Flood Risk	Summary of Risk to Development Site (High/Medium/Low)	Notes	Mitigation Required
Surface Water	Low	A review of the EA RoFfSW dataset suggests extensive ponding predicted from the 1 in 30 year (3.33% AEP) event onwards in the southern area of the Proposed Development however this is likely a result of fluvial flooding. In the 1 in 100 year and 1 in 1000 year event, surface water flooding is predicted along Pield Heath Road. An overland surface water flow path is also shown in the north-eastern corner. Mitigation is proposed to manage the risk of surface water flooding to the development, including the installation of a surface water drainage network capable of attenuating the 1 in 100 year (1% AEP) plus 40% climate change event. Assuming mitigation measures are implemented, the risk of surface water flooding to the development is considered to be low and no further mitigation is required.	Yes Installation of Surface Water Drainage Network able to accommodate up to and including the 1 in 100 year (1% AEP) plus 40% climate change event Overland offsite surface water flow path in the north-eastern corner will be conveyed by a proposed cut off filter drain along the eastern perimeter of the site.
Groundwater	Low	A review of the BGS data shows that the Proposed Development is located above a Secondary A aquifer associated with the superficial deposits. The presence of an aquifer beneath the site could be indicative of elevated groundwater levels. The northern part of the site is located within a Source Protection Zone. However, the BGS Groundwater Vulnerability Map shows the site to be at low – unproductive risk from groundwater flooding. The Proposed Development includes below ground elements including a basement, foul drainage network and attenuation tank. As such, as a precautionary measure, mitigation measures are required.	Yes All below ground elements must be designed to prevent water ingress and withstand hydrostatic groundwater pressures.
Water Supply Infrastructure	Low	Following a review of Affinity Water Utility Survey, there are several water mains located within the site boundary and along the roads which bound the site. Affinity Water, as a designated Risk Management Authority have a legislative responsibility to undertake adequate maintenance and inspection regimes, such that the risk of pipe surcharge is considered low.	No

Flood Risk	Summary of Risk to Development Site (High/Medium/Low)	Notes	Mitigation Required
Sewer Infrastructure	Residual	Following a review of the available Thames Water asset location search, there are several foul sewerage networks within close proximity to the Proposed Development, along the roads surrounding the Proposed Development site. In the event of a sewer breach, flows would likely be channelled south westwards by the topography towards the Ordinary Watercourse A. However, the existing sewer infrastructure along Pield Heath Road has a 225 mm internal diameter and is located at the beginning of the respective drainage networks, as such, the ability of these systems to generate large volumes of flow is considered unlikely. However, in the event of a sewer surcharge the proposed drainage network will likely capture the overflow. Therefore, the risk to the development from sewer and water supply infrastructure is low.	No
Canal Systems	Low	A review of the Canal and Rivers Trust mapping indicates that there nearest canal to the Proposed Development is the Grand Union Canal, approximately 1.5 km west of the Proposed Development.	No
Reservoirs	Low	The Proposed Development is not located in the extent of potential reservoir flooding.	No
Flood Risk Management Infrastructure	Low	The nearest flood risk management infrastructure includes the River Pinn which is protected by high ground. The site is not located within an area considered to benefit from defences.	No

5. Impacts of the Development on Flood Risk

5.1 Impact on Fluvial Flooding

It is possible that the Proposed Development could have an impact on fluvial flooding due to an alteration of flood mechanisms and flows and through an increase in the amount of surface water runoff generated by the site. As such, the development has been assessed in relation to these two potential issues.

5.2 Impact on Flood storage and Mechanisms

It is possible that the Proposed Development could have an impact on fluvial flooding due to an alteration of flood mechanisms and loss of floodplain storage.

The Proposed Development is located in Flood Zone 1 and is therefore at low risk of fluvial flooding from Main Rivers. However, it is acknowledged through hydraulic modelling that the site is at risk from fluvial flooding associated from the unnamed Ordinary Watercourse A that traverses through the southern perimeter of the site.

5.2.1 Phase 1a and Phase 1b – Proposed Scenario

As described in **Section 4.3**, the proposed hydraulic model scenario, which incorporates the Proposed Development associated with Phase 1a and 1b is shown outside the flood extents up to and including the 1 in 100 year plus 21% CC event with the exception of the southern access road. As such, the new hospital facility situated to the west of the site will have minimal impact on fluvial flood mechanisms.

As a precautionary measure, mitigation measures such as the flood bund at the entrance of the hospital and raising the oxygen tanks on a platform will be implemented to minimise the fluvial flood risk to the development. In addition, Phase 1 will also include the extension of two existing culverts beneath the southern access road whilst maintaining the cross-sectional area. To ensure these mitigation measures do not have an impact on flood storage nor displace flood water outside of the site boundary, a map showing the flood depth differences between the baseline scenario and the proposed scenario (with on-site mitigation for Phase 1) is shown in **Figure 5-1**. Please note, a 10 mm modelling tolerance has been implemented within the Water Depth Difference Maps where any depths within this threshold have been classified as having 'no impact'.

As shown, there is no displacement of flood water outside the site boundary. A localised area of betterment is shown in the south western corner of the Proposed Development site with flood depth differences shown between 0.02 m and 0.1 m.

As such, the impact on fluvial flood risk from the Proposed Development in Phase 1a and Phase 1b is considered **low** and no further mitigation is required.

5.2.2 Phase 1a and Phase 1b - Off-site Mitigation Measures

Mitigation measures such as the upstream storage basin and associated flood bunds at Colham Green have been modelled with an aim to reduce fluvial flooding, **Figure 5-2** shows the flood depth differences between the baseline scenario and the proposed development if the off-site mitigation was taken forward. As such, the impact on fluvial flood risk from the off-site mitigation measure in Phase 1a and Phase 1b is considered **low** and no further mitigation is required. As described in **Section 4.3.2**, a marginal negligible betterment in flood depths is shown in the 1 in 100 year plus 21% CC event along the southern access road by approximately 0.04 m and there is no displacement or increases in flood risk within the Proposed Site or surrounding area. The off-site mitigation measures are not included within the proposed development but the associated impacts were assessed within this FRA for completeness.

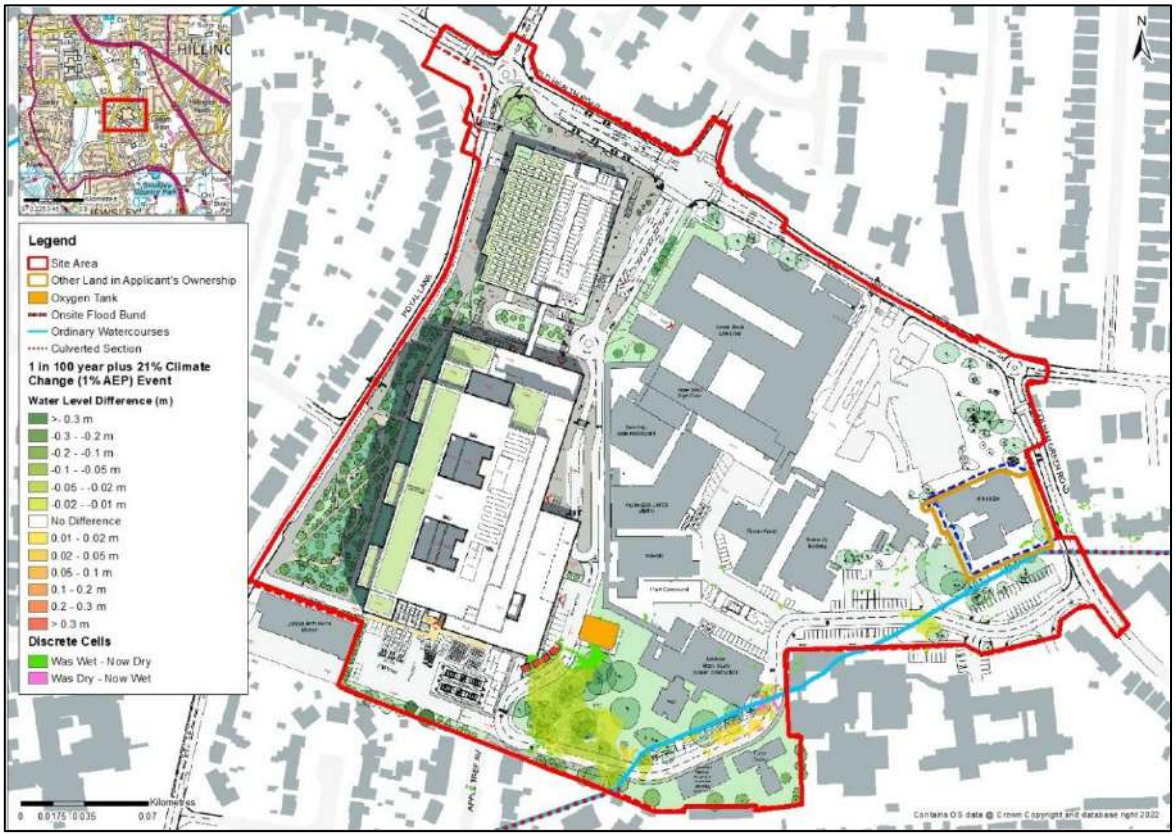


Figure 5-1 - 1 in 100 year + 21% CC Flood Depth Difference (Proposed Scenario with On-site Mitigation for Phase 1 vs Baseline)

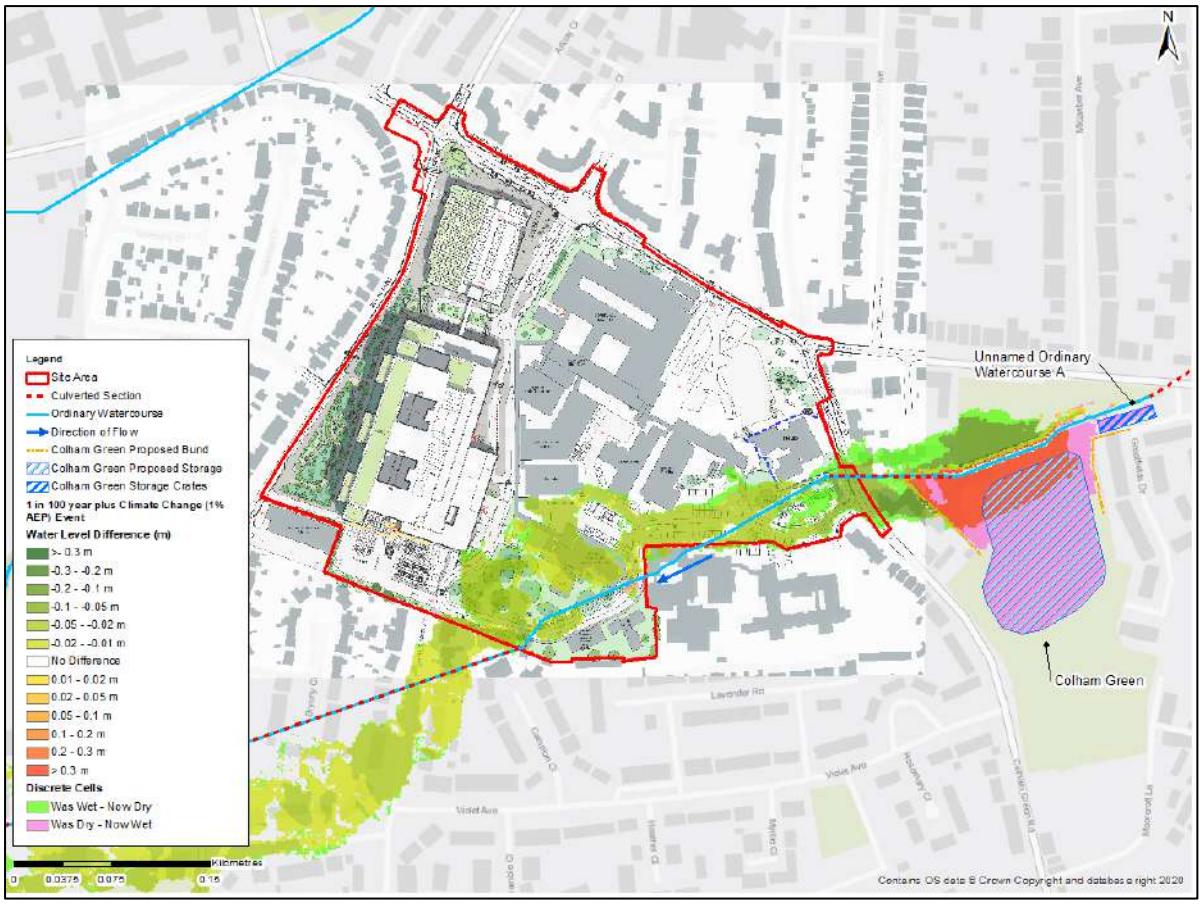


Figure 5-2 - 1 in 100 year + 21% CC Flood Depth Difference Proposed Scenario with Off-site Mitigation for Phase 1 vs Baseline)

5.2.3 Phase 1c and Phase 2 – Proposed Scenario

As described in **Section 4.4**, the FFLs of Plot P03 have been raised by 300 mm above the 1 in 100 year plus 21% CC event. A 500 mm heighted wall will also bound the southern perimeter of Plot P03 and will be dry-proofed to prevent the ingress of fluvial water. To ensure there is no displacement of flood water to the surrounding land, a water depth difference map for the 1 in 5 year and 1 in 100 year plus 21% CC comparing the proposed scenario for Phase 1c (excluding mitigation measures) and Phase 2 with the baseline scenario has been produced, see **Figure 5-3** and **Figure 5-4.**

Figure 5-3 - Phase 1c and Phase 2 Proposed Scenario vs Baseline - 1 in 5 year – Water Depth Difference

Results show in the 1 in 5 year event and 1 in 100 year plus 21% CC event, there is no increase in flood risk to the surrounding area or within the site as a result of the Proposed Development and raising the FFLs'. As such, the impact on fluvial flood risk from the Proposed Development in Phase 1c and Phase 2 is considered **low** and no further mitigation is required.

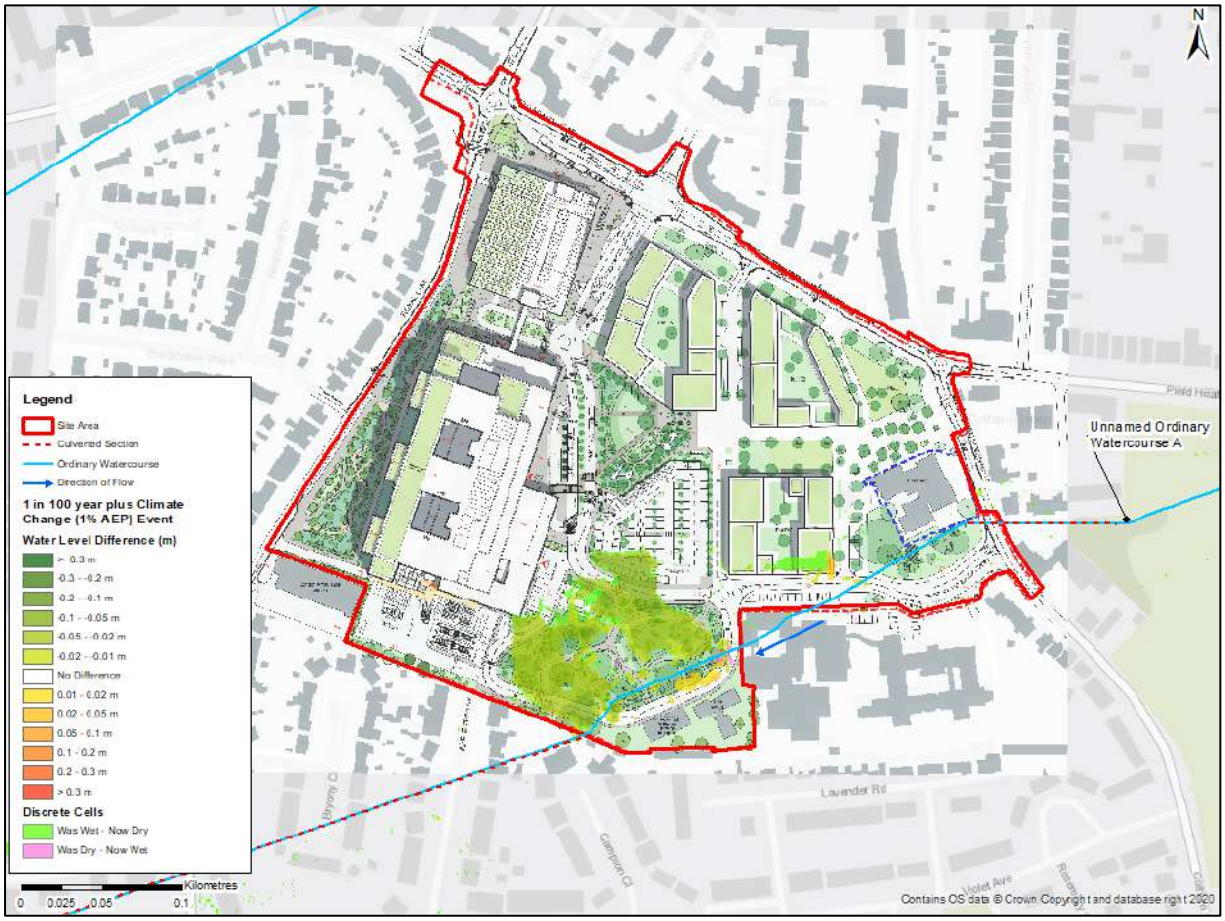


Figure 5-4 - Phase 1c and Phase 2 Proposed Scenario vs Baseline - 1 in 100 year plus 21% CC – Water Depth Difference

5.2.4 Phase 1c and Phase 2 – Proposed Scenario – Onsite Mitigation – Option 2

As described in **Section 4.4.1 and Section 4.4.2**, additional on-site mitigation measures have also been explored for Phase 1c and Phase 2 including the preferred option of Option 2. To ensure there is no displacement in flood risk outside of the site boundary, water depth differences have been produced for the 1 in 5 year, 1 in 20 year and 1 in 100 year plus 21% CC event. As identified in **Figure 5-5**, **Figure 5-6** and **Figure 5-7**, there is no increase in flood extents off-site for all events up to and including the 1 in 100 year plus 21% CC event.

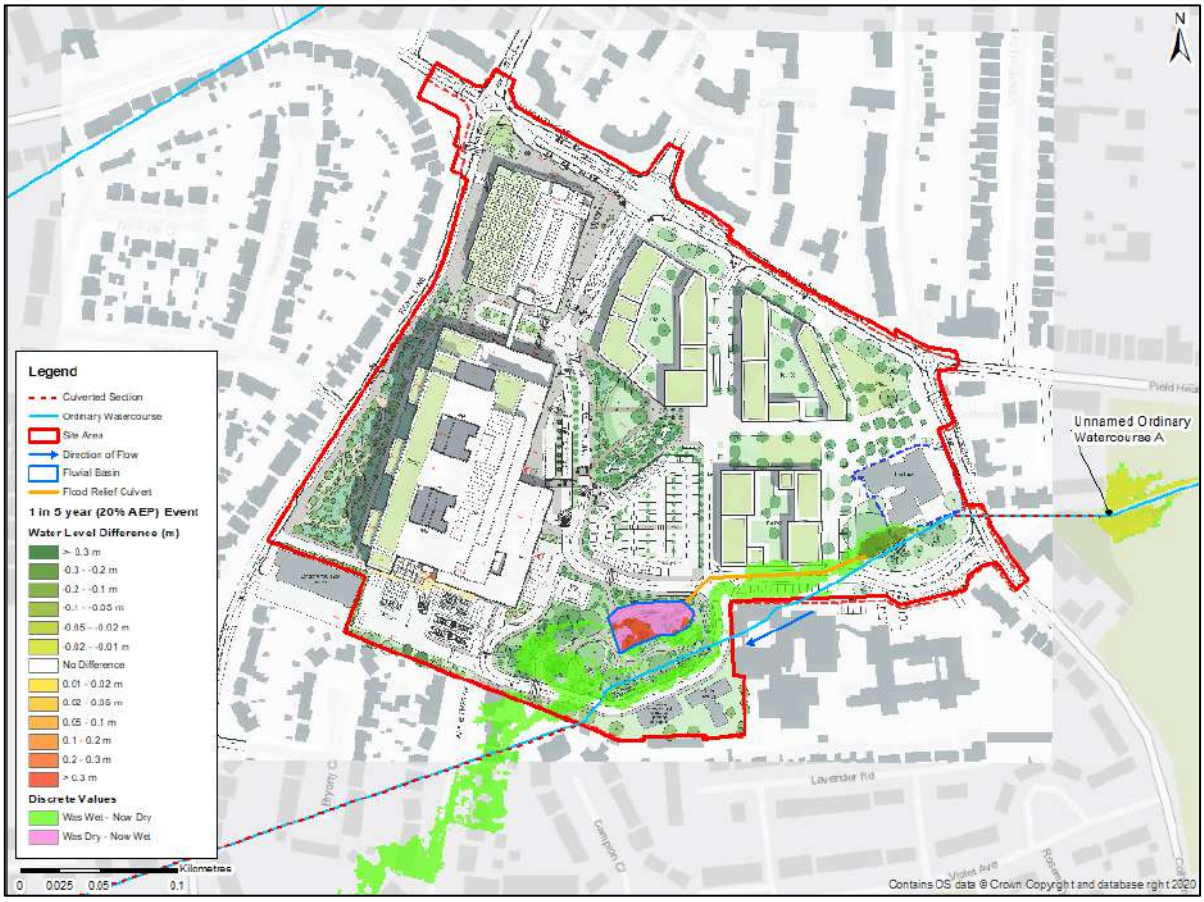


Figure 5-5 - 1 in 5 year – Water Depth Difference – Option 2 Vs Baseline

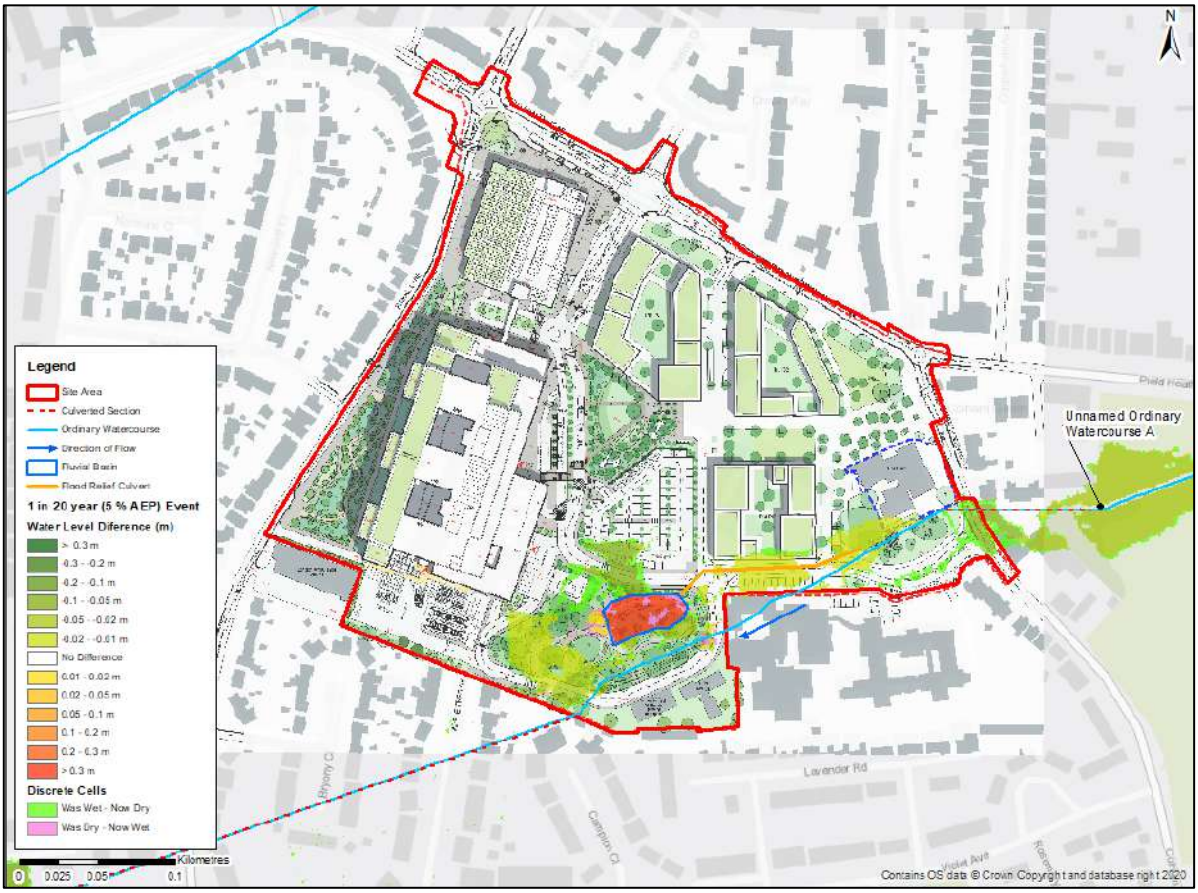


Figure 5-6 - 1 in 20 year – Water Depth Difference – Option 2 Vs Baseline

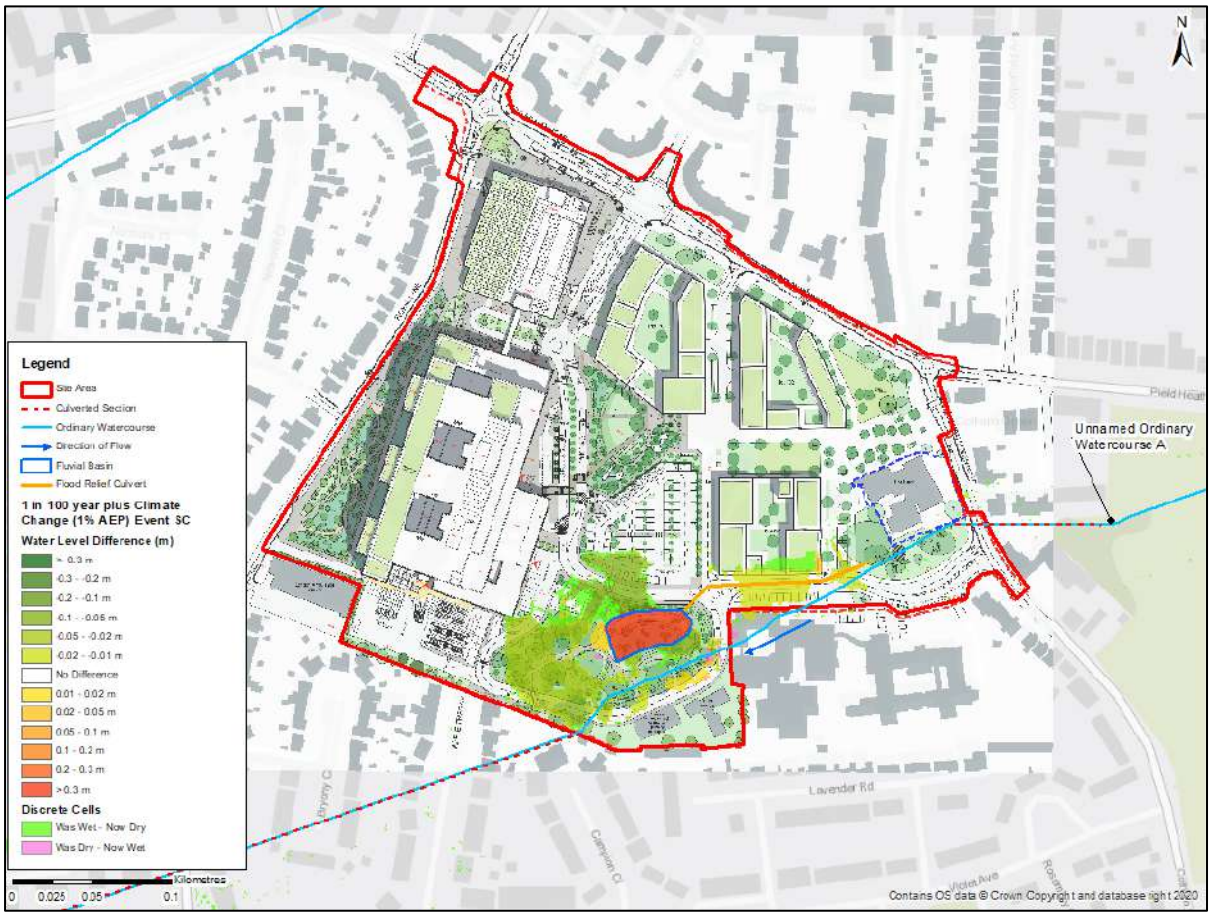


Figure 5-7 1 in 100 year plus 21% CC – Water Depth Difference – Option 2 Vs Baseline

To ensure there is no change in flow mechanisms within the Ordinary Watercourse A as a result of Option 2, a comparison to the flows downstream of the Proposed Development are shown in **Table 5-1.** A node [Ref: HILL01_0147] in the 1D Hydraulic Model was chosen approximately 450 m downstream of the Proposed Site, refer to **Figure 5-8.**

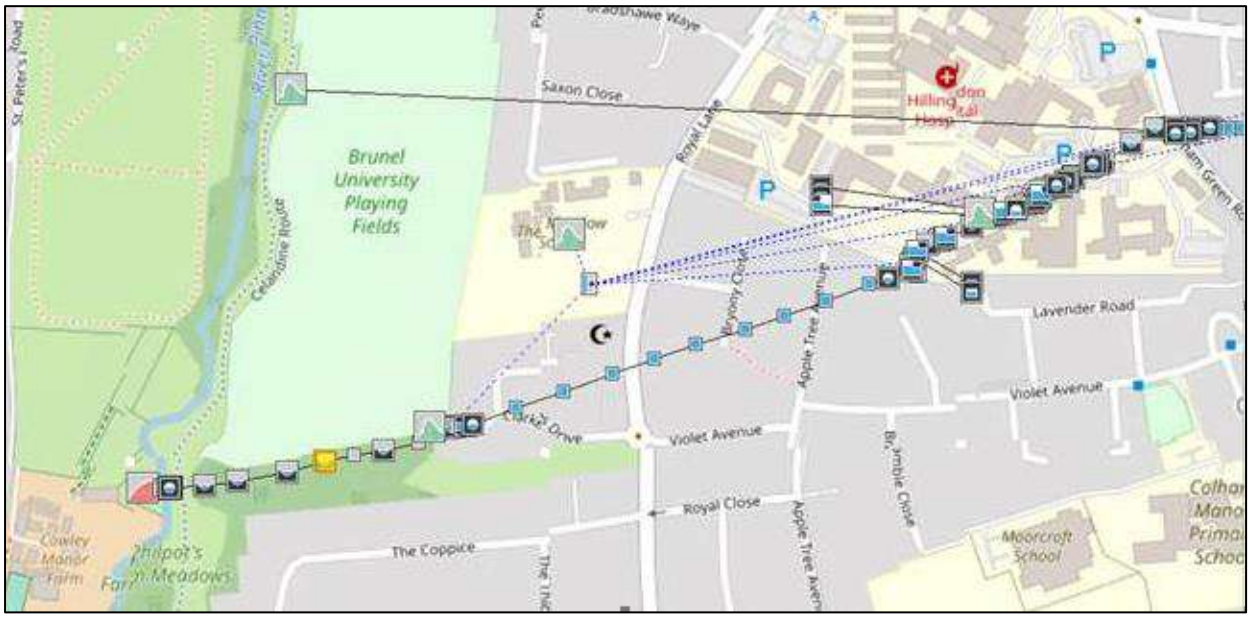


Figure 5-8 – Location of Node [Ref: HILL01_0147] Downstream of the Proposed Site

As shown in **Table 5-1,** a marginal increase in flows in the smaller return periods are observed in the Proposed Scenarios for Phase 1 and Phase 2 in comparison to the baseline. This is due to a conservative approach taken within the hydraulic modelling when importing the hydrology. With the addition of fluvial mitigation measures outlined in Option 2 as part of Phase 1c and Phase 2, a marginal reduction in flows is shown in all return periods up to and including the 1 in 100 year plus 21% CC event.

Table 5-1 – Comparison of Flow Mechanisms downstream of Ordinary Watercourse A

Flow	1 in 5 year	1 in 20 year	1 in 100 year plus CC
Baseline	**2.44**	**3.61**	**6.25**
Phase 1a and 1b Proposed	2.48	3.64	6.18
Phase 1c and Phase 2 Proposed (without mitigation)	2.48	3.64	6.19
Phase 1c Mitigation Option 1	2.46	3.63	6.23
Phase 1c Mitigation Option 2	2.42	3.59	6.20

A tabulated breakdown of the maximum water levels downstream of the Proposed Development is also shown in **Table 5-2.** Negligible changes in the maximum water levels downstream of Ordinary Watercourse A are observed which are likely due to modelling tolerances. Whilst a small increase in flows is estimated in the lower return period, as shown in **Table 5-1,** it is important to note that the maximum water level doesn't change. Option 2 shows a marginal decrease in the maximum water level in comparison to the baseline downstream.

Table 5-2 - Comparison of Maximum Water Levels downstream of Ordinary Watercourse A

Stage	1 in 5 year	1 in 20 year	1 in 100 year plus CC
Baseline	**29.60**	**29.76**	**29.97**
Phase 1a and 1b Proposed	29.61	29.76	29.96
Phase 1c and Phase 2 Proposed	29.61	29.76	29.96
Option 1	29.60	29.76	29.96
Option 2	29.60	29.75	29.96

As such, the impact the Proposed Development has on flow mechanisms is considered **negligible** and no further mitigation is required.

5.3 Impact on additional surface water runoff entering watercourses and Land Drainage Infrastructure and surface water runoff

Whilst the Proposed Site is already operational as Hillingdon Hospital and is classified as a brownfield site, the Proposed Development could still lead to a small increase in the amount of impermeable surfaces at the site. If left unmitigated, there is the potential that the Proposed Development could lead to an increase in the amount of surface water runoff generated by the site.

The Proposed Development will include a surface water drainage system, which will intercept and attenuate all runoff generated by the site up to and including the 1 in 100 year plus 40% CC event. Whilst the western catchment of the site will be conveyed to wetlands and swales before being discharged to the existing Thames Water surface water sewer, the eastern catchment which includes the southern access road will be discharged at a restricted rate of greenfield to the unnamed Ordinary Watercourse A via an existing outfall. As such betterment will be achieved due to on-site mitigation resulting in a reduction in surface water run-off compared to the baseline scenario. As a result, the impact of the Proposed Development on fluvial flood risk and surface water runoff to other areas is considered to be **low and no further mitigation is required**.

5.4 Impact on Surface Water

As discussed in **Section 4.7**, the creation of impermeable surfaces at the Proposed Development could lead to an increase in the volume of surface water runoff generated by the proposed site. This effect could also be worsened when considered in combination to increased runoff as a result of climate change, especially that the Proposed Development is situated in a Critical Drainage Area. If left unmitigated, surface water runoff will likely flow in a southerly direction towards the unnamed Ordinary Watercourse A which could exacerbate flood extents.

As such, the Proposed Development for both Phases 1 and 2 will include the construction of a drainage system suitable of accommodating up to and including the 1 in 100 year plus 40% climate change event. Flows will be discharged at a restricted rate of greenfield runoff.

5.4.1 Phase 1

The Drainage Strategy for the Proposed Development for Phase 1 will be divided between three drainage catchments. These are as follows:

- Surface water runoff from the west of the proposed hospital facility will be conveyed through permeable paving, wetlands and swales which form the western perimeter of the site. Flows will be restricted at the respective pre-development greenfield runoff rate for the 1 in 1 year, 1 in 30 year and 1 in 100 year before discharging into an existing Thames Water surface water sewer along Royal Lane.
- Surface water from the east of the proposed hospital facility and multi storey car park will be captured into two proposed below ground attenuation tanks. One tank will be situated along the ambulance access road east of the hospital building with a depth of 1.4 m and a maximum volume of 1065 m^3. The second tank will be located in the south west corner of the FM Yard. Given space constraints in the FM Yard, the attenuation tank will be 1.2 m in depth and hold a max volume of 1415 m^3 of water. Flows will be restricted at the respective pre-development greenfield runoff rate for the 1 in 1 year, 1 in 30 year and 1 in 100 year before discharging into an existing Thames Water surface water sewer along Royal Lane.
- Surface water along the southern access road will captured through permeable paving discharging to the unnamed Ordinary Watercourse A through an existing outfall at a restricted pre-development 1 in 100 year greenfield rate of 2.6 l/s. Permeable paving along the access road will also provide attenuation discharging at nine different points into Ordinary Watercourse A.

5.4.2 Phase 2

The Drainage Strategy for Phase 2 will be developed to accommodate up to and including the 1 in 100 year plus 40% CC event with a restricted rate to greenfield equivalents. Flows will be conveyed via an existing outfall to the unnamed Ordinary Watercourse A. In addition, the Phase 2 Drainage Strategy will manage the offsite overland flow path in the north-eastern corner of the site, as discussed in **Section 4.7**, where a cut-off filter drain will convey flows around the eastern perimeter of the site, before outfalling to the unnamed Ordinary Watercourse A.

Assuming the above is included within the drainage design, the risk from the Proposed Development in Phase 1and Phase 2 is considered to be low and no further mitigation is required

5.5 Impact on Groundwater

The Proposed Development will include the installation of a surface water and foul drainage network, below ground attenuation tanks, pumping stations and a hospital basement. All below ground elements must be designed to prevent water ingress and withstand hydrostatic ground water pressures.

Given the size of this drainage network relative to the surrounding groundwater catchment, the ability of the Proposed Development to impact sub-surface flow regimes or groundwater storage capabilities is considered to be low. The proposed basement in the new Hospital facility is an additional below ground development and could potentially lead to a change in the subsurface flow regimes and a reduction in the natural storage capacity of the ground. However, given the size of the basement relative to the surrounding groundwater catchment the impact of the basement on groundwater is considered to be low. Therefore, the Proposed Development is likely to have a negligible impact on groundwater and no further mitigation is required.

5.6 Impact on Sewers and Water Supply Infrastructure

As discussed in **Section 4.9**, a review of Thames Water Drainage Plans shows surface water and foul sewer networks along the adjacent roads to the Proposed Site, including Pield Heath Road, Royal Lane and Colham Green Road. Whilst not identified on the Thames Water Drainage Plans, a utility plan shows a private network of surface water and foul drainage network within the site; refer to **Appendix G**.

To support the Proposed Works, the existing foul and surface water network will be removed within the site boundary to make space for the new proposed system with the exception of Pield Heath Road where highway resurfacing works are proposed. As agreed with the LLFA and Thames Water, the surface water network will connect to two points of discharge at an existing Thames Water surface water network along Royal Lane with an internal diameter of 1200 mm.

The proposed foul sewer network will also connect to two points of discharge at an existing foul sewer network along Royal Lane. A 150 mm foul sewer is proposed along the northern perimeter of the hospital which will accommodate part of the outflow from the hospital building. A 150 mm and 225 mm foul sewer is proposed around the southern perimeter of the hospital building. A pumping station is proposed to accommodate the outflows from the basement.

Given the points of discharge at the existing sewer infrastructure will be restricted to greenfield runoff and have been agreed with Thames Water to ensure the existing network has sufficient capacity, the risk of increased sewer flooding as a result of the Proposed Development is considered to be low and no mitigation is required.

5.7 Impact on Flooding from Reservoirs, Canals and Flood Risk Management Infrastructure

As discussed in **Section 4.10, Section 4.11** and **Section 4.12** there are no reservoir, canal systems, or flood defence infrastructure located within close proximity of the Proposed Development. There would be no works associated with the Proposed Development that could affect the structural integrity of flood defences, canal or reservoir infrastructures. Therefore, the impact of the Proposed Development on these features is considered to be low and no mitigation is required.

5.8 Summary of Flood Risk from the Proposed Development

Flood Risk	Summary of Risk from Development Site (High/Medium/Low)	Notes	Mitigation Required
Fluvial – Floodplain Storage and Mechanisms	Low	The Proposed Development is located in Flood Zone 1 and is therefore at low risk of fluvial flooding from Main Rivers. However, as shown through hydraulic modelling, the Proposed Development is at risk of fluvial flooding from unnamed Ordinary Watercourse A. The Proposed Development associated with Phase 1a and 1b, is shown outside the flood extents with the exception of the southern access road. The Water Depth Difference Maps which compare the Phase 1a and Phase 1b Onsite Mitigation Measures results to the baseline shows no displacement of flooding outside of the Proposed Site. Phase 1c and Phase 2 inclusive of the fluvial mitigation Option 2 also show no displacement of flood risk outside of the Proposed Site. A comparison of the flows and maximum water level depth in Option 2 to the baseline at a node located 450 m downstream of the Proposed Site shows a marginal reduction in flows and depth for the 1 in 100 year plus 21% CC event. For lower return flood events marginal increases < 1.7% are estimated for fluvial flows however this equates to negligible differences (≤ 0.02%) in water level within the hydraulic model study area. As such, the Proposed Development has a negligible impact on fluvial floodplain storage and flow mechanisms.	No
Fluvial - Surface Water Runoff	Low	The Proposed Development could lead to a small increase in the amount of impermeable surfaces and therefore increased run off if left unmitigated. The Proposed Development will include a surface water drainage system, which will intercept and attenuate runoff generated by the site up to and including the 1 in 100 year plus 40% CC event and will be restricted to greenfield runoff. The impact of the Proposed Development on fluvial flood risk as a result of increased surface water entering nearby watercourses and surface water flood risk to other areas is considered to be low and no further mitigation is required.	Yes Installation of Surface Water Drainage Network able to accommodate up to and including the 1 in 100 year (1% AEP) plus 40% climate change event and restrict to greenfield runoff.
Groundwater	Low	The Proposed Development will include the installation of a surface water drainage network, hospital basement and attenuation tank. All below ground elements must be designed to prevent water ingress and withstand hydrostatic ground water pressures. Given the size of this surface water drainage network and basement relative to the surrounding groundwater catchment, the ability of the Proposed Development to impact sub-surface flow regimes or groundwater storage capabilities is considered to be low.	No

Flood Risk	Summary of Risk from Development Site (High/Medium/Low)	Notes	Mitigation Required
Sewer and Water Supply Infrastructure	Low	To support the Proposed Works, the existing foul and surface water network will be removed within the site boundary to make space for the new proposed drainage system. Given the points of discharge at the existing sewer infrastructure will be restricted to greenfield runoff and have been agreed with Thames Water to ensure the existing network has sufficient capacity. The risk of increased sewer flooding as a result of the Proposed Development is considered to be low and no mitigation is required.	No
Reservoirs, Canal Systems and Flood Risk Management Infrastructure	Low	A review of Ordnance Survey mapping indicates that there are no Reservoirs, Canal Systems and Flood Risk Management Infrastructure within close proximity to the Proposed Development.	No

6. Summary and Conclusion

This FRA has been completed in accordance with the NPPF and the accompanying Technical Guidance.

The Proposed Development will involve the redevelopment of Hillingdon Hospital which will be divided among two key phases; Phase 1 and Phase 2 which are further sub-divided (Phase 1a, 1b and 1c) to ensure the continuity and functioning of the existing hospital.

The Proposed Development is situated in Flood Zone 1. A review of the NPPF and local planning policies suggests the Proposed Development is considered to fit within a range of different vulnerability classifications. In accordance with Table 3 of the PPG, all infrastructure is permitted in Flood Zone 1 and therefore the Proposed Development is deemed to have passed the requirements of the Sequential Test.

6.1 Fluvial Flood Risk

The Proposed Development site is not identified at risk of flooding from Main Rivers however three Ordinary Watercourses are shown to flow in close proximity. The site is at risk of fluvial flooding from the unnamed Ordinary Watercourse A which flows along the south eastern boundary of the site. The other two Ordinary Watercourses (B and C) are assessed as low risk for the site.

For the purposes of this FRA, a 1D-2D Hydraulic Model has been built to assess the fluvial flood risk for the unnamed Ordinary Watercourses A. The baseline hydraulic modelling, representing the existing situation, indicate that the southern area of the Proposed Development site is at risk from the 1 in 5 year up to and including the 1 in 100 year plus 21% CC events from the unnamed Ordinary Watercourse A.

For Phase 1a and 1b, which includes the new hospital ward, extension of two existing culverts beneath the southern access road and the proposed restricted drainage discharge rates; modelling results from the 1 in 100 year plus 21% CC event shows that the Proposed Development with the exception of the southern access road is situated outside these flood extents. The proposed development does not increase the risk of flooding to the site however the oxygen tanks and southern access road are identified vulnerable to flooding. As such the following precautionary mitigation measures are proposed:

- A precautionary 300 mm heighted flood bund near the proposed hospital entrance.
- Raised 150 mm platform at the oxygen tanks to a level of approximately 36.8 m AOD.
- Road signage noting the southern access road is liable to flooding.

For Phase 1c and Phase 2, which includes the decommissioning of the exiting hospital and a proposed mixed residential / commercial development, the following mitigation is proposed:

<u>Phase 1c</u>

- On-site flood mitigations measures including an overflow culvert immediately south of the Furze and a flood basin to attenuate flows.

<u>Phase 2</u>

- Raising the FFLs at Plot P03 and implementing a 500 mm wall along the southern façade.
- Preparation of a Flood Management Plan in collaboration with LBH.

Hydraulic modelling results demonstrate by incorporating these mitigation measures, the site is dry within the 1 in 5 year fluvial flood event, which is a betterment of > 100 mm compared to the pre-development condition. Betterment in flood depths up to 60 mm and 50 mm are also achieved along the southern access road for the 1 in 20 year and the 1 in 100 year plus 21% CC flood event respectively. The flood risk mitigation measures will be refined during the detailed design and opportunities to provide further betterment should be explored.

The proposed development is demonstrated to reduce the frequency and depth of flooding however the residual risk along the southern access road is considered medium for the 1 in 100 year + 21% CC flood event. It is important to note that during such an event, many other areas and roads of Hillingdon would be flooding therefore the residual risk to the site should be considered in this context. With on-site mitigation measures

incorporated, the proposed buildings are demonstrated to remain dry during all flood events up to and including the 1 in 100 year plus 21% CC event. Alternative access routes including for emergency vehicles have been identified from the north of the site for all phases of the Proposed Development, providing additional resilience during the more extreme flood events and demonstrating the development will be safe for its lifetime in accordance with the NPPF.

Off-site mitigation measures have been explored which includes an upstream storage basin in Colham Green, alongside flood bunds and below ground storage crates. Hydraulic modelling identifies a negligible betterment in flood depths for the 1 in 100 year plus 21% CC event however an alternative catchment level flood risk management scheme is likely to yield a more effective solution. Moreover, if the mitigations works within Colham Green are considered in isolation; the scale of them would alter the majority of the existing recreational green space which could lead to detriment of existing amenity and wellbeing benefits for the local community. As such the off-site mitigation measures have not been taken forward but a S106 financial contribution to support a catchment flood risk management scheme will be discussed during the course of the application.

6.1.1 Other Sources of flood risk

The risk to the Proposed Development from surface water flooding has been considered as medium. The risk from the Proposed Development to surface water is considered as low. Mitigation is proposed to manage the risk of surface water flooding to the development, including the installation of a surface water drainage network capable of attenuating the 1 in 100 year (1% AEP) plus 40% climate change event and a restriction to greenfield runoff. In addition, the Phase 2 Drainage Strategy will manage the offsite overland flow path in the north-eastern corner of the site where a cut-off filter drain will convey flows around the eastern perimeter of the site. When mitigation is considered, the risk from this source of flooding is considered low.

The risk to and from the Proposed Development from groundwater flooding has been considered as low. Any below ground development such as attenuation tanks, the basement and drainage network should be designed to prevent ground water ingress.

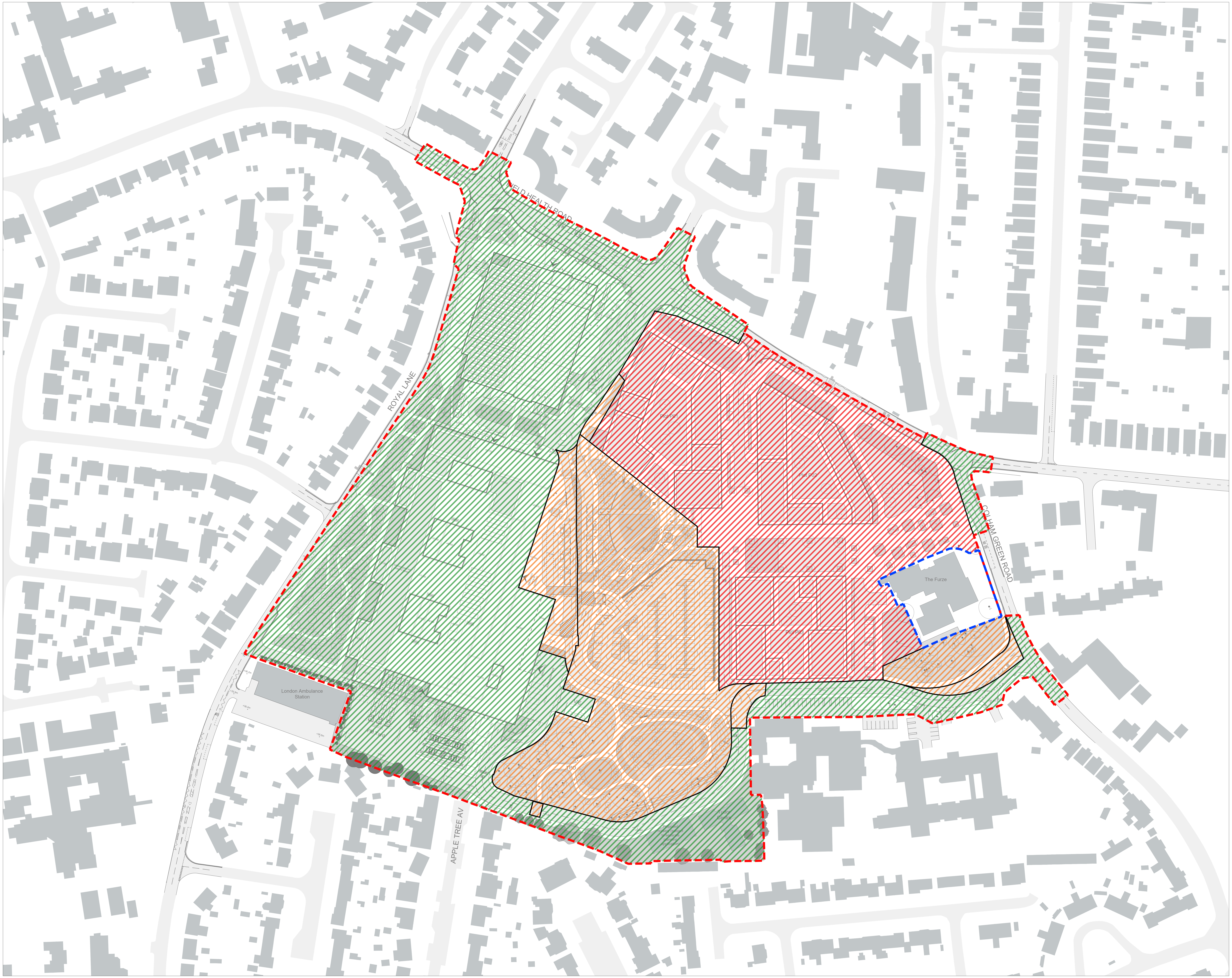
The risk to the Proposed Development from water and sewer infrastructure is considered residual. The existing sewer infrastructure along Pield Heath Road is located at the beginning of the respective drainage networks, as such, the ability of these systems to generate large volumes of flow is considered unlikely. The risk to and from the Proposed Development from canal, reservoir and flood risk management infrastructure are considered to be low.

Flood Risk Source	Summary of Risk to Development Site	Summary of Risk from the Proposed Development
Main Rivers	Low	Low
Ordinary Watercourses and Land Drainage Systems	Medium	Low
Tidal Sources	Low	Low
Surface Water	Low	Low
Groundwater	Low	Low
Water Supply Infrastructure	Low	Low
Sewer Infrastructure	Residual	Low
Canal Systems	Low	Low
Reservoirs	Low	Low
Flood Risk Management Infrastructure	Low	Low

6.2 Conclusion

This FRA has demonstrated that it will be possible to manage flood risks to and from the Proposed Development in compliance with the NPPF, PPG and local planning policies. A strategy has been developed to control and discharge surface water runoff and foul discharge in an acceptable, conventional, and sustainable manner as well as effective mitigation measures to protect the Proposed Development against flooding. The Proposed Development delivers a reduction of the existing risk of flooding to the site and goes further to support flood risk betterment to the neighbouring community through financial contribution for a catchment wide flood risk management scheme.

Appendix A Phasing Plan



Notes:

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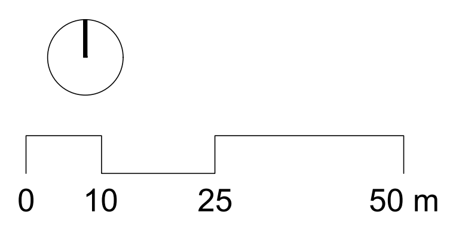
North Sign / Key Plan



The following external model files are included within this drawing:

🟥 🟥 🟥 Application Boundary

🟦 🟦 🟦 Other Land in Applicant's Ownership

▨ Phase 1A (detailed application)

🟨 Phase 1B (detailed application)

▨ Phase 1C (detailed application)

▨ Phase 2 (outline application)

P01	08.04.22	First Issue	AB	TB
Rev	Date	Revision Notes	Dn	Rv

Client / Contractor

NHS

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Hillingdon Hospital Redevelopment

Drawing Title
SITE PHASING PLAN

Job Number	Drawing Originated Date	PAS 1192 Status Code
126649	06/04/2022	S6
Scale@A1	Purpose	
1:1000	FOR PLANNING	

Drawing Number	Revision
THHR_01-IBI-XX-XX-DR-A-100007	P01

Appendix B Site Layout Plans

B.1 Phase 1

Notes:
- This drawing is copyright.
- Do not scale dimensions from this drawing.
- This drawing is to be read in conjunction with all other relevant drawings
- All discrepancies on this drawing are to be reported to the architect.
- Do not modify any element of this drawing.
- Use drawing only for purpose(s) issued.

North Sign / Key Plan

0 10 25 50 m

The following external model files are included within this drawing:

Application Boundary

Other Land in Applicant's Ownership

Rev	Date	Revision Notes	Dn	Rv
P21	11.04.22	Updated application boundary	AB	TB
P20	04.03.22	Detailed and Outline application boundaries updated	AB	TB
P19	31.01.22	Issued for closing of RIBA Stage 2	AB	TB
P18	15.11.21	General updates for PPA5	AB	TB
P17	20.10.21	Updated to revised hospital layout	AB	TB
P16	08.09.21	Updated to revised hospital layout	AB	TB
P15	04.08.21	Road Layout updated. Drawing number updated	AB	TB
P14	16.07.21	FM Yard layout updated. Site levels amended	AB	TB
P13	09.07.21	Updated to revised hospital layout	AB	TB
P12	18.06.21	Generators relocated. Basement FM yard added. Landscape for linear park added. Application boundaries updated	AB	TB
P11	08.06.21	Relocation of incoming substation. Updated hospital roof levels and application boundaries	AB	TB
P10	18.05.21	Updated location of the generator compound as agreed on Generators Options Appraisal Meeting on 13/05/2021	AB	TB
P09	19.04.21	Planning Application Boundaries added. General Updates	AB	TB
P08	15.03.21	Surface Car Park replaced by a Multi-storey Car Park. General Updates. Drawing number updated from previous 126649-IBI-WS-XX-DR-A-1000-0002	AB	TB
P07	25.02.21	Issued fo RFI	AB	TB
P06	23.02.21	General updates following on disciplines coordination	AB	TB
P05	09.02.21	Updated to revised hospital Layout (SoA v16)	AB	TB
P04	26.01.21	Revised FM / Waste Yard layout	AB	TB
P03	10.12.20	Ordnance Survey grid reference added. Revised MSCP, roads layout and external MEP	AB	TB
P02	24.11.20	Revised MSCP and Bus Hub	AB	TB
P01	18.11.20	First Issue	AB	TB

Client / Contractor

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Hillingdon Hospital Redevelopment

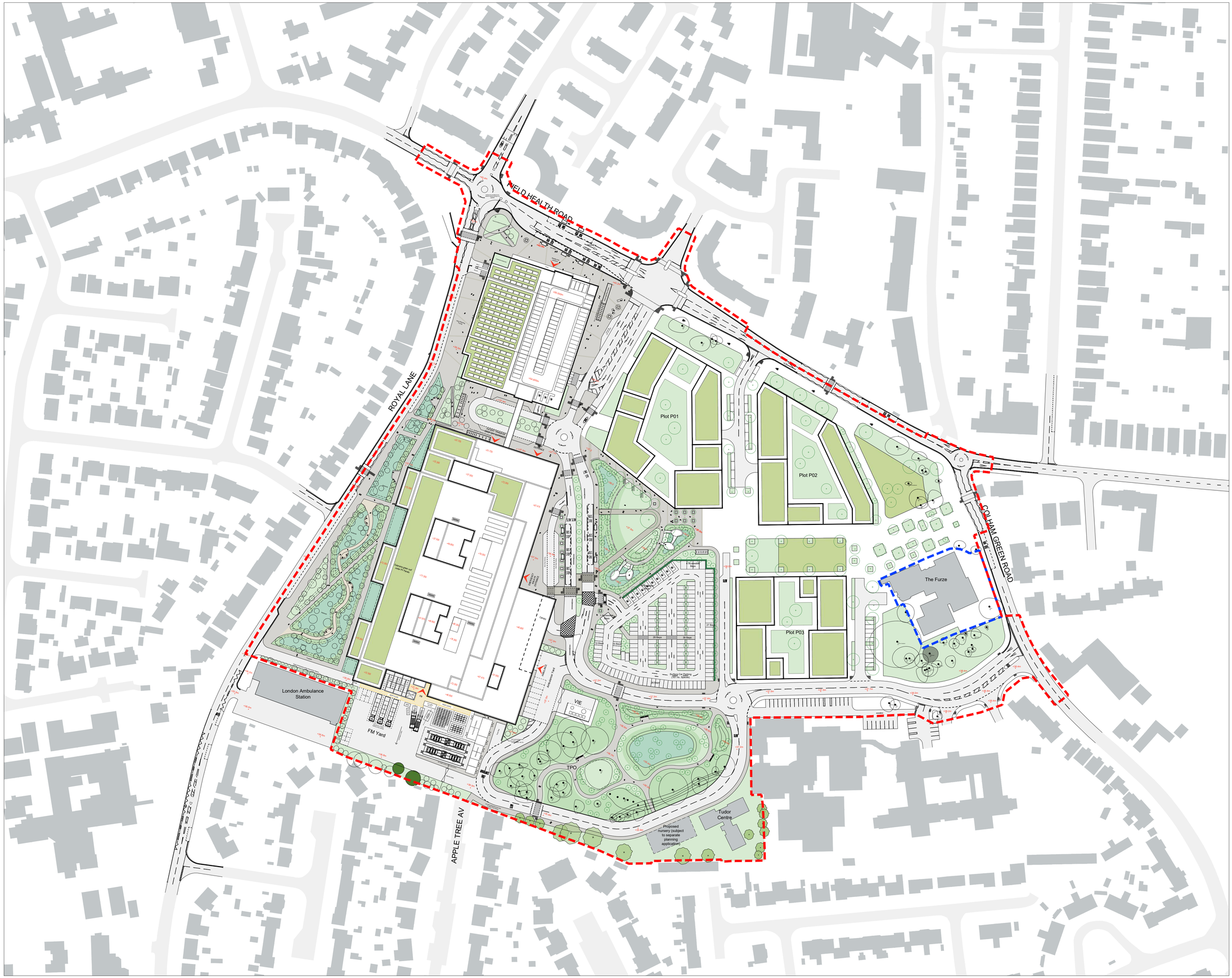
Drawing Title
SITE PLAN AS PROPOSED - WITH EXISTING HOSPITAL PRESENT

Job Number	Drawing Originated Date	PAS 1192 Status Code
126649	13/11/2020	S6
Scale@A1	Purpose	
1:1000	FOR PLANNING	

Drawing Number
THHR_01-IBI-XX-XX-DR-A-100002

Revision
P21

B.2 Phase 2



Notes:
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- All discrepancies on this drawing are to be reported to the architect.
- Do not modify any element of this drawing.
- Use drawing only for purpose(s) issued.

North Sign / Key Plan

0 10 25 50 m

The following external model files are included within this drawing:

Application Boundary

Other Land in Applicant's Ownership

Rev	Date	Revision Notes	Dn	Rv
P08	11.04.22	Updated application boundary	AB	TB
P07	29.03.22	Updated road layout in response to the bus diversion scheme. Updated central green space, woodlands and surface car park	AB	TB
P06	04.03.22	Detailed and Outline application boundaries updated	AB	TB
P05	31.01.22	Issued for closing of RIBA stage 2	AB	TB
P04	12.11.21	General updates for PPA5	AB	TB
P03	13.10.21	Hospital updated following on 1:200 development	AB	TB
P02	13.09.21	Revised to updated design	AB	TB
P01	08.03.21	First Issue	AB	TB

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Hillingdon Hospital Redevelopment

Drawing Title
SITE PLAN AS PROPOSED

Job Number	Drawing Originated Date	PAS 1192 Status Code
126649	05/03/2021	S6
Scale@A1	Purpose	
1:1000	FOR PLANNING	

Drawing Number
THHR_01-IBI-XX-XX-DR-A-100003

Revision
P08

Appendix C Location of Basement

Notes:

- This drawing is copyright.
- Do not scale dimensions from this drawing.
- This drawing is to be read in conjunction with all other relevant drawings.
- All discrepancies on this drawing are to be reported to the architect.
- Do not modify any element of this drawing.
- Use drawing only for purpose(s) issued.
- This drawing may contain colour.

North Point

N

Scale Bar

0 2m 6m 10m

Scale: 1:200

Key Plan

Hazard	**HAZ-xx** To warn of significant hazards or information that is unusual To be read in conjunction with all other consultant's information Refer to CDM Schedule XXXX-IBI-WB-XX-SH-A-200-XXXX

The following external model files are included within this drawing:

🟦 BED LIFT
🟦 CATERING
🟩 CATERING LIFT
🟨 COMMS
⬜ ELEC RISER
🟩 FM LIFT
🟨 IT HUB
🟦 LOGISTIC STORES
⬜ MEP
🟦 MORTUARY
🟦 PHARMACY
🟦 SOFT FM
🟥 VISITOR LIFT

Rev	Date	Revision Notes	Drawn	Review
P09	2022-04-22	Issued for Planning	CQ	GH
P08	2022-03-09	Issue Date corrected - Stage 2 final update, including final comments from KIT Meetings and mark-ups	CQ	GH
P07	2022-02-04	Stage 2 final update, including final comments from KIT Meetings and mark-ups	CQ	GH
P06	2022-02-07	Re-Issue for Stage 2	CQ	GH
P05	2022-01-31	Plan issued for Stage 2	CQ	GH
P04	2022/01/05	Design updated to reflect adjustment ahead of next round of 1:200s Workshops	CQ	GH
P03	2021/11/12	Design update to reflect 1:200 layout updates from 1:200s Round 2 of Workshops comments	CQ	GH
P02	2021/10/13	Design changed to reflect updated clinical brief ahead of round two 1:200 meetings	KK	GH
P01	2021/04/26	First Issue - Work In Progress Plans	CQ	GH

Logos

The Hillingdon Hospitals
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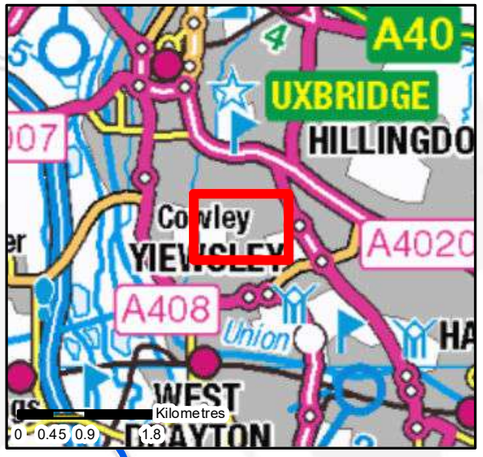
Drawing Title
BASEMENT - Department Adjacency Plan

Job Number	Date	Security Classification	Drawn By
126649	2021-03-16	OFFICIAL	CQ

Scale@A0	Purpose	Reviewed By
1 : 200	For Planning	GH

Drawing Number	Revision	Suitability
THHR_01-IBI-WB-B1-DR-A-251009	P09	S6

Appendix D Location of Extended Culverts



Brunel University Playing Fields

Pield Heath School

Pav

Unnamed Ordinary Watercourse C

GROVE LANE

ARKLAY CLOSE

COLHAM ROAD

OLD SCHOOL R

Hall

ST MARGARET

MICAWBER AVENUE

COPPERFIELD AVENUE

Hospl

PW

Cvt

PIELD HEATH ROAD

CRISPIN W

NEWCROFT CL

BRADSHAWE WAYE

PEEL WAY

ROYAL CL

SAXON CL

BENSON CL

Recn Gd

Amb Sta

River Pinn

Unnamed Ordinary Watercourse A

PIELD HEATH

GREATFIE

Colham Green

Colham Green

Culvert lengthened by 11.4 m

Culvert lengthened by 4.4 m

The Meadow School

Unnamed Ordinary Watercourse B

BRYONY

Apple Tree Avenue

CAMPION C

LAVENDER ROAD

VIOLET AVENUE

MYRTLE C

CLEMENTS DRIVE

BRAMBLE C

ROYAL CLOSE

MOORCROFT L

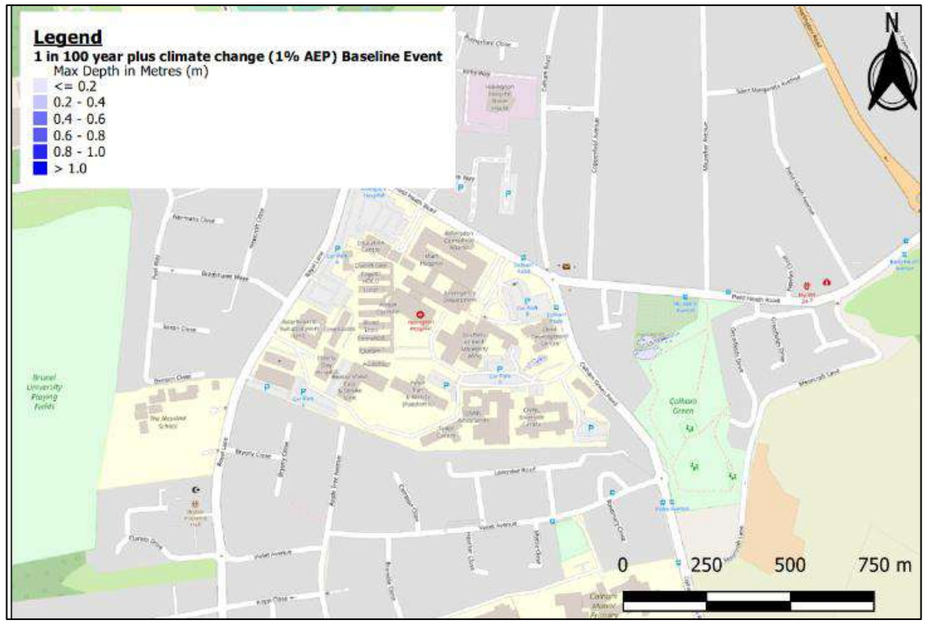
N

Legend

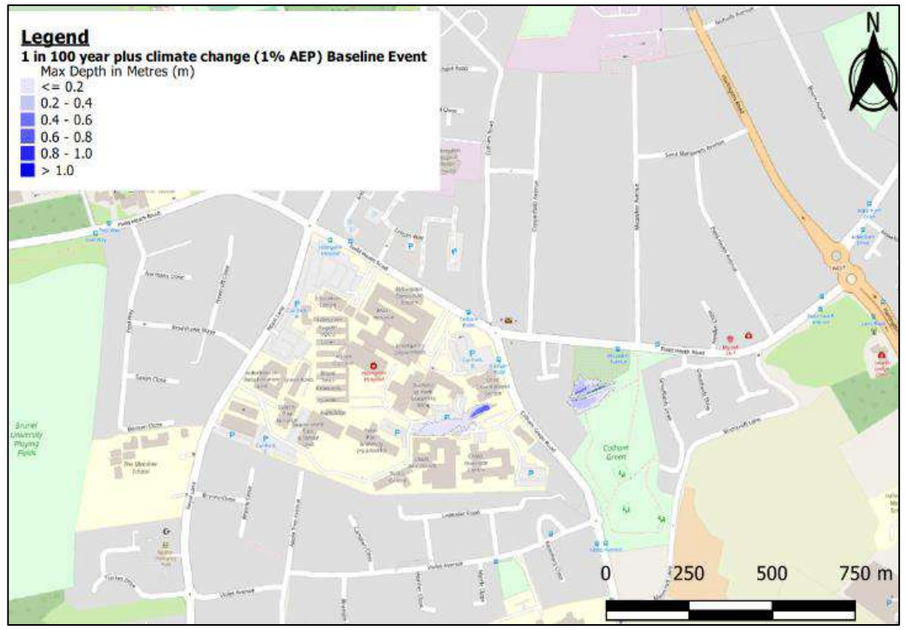
- Site Area
- Lengthened Culverts
- Main River
- Ordinary Watercourse
- Culverted Section
- Direction of Flow

Kilometres
0 0.05 0.1 0.2

Appendix E Timestep of Flood Mechanisms for the Baseline 1 in 100 year plus 21% CC Event

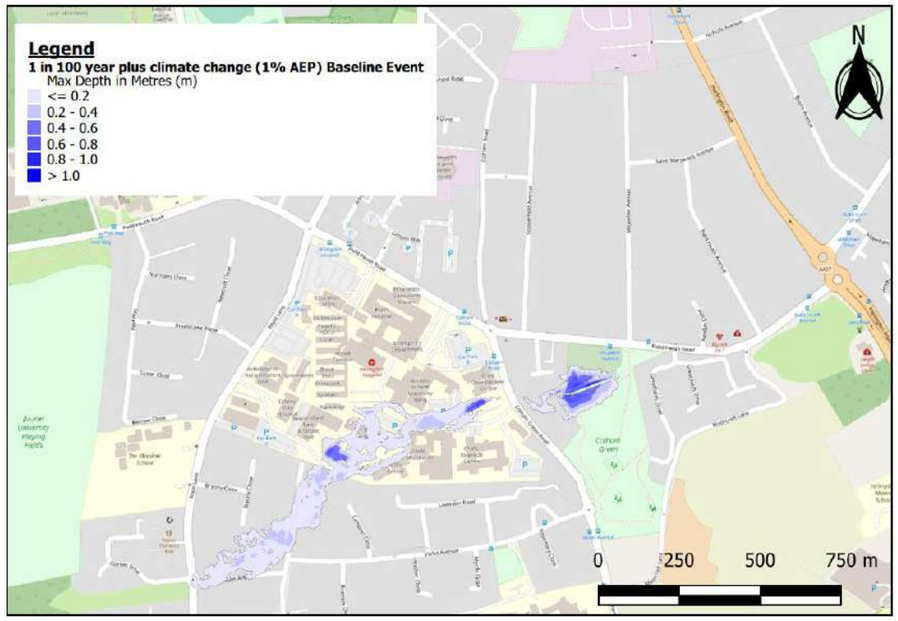


Timestep: 4 hours 10 mins



Timestep: 4 hours 30 mins

Timestep: 4 hours 50 mins



Timestep: 5 hours 10 mins

Appendix F Proposed Scenario Without Mitigation – Phase 1a and Phase 1b

F.1 1 in 5 year