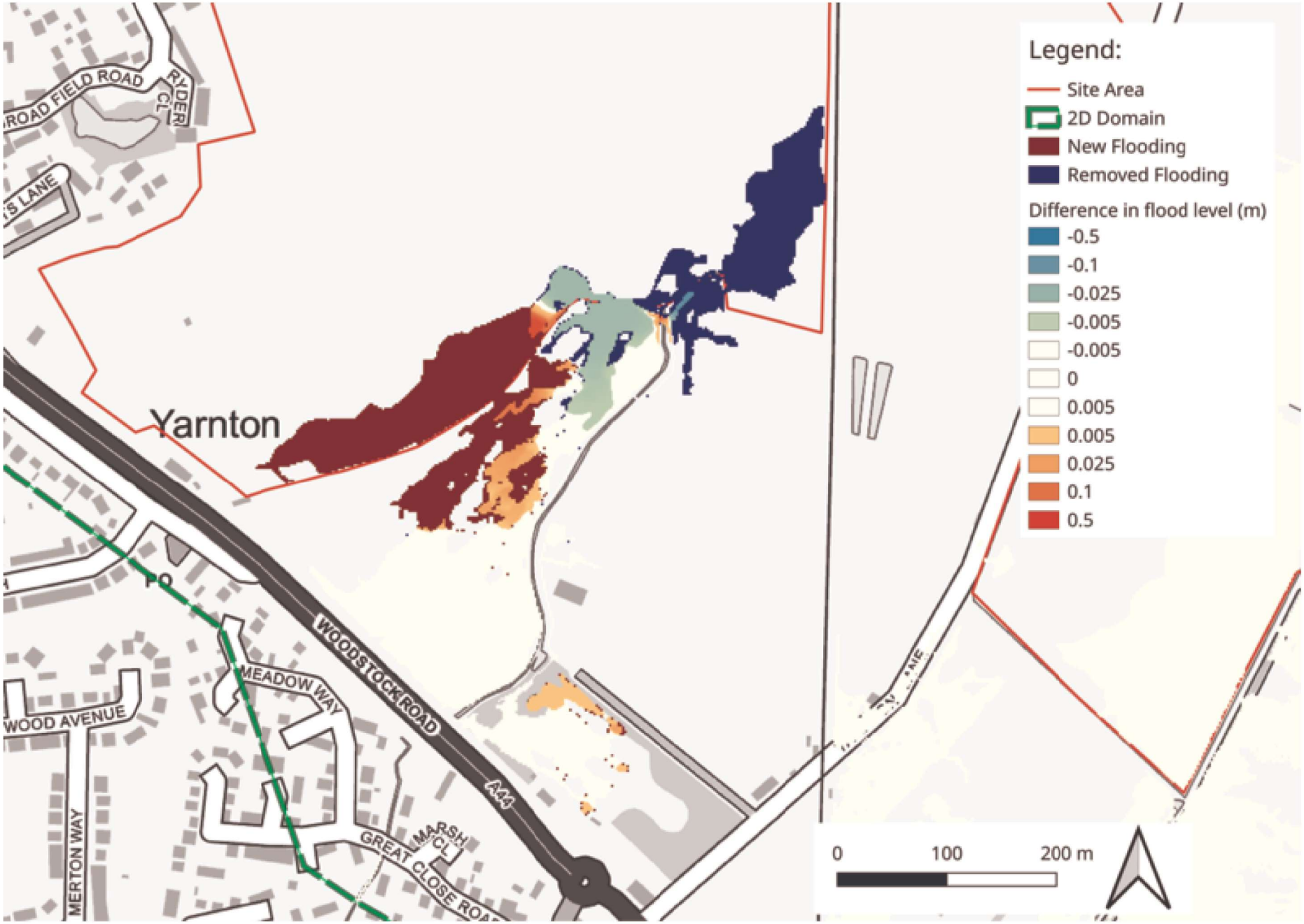

Figure 3.6: *Peak water level differences between the proposed and baseline conditions for the 0.1% AEP present-day event.*

4. Conclusions

Edenvale Young Associates have modelled the flood risk impacts of a proposed re-grading of the school site within the Begbroke Innovation District.

The proposed-condition modelling does not show any flood depths within the school site for any design event and the water levels from this model may therefore be used to inform the re-grading levels.

The models do show significant increases in flood risk to the west of the school site and mitigation for this will likely be required. It is felt that flood storage within the red line to the west of the school site would provide effective mitigation on a volume-for-volume basis.

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