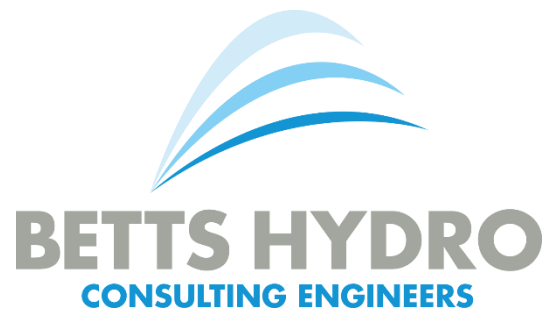




LAND AT DYE HOUSE PRESCOT

FLOOD RISK ASSESSMENT



For

SEP Construction Services Ltd
The Mezzanine
Royal Liver Building
Liverpool Waterfront
L3 1HU



SEPTEMBER 2022

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LAND AT DYE HOUSE PRESCOT

FLOOD RISK ASSESSMENT

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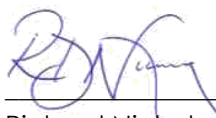
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EXECUTIVE SUMMARY

This Flood Risk Assessment was commissioned SEP Construction Services Ltd referred to hereafter as 'the client'. This report has been prepared to support a planning application for the construction of 45no. residential dwellings on the former Dye House site in Prescot.

The site lies within Flood Zone 1, 2 and 3 based on the Environment Agency Flood Map for Planning and approximately covers 1.14ha. In accordance with planning policy, although the vast majority of the development is within Flood Zone 1, the proposals should be supported by the Sequential Test, as a small portion of the development is within Flood Zone 2.

Consultations with the Environment Agency, Knowsley Metropolitan Borough Council, and United Utilities have been undertaken and did not identify historical flooding of the site. Consultation with the Environment Agency has been undertaken to obtain the most up-to-date flood risk information to allow a better understanding of the potential flood risk at the site to be gained. A hydraulic modelling exercise was undertaken to support this assessment using the existing modelling to assess in more detail the potential fluvial flood risks to the site.

At present the proposed development area is not at risk of flooding in the 100yr return period event but is potentially in the 100yr + CCA and 1000yr. The development proposals include a range of levels outside of the watercourse corridor resulting in the proposed development remaining dry, safe, and flood-free in all storm events including the 100yr RP + CCA design event.

The proposed FFL is 53.15mAOD which provides approximately 2.3m of freeboard from the design event.

The proposed scenario has been compared against the existing scenario. There is shown to be a minor increase in top water level within the main channel upstream (5mm) and downstream (7mm) of the site. This increase is reduced to the pre-development water level 100m upstream and 200m downstream of the site.

This assessment has been prepared in consultation with the relevant interested parties and incorporates their comments where possible. The report is commensurate with the scale and nature of the development proposals and in summary, the development can be considered appropriate in accordance with the Planning Practice Guidance.

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Specialist Software

-  MicroDrainage WinDES (v.2020.1.3) – Calculation of greenfield run-off volumes, rates of rainfall and stormwater storage estimates.

Abbreviations & Acronyms

AEP	Annual Exceedance Probability
BGS	British Geological Survey
CC	Climate Change
EA	Environment Agency
FEH	Flood Estimation Handbook
FRA	Flood Risk Assessment
KMBC	Knowsley Metropolitan Borough Council
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
mAOD	Metres Above Ordnance Datum
NPPF	National Planning Policy Framework
NSRI	National Soil Resources Institute
PFRA	Preliminary Flood Risk Assessment
PPG	Planning Practice Guidance
QSE	Quick Storage Estimate
QBAR	Mean Annual Flood
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems
TWL	Top Water Level
UU	United Utilities

1.0 INTRODUCTION

1.1 Planning Policy Context

- 1.1.1 All forms of flooding and their impact on the natural and built environment are material planning considerations. The revised National Planning Policy Framework (NPPF) sets out the Government's objectives for the planning system, and how planning should facilitate and promote sustainable patterns of development, avoiding flood risk and accommodating the impacts of climate change. Government policy with respect to development in flood risk areas is contained within the revised NPPF and the supporting Planning Practice Guidance (PPG) (refer to extracts in **Appendix A**).
- 1.1.2 A Flood Risk Assessment (FRA) has been completed in accordance with the revised NPPF and the PPG to review all sources of flood risk both to and from the proposed development.
- 1.1.3 The proposals are solely 'residential' in nature and are classified as 'more vulnerable' in Table 2 (Flood Risk Vulnerability Classification) within the Planning Practice Guidance. The PPG identifies those certain types of development are not acceptable if located within high flood risk areas. Policy also notes that justification for locating certain development within these high-risk areas is required. The proposals should be supported by the Sequential Test to conform with planning policy, as residential development is proposed in Flood Zones 1 and 2. An intra-site sequential approach has been undertaken to locate development in areas at lowest risk onsite.

1.2 Site Context

- 1.2.1 This FRA has been prepared to support a planning application for the construction of 45no. residential dwellings on the former Dye House site off Liverpool Road in Prescot. The total site covers 1.14ha, and the proposals will be complete with access, car parking, external works, landscaping, boundary walls/fencing, external services and drainage.

1.3 Consultation

- 1.3.1 Consultations with the Environment Agency (EA), Knowsley Metropolitan Borough Council (KMBC), and United Utilities (UU) have been carried out. These consultation responses have been used to support this assessment and can be seen in **Appendix B, C and D**. The NPPF advises that the LPA (Knowsley Metropolitan Borough Council) should consult with the Environment Agency who will provide advice and guidance on flood issues at a strategic level and in relation to planning applications.

2.0 EXISTING SITE LOCATION

2.1 Location

- 2.1.1 The site is accessed via the Taylor Wimpey development in construction adjacent to the northern boundary of the site. The former Dye House building is currently located on the site, and will be demolished as part of the proposals. The nearest Ordnance Survey National Grid Reference is E: 345816, N: 392765 and the nearest postcode is L34 3LX (see location plan in **Appendix E**). The total site area covers 1.14ha and is edged in red in **Figure 1**.
- 2.1.2 In terms of the surrounding land use, to the north and east of the site is undeveloped agricultural land. Located adjacent to the southern boundary of the site is Liverpool Road, and adjacent to the western boundary of the site is the A58. Finally, the development site is bisected by Prescott Brook, which flows in a south-easterly direction, as illustrated in **Figure 1**. Prescott Brook is known as Logwood Mill Brook further downstream.



2.2 Existing and Historical Land Use

- 2.2.1 The site is mostly undeveloped, although the former Dye House and associated hardstanding is present in the north-eastern corner of the site, as illustrated above. Dye House has been located onsite as early as 1890, however, no other historical uses have been identified during the preparation of this report.

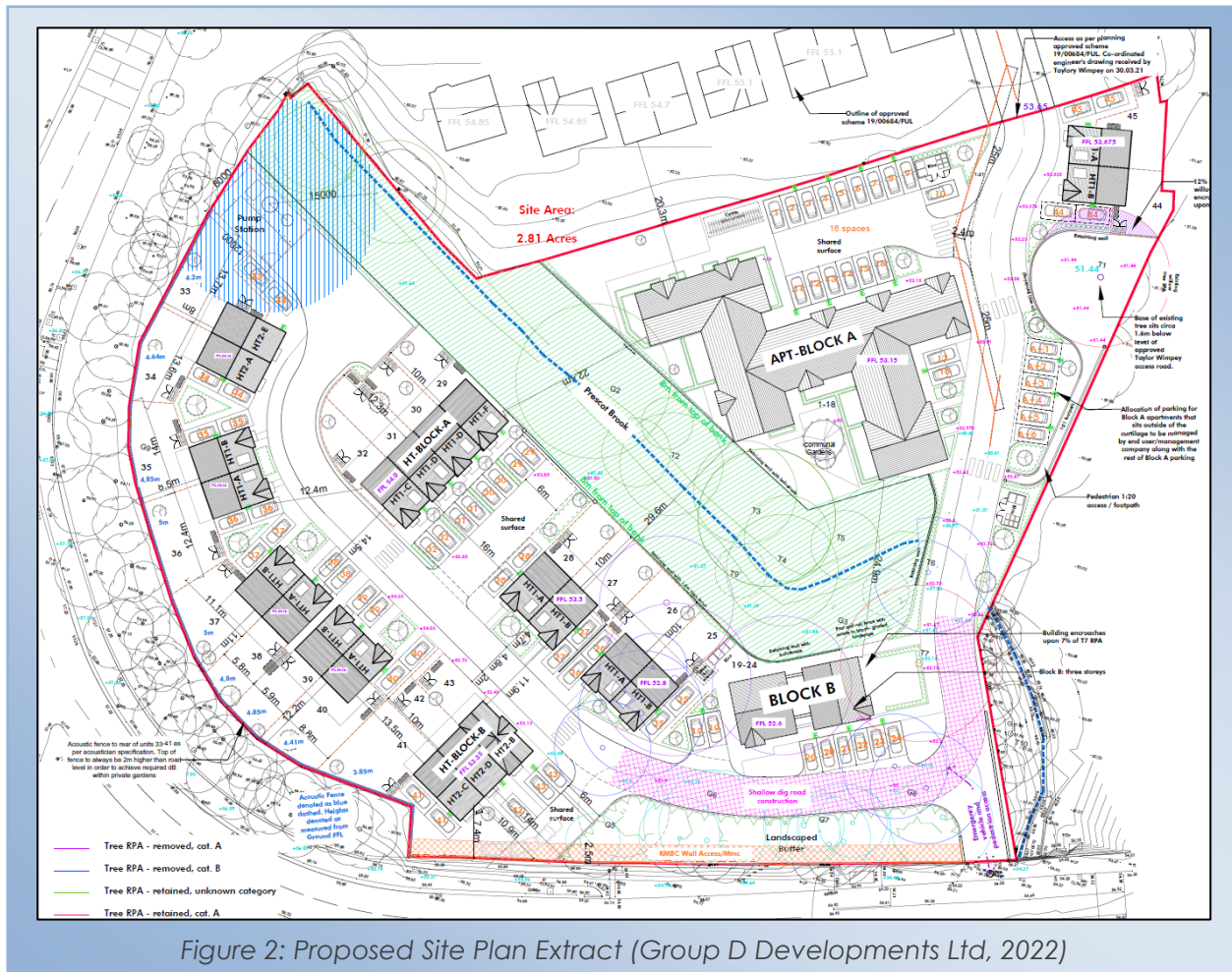
2.3 Topography

- 2.3.1 A topographic survey has been undertaken and included within **Appendix F**. The topographic survey has identified that the onsite ground levels fall from 54.21mAOD adjacent to the south-western boundary of the site, down toward the Main River (Prescot Brook) at 50.24mAOD. The arrows shown on **Figure 1** give a general indication of the fall across the site.

3.0 DEVELOPMENT PROPOSALS

3.1 Nature of the development

- 3.1.1 This assessment supports a planning application for the construction of 45no. residential dwellings, and the proposals will be complete with access via the Taylor Wimpey development in construction adjacent to the northern boundary of the site. Footpaths, car parking, external works lighting, landscaping, boundary walls/fencing, external services and drainage will also be included as shown within **Figure 2** (full layout included within **Appendix G**).



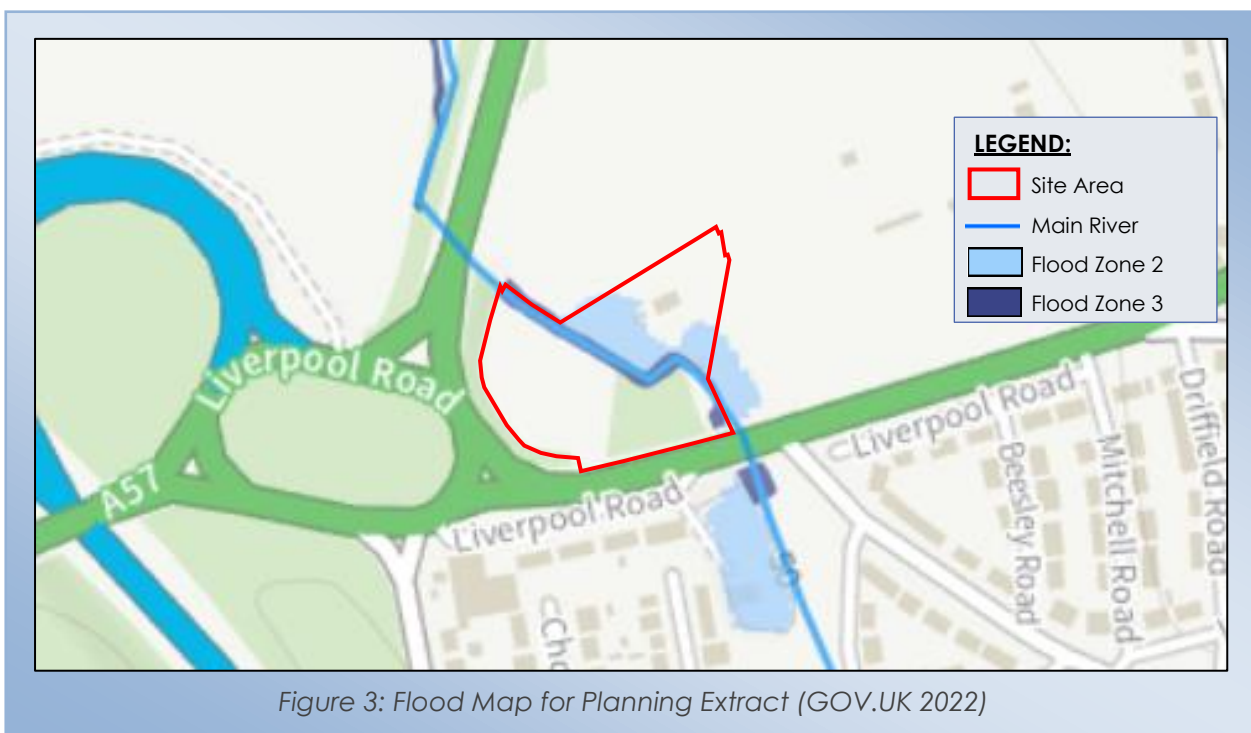
- 3.1.2 Review of the mapping has identified a Main River known as Prescott Brook located onsite. This Main River enters site from the north-west, and flows in a south-easterly direction where it is then culverted under Liverpool Road. Prescott Brook is known as Logwood Mill Brook further downstream.
- 3.1.3 The EA will require an 8m offset to be maintained from the top of the bank. This offset should provide clear and unimpeded access for future maintenance purposes, and has been accounted for within the proposed site plan. An Environmental Permit will also be required from the EA for any works being undertaken within 16m of a Main River, this permit is a standard requirement for any new development taking place within proximity to a Main River.

- 3.1.4 National and local policy identifies that Sustainable Drainage Systems (SuDS) should be incorporated into new development where at all feasible. SuDS should also be considered in proposed public open space areas to assist with providing attenuation and conveyance benefits.

4.0 SOURCES OF FLOOD RISK

4.1 Fluvial Flood Risk

- 4.1.1 Information relating to flood risk at the site has been obtained from the EA and the long-term government mapping. An extract of the EA's Flood Zone Map for Planning is shown in **Figure 3**, which illustrates that the site is located within Flood Zones 1, 2 and 3.
- 4.1.2 Flood Zone 1 is an area not considered to be at risk of flooding. Flood Zone 2 is an area at 'low' to 'medium' risk of flooding (so an area at risk in the undefended 1 in 1000yr return period fluvial event). Flood Zone 3 is an area at medium to high risk, and an area at risk in the undefended 1 in 100yr return period fluvial event or the tidal 1 in 200yr return period event. In this case the primary source of flooding is fluvial given the sites proximity from the nearest tidal flood sources.



- 4.1.3 Although the site is located within Flood Zones 1, 2 and 3, an intra-site sequential approach has been undertaken where development has been proposed in areas of lower risk. It is therefore noted that development is only proposed within Flood Zones 1 and 2, as illustrated in **Figure 4**. As development is partially proposed within Flood Zone 2, the proposals should be supported by the Sequential Test to conform with planning policy.
- 4.1.4 The nearest Main River is Prescot Brook, which bisects the site. This Main River enters site from the north-west, and flows in a south-easterly direction where it is then culverted under Liverpool Road. Prescot Brook is known as Logwood Mill Brook further downstream. The risk to the site from fluvial sources is identified to be low to medium based on the long-term government flood maps, due to the site's proximity to this key watercourse (see full mapping in **Appendix B**).



Figure 4: EA Flood Zone Overlay Plan Extract (Betts Hydro, 2022)

- 4.1.5 Consultation with the Environment Agency has been undertaken to obtain the most up-to-date flood risk information to allow a better understanding of the potential flood risk at the site to be gained. The modelling information obtained from the EA has been reviewed and assessed by our hydraulic modelling team.

Hydraulic Modelling

- 4.1.6 A separate Hydraulic Modelling Assessment has been undertaken to assess the potential fluvial flood risk more accurately. The full modelling methodology has been included within the separate Hydraulic Modelling Assessment Note (**Appendix H**), and a short summary is included for context.
- 4.1.7 The hydraulic modelling work was commissioned to review the existing and future flood risk, and to steer any mitigation measures required. The assessment has utilised the fluvial Logwood Mill Brook, which is a 1D – 2D ISIS-TUFLOW model. The model was created by JBA in 2012 to refine the Flood Zones in the area, and since the creation of this model there have been changes to the fluvial allowances for climate change. The Logwood Mill Brook model therefore required updating to meet these new standards. A pre-application meeting with the EA also confirmed the requirement to use the latest Climate Change allowances. A site specific topographic survey has also been included within the updated modelling to best represent the existing levels onsite.
- 4.1.8 The model was simulated for an existing scenario using a site specific topographic survey. The following simulations were undertaken:
- Fluvial 1 in 100 year (1% AEP)
 - Fluvial 1 in 100 year plus Climate Change (44%) (1% AEP plus 44% CC)
 - Fluvial 1 in 1000 year (0.1% AEP)
 - Fluvial 1 in 100 year plus Climate Change (44%) with 95% blockage

Existing Scenario Fluvial Results

- 4.1.9 The key modelled scenarios to be considered are the fluvial 1 in 100 year, 1 in 100 year plus 44% Climate Change, and the 1 in 1000 year events. There is no out-of-channel exceedance in the 1 in 100 year return period event, evidenced in **Figure 5** (see flood depth, level and velocity plans in **Appendix H**). The nearest flooding to the site is located 550m south-east of the site, and west of Cables Way.



Figure 5: Existing Fluvial 1 in 100yr Flood Depth Extract (Betts Hydro, 2022)

- 4.1.10 Some out-of-channel exceedance occurs in the 1 in 1000 year return period event, and the predicted flood extent and depths are shown in **Figure 6**. The flood extent is shown to impact the northern part of the site, with a peak water level onsite of 51.27mAOD. Full flood depth, level and velocity plans are included within **Appendix H** for completeness.

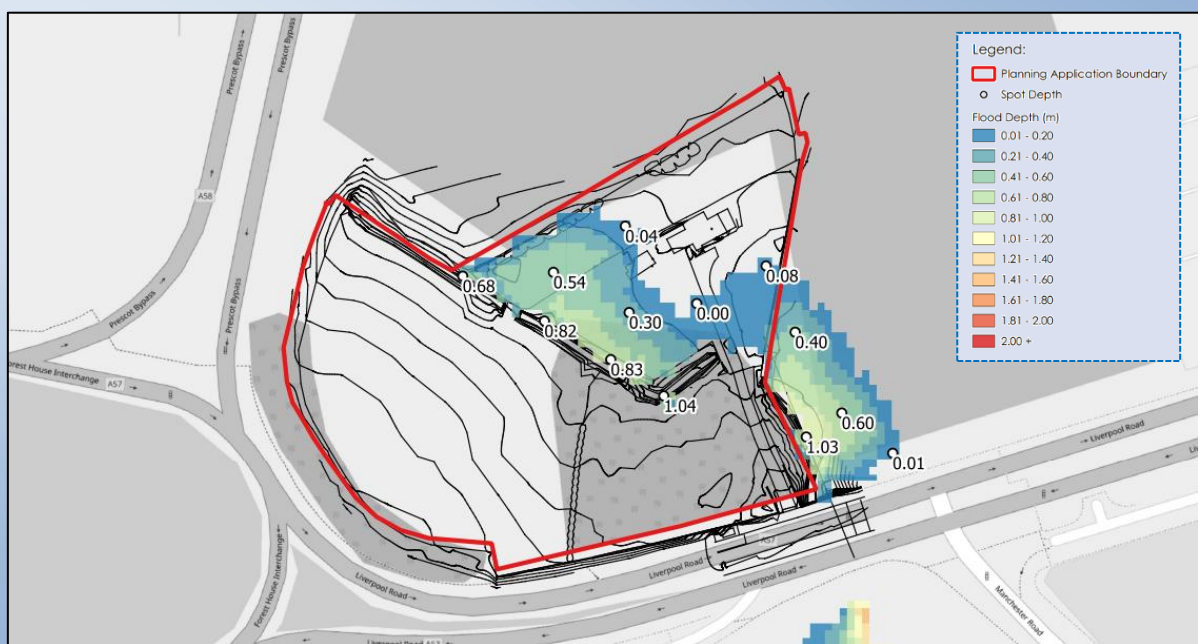
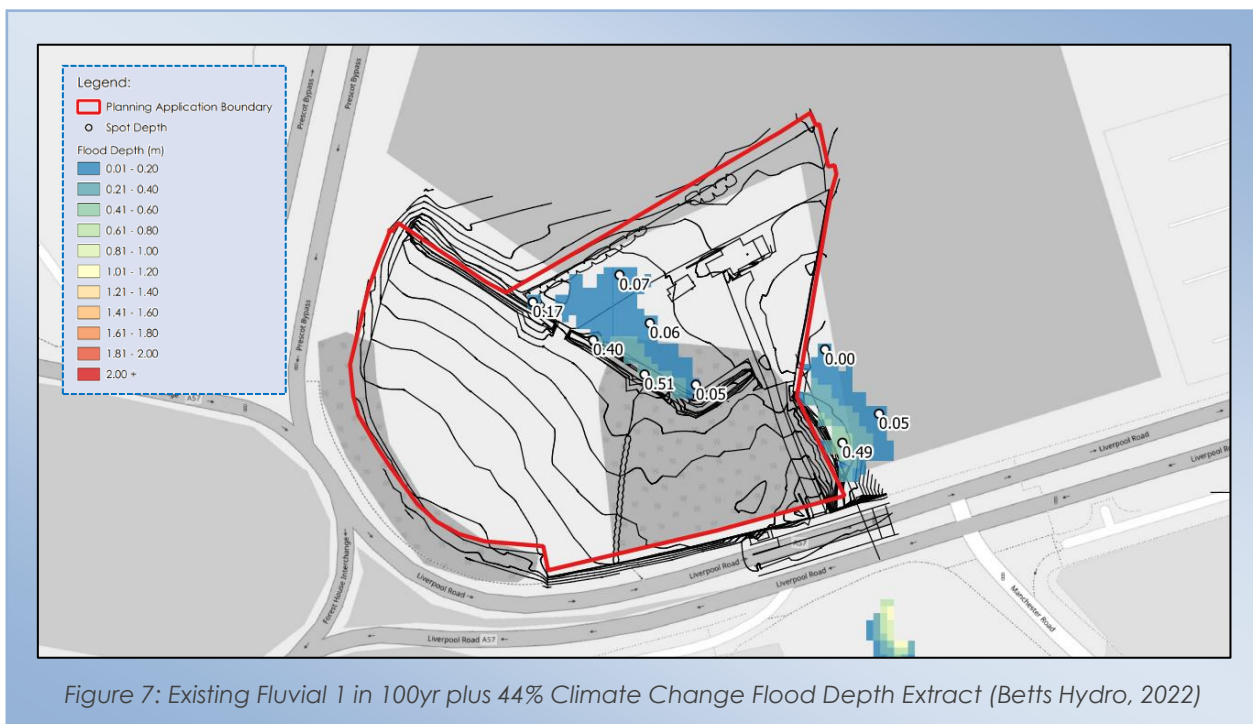


Figure 6: Existing Fluvial 1 in 1000yr Flood Depth Extract (Betts Hydro, 2022)

- 4.1.11 We have reviewed the current Climate Change Allowance for the site in accordance with the EA's latest guidance and identified that for 'more vulnerable' development, the 'central allowance' should be applied to Main Rivers located within the Lower Mersey Management Catchment area. An increase of 44% has been applied to the peak 1 in 100 year flow in the Logwood Mill Brook Model. The previous allowances used within the model were 30%, 35% and 70%.
- 4.1.12 Some out-of-channel exceedance is also shown to occur in the 1 in 100 year plus 44% Climate Change return period event. As illustrated in **Figure 7**, low-lying areas adjacent to the channel in the northern half of the site are inundated, and the peak water level onsite is identified to be 50.85mAOD (see flood depth, level, and velocity plans in **Appendix H**). To mitigate this flood risk, the minimum Finished Floor Level (FFL) for the residential dwellings should be set 600mm above the top water level in this event, to a level of 51.45mAOD. Review of the site plan has identified that the proposed FFL for the apartment block is 53.15mAOD, which is 1.7m above the minimum FFL required.



Proposed Scenario

- 4.1.13 The proposed levels mean that the development site is not at risk of flooding in the 1 in 100 year, 1 in 100 year plus 44% Climate Change and 1 in 1000 year return period events.
- 4.1.14 There is no exceedance outside of the channel corridor in the proposed scenario in the 1 in 100 year plus 44% Climate Change event, as shown in **Figure 8**. The peak water level onsite in this event is identified to be 50.86mAOD. The proposed FFL of the apartment building is 53.15mAOD, which is 2.3m above the top water level in the 1 in 100 plus 44% Climate Change event (50.85mAOD). It is therefore understood that the development will remain dry, safe, and flood-free in all key scenarios.

- 4.1.15 The proposed development results in no increased risk of flooding to others, but does show minor increases in top water level within the main channel upstream (5mm) and downstream (7mm) of the site. This increase returns to the pre-development top water level 100m upstream and 200m downstream of the site.



Figure 8: Proposed Fluvial 1 in 100yr plus 44% CC Flood Depth Extract (Betts Hydro, 2022)

Residual Risk

- 4.1.16 Consultation with the Environment Agency identified that modelling a blockage scenario was not a requirement, as minimal changes to the culvert are proposed. This has however been undertaken as a precautionary measure to better understand the residual flood risk to the site. Full flood depth, level and velocity plans are included in **Appendix H** for completeness.



Figure 9: Proposed Fluvial 1 in 100yr plus 44% CC with 95% Blockage Flood Depth Extract (Betts Hydro, 2022)

- 4.1.17 There is no exceedance outside of the channel corridor in the proposed scenario in the 1 in 100 year plus 44% Climate Change with 95% blockage event, as shown in **Figure 9**. The peak water level onsite in this event is 51.44mAOD. The proposed FFL of the apartment building is 53.15mAOD, which is 1.71m above the top water level in the 1 in 100 plus 44% Climate Change with 95% blockage event (51.44mAOD). It is therefore understood that the development will remain dry, safe, and flood-free in all key scenarios including when a potential blockage is considered.

Safe Access and Egress

- 4.1.18 As the site is located within Flood Zones 1, 2 and 3, consideration for safe access and egress has been provided. The site is located within an EA Flood Alert Area (River Ditton catchment including areas around Huyton-with-Roby and Widnes), this means Prescot Brook is monitored at its location in close proximity to the site, and that early warning would be provided in the event of a potential future flood event. This will provide future occupants of the properties with an early warning of future flood events and give them time to implement any emergency plans or procedures.
- 4.1.19 It is recommended that future occupiers of the dwellings look to prepare their own household Flood Plans based on their proximity to an area which is at flood risk. These are documents which identify procedures to be carried out in the event of future flooding (IE. moving valuables upstairs, implementing temporary flood resistance measures and reviewing local media to determine whether evacuation is recommended). Flood Plans are not specific to a single type of flood source and can be used for a variety of flood sources such surface water and reservoir flooding. A flood plan would note the actions for the household to take before, during and after a flood event and there are multiple guidance documents available to assist in the preparation of these plans.
- 4.1.20 Although the proposals are to raise the residential dwellings above the TWL in the design event (fluvial 1 in 100 year plus 44% Climate Change), safe access and egress has still been considered. If evacuation from the site is advised, then occupants would need to evacuate towards an area of safety located outside of the predicted floodplain extents, which can be achieved via the emergency vehicle/pedestrian access onto Liverpool Road, proposed in the south-eastern corner of site.

4.2 Tidal Flood Risk

- 4.2.1 The coastline is located over 12km west of the site. Due to the distance from the coast, the associated tidal flood risk to site is 'very low'.

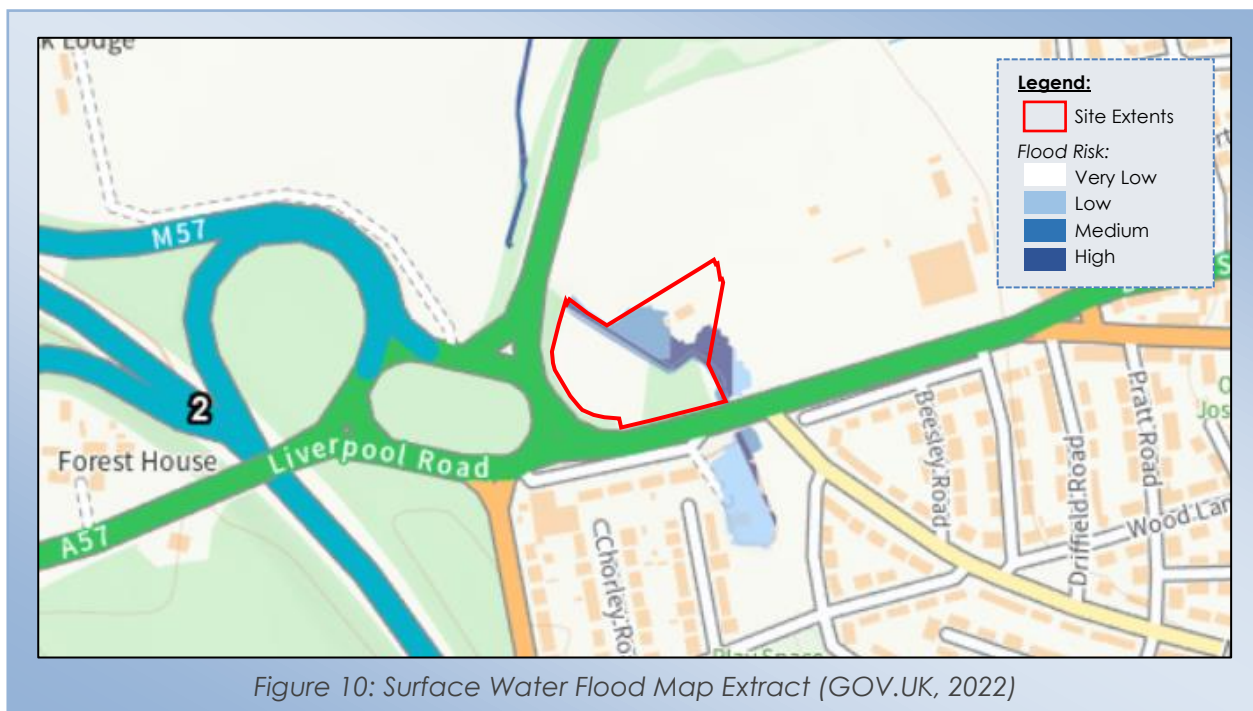
4.3 Flood Risk Vulnerability Classification and Flood Zone Compatibility

- 4.3.1 The site lies within Flood Zones 1, 2 and 3 based on the Environment Agency Flood Map for Planning. Residential development is classified as 'more vulnerable' within the Planning Practice Guidance which supports the National Planning Policy Framework. The PPG identifies those certain types of development are not acceptable if located within high flood risk areas.
- 4.3.2 Policy also notes that justification for locating certain development within these high-risk areas is required. The proposals should be supported by the Sequential Test to

conform with planning policy, as residential development is proposed in Flood Zones 1 and 2. An intra-site sequential approach has been undertaken to locate development in areas at lowest risk onsite.

4.4 Surface Water Flood Risk

- 4.4.1 Surface water flooding occurs when rainwater is unable to drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead. The risk associated with surface water run-off is indicated by the long-term flood risk mapping (extract shown in **Figure 10**).



- 4.4.2 As indicated in **Figure 10**, the site is predominantly at 'very low' to 'high' risk from surface water flooding. Generally, areas at higher risk of surface water flooding correspond with either existing watercourses, conveyance features, existing ponds, or natural low-lying depressions. In this case those areas onsite at higher risk from surface water are associated with low-lying areas located adjacent to Prescot Brook (Main River) onsite.
- 4.4.3 The risk to the proposals from surface water flooding will be managed and reduced post-development through the design and implementation of a sustainable surface water management regime. To further mitigate for any residual risks, it is advised that (following any re-grade of the site) finished floor levels of the residential dwellings are elevated above the external levels (where possible) to provide safe overland flood routes for any excess surface water run-off.

Pluvial (Overland run-off) Flood Risk

- 4.4.4 Intense rainfall that is unable to soak into the ground or enter drainage systems can run-off land and result in flooding. Local topography and the land-use can have a strong influence on the direction and depth of flow. The topography of the surrounding undeveloped areas means there may be potential for overland flows to impact the

site from the northern and western boundaries. It is therefore recommended that an interception drain is designed to intercept any overland flows from the neighbouring undeveloped land before it can impact upon the proposals post-development.

- 4.4.5 The volume and rate of overland flow from land can be exacerbated, if development increases the percentage of impermeable area. Any overland flows generated by the development must be carefully controlled with safe avenues directing overland flow away from adjacent development being advised.

Sewer Flood Risk

- 4.4.6 In urban areas, rainwater is frequently drained into surface water sewers or sewers containing both surface and wastewater known as 'combined sewers'. Foul water flooding often occurs in areas prone to overland flow and can result when the sewer is overwhelmed by heavy rainfall and will continue until the water drains away.
- 4.4.7 Consultation with United Utilities has been undertaken and has not identified any historical sewer flooding issues on or near to the proposed development site (see **Appendix C** for correspondence).

4.5 Groundwater Flood Risk

- 4.5.1 High groundwater levels are usually the key source of groundwater flooding, which occurs when excess water emerges at the ground surface (or within man-made underground structures such as basements). Groundwater flooding is often more insistent than surface water flooding and would typically last for weeks/months rather than days meaning the result to property is often more severe. In general terms groundwater flooding can occur from three main sources:
- If groundwater levels are naturally close to the surface, then this can present a flood risk during times of intense rainfall.
 - Seepage and percolation occur where embankments above ground level hold water. In these cases, water travels through the embankment material and emerges on the opposite side of the embankment.
 - Groundwater recovery/rebound occurs where the water table has been artificially depressed by abstraction. When the abstraction stops the water table makes a recovery to its original level. There is the potential for groundwater flooding in low lying areas where groundwater levels have been depressed below their pre-pumping conditions, where these were at or close to ground level.
- 4.5.2 The mapping data for groundwater shows that the site is underlain by a Secondary A Bedrock Aquifer with Secondary (undifferentiated) Deposits. The site has been identified to be in a Medium – Low Groundwater Vulnerability Zone with no historical groundwater flooding identified by the EA.
- 4.5.3 No groundwater flood risk has been identified during consultation with the other stakeholders. Irrespective, it is advised that the Finished Floor Levels of the units be raised sufficiently above the external levels to safeguard them. The external levels should fall away from the proposed development to provide safe avenues for overland flows around/away from any proposed more vulnerable development.

4.6 Artificial Sources of Flood Risk

- 4.6.1 National policy states that an FRA should consider the potential risks from a variety of other flood sources including artificial sources (such as risks from reservoirs and canals).

Reservoirs

- 4.6.2 The EA recognises reservoirs as bodies of water over 25,000cu.m and the long-term flood mapping is included in **Appendix B**. The mapping shows that the site is at risk of flooding should a breach or overtopping in the nearest reservoir(s) occur, when river levels are normal.

- 4.6.3 The Reservoirs Act 1975 means that the EA ensure reservoirs (over 25,000 cu.m) are regularly inspected and safety work is carried out thus meaning a failure or breach in one of these assets is considered to be highly unlikely. Although reservoir flooding is 'extremely unlikely', if a failure was to occur there would be little or no warning therefore preparedness is key to ensure resilience. In the case of emergency the LLFA often prepare emergency plans in collaboration with the EA and other stakeholder to assist with improving community resilience to residual risks such as reservoir flooding.

Canals

- 4.6.4 There are no canals in proximity of the site and there is therefore no flood risk to the site associated with canals. Irrespective, it is advised that external levels fall away from the proposed buildings, to minimise the flood risk from a variety of sources. By keeping the finished floor levels elevated relative to the externals, this should help create an overland flood flow route in the event of a breach or any other source of flooding that could lead to overland flows including reservoir or canal flooding.

4.7 Historical and Anecdotal Flooding Information

- 4.7.1 No historical flooding has been identified during our review of online sources, including review of Knowsley Metropolitan Borough Council's Strategic Flood Risk Assessment (see general mapping extracts in **Appendix I**). Consultation with Knowsley Metropolitan Borough Council, United Utilities and the Environment Agency has been carried out for this specific application and have not identified any flood risk to the proposed development site (correspondence in **Appendix B, C and D**).

4.8 Flood Risk Mitigation Measures & Residual Risks

- 4.8.1 The site is located within Flood Zones 1, 2 and 3 and considered to be at low to medium risk of fluvial flooding. To observe a conservative approach, mitigation measures have been proposed below to safeguard the development and to consider the future uncertainties of Climate Change in accordance with the NPPF and PPG.

Mitigation Measures

- 4.8.2 The minimum Finished Floor Level (FFL) is 51.45mAOD, which provides 600mm freeboard in the design event (1 in 100 year plus 44% Climate Change event). Review of the site plan has identified that the proposed FFL for the apartment block is 53.15mAOD, which is 1.7m above the minimum FFL required and 2.3m above the top water level in the key design event.

- 4.8.3 Further safeguarding can also be considered within the design to mitigate any residual flood occurrences. Flood resilience measures can be an effective means of mitigating residual events and can be built into new development easily to provide valuable property level resilience. Measures can include raising electricals and utilities above the ground floor level, using water compatible materials for flooring at ground floor level, horizontal plaster boards rather than vertical (to allow for easier replacement) and the use of non-return flap valves on plot drainage to prevent ingress into the dwellings in the event of downstream surcharging on the drainage systems.
- 4.8.4 If evacuation from the site is advised, then occupants would need to evacuate towards an area of safety located outside of the predicted floodplain extents, which can be achieved via the emergency vehicle/pedestrian access onto Liverpool Road, proposed in the south-eastern corner of site. It is recommended that an evacuation plan is prepared.
- 4.8.5 The EA will require an 8m offset to be maintained from the top of the bank. This offset should provide clear and unimpeded access for future maintenance purposes and has been accounted for within the proposed site plan. An Environmental Permit will also be required from the EA for any works being undertaken within 16m of a Main River, this permit is a standard requirement for any new development taking place within proximity to a Main River.
- 4.8.6 Any overland flows generated by the development must be carefully controlled. Safe avenues directing overland flow way from any existing and proposed buildings are advised. Any natural conveyance routes through the site will be maintained, where this is not practical then provision should be made to intercept and convey flows through the proposals to safely outfall as they would naturally.
- 4.8.7 The topography of the surrounding undeveloped areas means there may be potential for overland flows to impact the site from the northern and western boundaries. It is therefore recommended that suitable interception measures are installed to intercept any overland flows from the neighbouring land before it can impact upon the proposals post-development.
- 4.8.8 To minimise the flood risk to the neighbouring properties it is recommended that the surface water run-off generated by the proposals be managed effectively with the peak rates of run-off being restricted to the equivalent of the pre-development situation. The proposed onsite surface water drainage system will need to be sized to cater for events up to and including the 1 in 100yr return period storm event with a 40% allowance for climate change.
- 4.8.9 As with any drainage system blockages within either the foul or surface water system have the potential to cause flooding or disruption. It is important that should any drainage systems not be offered for adoption to either the Water Company or the Local Authority then an appropriate maintenance regime should be scheduled with a suitably qualified management company for these private drainage systems.

Residual Risks

- 4.8.10 If an extreme rainfall event exceeds the design criteria for the drainage system it is likely that there will be some overland flows that are unable to enter the system, it is important that these potential overland flows are catered for within the development site if the capacity of the drainage system is exceeded.

5.0 SUMMARY AND CONCLUSIONS

- 5.1 This Flood Risk Assessment has been prepared to support a planning application for the construction of 45no. residential dwellings on the former Dye House site off Liverpool Road in Prescot. The site lies within Flood Zone 1, 2 and 3 based on the Environment Agency Flood Map for Planning and approximately covers 1.14ha. In accordance with planning policy, although the vast majority of the development is within Flood Zone 1, the proposals should be supported by the Sequential Test, as a small portion of the development is within Flood Zone 2.
- 5.2 Consultations with the Environment Agency, Knowsley Metropolitan Borough Council, and United Utilities have been undertaken and did not identify historical flooding of the site. Consultation with the Environment Agency has been undertaken to obtain the most up-to-date flood risk information to allow a better understanding of the potential flood risk at the site to be gained. A hydraulic modelling exercise was undertaken to support this assessment using the existing modelling to assess in more detail the potential fluvial flood risks to the site.
- 5.3 At present the proposed development area is not at risk of flooding in the 100yr return period event but is potentially in the 100yr + CCA and 1000yr. The development proposals include a range of levels outside of the watercourse corridor resulting in the proposed development remaining dry, safe, and flood-free in all storm events including the 100yr RP + CCA design event.
- 5.4 The proposed FFL is 53.15mAOD which provides approximately 2.3m of freeboard from the design event.
- 5.5 The proposed scenario has been compared against the existing scenario. There is shown to be a minor increase in top water level within the main channel upstream (5mm) and downstream (7mm) of the site. This increase is reduced to the pre-development water level 100m upstream and 200m downstream of the site.
- 5.6 This assessment has been prepared in consultation with the relevant interested parties and incorporates their comments where possible. The report is commensurate with the scale and nature of the development proposals and in summary, the development can be considered appropriate in accordance with the Planning Practice Guidance.

6.0 RECOMMENDATIONS

- 6.1 The minimum Finished Floor Level (FFL) is 51.45mAOD, which provides 600mm freeboard in the design event (1 in 100 year plus 44% Climate Change event). Review of the site plan has identified that the proposed FFL for the apartment block is 53.15mAOD, which is 1.7m above the minimum FFL required and 2.3m above the top water level in the key design event.
- 6.2 Further safeguarding can also be considered within the design to mitigate any residual flood occurrences. Flood resilience measures can be an effective means of mitigating residual events and can be built into new development easily to provide valuable property level resilience. Measures can include raising electricals and utilities above the ground floor level, using water compatible materials for flooring at ground floor level, horizontal plaster boards rather than vertical (to allow for easier replacement) and the use of non-return flap valves on plot drainage to prevent ingress into the dwellings in the event of downstream surcharging on the drainage systems.
- 6.3 If evacuation from the site is advised, then occupants would need to evacuate towards an area of safety located outside of the predicted floodplain extents, which can be achieved via the emergency vehicle/pedestrian access onto Liverpool Road, proposed in the south-eastern corner of site. It is recommended that an evacuation plan is prepared.
- 6.4 The EA will require an 8m offset to be maintained from the top of the bank. This offset should provide clear and unimpeded access for future maintenance purposes and has been accounted for within the proposed site plan. An Environmental Permit will also be required from the EA for any works being undertaken within 16m of a Main River, this permit is a standard requirement for any new development taking place within proximity to a Main River.
- 6.5 Any overland flows generated by the development must be carefully controlled. Safe avenues directing overland flow way from any existing and proposed buildings are advised. Any natural conveyance routes through the site will be maintained, where this is not practical then provision should be made to intercept and convey flows through the proposals to safely outfall as they would naturally.
- 6.6 The topography of the surrounding undeveloped areas means there may be potential for overland flows to impact the site from the northern and western boundaries. It is therefore recommended that suitable interception measures are installed to intercept any overland flows from the neighbouring land before it can impact upon the proposals post-development.
- 6.7 To minimise the flood risk to the neighbouring properties it is recommended that the surface water run-off generated by the proposals be managed effectively with the peak rates of run-off being restricted to the equivalent of the pre-development situation. The proposed onsite surface water drainage system will need to be sized to cater for events up to and including the 1 in 100yr return period storm event with a 40% allowance for climate change.

- 6.8 As with any drainage system blockages within either the foul or surface water system have the potential to cause flooding or disruption. It is important that should any drainage systems not be offered for adoption to either the Water Company or the Local Authority then an appropriate maintenance regime should be scheduled with a suitably qualified management company for these private drainage systems.

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Environment Agency – www.environment-agency.gov.uk/

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Flood Forum – <http://www.floodforum.org.uk/>

Flood London – <http://www.floodlondon.com/>

Google Maps – <http://maps.google.co.uk/>

Streetmap – <http://www.streetmap.co.uk/>

United Utilities – <https://www.unitedutilities.com/>

APPENDIX A: NPPF & PPG EXTRACTS

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14. Meeting the challenge of climate change, flooding and coastal change

152. The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.

Planning for climate change

153. Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures⁵³. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.
154. New development should be planned for in ways that:
- a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and
 - b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.
155. To help increase the use and supply of renewable and low carbon energy and heat, plans should:
- a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);
 - b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

⁵³ In line with the objectives and provisions of the Climate Change Act 2008.

- c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.
156. Local planning authorities should support community-led initiatives for renewable and low carbon energy, including developments outside areas identified in local plans or other strategic policies that are being taken forward through neighbourhood planning.
157. In determining planning applications, local planning authorities should expect new development to:
- a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and
 - b) take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.
158. When determining planning applications for renewable and low carbon development, local planning authorities should:
- a) not require applicants to demonstrate the overall need for renewable or low carbon energy, and recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions; and
 - b) approve the application if its impacts are (or can be made) acceptable⁵⁴. Once suitable areas for renewable and low carbon energy have been identified in plans, local planning authorities should expect subsequent applications for commercial scale projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas.

Planning and flood risk

159. Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.
160. Strategic policies should be informed by a strategic flood risk assessment, and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards.

⁵⁴ Except for applications for the repowering of existing wind turbines, a proposed wind energy development involving one or more turbines should not be considered acceptable unless it is in an area identified as suitable for wind energy development in the development plan; and, following consultation, it can be demonstrated that the planning impacts identified by the affected local community have been fully addressed and the proposal has their backing.

161. All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by:
- a) applying the sequential test and then, if necessary, the exception test as set out below;
 - b) safeguarding land from development that is required, or likely to be required, for current or future flood management;
 - c) using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding, (making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management); and
 - d) where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations.
162. The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.
163. If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in Annex 3.
164. The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. To pass the exception test it should be demonstrated that:
- a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and
 - b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.
165. Both elements of the exception test should be satisfied for development to be allocated or permitted.
166. Where planning applications come forward on sites allocated in the development plan through the sequential test, applicants need not apply the sequential test again. However, the exception test may need to be reapplied if relevant aspects of the proposal had not been considered when the test was applied at the plan-

making stage, or if more recent information about existing or potential flood risk should be taken into account.

167. When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment⁵⁵. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:
- a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
 - b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;
 - c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
 - d) any residual risk can be safely managed; and
 - e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.
168. Applications for some minor development and changes of use⁵⁶ should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments set out in footnote 55.
169. Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:
- a) take account of advice from the lead local flood authority;
 - b) have appropriate proposed minimum operational standards;
 - c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
 - d) where possible, provide multifunctional benefits.

Coastal change

⁵⁵ A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

⁵⁶ This includes householder development, small non-residential extensions (with a footprint of less than 250m²) and changes of use; except for changes of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the sequential and exception tests should be applied as appropriate.

170. In coastal areas, planning policies and decisions should take account of the UK Marine Policy Statement and marine plans. Integrated Coastal Zone Management should be pursued across local authority and land/sea boundaries, to ensure effective alignment of the terrestrial and marine planning regimes.
171. Plans should reduce risk from coastal change by avoiding inappropriate development in vulnerable areas and not exacerbating the impacts of physical changes to the coast. They should identify as a Coastal Change Management Area any area likely to be affected by physical changes to the coast, and:
- a) be clear as to what development will be appropriate in such areas and in what circumstances; and
 - b) make provision for development and infrastructure that needs to be relocated away from Coastal Change Management Areas.
172. Development in a Coastal Change Management Area will be appropriate only where it is demonstrated that:
- a) it will be safe over its planned lifetime and not have an unacceptable impact on coastal change;
 - b) the character of the coast including designations is not compromised;
 - c) the development provides wider sustainability benefits; and
 - d) the development does not hinder the creation and maintenance of a continuous signed and managed route around the coast⁵⁷.
173. Local planning authorities should limit the planned lifetime of development in a Coastal Change Management Area through temporary permission and restoration conditions, where this is necessary to reduce a potentially unacceptable level of future risk to people and the development.

⁵⁷ As required by the Marine and Coastal Access Act 2009.

Revision date: 06 03 2014

What should be considered if bringing forward a Neighbourhood Development Order/Community Right to Build Order in an area at risk of flooding?

The general approach and requirements for site-specific flood risk assessments should be applied to developments in areas at risk of flooding to be permitted by Neighbourhood Development/ Community Right to Build Orders. This means that for any development proposals:

- in Flood Zone 2 or 3;
- or of at least 1 hectare;
- or in an area that has critical drainage problems (as notified to the local planning authority by the Environment Agency);
- or that may be subject to other sources of flood risk;

a site-specific flood risk assessment should support the draft Order. The flood risk assessment checklist may be helpful in this respect.

Where the neighbourhood planning area is in Flood Zone 2 or 3, or is in an area with critical drainage problems, advice on the scope of the flood risk assessment required should be sought from the Environment Agency. Where the area may be subject to other sources of flooding, it may be helpful to consult other bodies involved in flood risk management, as appropriate.

Where a Neighbourhood Development/Community Right to Build Order is under consideration for a site/area in Flood Zone 2 or 3, which has not been allocated in the development plan through the Sequential Test, and if necessary the Exception Test, it will be necessary for those proposing the development, in having regard to the National Planning Policy Framework's policies on flood risk, to demonstrate why the development cannot reasonably be located in areas of lower flood risk.

In all cases where new development is proposed, the sequential approach to locating development in areas of lower flood risk should still be applied within a neighbourhood planning area.

Neighbourhood Development/Community Right to Build Orders that propose new development that would be;

- contrary to the flood risk vulnerability and flood zone compatibility table (Table 3), or;
- within areas at risk of flooding where sequential testing shows there to be places at lower flood risk which are suitable and reasonably available for the development proposed,

should not be considered appropriate, having regard to the national policies on development and flood risk.

Paragraph: 064 Reference ID: 7-064-20140306

Revision date: 06 03 2014

Flood Zone and flood risk tables

- Table 1: Flood Zones
- Table 2: Flood risk vulnerability classification
- Table 3: Flood risk vulnerability and flood zone 'compatibility'

Table 1: Flood Zones

These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea (<https://flood-map-for-planning.service.gov.uk/>)), available on the Environment Agency's web site, as indicated in the table below.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the Strategic Flood Risk Assessment when considering location and potential future flood risks to developments and land uses.

Paragraph: 065 Reference ID: 7-065-20140306

Revision date: 06 03 2014

Table 2: Flood risk vulnerability classification

Essential infrastructure

- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.
- Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood.
- Wind turbines.

Highly vulnerable

- Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding.
- Emergency dispersal points.
- Basement dwellings.
- Caravans, mobile homes and park homes intended for permanent residential use.
- Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').

More vulnerable

- Hospitals
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non-residential uses for health services, nurseries and educational establishments.
- Landfill* and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Less vulnerable

- Police, ambulance and fire stations which are not required to be operational during flooding.
- Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill* and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do not need to remain operational during times of flood.
- Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.

Water-compatible development

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

* "Landfill is as defined in Schedule 10 of the Environmental Permitting (England and Wales) Regulations 2010 (<http://www.legislation.gov.uk/uksi/2010/675/schedule/10/made>).

Paragraph: 066 Reference ID: 7-066-20140306

Revision date: 06 03 2014

Table 3: Flood risk vulnerability and flood zone 'compatibility'

Table 3: flood risk vulnerability and flood zone 'compatibility'

(https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/575184/Table_3_-_Flood_risk_vulnerability_and_flood_zone__compatibility_.pdf) (PDF, 58.1KB, 1 page)

Key:

✓ Development is appropriate

✗ Development should not be permitted.

Notes to table 3:

- This table does not show the application of the Sequential Test which should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;
- The Sequential and Exception Tests do not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site;
- Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

* * * In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.

Paragraph: 067 Reference ID: 7-067-20140306

Revision date: 06 03 2014

Site-specific flood risk assessment: Checklist**1 - Development site and location**

You can use this section to describe the site you are proposing to develop. It would be helpful to include, or make reference to, a location map which clearly indicates the development site.

- Where is the development site located? (eg postal address or national grid reference)
- What is the current use of the site? (eg undeveloped land, housing, shops, offices)
- Which Flood Zone (for river or sea flooding) is the site within? (ie Flood Zone 1, Flood Zone 2, Flood Zone 3). As a first step, you should check the Flood Map for Planning (<http://apps.environment-agency.gov.uk/wiyby/37837.aspx>) (Rivers and Sea). It is also a good idea to check the Strategic Flood Risk Assessment for the area available from the local planning authority.

2 - Development proposals

APPENDIX B: EA INFORMATION & CORRESPONDENCE

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Patrick Taylor

From: GMMC Info Requests <InfoRequests.GMMC@environment-agency.gov.uk>
Sent: 16 June 2022 08:04
To: Patrick Taylor
Subject: GMMC262440AB Response ERKD976V24T3
Attachments: GMMC262440AB_Auto.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Patrick,

Thank you for your enquiry which was received on 12/5/22.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

I enclose the data requested.

We have no records of flooding affecting the site. However, this does not mean flooding has not occurred in the past or that it will not flood in future. We recommend that you also contact United Utilities and Knowsley District Authority who may hold additional information (the former especially in relation to sewer flooding).

Here are some additional links that may be of use:

<https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities>
<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

Please refer to the [Open Government Licence](#) which explains the permitted use of this information.

Please use the following Sharefile links to access the requested Logwood Mill data:

P567 2012: <https://ea.sharefile.com/d-sb001bf6c24f74e4aaa92c841d9be38d7>

Climate change & 2D 2019: <https://ea.sharefile.com/d-sb906d2e61bc142f79e1122cbcd50129>

Please be aware that the above links are live for only 30 days from 13/06/2022 and therefore you are recommended to download the data at your earliest convenience.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Kind regards,

Anne Ball
Customer and Engagement Officer
Greater Manchester, Merseyside and Cheshire
Email: Inforequests.gmmc@environment-agency.gov.uk

Office address: Richard Fairclough House, Knutsford Road, Latchford, Warrington, WA14 4UW

Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else. We have checked this email and its attachments for viruses. But you should still check any attachment before opening it. We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes.

Flood map for planning

Your reference
Dye House

Location (easting/northing)
345817/392757

Created
4 May 2022 16:17

Your selected location is in flood zone 3, an area with a high probability of flooding.

This means:

- you must complete a flood risk assessment for development in this area
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (see www.gov.uk/guidance/flood-risk-assessment-standing-advice)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

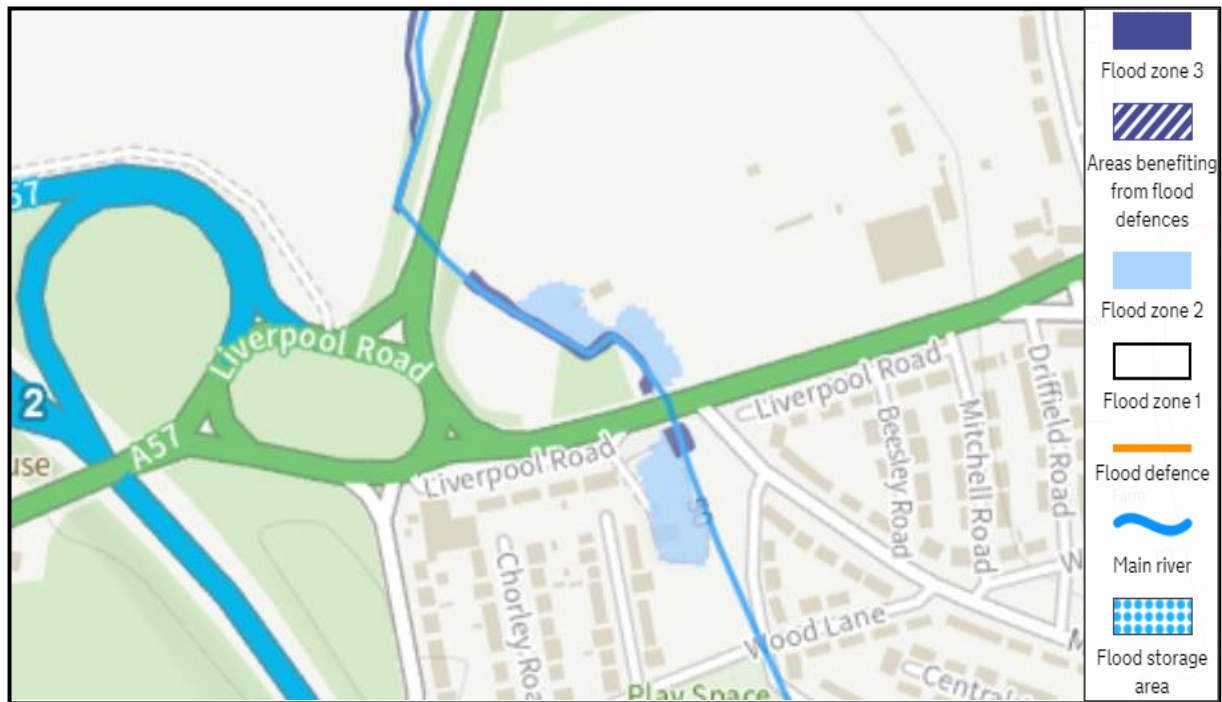
This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

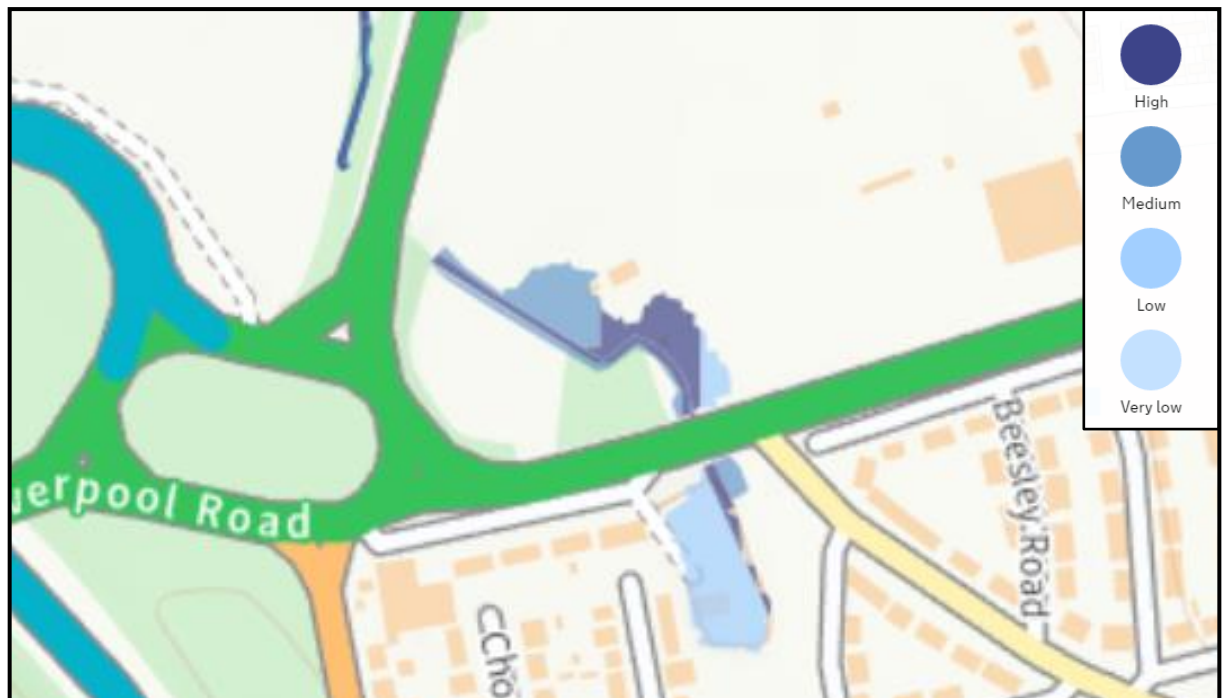
Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2021 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>

NATIONAL FLOOD MAPPING

Flood Map for Planning



Long Term Flood Risk – Rivers or Sea



NATIONAL FLOOD MAPPING

Long Term Flood Risk – Surface Water



Long Term Flood Risk - Reservoirs



Flood risk assessment data

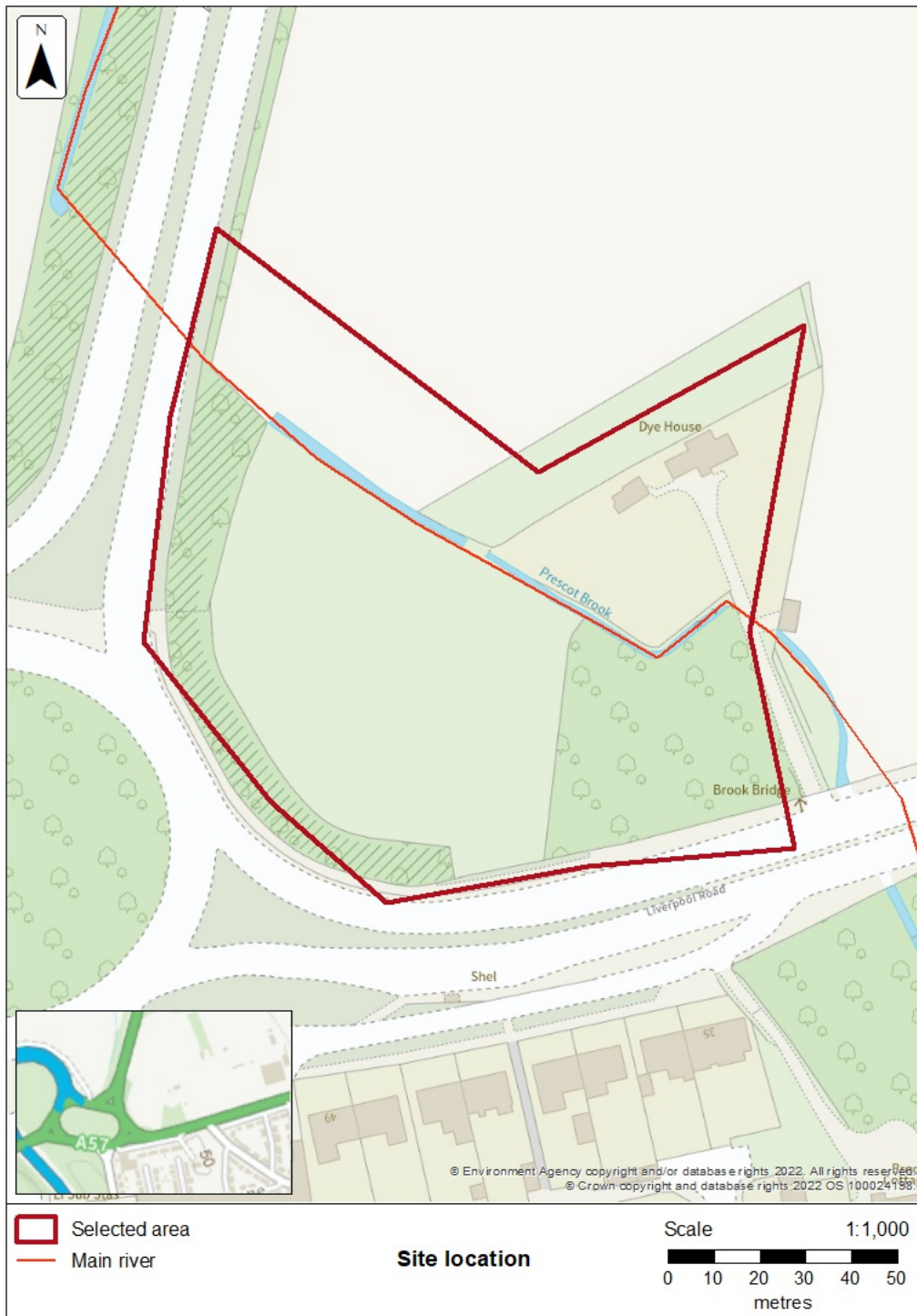
Location of site: 345810 / 392753 (shown as easting and northing coordinates)

Document created on: 13 June 2022

This information was previously known as a product 4.

Customer reference number: GMMC262440AB

Map showing the location that flood risk assessment data has been requested for.



How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

We recommend that you work with a flood risk consultant to get your flood risk assessment.

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Information that's unavailable

This document **does not** contain:

- historic flooding
- flood defences and attributes

We do not have historic flooding data for this location. You can contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

We aren't able to display flood defence locations and attributes as there are no formal flood defences in the area of interest.

Surface water and other sources of flooding

Use the [long term flood risk service](#) to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

For information about sewer flooding, contact the relevant water company for the area.

About the models used

Model name: Logwood_2012

Scenario(s): No defences exist fluvial

Date: 6 March 2012

This model contains the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occurring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your development is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change

This data is updated on a quarterly basis as better data becomes available.

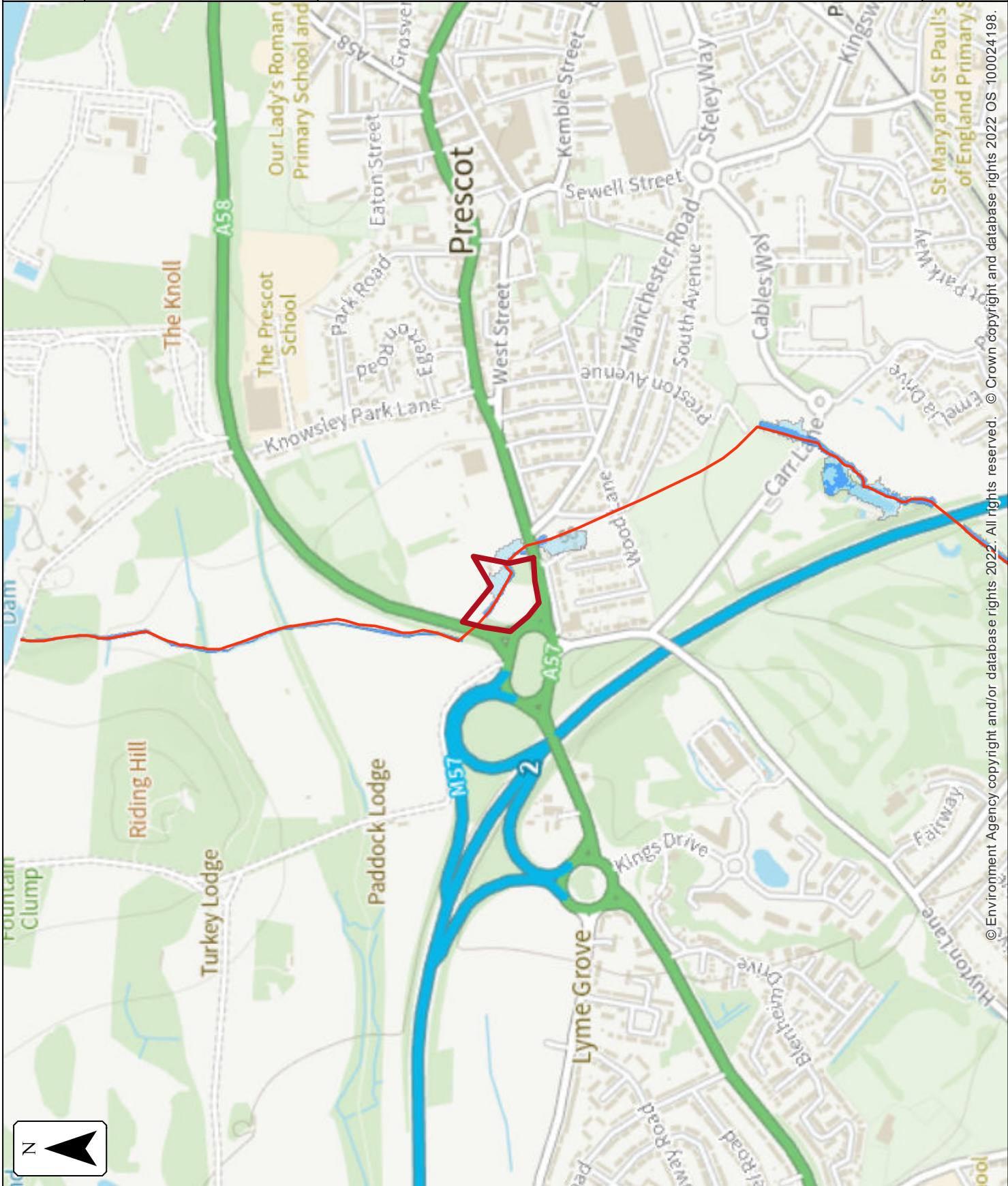
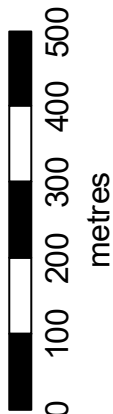
Flood map for planning

Location (easting/northing)
345810/392753

Scale
1:10,000

Created
12 May 2022

-  Selected area
-  Main river
-  Flood zone 3
-  Flood zone 2



Modelled data

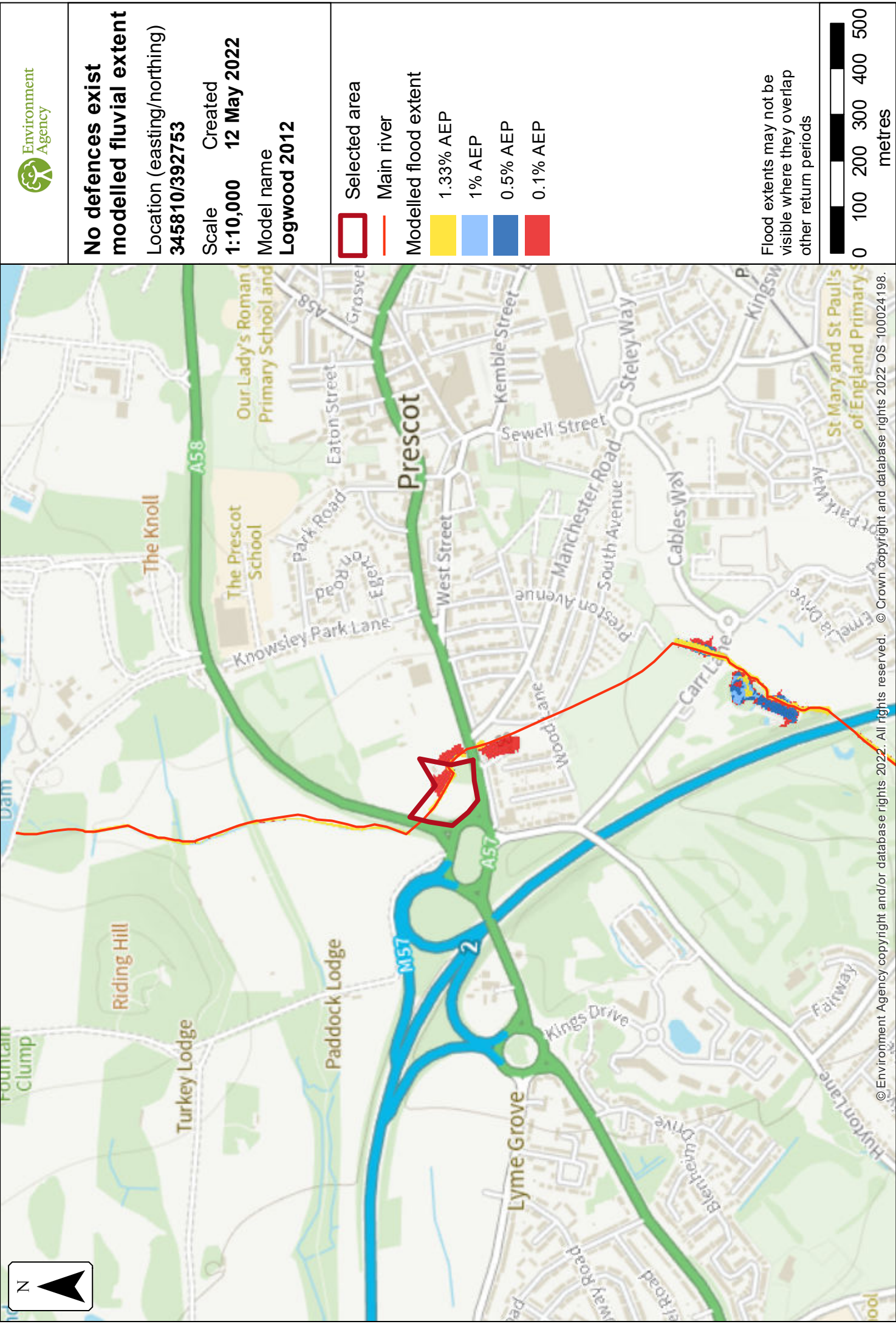
This section provides details of different scenarios we have modelled and includes the following (where available):

- outline maps showing the area at risk from flooding in different modelled scenarios
- modelled node point map(s) showing the points used to get the data to model the scenarios and table(s) providing details of the flood risk for different return periods

Modelled scenarios

The following scenarios are included:

- No defences exist modelled fluvial: risk of flooding from rivers where there are no flood defences



No defences exist modelled fluvial node locations

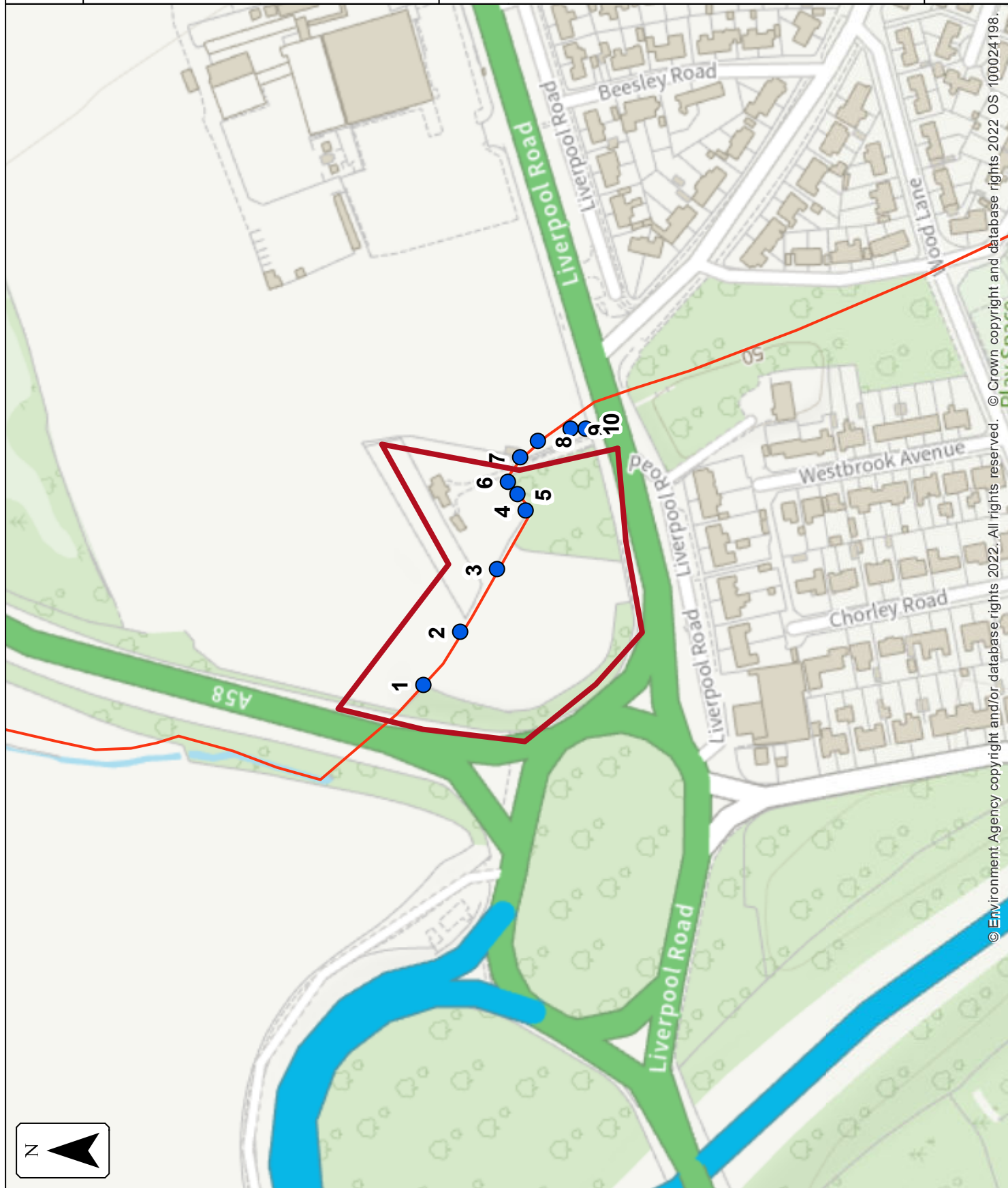
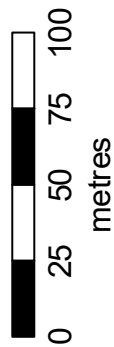
Location (easting/northing)
345810/392753

Scale
1:2,500

Created
12 May 2022

Model name
Logwood 2012

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

No defences exist

Label	Modelled location ID	Easting	Northing	4% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	91979	345767	392794	50.38	0.80			50.50	1.10	50.54	1.19	50.62	1.40	51.29	2.0
2	332473	345793	392776	50.33	0.87			50.45	1.18	50.49	1.29	50.57	1.51	51.28	2.15
3	93396	345824	392758	50.26	0.94			50.38	1.27	50.42	1.38	50.50	1.62	51.28	1.99
4	202391	345852	392744	50.14	1.01			50.26	1.36	50.31	1.48	50.41	1.73	51.28	2.09
5	129283	345860	392749	50.12	1.03			50.25	1.38	50.29	1.50	50.39	1.76	51.27	2.13
6	137898	345866	392753	50.11	1.05			50.23	1.40	50.28	1.53	50.38	1.79	51.27	2.51
7	266588	345878	392747	49.91	1.05			50.03	1.40	50.07	1.53	50.13	1.79	50.90	2.51
8	92756	345886	392739	49.78	1.08			49.91	1.44	49.93	1.57	49.98	1.84	50.89	2.32
9	229238	345892	392722	49.42	1.12			49.53	1.50	49.57	1.63	49.66	1.91	50.89	2.29
10	112320	345892	392716	49.20	1.14			49.35	1.51	49.41	1.65	49.53	1.93	50.89	2.71

Data in this table comes from the Logwood 2012 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

[Find out more about flood risk activity permits](#)

Help and advice

Contact the Greater Manchester Merseyside and Cheshire Environment Agency team at inforequests.gmmc@environment-agency.gov.uk for:

- [more information about getting a product 5, 6, 7 or 8](#)
- general help and advice about the site you're requesting data for

APPENDIX C: UU CORRESPONDENCE

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Hannah Buchanan

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 24 June 2022 16:56
To: Hannah Buchanan
Subject: RE: Sewer Flood Risk Information Request

Hi Hannah

'I can confirm that we have no current record of sewer flooding within the vicinity of the proposed development.

Please note that United Utilities Water Limited (U UW) can only record and check flooding events which are reported to us and we have to comply with our Regulators instructions on the qualification of flooding events to place on the register.

Our response does not include:

- any sewer flooding events caused by blockages or collapses which are the result of third party actions, natural events or other actions over which U UW has no control and not a facet of sewer capacity; or*
- any historical sewer flooding events that have been removed from the register as a result of investment in our infrastructure.*

As with all development sites, we recommend you liaise with our water and wastewater engineers by contacting our Developer Services team so the details of your development proposal can be considered further. Details can be found at the following link.

<https://www.unitedutilities.com/services/builders-developers/>

Should you require any further information please do not hesitate to contact me.'

Kind regards Jill



Jill Ellis
Customer Advisor Advanced
Developer Services & Metering
Customer Services
Direct Tel: 01925 233 064
Tel: 0345 072 6067
unitedutilities.com

If you have received a great service today why not tell us?

Visit: [unitedutilities.com/wow](https://www.unitedutilities.com/wow)

Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm. You just click on the orange live chat box on our webpage and one of our advisors will be ready to chat to you and help you with your enquiry <https://www.unitedutilities.com/builders-developers/> or you can email us at

----- Original Message -----

From: Hannah Buchanan [hannahbuchanan@betts-associates.co.uk]

Sent: 17/06/2022 12:57

To: wastewaterdeveloperservices@uuplc.co.uk

Subject: Sewer Flood Risk Information Request

EXTERNAL EMAIL This email originated outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

To whom it may concern,

Dye House, Prescot

Please could you confirm whether you have any information that you feel would be valuable to a Flood Risk Assessment and Drainage Management Strategy for the above site (location plan attached), including details of historical flooding and any predicted flood water levels; this would be greatly appreciated. If there are any specific requirements that you require in a scope of works for this site please can you advise at this stage so that it can be fully incorporated into the proposals at an early stage.

Please do not hesitate to contact me on the details below to discuss further should you require additional information or clarification.

Kind Regards,

Hannah Buchanan *BSc (Hons) MSc GradCIWEM*

Graduate Flood Risk Analyst

BETTS HYDRO

Consulting Engineers

Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire, CH5 2LY

Chester +44 (0)1244 289041

hannahbuchanan@betts-associates.co.uk

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APPENDIX D: LPA/LLFA CORRESPONDENCE

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Hannah Buchanan

From: Hannah Buchanan
Sent: 30 June 2022 15:17
To: 'LLFA@Knowsley.gov.uk'
Subject: Historic Flood Risk Information Request
Attachments: Location Plan.pdf

To whom it may concern,

Dye House, Prescot

Please could you confirm whether you have any information that you feel would be valuable to a Flood Risk Assessment and Drainage Management Strategy for the above site (location plan attached), including details of historical flooding and any predicted flood water levels; this would be greatly appreciated. If there are any specific requirements that you require in a scope of works for this site please can you advise at this stage so that it can be fully incorporated into the proposals at an early stage.

Please do not hesitate to contact me on the details below to discuss further should you require additional information or clarification.

Kind Regards,

Hannah Buchanan BSc (Hons) MSc GradCIWEM
Graduate Flood Risk Analyst

BETTS HYDRO

Consulting Engineers

Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire, CH5 2LY
Chester +44 (0)1244 289041

hannahbuchanan@betts-associates.co.uk
www.betts-associates.co.uk

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APPENDIX E: LOCATION PLAN

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LOCATION PLAN

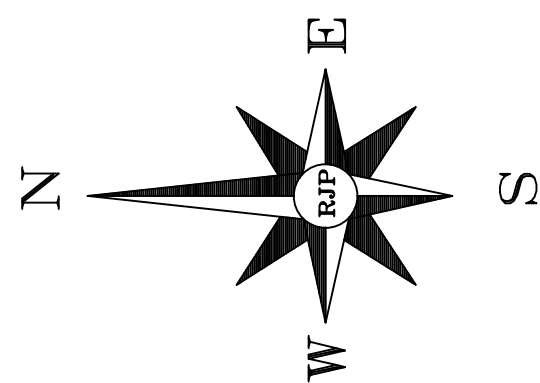
Dye House, Prescott



OS X (Eastings)	345816
OS Y (Northings)	392765
Nat Grid	SJ458927 / SJ4581692765
Nearest Post Code	L34 3LX
Lat (WGS84)	N53:25:44 (53.428874836515824)
Long (WGS84)	W2:49:01 (-2.816940100824598)
Lat, Long (WGS84)	53.428874836515824,-2.816940100824598
Lat (OSGB36)	N53:25:43 (53.42862856506315)
Long (OSGB36)	W2:48:56 (-2.8155720182480306)
Lat, Long (OSGB36)	53.42862856506315,-2.8155720182480306

APPENDIX F: TOPOGRAPHIC SURVEY

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COORDINATED STATIONS

STATION	EASTING	NORTHING	LEVEL (m)
GPS1	345869.864	392695.005	54.622
GPS2	345906.635	392706.085	54.851
STNA	345887.378	392710.867	54.262

ABBREVIATIONS

AV	AIR WAVE/VENT	IC	INSECT CHAMBER
BO	BOLLARD	IK	INVERT LEVEL
BB	BELUSH BEACON	JW	JAPANESE KNOTT WEAVE
BN	BENCH MARK	KA	KAYAK POLE
BL	BLIND	LA	LAKE
BS	BUS STOP	MA	MAK PLATE
BT	BRITISH TELECOM	MH	MANHOLE
BT	COVER LEVEL	PS	POST/BOX POST
CL	COVER LEVEL	PS	POST/BOX POST
CL	DISUSED	SB	SHOULDER
DA	DRAINAGE	SE	SEWER SERVICE
EA	ENAMES LEVEL	RP	ROPPING DECK
EL	ELEC JUNCT. BOX	RL	RIDGE LEVEL
EL	ELEC JUNCT. POLE	RS	ROAD SIGN
FI	FIRE HYDRANT	SH	SHOULDER
FL	FLOOR LEVEL	TH	THROAT HOLE
FOS	FULL OF SEDIMENT	TL	TRAFFIC LIGHT
FP	FLAG POLE	TE	TELEGRAPH POLE
GA	GAS VALVE	UN	UNABLE TO LEFT
GM	GAS METER	WA	WATER METER
GV	GAS VALVE	WM	WATER METER

SYMBOLS

	SURVEY STATION		TREE
	O/H ELEC CABLE		BENCH MARK
	O/H PHONE LINE		TRIAL PIT
	CANOPY/HEDGE		BOREHOLE

NOTES

- A) ONLY MANHOLES AND SERVICES VISIBLE AT TIME OF SURVEY SHOWN
- B) O/S USED AND ORIENTATED TO TRUE NORTH
- C) LEVELS IN METRES RELATED TO G.P.S.
- D) DRAINAGE INFORMATION TAKEN FROM LOCAL AUTHORITY RECORDS. INFORMATION MUST BE CHECKED PRIOR TO WORK COMMENCING

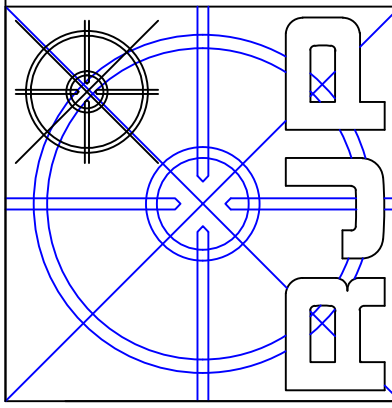
Rev	Description	Date
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PROPOSED DEVELOPMENT AT
DYE HOUSE, LIVERPOOL ROAD, PRESCOT

உயிர்

TOPOGRAPHICAL SURVEY

SEP002/T00	Surveyed	A. BAYBUTT
	Drawn	J. POTTER
	Date	MARCH 2021
	Scale	1:500 @ A1



RJP Surveying Consultants Ltd
LAND SURVEYORS & SITE ENGINEERS

AYREFIELD COTTAGE
AYREFIELD ROAD
ROBY MILL
UPHOLLAND
LANCASHIRE
WN8 0OD

TEL: 01257 251554
MOBILE: 07710 308709
www.rjpsurveyors.co.uk
mail@rjpsurveyors.co.uk

APPENDIX G: PROPOSED PLANNING LAYOUT

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PROPOSED SITE PLAN - ROOF

T: 0151 542 5027

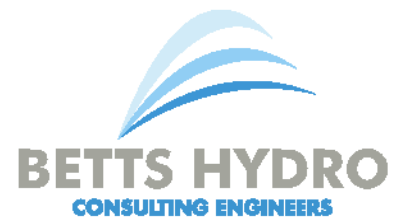
Tree RPA - retained cat. II

APPENDIX H: HYDRAULIC MODELLING ASSESSMENT

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1st September 2022

SEP Construction Services Ltd
The Mezzanine
Royal Liver Building
Liverpool Waterfront
L3 1HU



DYE HOUSE, PRESCOT

HYDRAULIC MODELLING ASSESSMENT NOTE

Outline Assessment

This assessment analyses flood risk to the site at Dye House, which is accessed off Liverpool Road in Prescot. A Flood Risk and Hydraulic Modelling Scoping Exercise has been undertaken previously for the site and has reviewed the relevant hydraulic model for the site provided by the Environment Agency (EA).

This assessment has utilised the fluvial Logwood Mill Brook, which is a 1D – 2D ISIS-TUFLOW model. The model was created by JBA in 2012 to refine the Flood Zones in the area, and since the creation of this model there have been changes to the fluvial allowances for climate change. The Logwood Mill Brook model therefore required updating to meet these new standards. The most up to date LiDAR information has been used to more accurately model ground levels onsite.

Site Information

The site is located at Dye House in Prescot, the nearest Ordnance Survey National Grid Reference is E: 345816, N: 392765 and the nearest postcode is L34 3LX (see the Location Plan in **Appendix A**).



Figure 1: Site Location and Features (Betts Hydro, 2022)

Page 1 of 5



Old Marsh Farm Barns
Welsh Road, Sealand
Flintshire CH5 2LY
Telephone: 01244 289 041

LiDAR data has been used to identify existing ground levels. An elevation plan has been created and included within **Appendix B**. The onsite ground levels fall from 54.00mAOD adjacent to the south-western boundary of the site, down toward the Main River (Prescot Brook) at 50.25mAOD. The arrows shown on **Figure 1** give a general indication of the fall across the site.

Peak River Climate Change Allowances

Peak river flow allowances show the anticipated changes to peak flow by management catchment. Management catchments are sub-catchments of river basin districts.

The range of allowances is based on percentiles. A percentile describes the proportion of possible scenarios that fall below an allowance level. The 50th percentile is the point at which half of the possible scenarios for peak flow fall below it, and half fall above it.

The:

- Central allowance is based on the 50th percentile.
- Higher central allowance is based on the 70th percentile.
- Upper end allowance is based on the 95th percentile

An allowance based on the 50th percentile is exceeded by 50% of the projections in the range. At the 70th percentile it is exceeded by 30%. At the 95th percentile it is exceeded by 5%.

For the Lower Mersey Management Catchment, the peak river allowances are shown in **Table 1**.

Table 1: Peak Climate Change River Allowances Lower Mersey Management Catchment (EA 2022)

Year	Central	Higher	Upper
2020s	18%	22%	32%
2050s	27%	35%	55%
2080s	44%	57%	90%

The Environment Agency guidance for "more vulnerable" development is to use the Central allowance, thus an increase of 44% has been applied to the peak 1 in 100 year flow in the Logwood Mill Brook model. The previous allowances used within the model were 30%, 35% and 70%.

Hydraulic Modelling Assessment

The model inflow boundaries were updated to meet latest climate change standards. The following simulations have been undertaken:

- 1 in 100 year fluvial event
- 1 in 100 year fluvial event plus 44% climate change
- 1 in 1000 year fluvial event
- 95% blockage 1 in 100 year fluvial event plus 44% climate change

Fluvial Results

100 Year Event – 1% AEP

The predicted flood depth for the fluvial 1 in 100 year event is shown on **Drawing No. HYD730/102/A**, the predicted flood level is shown in **Drawing no. HYD695/103/A**, and the predicted flood velocity is shown in **Drawing no. HYD730/104/A**. The site is shown to remain dry, safe, and flood free in the fluvial 1 in 100 year event with no predicted flooding in close proximity to the site. The nearest flooding to the site is located 550m south-east of the site, and west of Cables Way.

100 Year Event Plus 44% Climate Change – 1% AEP plus 44% CC

The predicted flood depth for the 1 in 100 year plus 44% climate change fluvial event is shown on **Drawing No. HYD730/105/A**. The northern portion of the site is shown to be inundated, in the 1 in 100 year plus 44% climate change event with flood depths up to 0.51m. The peak water level onsite is 50.85mAOD as shown on **Drawing no. HYD730/106/A**. The maximum flood velocity is 0.11m/s as shown on **Drawing no. HYD730/107/A**.

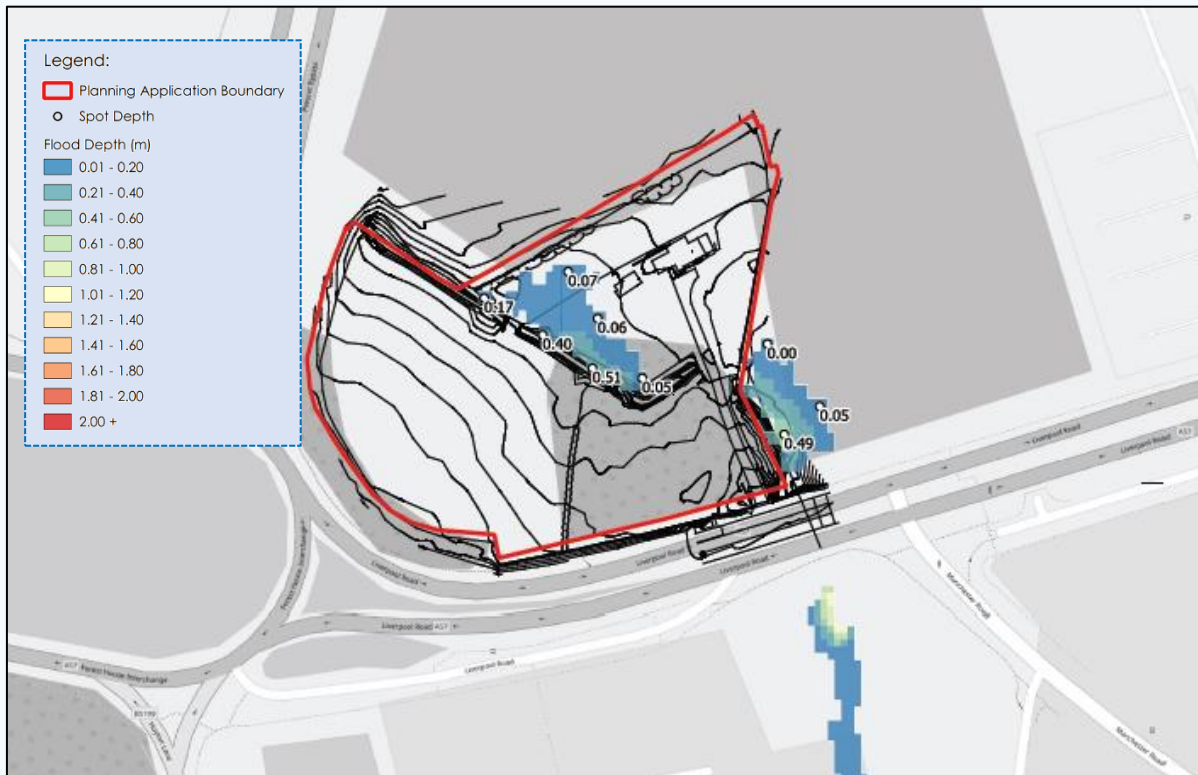


Figure 2: Fluvial 1 in 100yr plus 44% Climate Change Flood Depth Extract (Betts Hydro, 2022)

1000 Year Event – 0.1% AEP

The predicted flood depth for the 1 in 1000 year fluvial event is shown on **Drawing No. HYD730/108/A**. The site is shown to be inundated along the eastern boundary, with a maximum flood depth of up to 0.82m onsite. The peak water level onsite is 51.27mAOD as

shown on **Drawing No. HYD730/109/A**. The maximum flood velocity onsite is 0.17m/s adjacent to the channel, as shown on **Drawing No. HYD730/110/A**.

95% Blockage 100 Year Event Plus 44% Climate Change – 1% AEP plus 44% CC

The predicted flood depth for the 95% blockage scenario in the 1 in 100 year plus 44% climate change fluvial event is shown on **Drawing No. HYD730/111/A**. The site is shown to be inundated, in the 1 in 100 year plus 44% climate change event with flood depths up to 0.76m. Flows travel around the blockage to the north before returning to the channel adjacent to Liverpool Road. The peak water level onsite is 51.42mAOD as shown on **Drawing no. HYD730/112/A**. The maximum flood velocity is 0.76m/s as shown on **Drawing no. HYD730/113/A**.

Proposed 100 Year Event Plus 44% Climate Change – 1% AEP plus 44% CC

A proposed run has been simulated to evidence the proposed development will remain flood free in the design event. The predicted flood depth for the 1 in 100 year plus 44% climate change fluvial event is shown on **Drawing No. HYD730/114/A**. Flooding is shown to remain in the channel corridor and not in the area of proposed development due to levels raising. The peak water level onsite is 50.86mAOD as shown on **Drawing no. HYD730/115/A**. The Finished Floor Level of the apartment building is shown to be elevated more than 600mm above the peak design event at 53.15mAOD. The maximum flood velocity in-channel is 0.12m/s as shown on **Drawing no. HYD730/116/A**.

The proposed scenario has been compared against the existing scenario. There is shown to be minor increases in top water level within the main channel upstream and downstream of the site. This increase is reduced to the same top water level 200m to the south of the site.

Conclusions and Recommendations

The predicted results show that the site is only impacted by the fluvial 1 in 100 year event plus 44% climate change and the 1000 year event, the maximum flood level for these events is 50.85mAOD and 51.27mAOD.

The EA typically require that finished floor levels be set 600mm above the top water level in the fluvial 1 in 100 year plus 44% climate change event. It is therefore recommended the FFLs on site are raised above the in-channel TWL in the fluvial 1 in 100 year plus 44% climate change event, review of the proposed FFL of the apartment block shows the proposed finished floor level is elevated above this and also shown to be above the residual blockage event.

It is recommended these findings are incorporated into a Flood Risk Assessment (FRA) in order to support any planning applications on the site. Details on emergency access and egress should also be included within an FRA.

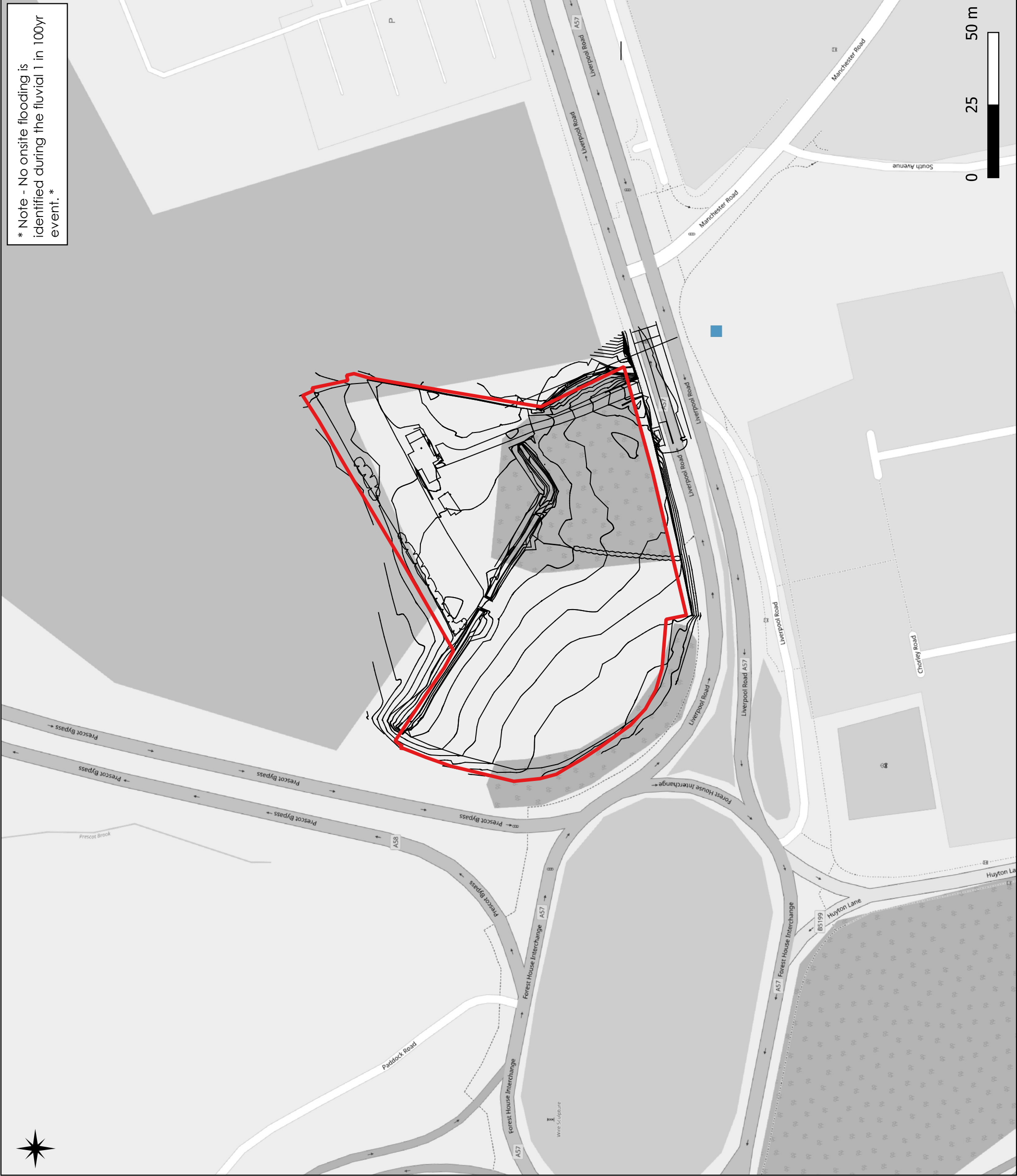
I trust you will find the above of assistance, however, if you have any queries or require further information, please do not hesitate to contact me.

Yours sincerely,

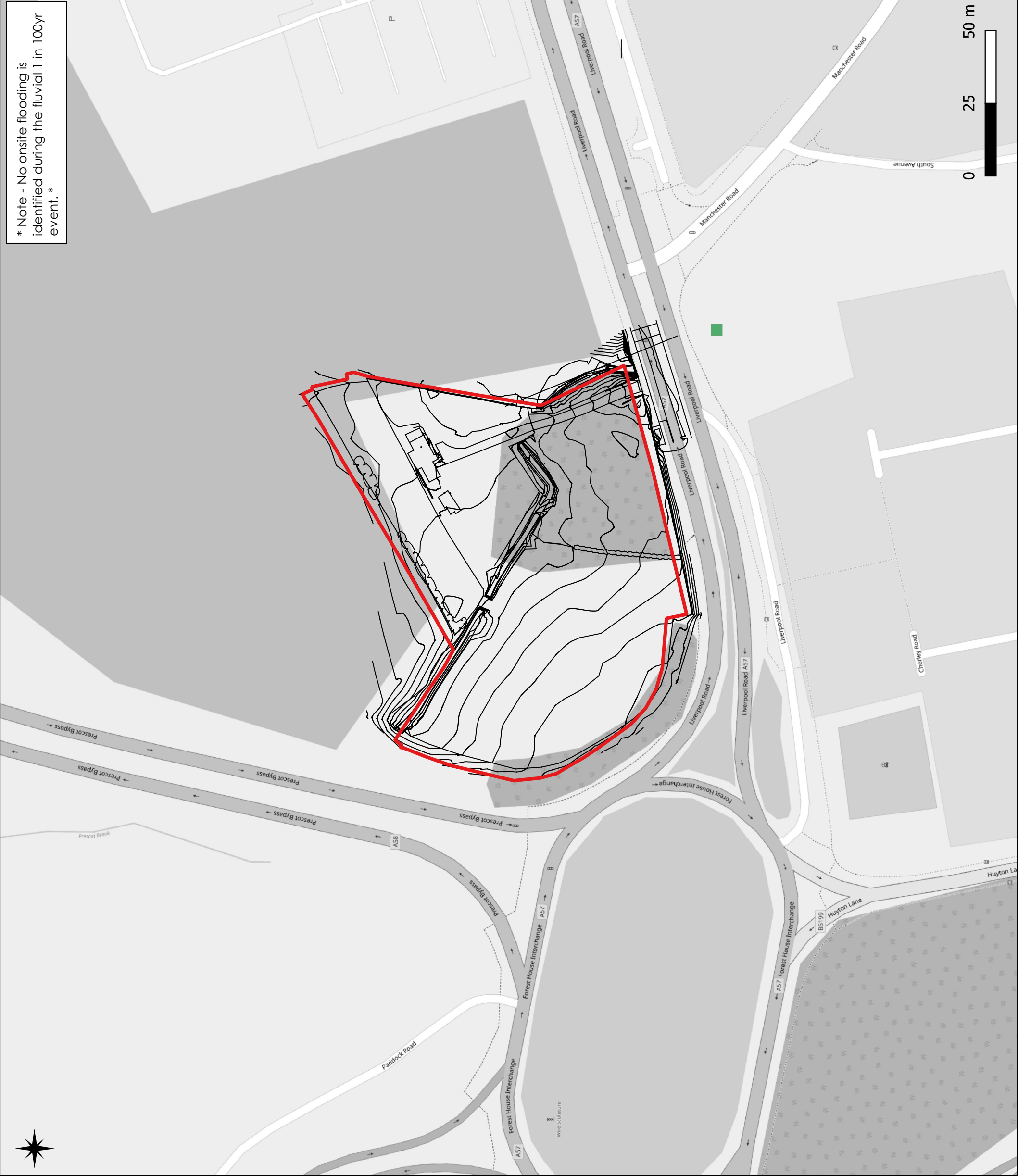


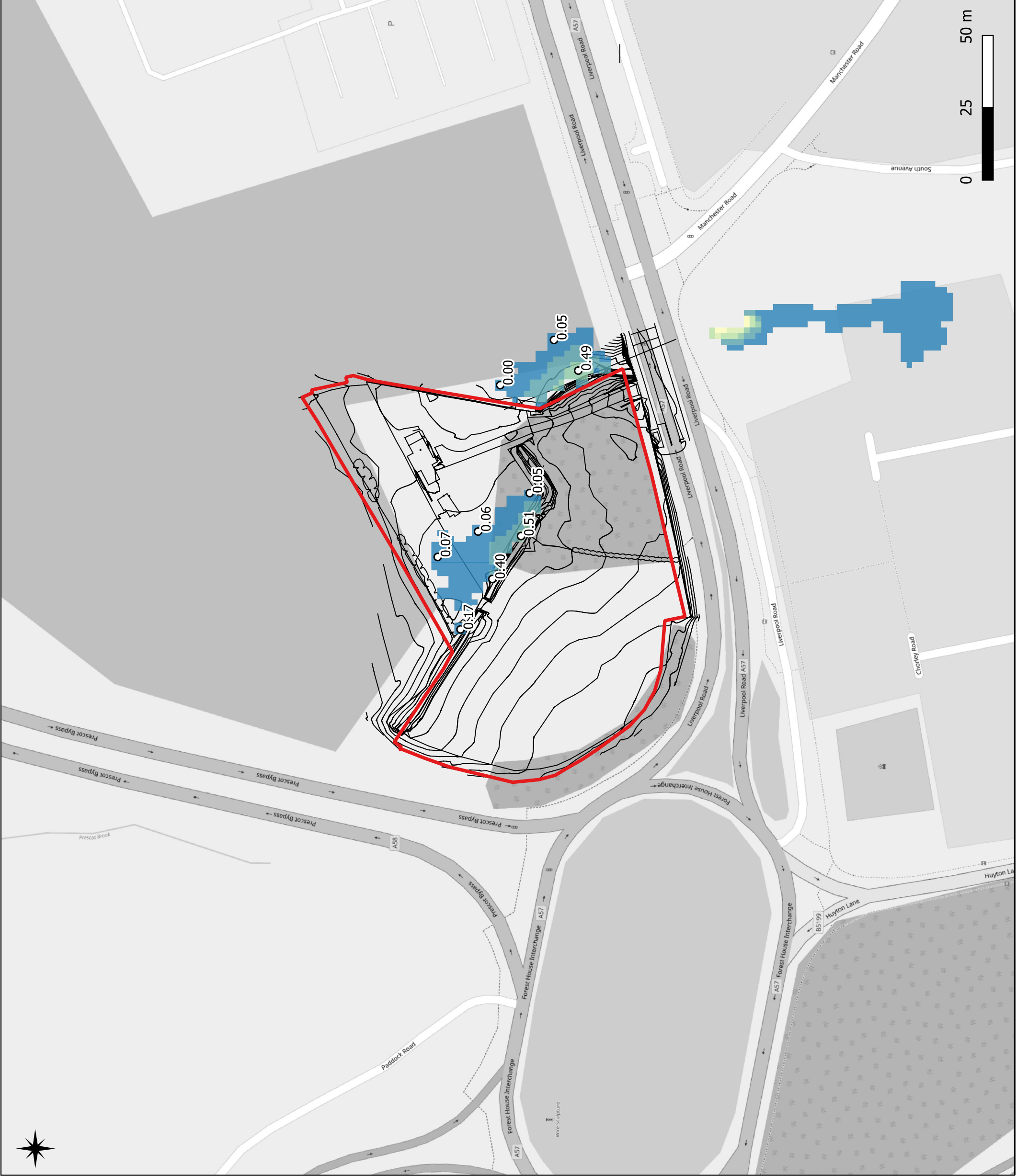
Hannah Buchanan BSc (Hons) MSc GradCIWEM
Graduate Flood Risk Analyst
BETTS HYDRO

Enc.	HYD730/102/B	1 in 100 year fluvial flood depth plan
	HYD730/103/B	1 in 100 year fluvial flood level plan
	HYD730/104/B	1 in 100 year fluvial flood velocity plan
	HYD730/105/B	1 in 100 year climate change fluvial flood depth plan
	HYD730/106/B	1 in 100 year climate change fluvial flood level plan
	HYD730/107/B	1 in 100 year climate change fluvial flood velocity plan
	HYD730/108/B	1 in 1000 year fluvial flood depth plan
	HYD730/109/B	1 in 1000 year fluvial flood level plan
	HYD730/110/B	1 in 1000 year fluvial flood velocity plan
	HYD730/111/A	95% Blockage 1 in 100 year climate change fluvial flood depth plan
	HYD730/112/A	95% Blockage 1 in 100 year climate change fluvial flood level plan
	HYD730/113/A	95% Blockage 1 in 100 year climate change fluvial flood velocity plan
	HYD730/114/B	Proposed 1 in 100 year climate change fluvial flood depth plan
	HYD730/115/B	Proposed 1 in 100 year climate change fluvial flood level plan
	HYD730/116/B	Proposed 1 in 100 year climate change fluvial flood velocity plan
	HYD730/117/B	Proposed 95% Blockage 1 in 100 year climate change fluvial flood depth plan
	HYD730/118/B	Proposed 95% Blockage 1 in 100 year climate change fluvial flood level plan
	HYD730/119/B	Proposed 95% Blockage 1 in 100 year climate change fluvial flood velocity plan



DO NOT SCALE									
Legend:									
Planning Application Boundary									
Flood Depth (m)									
0.01 - 0.20									
0.21 - 0.40									
0.41 - 0.60									
0.61 - 0.80									
0.81 - 1.00									
1.01 - 1.20									
1.21 - 1.40									
1.41 - 1.60									
1.61 - 1.80									
1.81 - 2.00									
2.00 +									





DO NOT SCALE

Legend:

Planning Application Boundary

Spot Depth

Flood Depth (m)

0.01 - 0.20

0.21 - 0.40

0.41 - 0.60

0.61 - 0.80

0.81 - 1.00

1.01 - 1.20

1.21 - 1.40

1.41 - 1.60

1.61 - 1.80

1.81 - 2.00

2.00 +

B	26/08/22	HB	RERUNS	PT
A	27/07/22	HB	PRELIMINARY FOR ISSUE	PT
REV	DATE	BY	DESCRIPTION	CHK

DRAWING STATUS:

BETTS HYDRO
CONSULTING ENGINEERS

Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk



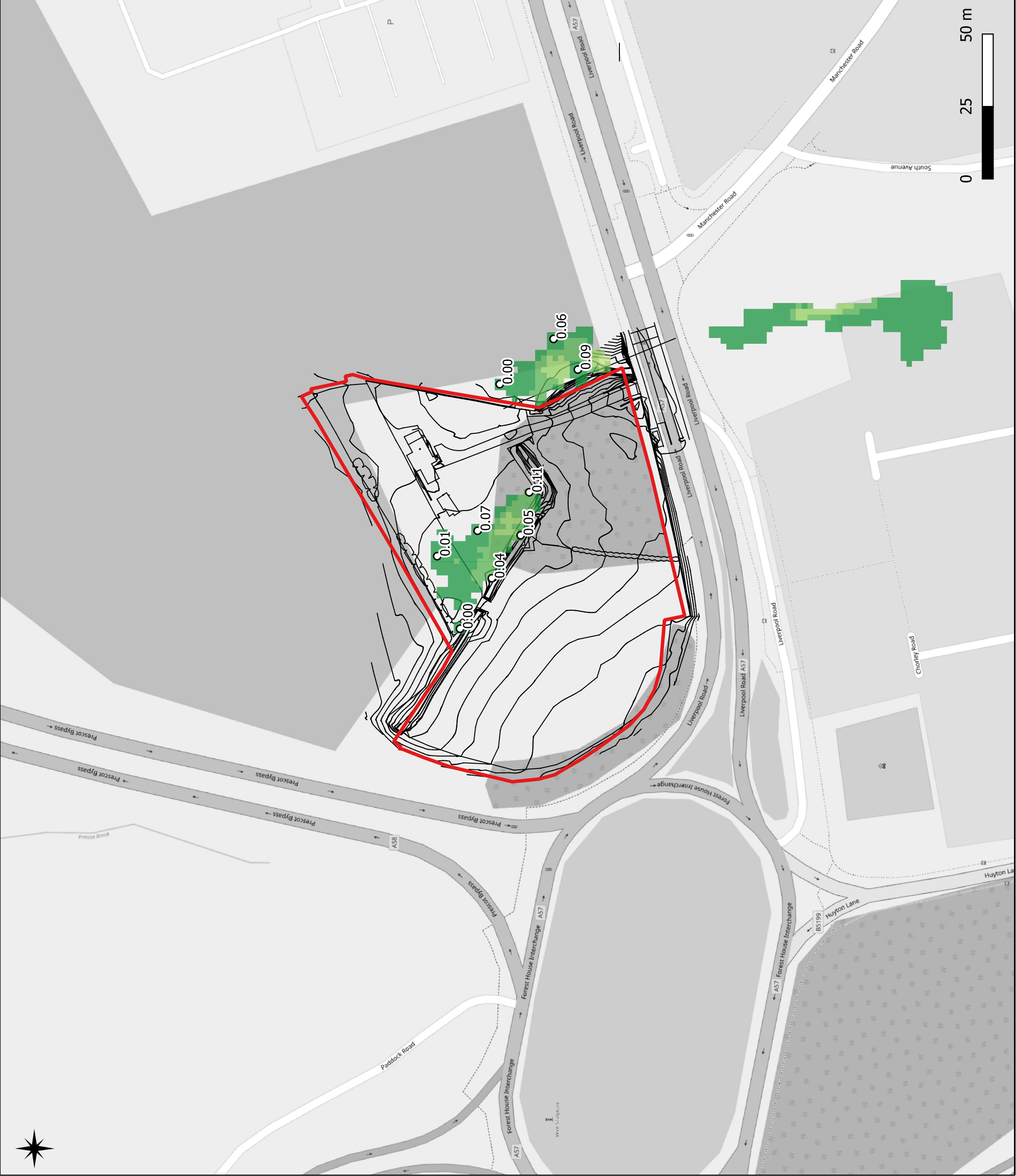
PROJECT:

DYE HOUSE
PRESCOT

TITLE:

PRESCOT BROOK
1 IN 100 YEAR PLUS 44% CC
(Q100 CC 44%)
FLOOD DEPTH PLAN

DATE:	SCALE @ SIZE:	DRAWN:	CHECKED:	REV:
AUG 22	1:1250@A3	HB	PT	
PROJECT NO:	DRAWING NO:			
HYD730	105			B



DO NOT SCALE

Legend:

Planning Application Boundary

Spot Velocity

Flood Velocity (m/s)

- <= 0.1
- 0.1 - 0.2
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- 3.0 - 3.5
- > 3.5

B	26/08/22	HB	RERUNS	PT	PT
A	27/07/22	HB	PRELIMINARY FOR ISSUE		

REV	DATE	BY	DESCRIPTION	CHK
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DRAWING STATUS:

BETTS HYDRO
CONSULTING ENGINEERS

Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk



PROJECT:

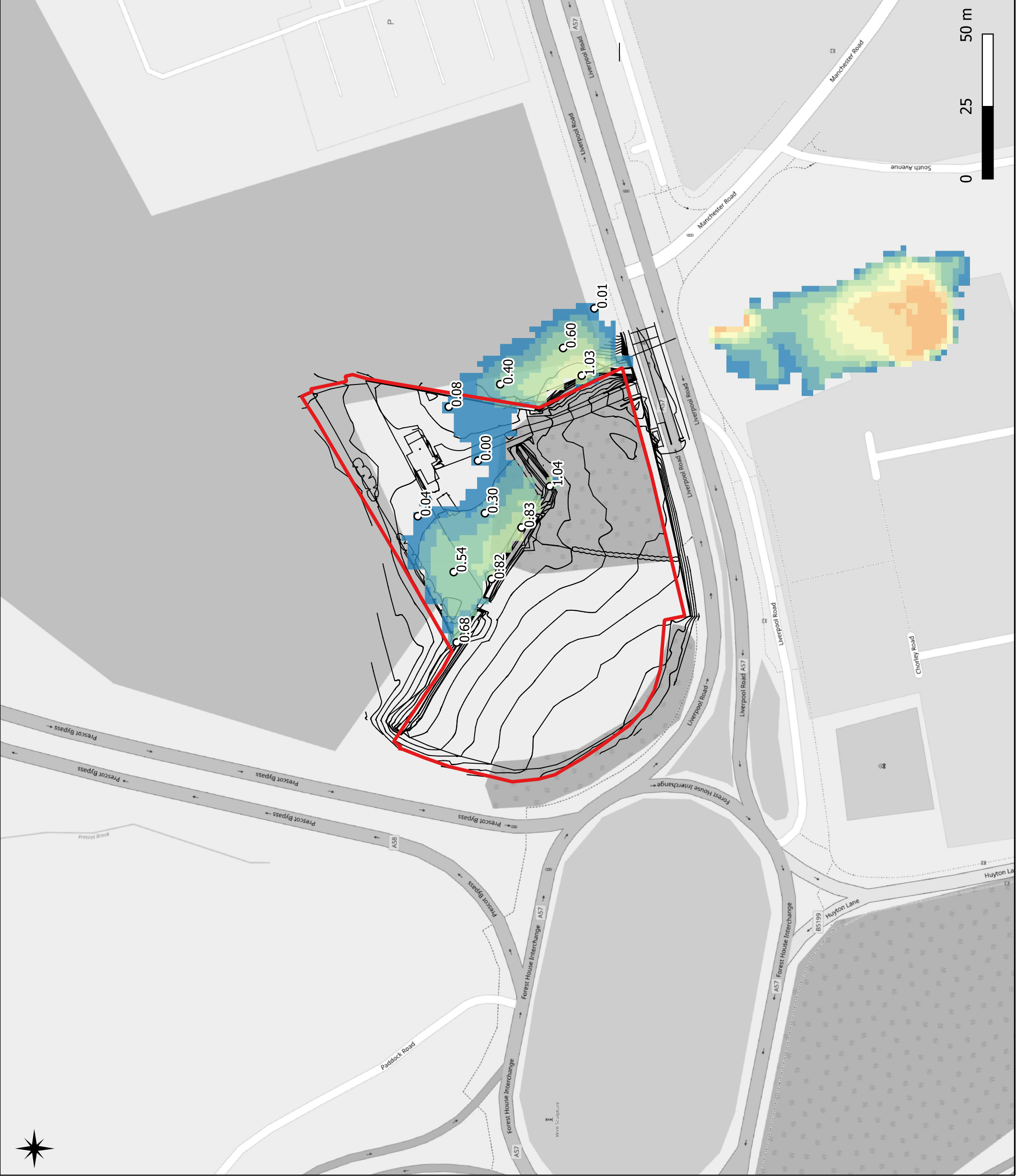
DYE HOUSE
PRESCOT

TITLE:

PRESCOT BROOK
1 IN 100 YEAR PLUS 44% CC
(Q100 CC 44%)
FLOOD VELOCITY PLAN

DATE:	SCALE @ SIZE:	DRAWN:	CHECKED:
AUG 22	1:1250@A3	HB	PT

PROJECT NO:	DRAWING NO:	REV:
HYD730	107	B



DO NOT SCALE

Legend:

 Planning Application Boundary

 Spot Depth

Flood Depth (m)

 0.01 - 0.20

 0.21 - 0.40

 0.41 - 0.60

 0.61 - 0.80

 0.81 - 1.00

 1.01 - 1.20

 1.21 - 1.40

 1.41 - 1.60

 1.61 - 1.80

 1.81 - 2.00

 2.00 +

B	26/08/22	HB	RERUNS			PT
A	27/07/22	HB	PRELIMINARY FOR ISSUE			PT
REV	DATE	BY	DESCRIPTION			CHK

DRAWING STATUS:



BETTS HYDRO
CONSULTING ENGINEERS

Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk



SEP
CONSTRUCTION

PROJECT:

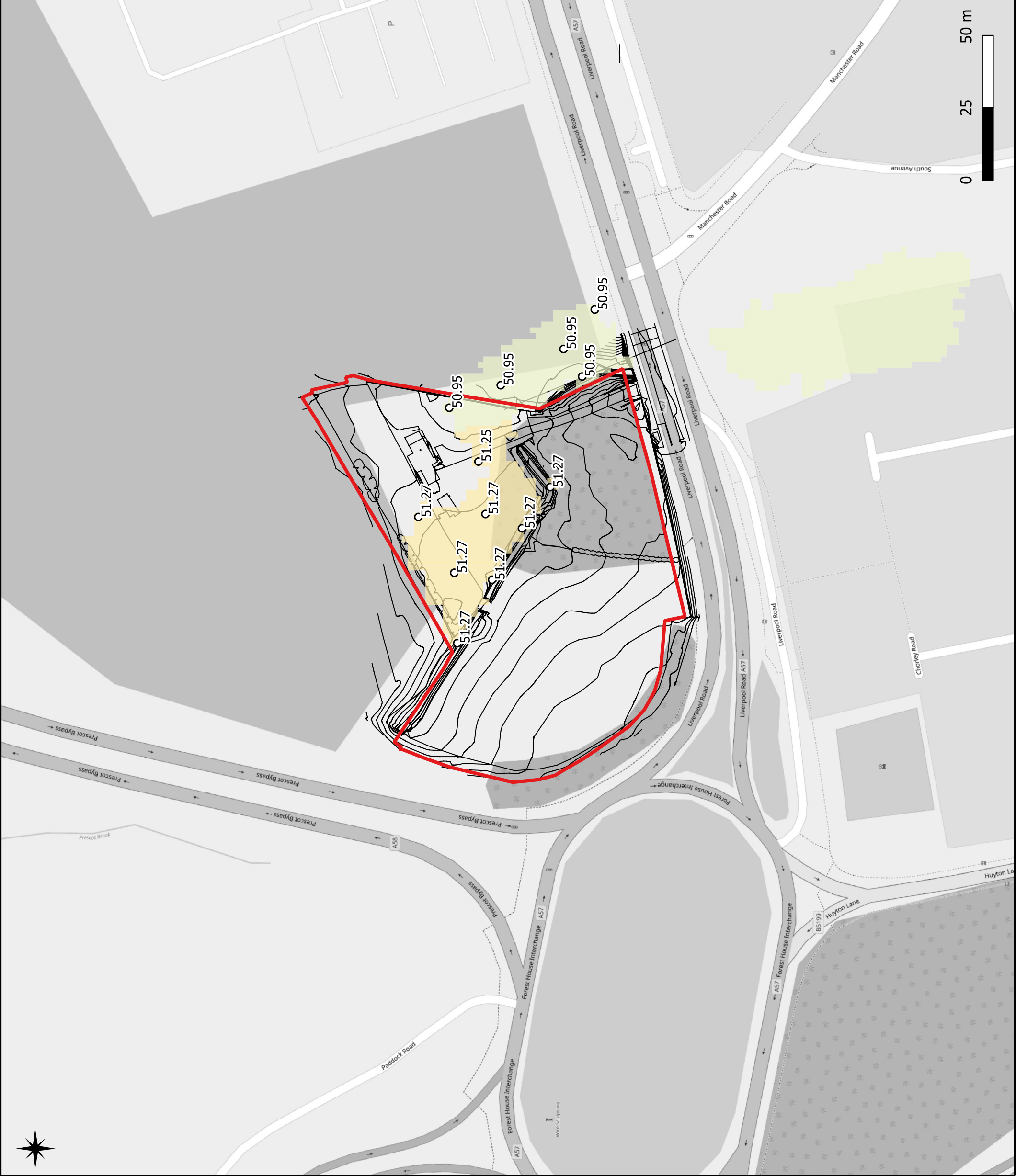
DYE HOUSE
PRESCOT

TITLE:

PRESCOT BROOK
1 IN 1000 YEAR (Q1000)
FLOOD DEPTH PLAN

DATE: **AUG 22** SCALE @ SIZE: **1:1250@A3** DRAWN: **HB** CHECKED: **PT**

PROJECT NO: **HYD730** DRAWING NO: **108** REV: **B**



DO NOT SCALE

Legend:

Planning Application Boundary

Spot Level

Flood Level (mAOD)

<= 43.00

43.00 - 45.00

45.00 - 47.00

47.00 - 49.00

49.00 - 51.00

51.00 - 53.00

53.00 - 55.00

55.00 - 57.00

> 59.00

REV	DATE	BY	DESCRIPTION	CHK
B	26/08/22	HB	RERUNS	PT
A	27/07/22	HB	PRELIMINARY FOR ISSUE	PT

DRAWING STATUS:

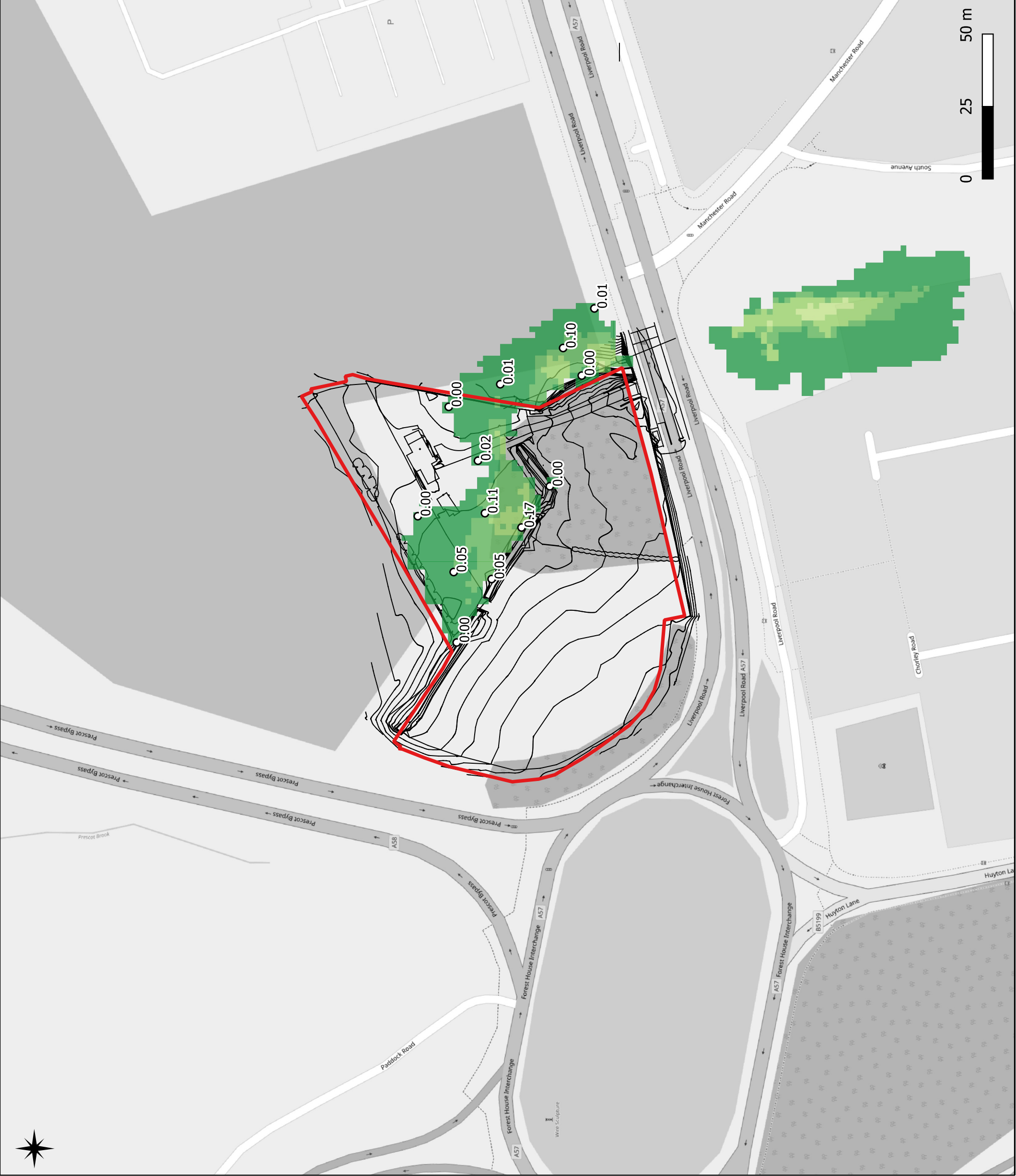
Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk



PROJECT:
**DYE HOUSE
PRESCOT**

TITLE:
**PRESCOT BROOK
1 IN 1000 YEAR (Q1000)
FLOOD LEVEL PLAN**

DATE: AUG 22	SCALE @ SIZE: 1:1250@A3	DRAWN: HB	CHECKED: PT
PROJECT NO: HYD730	DRAWING NO: 109	REV: B	



DO NOT SCALE

Legend:

 Planning Application Boundary

 Spot Velocity

Flood Velocity (m/s)

-  <= 0.1
-  0.1 - 0.2
-  0.2 - 0.5
-  0.5 - 1.0
-  1.0 - 1.5
-  1.5 - 2.0
-  2.0 - 2.5
-  2.5 - 3.0
-  3.0 - 3.5
-  > 3.5

REV	DATE	BY	DESCRIPTION	CHK
B	26/08/22	HB	RERUNS	PT
A	27/07/22	HB	PRELIMINARY FOR ISSUE	PT

DRAWING STATUS:



BETTS HYDRO
CONSULTING ENGINEERS

Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk



PROJECT:

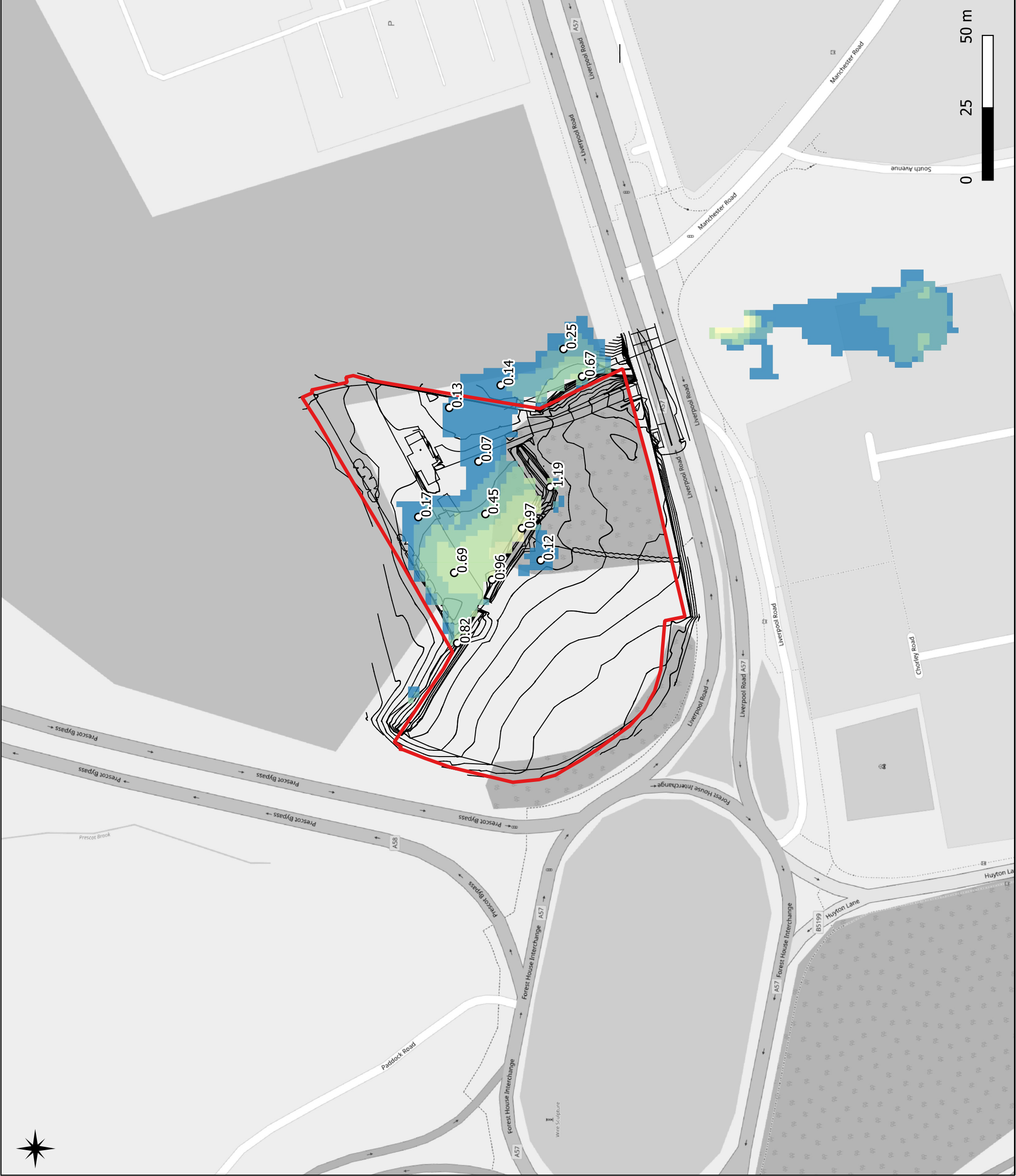
DYE HOUSE
PRESCOT

TITLE:

PRESCOT BROOK
1 IN 1000 YEAR (Q1000)
FLOOD VELOCITY PLAN

DATE:	SCALE @ SIZE:	DRAWN:	CHECKED:
AUG 22	1:1250@A3	HB	PT

PROJECT NO:	DRAWING NO:	REV:
HYD730	110	B



DO NOT SCALE

Legend:

 Planning Application Boundary

 Spot Depth

Flood Depth (m)

 0.01 - 0.20

 0.21 - 0.40

 0.41 - 0.60

 0.61 - 0.80

 0.81 - 1.00

 1.01 - 1.20

 1.21 - 1.40

 1.41 - 1.60

 1.61 - 1.80

 1.81 - 2.00

 2.00 +

REV	DATE	BY	DESCRIPTION	PT	CHK
A	26/08/22	HB	PRELIMINARY FOR ISSUE		

DRAWING STATUS:



BETTS HYDRO
CONSULTING ENGINEERS

Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk



SEP
CONSTRUCTION

PROJECT:

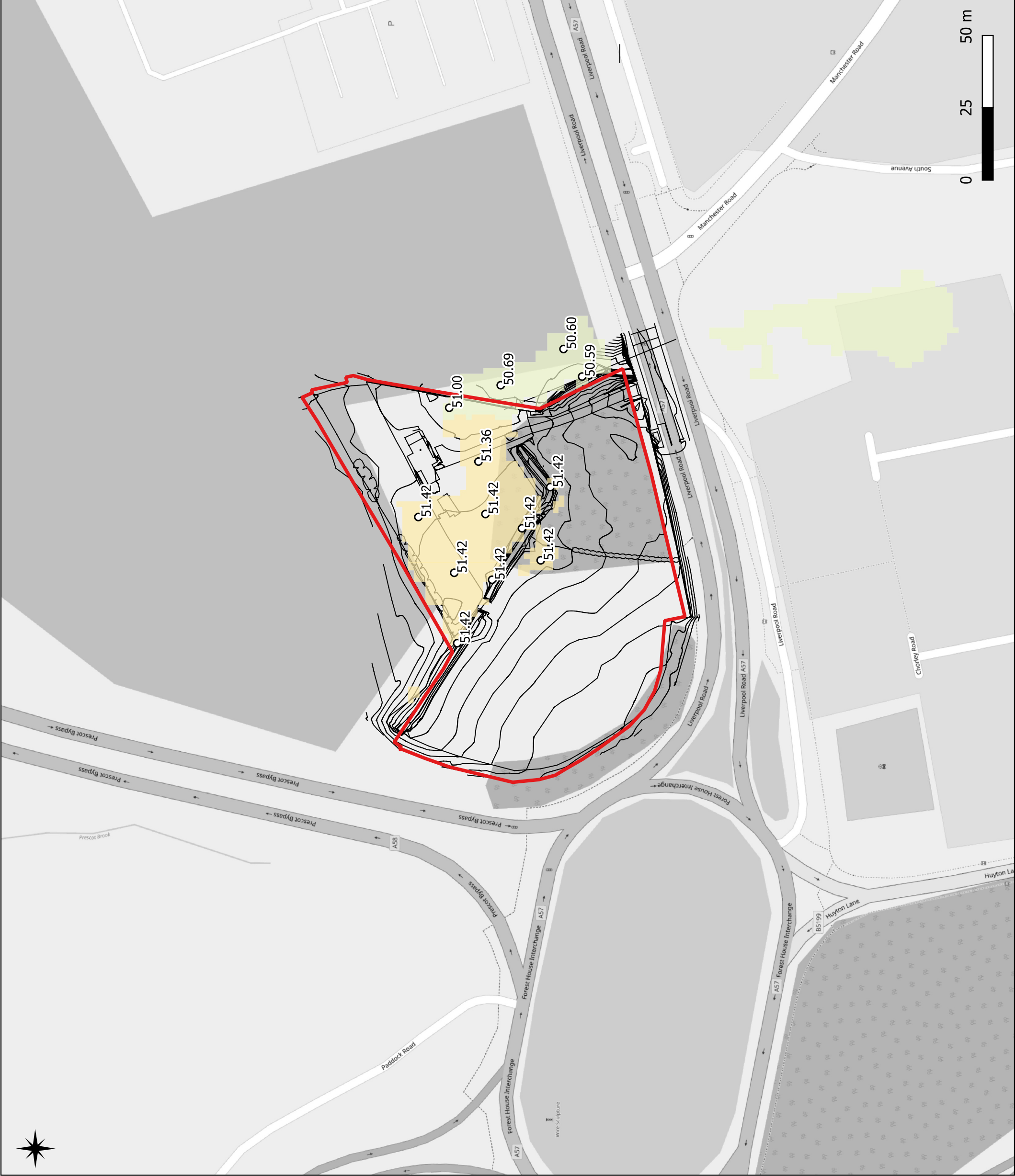
DYE HOUSE
PRESCOT

TITLE:

PRESCOT BROOK
1 IN 100 YEAR PLUS 44% CC WITH 95%
BLOCKAGE (Q100 CC 44% WITH 95% BL)
FLOOD DEPTH PLAN

DATE:	SCALE @ SIZE:	DRAWN:	CHECKED:
AUG 22	1:1250@A3	HB	PT

PROJECT NO:	DRAWING NO:	REV:
HYD730	111	A



DO NOT SCALE

Legend:

 Planning Application Boundary

 Spot Level

Flood Level (mAOD)

 <= 43.00

 43.00 - 45.00

 45.00 - 47.00

 47.00 - 49.00

 49.00 - 51.00

 51.00 - 53.00

 53.00 - 55.00

 55.00 - 57.00

 57.00 - 59.00

 > 59.00

REV	DATE	BY	DESCRIPTION	CHK
A	26/08/22	HB	PRELIMINARY FOR ISSUE	PT

DRAWING STATUS:



BETTS HYDRO
CONSULTING ENGINEERS

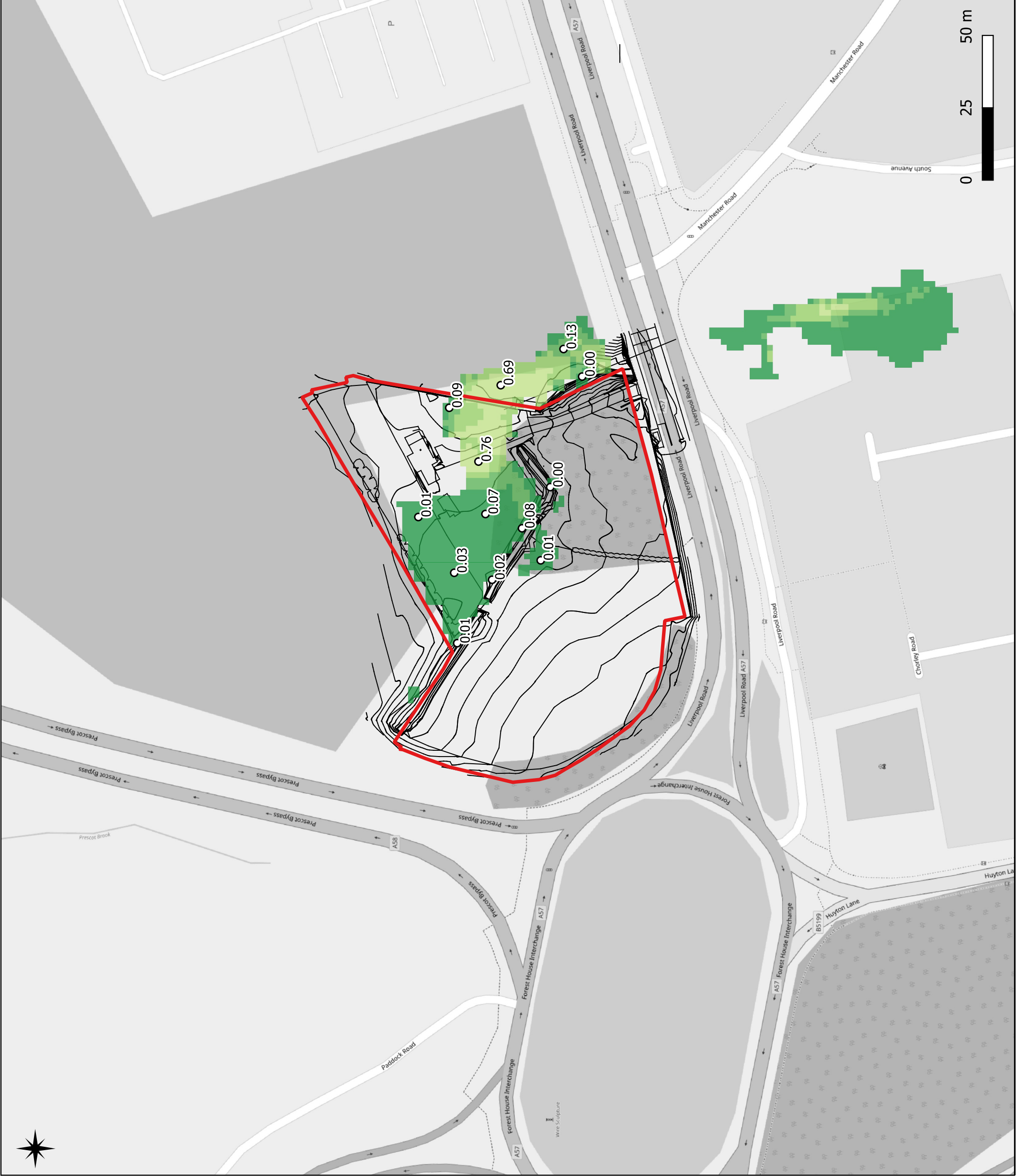
Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk



PROJECT:
**DYE HOUSE
PRESCOT**

TITLE:
**PRESCOT BROOK
1 IN 100 YEAR PLUS 44% CC WITH 95%
BLOCKAGE (Q100 CC 44% WITH 95% BL)
FLOOD LEVEL PLAN**

DATE:	SCALE @ SIZE:	DRAWN:	CHECKED:
AUG 22	1:1250@A3	HB	PT
PROJECT NO:	DRAWING NO:	REV:	
HYD730	112	A	



DO NOT SCALE

Legend:

 Planning Application Boundary

 Spot Velocity

Flood Velocity (m/s)

 <= 0.1

 0.1 - 0.2

 0.2 - 0.5

 0.5 - 1.0

 1.0 - 1.5

 1.5 - 2.0

 2.0 - 2.5

 2.5 - 3.0

 3.0 - 3.5

 > 3.5

REV	DATE	BY	DESCRIPTION	PT	CHK
A	26/08/22	HB	PRELIMINARY FOR ISSUE		

DRAWING STATUS:



BETTS HYDRO
CONSULTING ENGINEERS

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Tel: 01244 288178 enquiries@betts-associates.co.uk

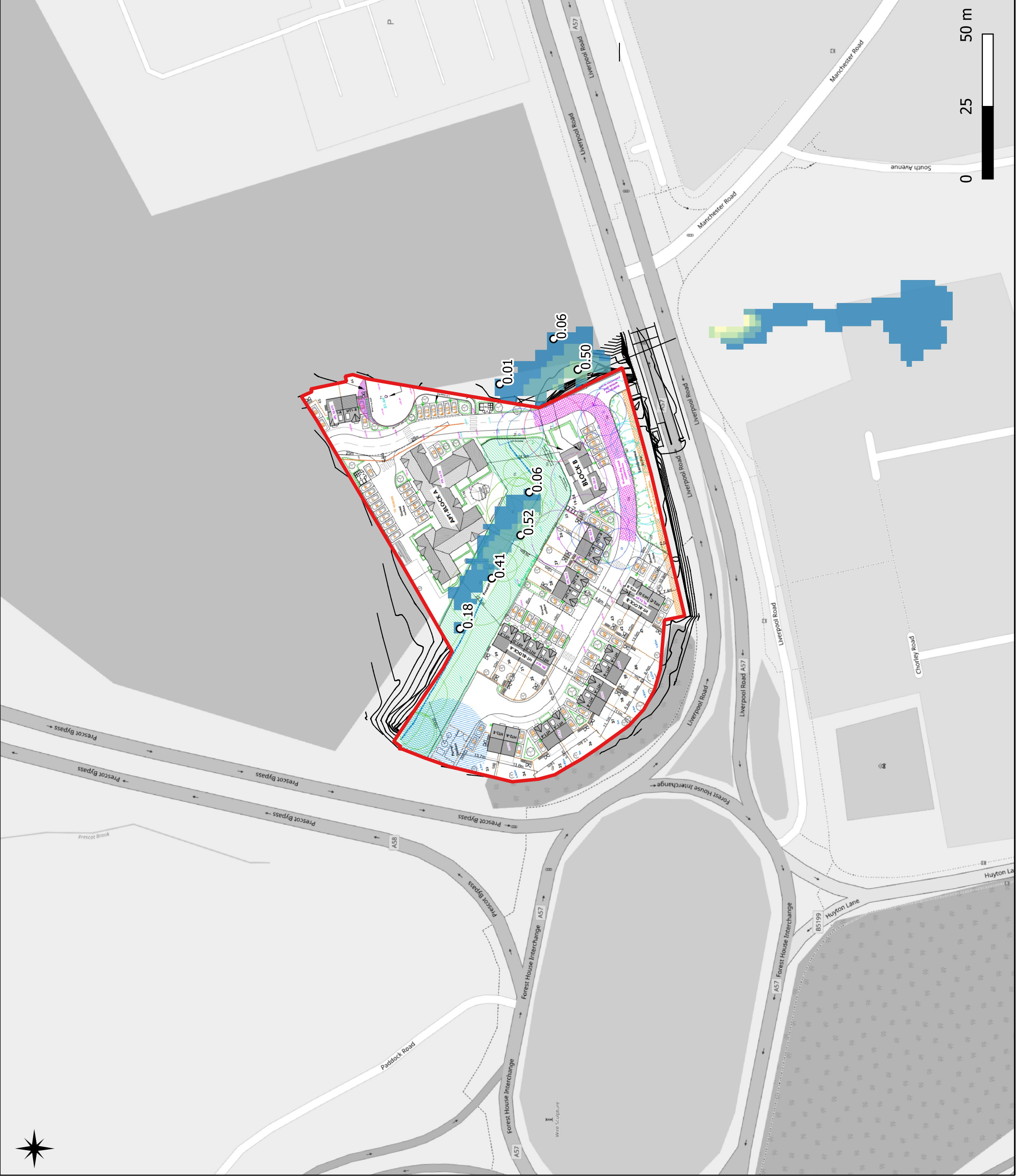


SEP
CONSTRUCTION

PROJECT:
**DYE HOUSE
PRESCOT**

TITLE:
**PRESCOT BROOK
1 IN 100 YEAR PLUS 44% CC WITH 95%
BLOCKAGE (Q100 CC 44% WITH 95% BL)
FLOOD VELOCITY PLAN**

DATE:	SCALE @ SIZE:	DRAWN:	CHECKED:
AUG 22	1:1250@A3	HB	PT
PROJECT NO:	DRAWING NO:	REV:	
HYD730	113	A	



DO NOT SCALE

Legend:

 Planning Application Boundary

 Spot Depth

Flood Depth (m)

 0.01 - 0.20

 0.21 - 0.40

 0.41 - 0.60

 0.61 - 0.80

 0.81 - 1.00

 1.01 - 1.20

 1.21 - 1.40

 1.41 - 1.60

 1.61 - 1.80

 1.81 - 2.00

 2.00 +

REV	DATE	BY	DESCRIPTION	CHK
B	26/08/22	HB	RERUNS	PT
A	27/07/22	HB	PRELIMINARY FOR ISSUE	PT

DRAWING STATUS:



BETTS HYDRO
CONSULTING ENGINEERS

Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk



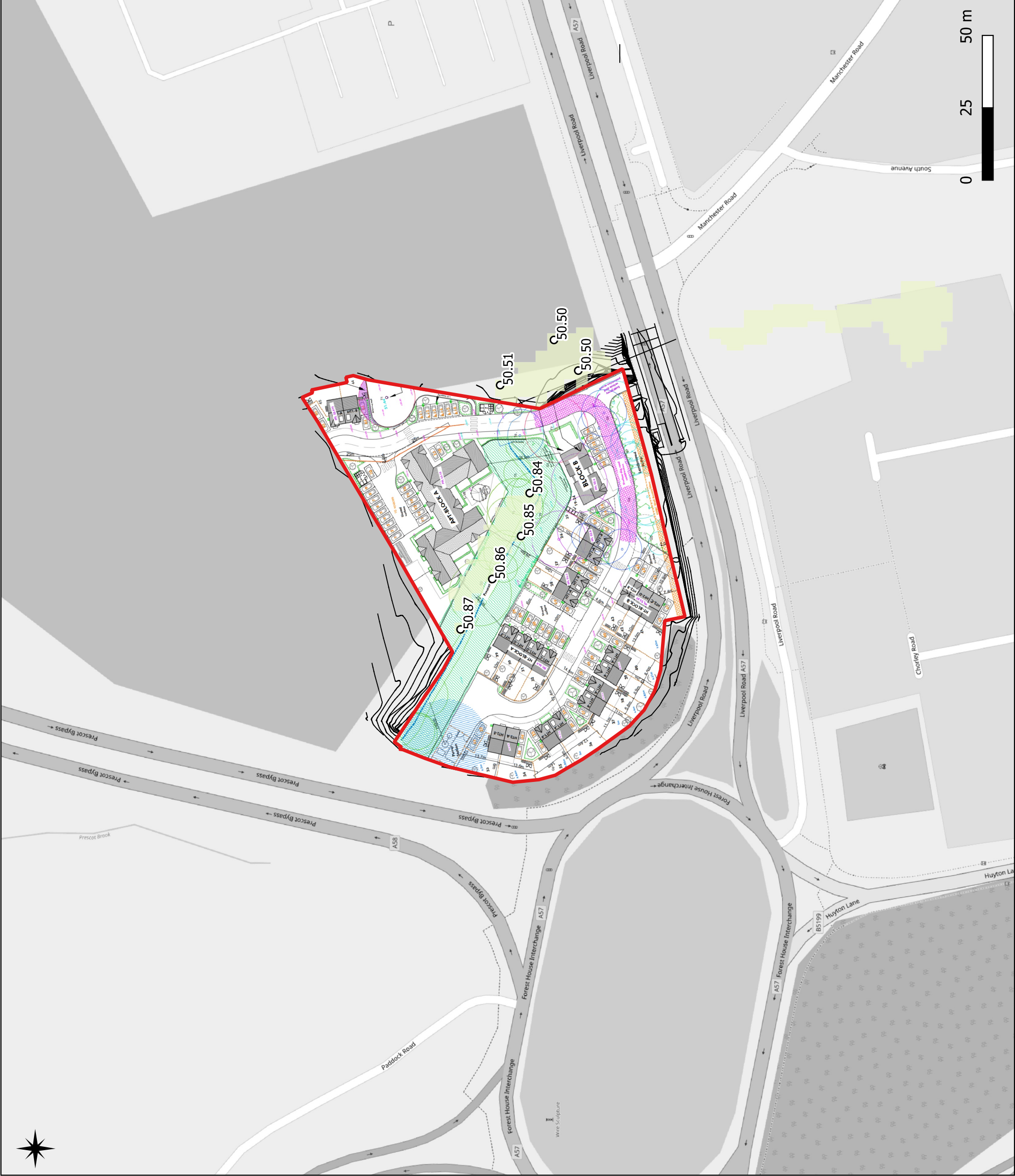
PROJECT:

DYE HOUSE
PRESCOT

TITLE:

PRESCOT BROOK
PROPOSED
1 IN 100 YEAR PLUS 44% CC
(Q100 CC 44%)
FLOOD DEPTH PLAN

DATE:	AUG 22	SCALE @ SIZE:	1:1250@A3	DRAWN:	HB	CHECKED:	PT
PROJECT NO:	HYD730	DRAWING NO:	114	REV:	B		



DO NOT SCALE

Legend:

 Planning Application Boundary

 Spot Level

Flood Level (mAOD)

 <= 43.00

 43.00 - 45.00

 45.00 - 47.00

 47.00 - 49.00

 49.00 - 51.00

 51.00 - 53.00

 53.00 - 55.00

 55.00 - 57.00

 57.00 - 59.00

 > 59.00

REV	DATE	BY	DESCRIPTION	CHK
B	26/08/22	HB	RERUNS	PT
A	27/07/22	HB	PRELIMINARY FOR ISSUE	PT

DRAWING STATUS:



BETTS HYDRO
CONSULTING ENGINEERS

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Tel: 01244 288178 enquiries@betts-associates.co.uk



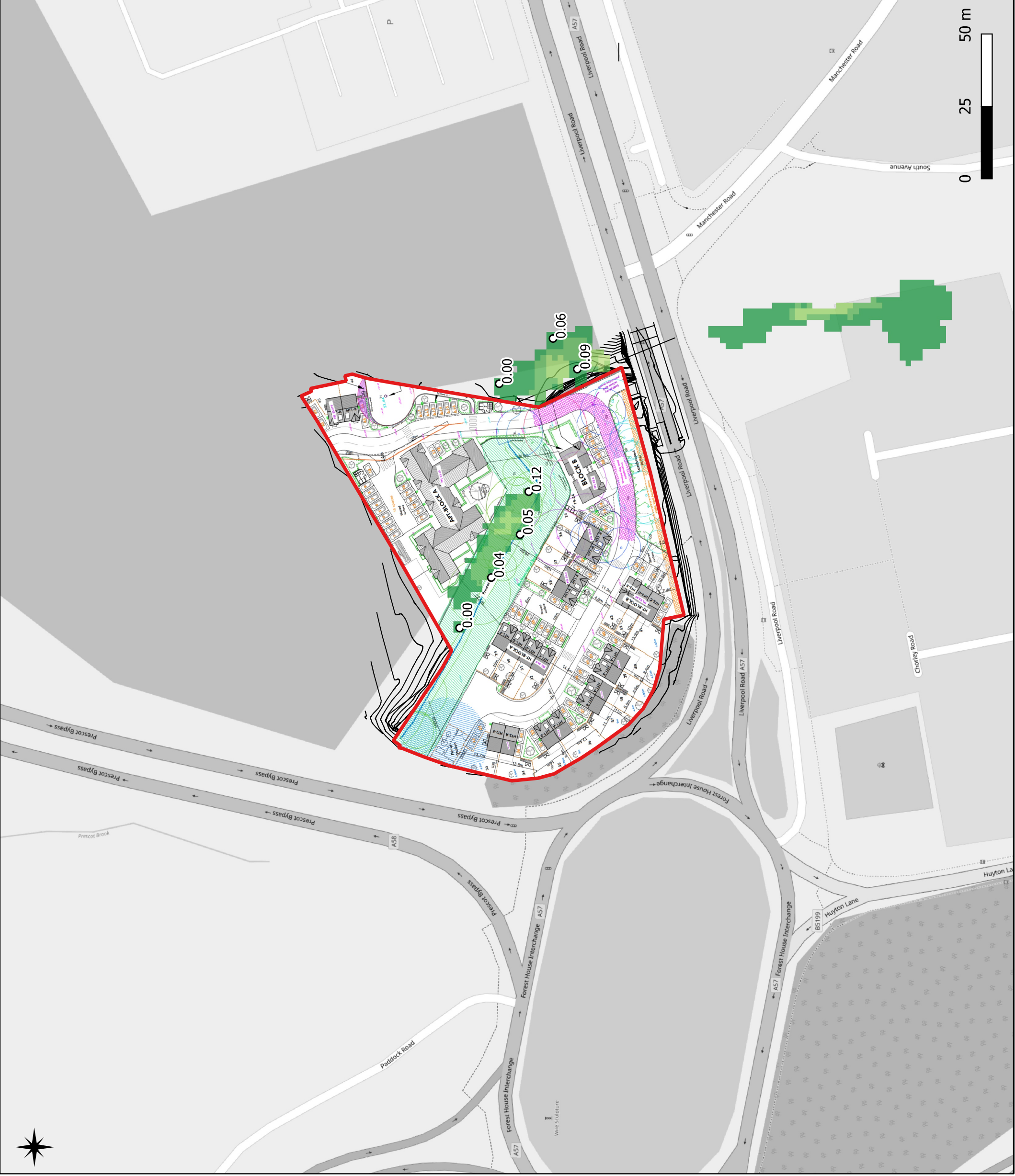
SEP
CONSTRUCTION

PROJECT: DYE HOUSE PRESCOT

TITLE: PRESCOT BROOK PROPOSED
1 IN 100 YEAR PLUS 44% CC
(Q100 CC 44%)
FLOOD LEVEL PLAN

DATE:	SCALE @ SIZE:	DRAWN:	CHECKED:
AUG 22	1:1250@A3	HB	PT

PROJECT NO:	DRAWING NO:	REV:
HYD730	115	B



Legend:

Planning Application Boundary

- Spot Velocity

Flood Velocity (m/s)

$$V \approx 0.1$$

 0.1 - 0.2

0.2 - 0.5

 0.5-1.0 1.0-1.5

15-20

20-25

25-30

303

531

B	26/08/22	HB	RERUNS	PT
A	27/07/22	HB	PRELIMINARY FOR ISSUE	PT

DRAWING STATUS:



BETTS HYDRO
CONSULTING ENGINEERS

Unit 6, Old Marsh Farm Bams, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk



PROJECT:

DYE HOUSE
PRESCOT

TITLE: PRESCOT BROOK

PROPOSED
1 IN 100 YEAR PLUS 4% CC
(Q100 CC 4%)

FLOOD VELOCITY PLAN

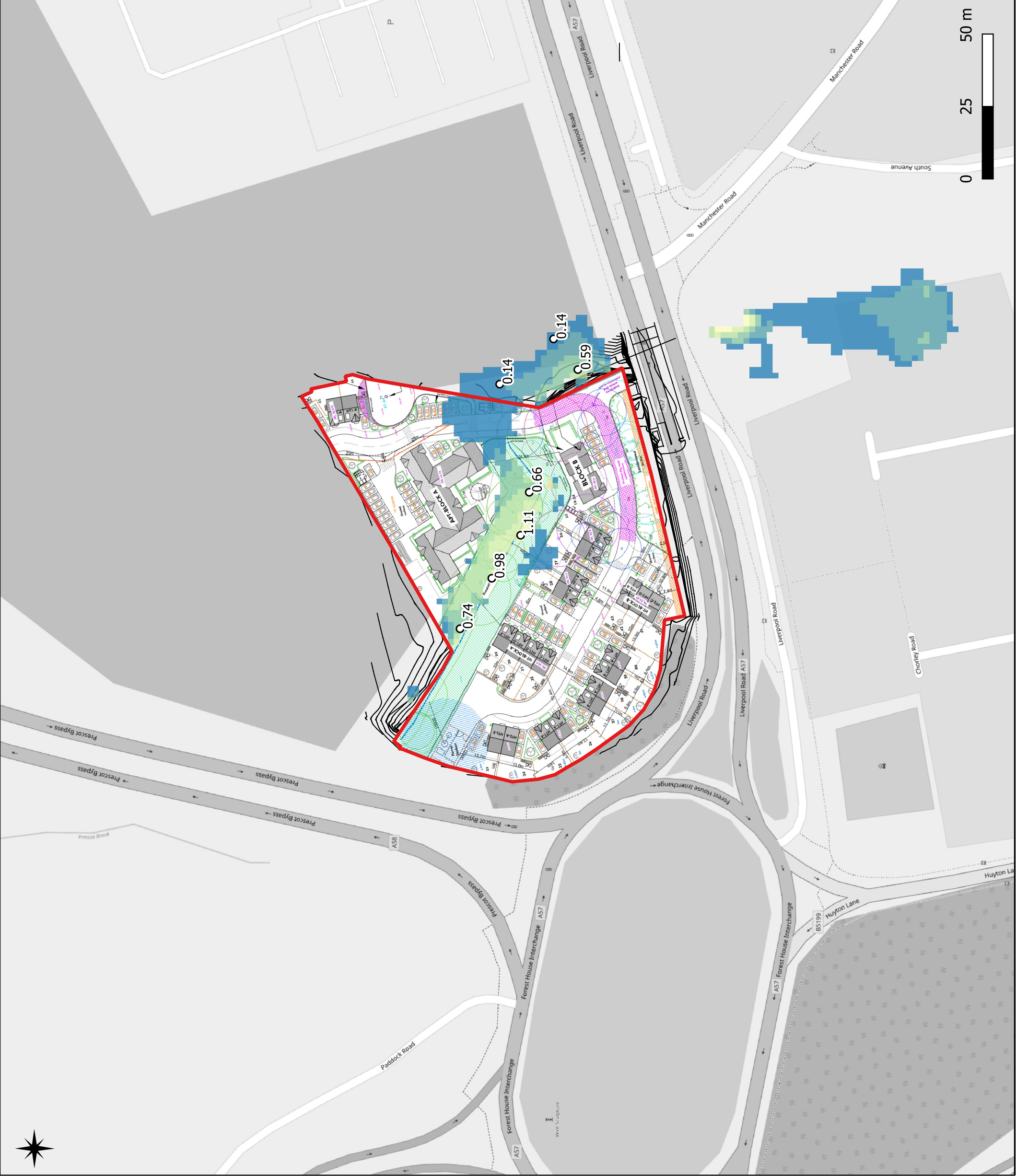
DATE:	SCALE @ SIZE:	DRAWN:	CHECKED:
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AUG 22 1:1250@A

PROJECT No:

HYD730

REV:



DO NOT SCALE

Legend:

 Planning Application Boundary

 Spot Depth

Flood Depth (m)

 0.01 - 0.20

 0.21 - 0.40

 0.41 - 0.60

 0.61 - 0.80

 0.81 - 1.00

 1.01 - 1.20

 1.21 - 1.40

 1.41 - 1.60

 1.61 - 1.80

 1.81 - 2.00

 2.00 +

REV	DATE	BY	DESCRIPTION	PT	CHK
A	05/09/22	HB	PRELIMINARY FOR ISSUE		

DRAWING STATUS:



BETTS HYDRO
CONSULTING ENGINEERS

Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk

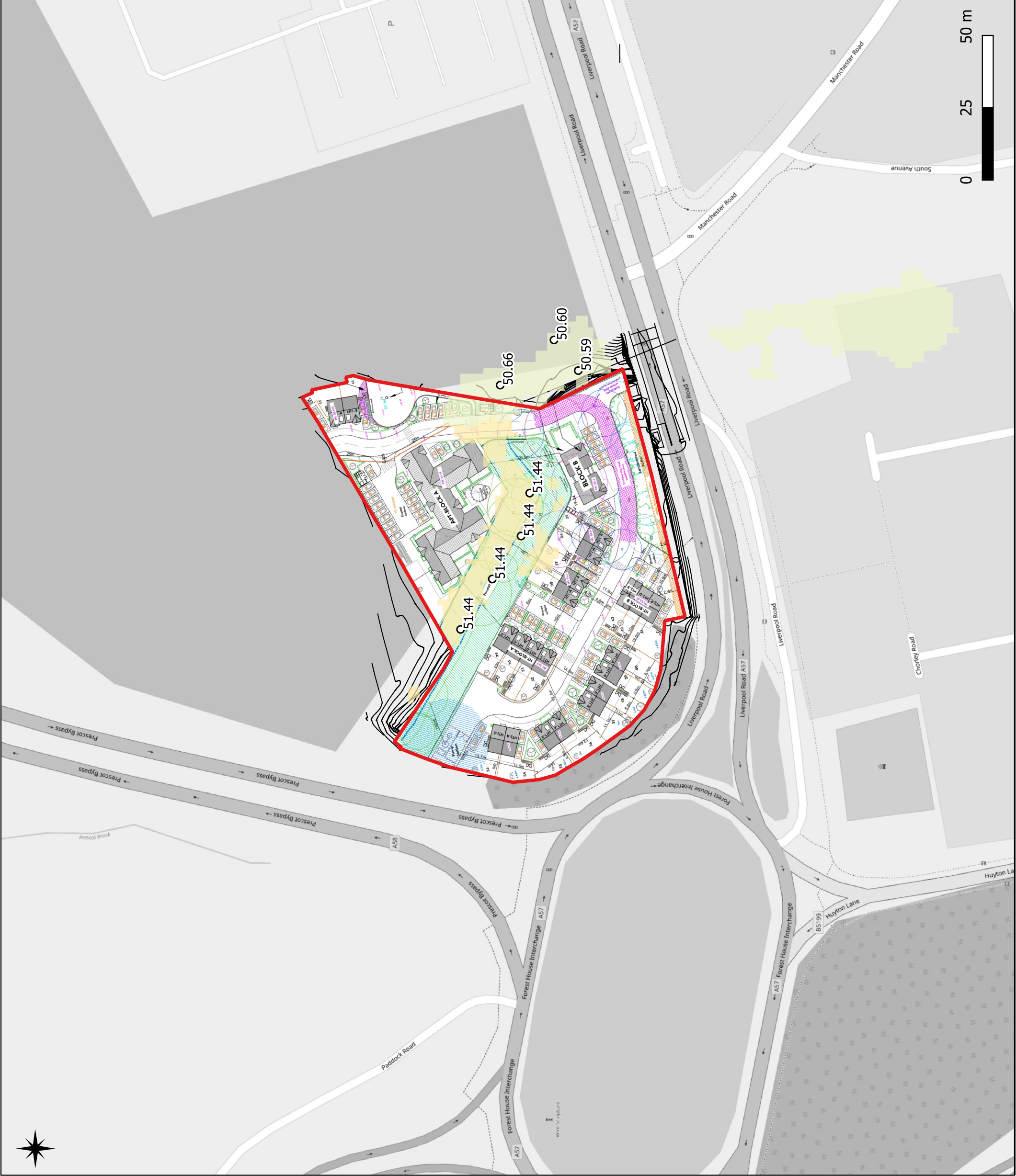


SEP
CONSTRUCTION

PROJECT:
**DYE HOUSE
PRESCOT**

TITLE:
PRESCOT BROOK
PROPOSED SCENARIO
1 IN 100 YEAR PLUS 44% CC WITH 95%
BLOCKAGE (Q100 CC 44% WITH 95% BL)
FLOOD DEPTH PLAN

DATE: SEPT 22	SCALE @ SIZE: 1:1250@A3	DRAWN: HB	CHECKED: PT
PROJECT NO: HYD730	DRAWING NO: 117	REV: A	



DO NOT SCALE

Legend:

 Planning Application Boundary

 Spot Level

Flood Level (mAO)

 <= 43.00

 43.00 - 45.00

 45.00 - 47.00

 47.00 - 49.00

 49.00 - 51.00

 51.00 - 53.00

 53.00 - 55.00

 55.00 - 57.00

 57.00 - 59.00

 > 59.00

REV	DATE	BY	DESCRIPTION	PT	CHK
A	05/09/22	HB	PRELIMINARY FOR ISSUE	PT	CHK

DRAWING STATUS:



BETTS HYDRO
CONSULTING ENGINEERS

Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk

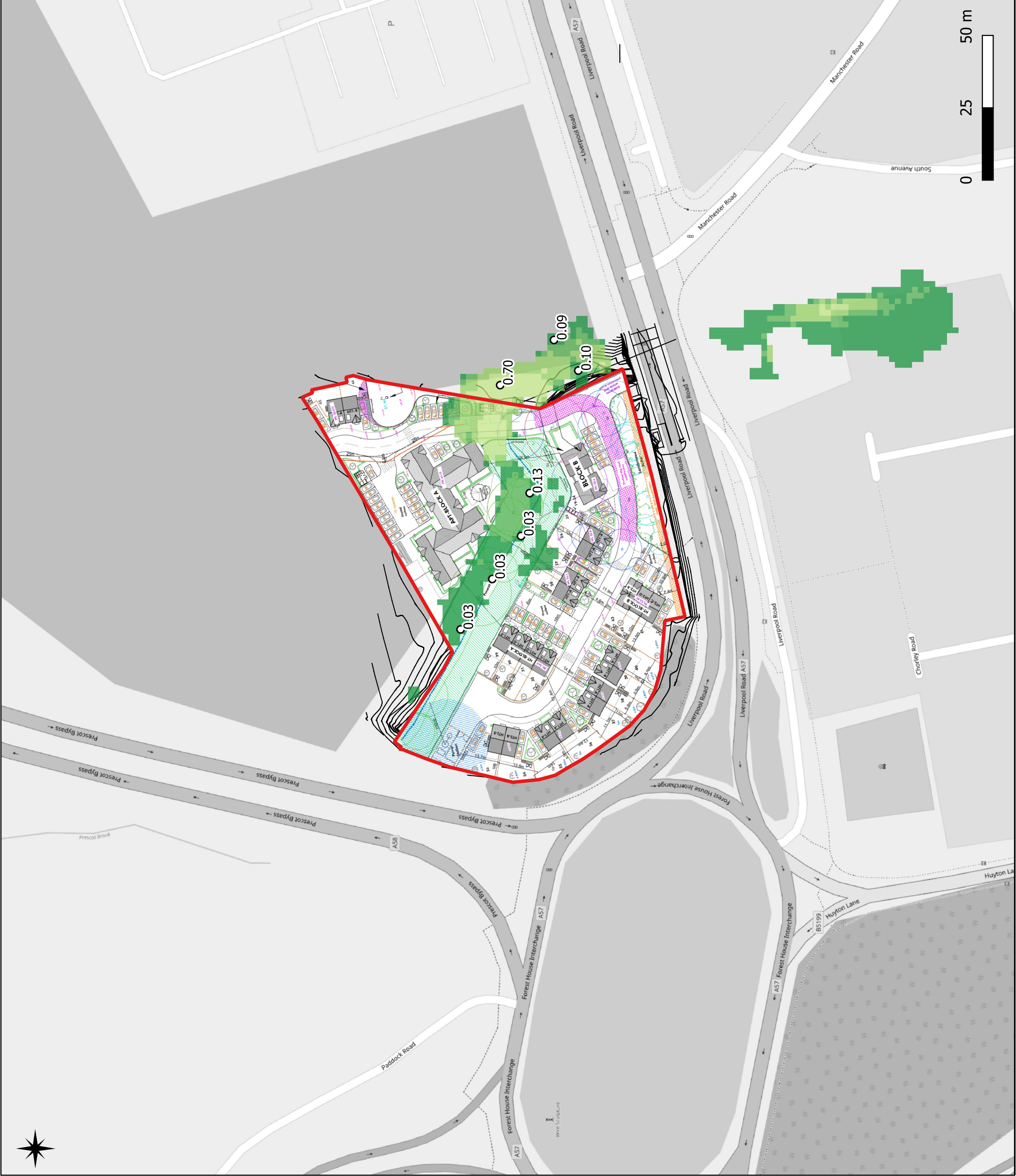


SEP
CONSTRUCTION

PROJECT: DYE HOUSE PRESCOT

TITLE: PRESCOT BROOK
PROPOSED SCENARIO
1 IN 100 YEAR PLUS 44% CC WITH 95%
BLOCKAGE (Q100 CC 44% WITH 95% BL)
FLOOD LEVEL PLAN

DATE: SEPT 22	SCALE @ SIZE: 1:1250@A3	DRAWN: HB	CHECKED: PT
PROJECT NO: HYD730	DRAWING NO: 118	REV: A	



DO NOT SCALE

Legend:

 Planning Application Boundary

 Spot Velocity

Flood Velocity (m/s)

 <= 0.1

 0.1 - 0.2

 0.2 - 0.5

 0.5 - 1.0

 1.0 - 1.5

 1.5 - 2.0

 2.0 - 2.5

 2.5 - 3.0

 3.0 - 3.5

 > 3.5

REV	DATE	BY	DESCRIPTION	PT	CHK
A	05/09/22	HB	PRELIMINARY FOR ISSUE	PT	CHK

DRAWING STATUS:



BETTS HYDRO
CONSULTING ENGINEERS

Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk



PROJECT: DYE HOUSE
PRESCOT

TITLE: PRESCOT BROOK
PROPOSED SCENARIO
1 IN 100 YEAR PLUS 44% CC WITH 95%
BLOCKAGE (Q100 CC 44% WITH 95% BL)
FLOOD VELOCITY PLAN

DATE: SEPT 22	SCALE @ SIZE: 1:1250@A3	DRAWN: HB	CHECKED: PT
PROJECT NO: HYD730	DRAWING NO: 119	REV: A	

APPENDIX I: PFRA/SFRA PLANNING EXTRACTS

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Legend

-  Borough Administrative Boundary
-  Main River
-  Ordinary Watercourse
-  Lakes/Reservoirs

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DRAWN BY	DATE	CHECKED BY	PASSED BY
S. Turnbull	30/05/2012	L. Tattersall	P. Raynor
SCALE @ A3		ISSUING OFFICE	
1:40,000		Sheffield	

**KNOWSLEY METROPOLITAN
BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD
RISK ASSESSMENT**

Figure B1-1-1
Catchment Overview

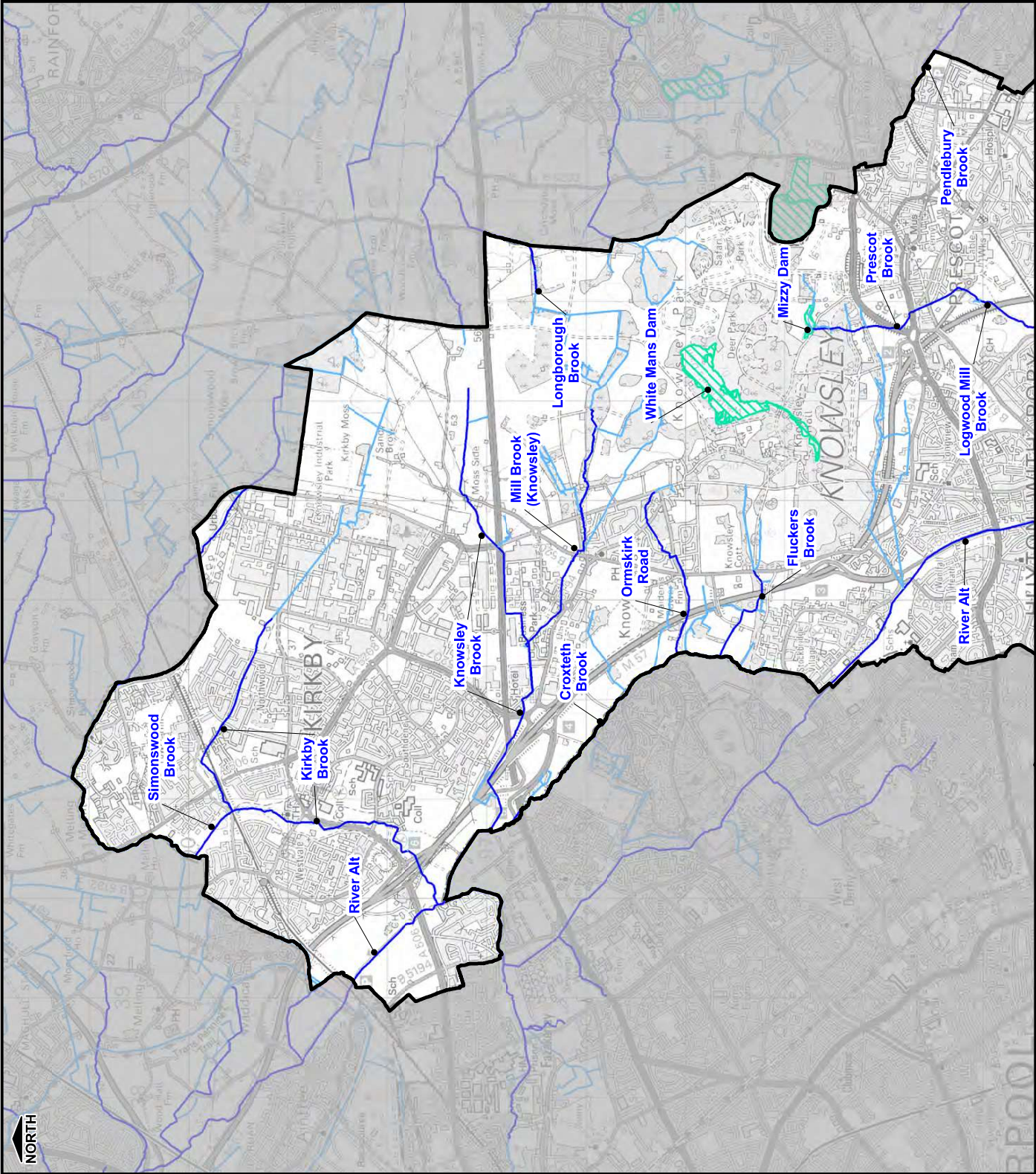


Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER
CS056421B1-1-1

REV
-



Legend

- Borough Administrative Boundary
- Defences
- Main River
- Ordinary Watercourse
- Flood Zone 2 Fluvial and Tidal
- Flood Zone 2 Tidal
- Flood Zone 3a Fluvial and Tidal
- Flood Zone 3a Tidal
- Flood Zone 2 Fluvial
- Flood Zone 3a Fluvial

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DRAWN BY	DATE	CHECKED BY	PASSED BY
S. Turnbull	30/05/2012	L. Tattersall	P. Raynor
SCALE @ A3	ISSUING OFFICE		
1:40,000	Sheffield		

KNOWSLEY METROPOLITAN
BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD
RISK ASSESSMENT

Figure B2-1
Environment Agency Flood Zones

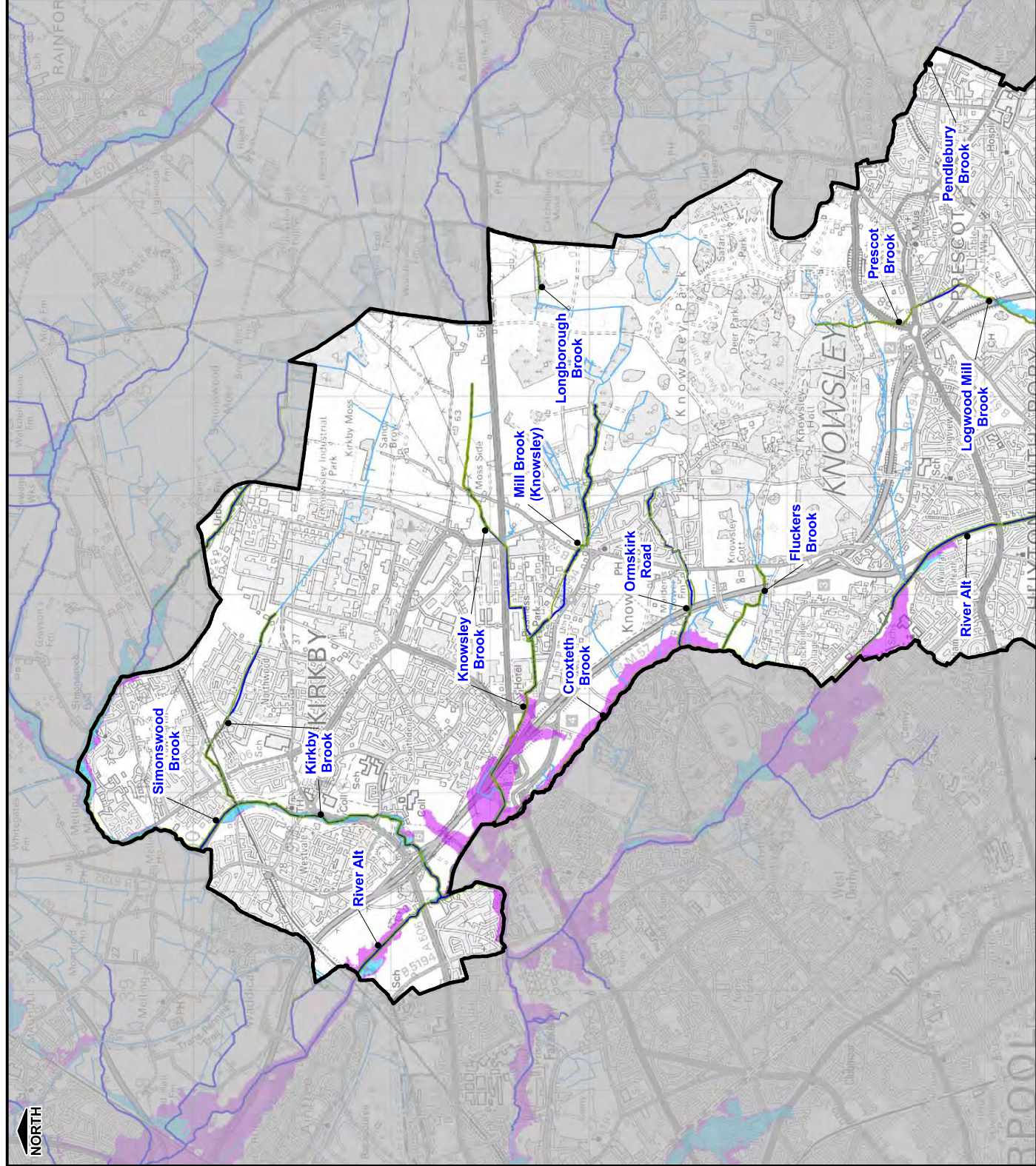


Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER
CS056421/B2-1

REV
-



Legend

- Borough Administrative Boundary
- 5% AEP Flood Extent
- 1% AEP Flood Extent
- 1%+CC AEP Flood Extent
- 0.1% AEP Flood Extent
- Main River
- Ordinary Watercourse

NOTES:

The flood extents are taken from the Logwood Mill Brook (2012), Netherley and Halewood (2012), Chikwell Brook (2008) and Lower Ait (2010) studies and take into account the presence of existing defences

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DRAWN BY	DATE	CHECKED BY	PASSED BY
S.Turnbull	30/05/2012	L.Tattersall	P.Raynor
SCALE @ A3		ISSUING OFFICE	
1:20,000		Sheffield	

**KNOWSLEY METROPOLITAN
BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD
RISK ASSESSMENT**

Figure B3-A-2
Actual Risk
Flood Extent

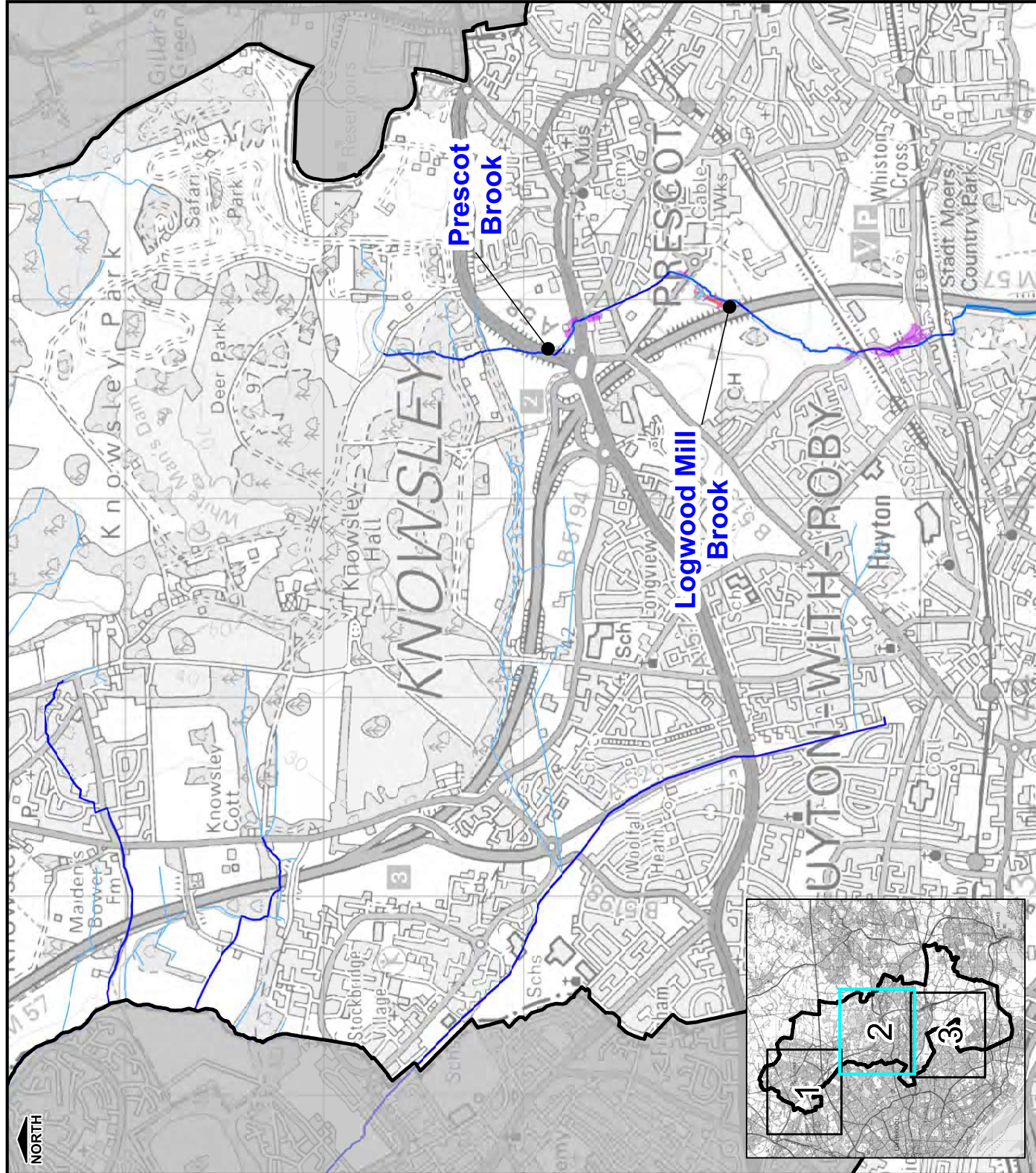


Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER
CS056421B3-A-2

REV
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Legend

- Borough Administrative Boundary
- Main River
- Ordinary Watercourse
- 200yr Surface Water Event (Deep)
- 200yr Surface Water Event (Shallow)

DISCLAIMER:

This map gives an indication of the broad areas likely to be at risk of surface water flooding. It is not suitable for use at an individual property scale due to the method used.

NOTES:

The outputs are from the Environment Agency Flood Map for Surface Water Data Set (2010).

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S.Turnbull	30/05/2012	L.Tattersall	P.Raynor
SCALE @ A3		ISSUING OFFICE	
1:40,000		Sheffield	

KNOWSLEY METROPOLITAN
BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD
RISK ASSESSMENT

Figure B5-1
Environment Agency Flood Map
for Surface Water

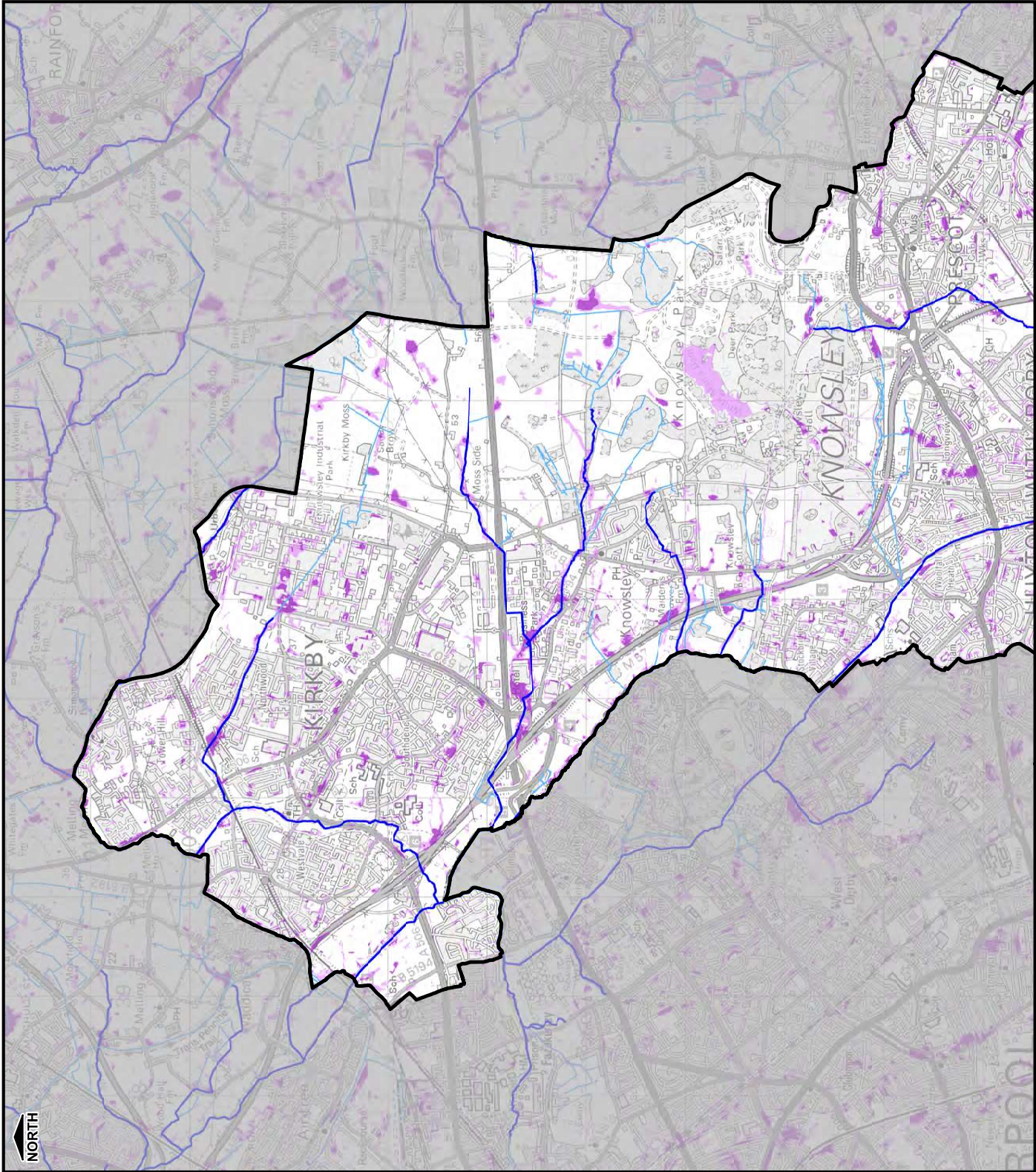


Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER
CS056421B5-1

REV
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Legend

- Borough Administrative Boundary
- Main River
- Ordinary Watercourse
- Lakes/Reservoirs
- Maximum Extent of Reservoir Flooding

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1:40,000		Sheffield	

KNOWSLEY METROPOLITAN
BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD
RISK ASSESSMENT

Figure B7-1
Reservoir Flooding

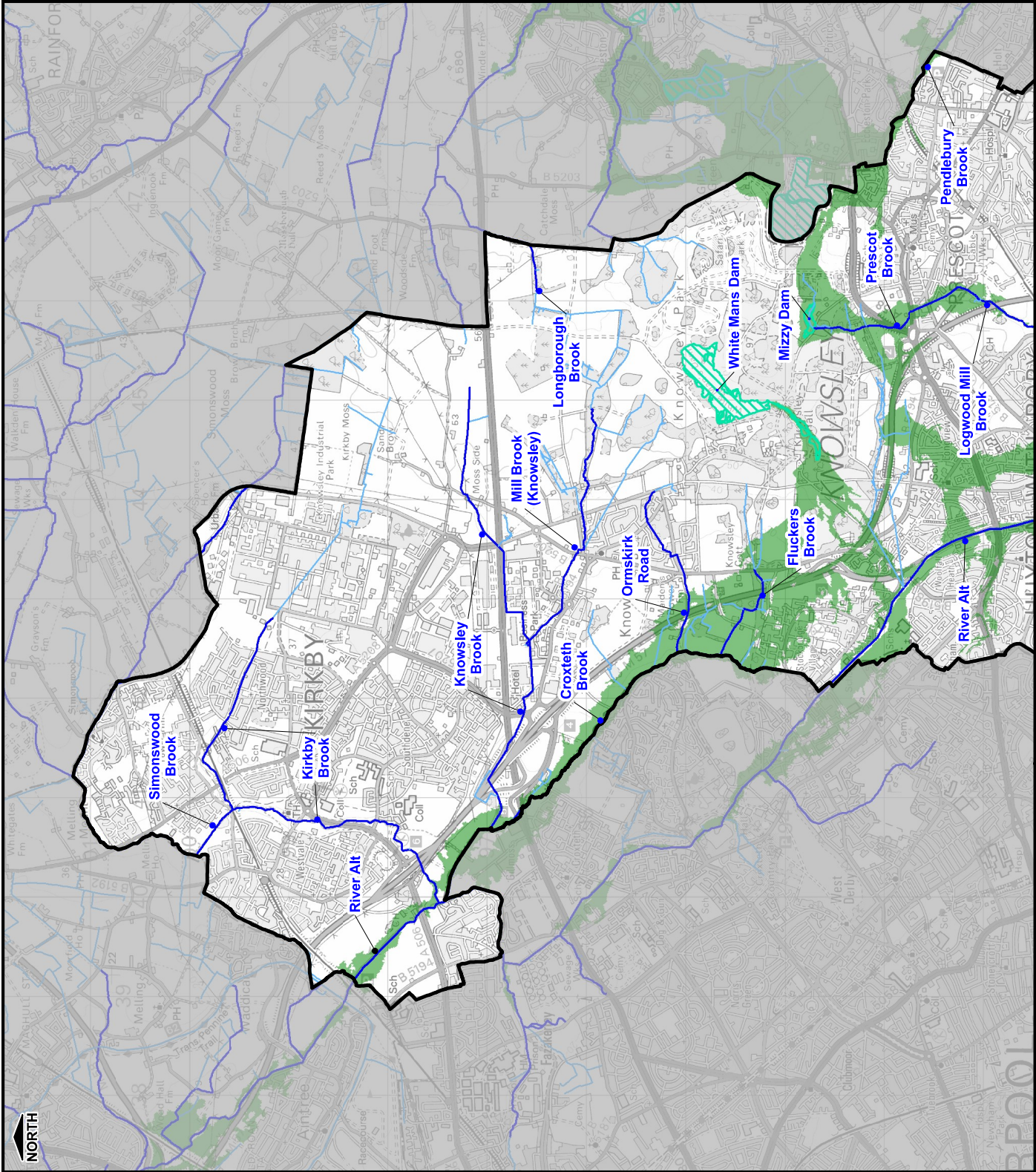


Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER
CS056421/B7-1

REV
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APPENDIX N: NOTES OF LIMITATIONS

The data essentially comprised a study of available documented information from various sources together with discussions with relevant authorities and other interested parties. There may also be circumstances at the site that are not documented. The information reviewed is not exhaustive and has been accepted in good faith as providing representative and true data pertaining to site conditions. If additional information becomes available which might impact our conclusions, we request the opportunity to review the information, reassess the potential concerns, and modify our opinion if warranted.

It should be noted that any risks identified in this report are perceived risks based on the available information.

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