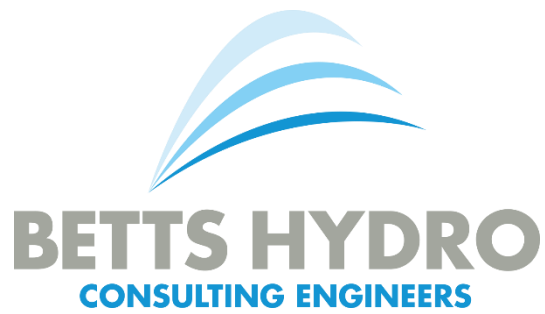




**LAND OFF
RADCLIFFE MOOR ROAD
BURY**

FLOOD RISK ASSESSMENT



For

Westchurch Homes Ltd.
Kennedy House
31 Stamford Street
Altrincham
WA14 1ES



SEPTEMBER 2021

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**LAND OFF
RADCLIFFE MOOR ROAD
BURY**

FLOOD RISK ASSESSMENT

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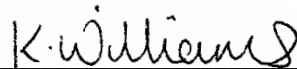


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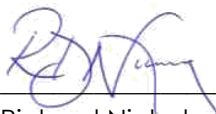


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EXECUTIVE SUMMARY

The Flood Risk Assessment was commissioned by Westchurch Homes Limited referred to hereafter as 'the client'. This report has been prepared to support a planning application for development of the land off Radcliffe Moor Road in Bury. The proposed development site lies solely within Flood Zone 1 based on the Environment Agency Flood Map for Planning. The development proposal consists of four new sports pitch and club house with access off Radcliffe Moor Road.

Recreational development is classified as 'less vulnerable' within the Planning Practice Guidance which supports the National Planning Policy Framework. The Planning Practice Guidance confirms that 'less vulnerable' development is appropriate to be located within Flood Zone 1, providing there is no increase in flood risk elsewhere due to the proposals.

Flood Risk

This report has reviewed all sources of flood risk both to and resulting from the proposed development site. Consultation with Bury Metropolitan Borough Council, United Utilities and the Environment Agency has not identified any historical flooding to the site or the wider area. A Main River known as Blackshaw Brook is located 150m from the western boundary of site.

Irrespective, the existing ground levels on the sites eastern boundary are between 0.5m to 1.5m higher than levels identified adjacent to Blackshaw Brook, therefore due to the existing ground levels the potential flood risk to site is low from this source. As the site falls from the north-eastern boundary to the south-west any potential exceedance from Blackshaw Brook would naturally route to the south-west and not toward the elevated site area.

The mapping has identified some surface water flood risk onsite which will be reduced and sustainably managed post-development, following the implementation of a sustainable surface water management regime and appropriate levels design.

To summarise, the proposals are at 'very low' flood risk from the flood sources reviewed as part of this assessment. This assessment has been prepared in consultation with the relevant interested parties. The report is commensurate with the scale and nature of the development proposals, and the development can be considered appropriate in accordance with the Planning Practice Guidance.

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Specialist Software

-  MicroDrainage WinDES (v.14.1) – Calculation of Greenfield run-off rates IH124/ICP-SUDS, Greenfield run-off volumes, rates of rainfall and stormwater storage estimates.
-  Flood Estimation Handbook FEH CD-ROM (v.3.0) – Determination of Catchment Descriptors and depths of rainfall.

Abbreviations & Acronyms

AEP	Annual Exceedance Probability
BGS	British Geological Survey
BMB	Bury Metropolitan Borough Council
CC	Climate Change
CRT	Canal & River Trust
CSAI	Cranfield Soil and Agrifood Institute
EA	Environment Agency
FEH	Flood Estimation Handbook
FRA	Flood Risk Assessment
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority

mAOD	Metres Above Ordnance Datum
NGR	National Grid Reference
NPPF	National Planning Policy Framework
NSRI	National Soil Resources Institute
OS	Ordnance Survey
PFRA	Preliminary Flood Risk Assessment
PPG	Planning Practice Guidance
QSE	Quick Storage Estimate
QBAR	Mean Annual Flood
SfA	Sewers for Adoption
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems
TWL	Top Water Level
UU	United Utilities

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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. The proposals are solely 'recreational' in nature and as such is classified as 'Less Vulnerable' in Table 2: Flood Risk Vulnerability Classification, within the Planning Practice Guidance. The PPG confirms that this type of land-use is appropriate for Flood Zone 1, providing there is no increase in flood risk elsewhere due to the proposals.

1.2 Site Context

- 1.2.1 This FRA has been prepared to support a planning application for the development of four new sports pitches and an associated club house on land off Radcliffe Moor Road in Bury. The site is currently undeveloped land and generally falls from the north-eastern boundary to the south-west. This site is also located in close proximity of a Main River known as Blackshaw Brook which will be considered within this assessment.

1.3 Consultation

- 1.3.1 The NPPF advises that BMBC as the Local Planning Authority (LPA) should consult with the EA who will provide advice and guidance on flood issues at a strategic level and in relation to planning applications. The preparation of this report has been undertaken in consultation with the Environment Agency (EA), United Utilities (UU), Bury Metropolitan Borough Council (BMBC), and the Canal River Trust (CRT). Consultation responses can be seen in **Appendix B, C and D** respectively.

2.0 EXISTING SITE LOCATION

2.1 Location

- 2.1.1 The development site is located off Radcliffe Moor Road in Bury. The Ordnance Survey National Grid Reference (OS NGR) for the site is E: 375544, N: 409104 and the nearest postcode is BL2 6QB (see location plan in **Appendix E**). The site covers 3.85ha, with Bury New Road to the north and Radcliffe Moor Road to the east. To the south of site is Starmount Lodges and associated ponds, and to the west is undeveloped greenfield, and Blackshaw Brook, as illustrated in **Figure 1**.



2.2 Existing and Historical Land Use

- 2.2.1 The site is currently undeveloped and comprises of low-density vegetation, with trees and shrubs along the field boundaries. Historically the site was utilised for agricultural purposes and no other historical uses have been identified during this assessment.

2.3 Topography

- 2.3.1 The topography generally falls from the north-eastern boundary (at 117.00mAOD) down to the south-western boundary (at 101.00mAOD), as illustrated in **Figure 1**. The topographical information provided by the client can be seen in **Appendix F**.

3.0 DEVELOPMENT PROPOSALS

3.1 Nature of the development

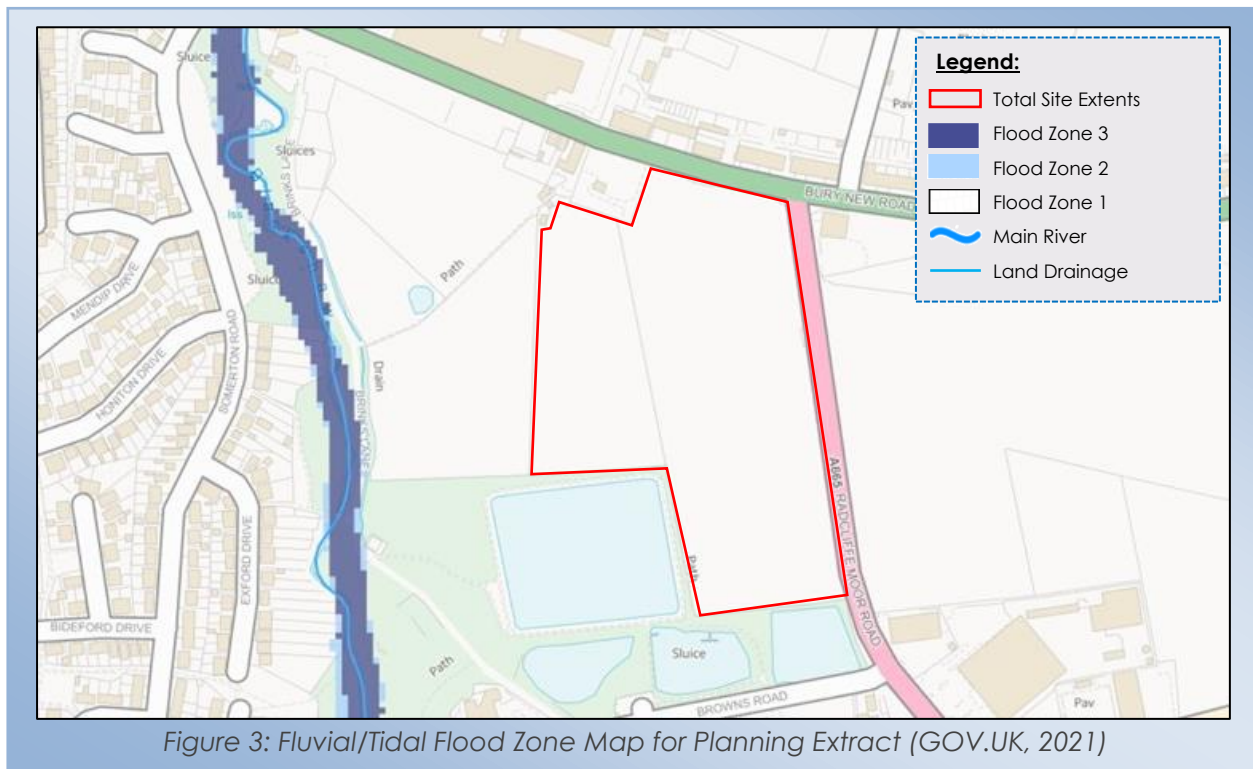
3.1.1 The planning application is for the construction of four new sports pitches and an associated club house on the land off Radcliffe Moor Road in Bury. The proposed development will have access off Radcliffe Moor Road as illustrated in the proposed planning layout in **Figure 2** (full plans are included in **Appendix G**).



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 Environment Agency and the Gov.uk website. An extract of the EA's Flood Zone Map for Planning is shown in **Figure 3**, which illustrates that the site is located solely within Flood Zone 1. Flood Zone 1 is an area considered to be at little or no flood risk from rivers and/or the sea (as defined by the EA).



- 4.1.2 The nearest Main River to the site is Blackshaw Brook located 150m west of site. The risk to the site from Blackshaw Brook is 'very low' based on the proximity to site and the surrounding topography. This is further supported by the Governments fluvial/tidal flood risk mapping, (see **Appendix B**) which shows the site at little to no risk of flooding from Blackshaw Brook.
- 4.1.3 Initial consultation with the EA, BMBC and UU also failed to highlight any historical flooding directly to the site or the surrounding area (see correspondence in **Appendix B, C and D**). This is further supported by the review of Bury Metropolitan Borough Council's Strategic Flood Risk Assessment, which does not identify the site location to be at flood risk from fluvial sources.

4.2 Tidal Flood Risk

- 4.2.1 The Northwest Coastline is located more than 60km from site and the Mersey Estuary is located 46km to the south-west of the site. The tidal flood risks associated with these sources are 'very low' due to the site's proximity. This is supported by the EA's Fluvial/Tidal Flood Map for Planning, which shows the site to be in Flood Zone 1 (**Figure 3**) and at little to no flood risk from fluvial/tidal sources.

4.3 Flood Risk Vulnerability Classification and Flood Zone Compatibility

4.3.1 The proposals are solely 'recreational' in nature and as such is classified as 'less vulnerable' in Table 2 (Flood Risk Vulnerability Classification) within the Planning Practice Guidance. Table 3 (Flood Risk Vulnerability and Flood Zone 'Compatibility') within the PPG confirms that this type of land-use is appropriate for Flood Zone 1, providing there is no increase in flood risk elsewhere due to the proposals.

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 mapping (extract shown in **Figure 4**). Based on the long-term government surface water flood mapping most of the development area will remain flood free.

4.4.2 The site is predominantly at 'very low' risk from flooding associated with surface water. Generally, on undeveloped sites, areas at highest risk of surface water flooding correspond with either existing watercourses, conveyance features, existing ponds, or low-lying depressions. In this case those areas onsite at highest risk from surface water flooding have been identified on the topographic survey to correspond with a natural conveyance route on the site. This conveyance route will be maintained post-development by implementing an appropriate surface water management regime and appropriate levels design.

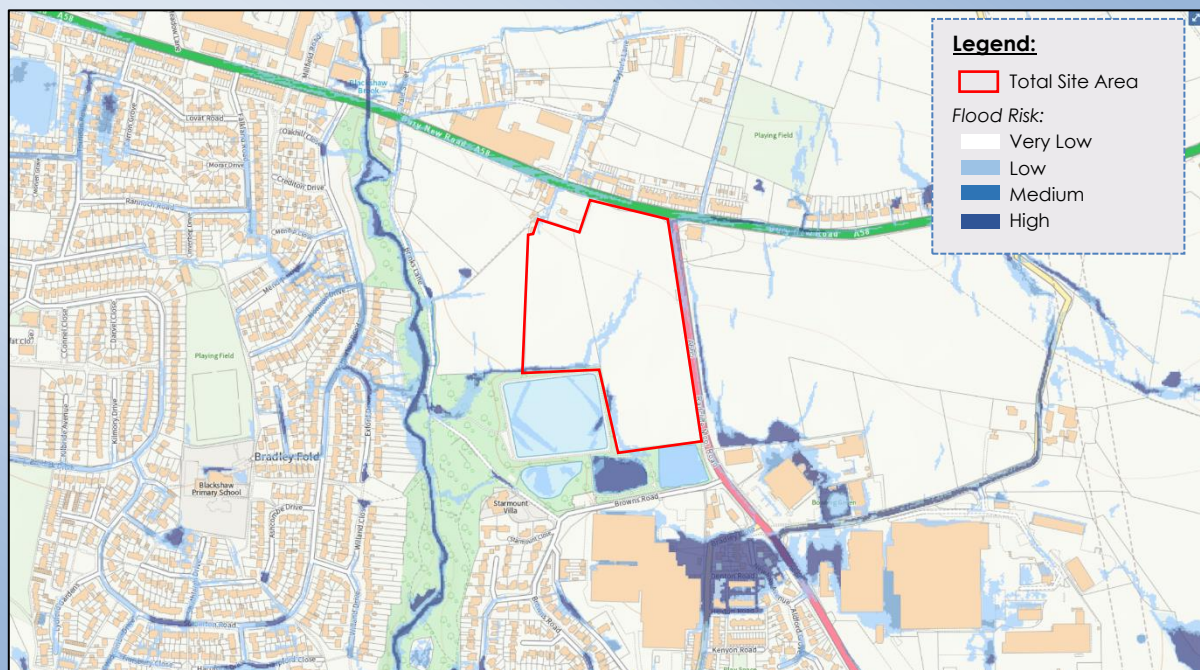


Figure 4: Surface Water Flood Map Extract (GOV.UK, 2021)

- 4.4.3 Any residual risk from surface water flooding will be managed, post-development through implementing a sustainable surface water management regime. Any overland flows generated must be carefully controlled. Safe avenues directing overland flow away from any existing buildings is advised. Any run-off conveying through the site at present should be catered for through continued routing in an appropriate manner, this will ensure no increased run-off elsewhere because of the proposals.

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 development and surrounding undeveloped areas means there is little potential for significant pluvial flows impacting on the proposed development as the undeveloped areas naturally fall towards the site from the watercourse/land drainage feature.
- 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 towards safe undeveloped areas.

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 United Utilities sewer records identify there to be very limited public sewers within the vicinity of site, therefore the risk to site from sewer flooding is understood to be low (refer to **Appendix C**). UU sewer records do not identify any sewer flooding at the site caused by blockages or collapses which are the result of third parties or private assets.

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 manmade 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.
- 4.5.2 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.

- 4.5.3 The EA mapping data for groundwater shows that the site is underlain by a Secondary A Bedrock Aquifer with Secondary (undifferentiated) superficial deposits. The site is located within a Medium to Low Groundwater Vulnerability Zone to a Major Aquifer.
- 4.5.4 No historical groundwater flooding to the site has been identified during consultation with the interested parties. It is advised however, that appropriate levels design is undertaken for the proposed club house, so that external levels fall away from the internal access; this will minimise the potential for ingress from the car park from external areas. Externally levels should fall towards the highways or main drainage systems.

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 Environment Agency 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 would not be susceptible to flooding should a failure occur in the nearby reservoir. Areas to the south of site would be affected and therefore this risk has been qualitatively assessed.
- 4.6.3 Located south of site is Starmount Lodges with three associated ponds, all smaller than the 25,000cu.m threshold the EA require to include in their assessment. Review of the topographic survey has identified that surrounding ground levels fall in a westerly direction and therefore away from the site. If there was a failure which resulted in exceedance, then flows would convey away from the development site. The potential flood risk to site from Starmount Lodges and the three associated ponds is therefore minimal, and considered a residual risk.

Canals

- 4.6.4 The nearest canal is the Manchester, Bolton & Bury Canal located approximately 2km south-west of the site, due to proximity the flood risk associated with canals is considered to be 'very low'.
- 4.6.5 It is advised however that external levels fall away from the proposed development (where feasible) to minimise the flood risk from a variety of sources. By keeping the ground floor levels elevated relative to the externals, this should help create overland flood flow routes externally 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 the Bury Metropolitan Borough Council's Strategic Flood Risk Assessment (see general mapping extracts in **Appendix H**).

- 4.7.2 Consultation with Bury Metropolitan Borough Council, United Utilities and the Environment Agency has been carried out for this specific application and at this time we are still awaiting a response. See **Appendix B, C and D** for correspondence.

4.8 Flood Risk Mitigation Measures & Residual Risks

- 4.8.1 The site is located within Flood Zone 1 and considered to be at little risk of fluvial/tidal flooding. To observe a conservative approach, mitigation measures have been proposed below in accordance with best practice, to safeguard the development from residual sources of flood risk, considering the uncertainties of climate change.

Mitigation Measures

- 4.8.2 It is advised that appropriate levels design is carried out at detailed design stage to ensure that the internal areas associated with the clubhouse remain flood free in an event whereby exceedance results in excess overland flow across site.
- 4.8.3 Any overland flows generated by the development itself must also be carefully controlled. Safe avenues directing overland flow way from any existing/proposed buildings is advised. Any natural overland flows conveying through the site at present should be catered for through continued routing in an appropriate manner, this will be confirmed during detailed design stage.
- 4.8.4 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 with betterment (where required). An appropriate land drainage system will need to be designed and implemented to drain the proposed sports pitches. A separate drainage management strategy is currently being prepared in a separate report (ref: HYD633_RADCLIFFE.MOOR.ROAD_DMS).
- 4.8.5 As with any drainage system blockages have the potential to cause flooding or disruption. It is important that should any drainage systems not be offered for adoption to either the UU or BMBC then an appropriate maintenance regime should be scheduled with a suitably qualified management company for any private drainage systems.

Residual Risks

- 4.8.6 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 proposed planning layout if the capacity of the drainage system is exceeded.

5.0 SUMMARY AND CONCLUSIONS

- 5.1 This report has been prepared to support a planning application for development of the land off Radcliffe Moor Road in Bury. The proposed development site lies solely within Flood Zone 1 based on the Environment Agency Flood Map for Planning. The development proposals consist of four new sports pitch and club house with access off Radcliffe Moor Road. Recreational development is classified as 'less vulnerable' within the Planning Practice Guidance which supports the National Planning Policy Framework. The Planning Practice Guidance confirms that 'less vulnerable' development is appropriate to be located within Flood Zone 1.

Flood Risk

- 5.2 This report has reviewed all sources of flood risk both to and resulting from the proposed development site. Consultation with Bury Metropolitan Borough Council, United Utilities and the Environment Agency has not identified any historical flooding to the site or the wider area. A Main River known as Blackshaw Brook is located 150m from the western boundary of site. The watercourse flows south past the site and is culverted in some locations adjacent to the western boundary.
- 5.3 Watercourses with catchments greater than 2km² are typically considered as part of the national flood mapping, and in this case the contributing catchments are greater than this. The assessment has therefore qualitatively assessed the potential flood risks.
- 5.4 Irrespective, the existing ground levels on the sites eastern boundary are between 0.5m to 1.5m higher than levels identified adjacent to Blackshaw Brook, therefore due to the existing ground levels the potential flood risk to site is low from this source. As the site falls from the north-eastern boundary to the south-west any potential exceedance from Blackshaw Brook would naturally route to the south-west and not toward the elevated site area.
- 5.5 The mapping has identified some surface water flood risk onsite which will be reduced and sustainably managed post-development, following the implementation of a sustainable surface water management regime and appropriate levels design.
- 5.6 To summarise, the proposals are at 'very low' flood risk from the flood sources reviewed as part of this assessment. This assessment has been prepared in consultation with the relevant interested parties. The report is commensurate with the scale and nature of the development proposals, and the development can be considered appropriate in accordance with the Planning Practice Guidance.

6.0 RECOMMENDATIONS

- 6.1 It is advised that appropriate levels design is carried out at detailed design stage to ensure that the internal areas associated with the clubhouse remain flood free in an event whereby exceedance results in excess overland flow across site. Any overland flows generated by the development itself must also be carefully controlled. Safe avenues directing overland flow way from any existing/proposed buildings is advised. Any natural overland flows conveying through the site at present should be catered for through continued routing in an appropriate manner, this will be confirmed during detailed design stage.
- 6.2 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 with betterment (where required). An appropriate land drainage system will need to be designed and implemented to drain the proposed sports pitches. A separate drainage management strategy is currently being prepared in a separate report (ref: HYD633_RADCLIFFE.MOOR.ROAD_DMS).
- 6.3 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 UU or BMBC then an appropriate maintenance regime should be scheduled with a suitably qualified management company for these private drainage systems.

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Cranfield University – <http://www.landis.org.uk/soilscapes/>

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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 – <http://www.unitedutilities.com/default.aspx>

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APPENDIX A: NPPF & PPG EXTRACTS

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

148. 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

149. 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 temperatures⁴⁸. 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.
150. 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.
151. 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
 - 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.

⁴⁸ In line with the objectives and provisions of the Climate Change Act 2008.

152. 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.
153. 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.
154. 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) acceptable⁴⁹. 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

155. 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.
156. 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.
157. All plans should apply a sequential, risk-based approach to the location of development – taking into account the current and future impacts of climate change

⁴⁹ 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.

– 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 to reduce the causes and impacts of flooding (where appropriate through the use of natural flood management techniques); 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.

158. The aim of the sequential test is to steer new development to areas with the lowest risk of flooding. 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.
159. If it is not possible for development to be located in zones 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 national planning guidance.
160. 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. For the exception test to be passed 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.
161. Both elements of the exception test should be satisfied for development to be allocated or permitted.
162. 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.

163. 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 assessment⁵⁰. 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;
 - 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.
164. Applications for some minor development and changes of use⁵¹ 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 50.
165. 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

166. 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.

⁵⁰ 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.

⁵¹ 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.

167. 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.
168. 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 coast⁵².
169. 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.

⁵² 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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Hannah Buchanan

From: GMMC Info Requests <InfoRequests.GMMC@environment-agency.gov.uk>
Sent: 25 June 2021 12:21
To: Hannah Buchanan
Subject: GMMC222560CC Response attached from the Environment Agency

Dear Hannah,

Re: Pitch Development, Bury New Road, Little Lever, BL2 6QB

Thank you for your enquiry which was received on 21/6/21.

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

There is currently no detailed modelling data within 2km of your site. The site is in Flood Zone 1 and is near the designated main river, Blackshaw Brook. There is JFLOW available for this, however it cannot be used for a Flood Risk Assessment.

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

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

From: Hannah Buchanan [mailto:hannahbuchanan@betts-associates.co.uk]
Sent: 21 June 2021 15:39
To: GMMC Info Requests <InfoRequests.GMMC@environment-agency.gov.uk>
Subject: Product 4, 5, 6, & 7

To whom it may concern,

Pitch Development, Bury New Road, Little Lever, BL2 6QB

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.

Hannah Buchanan BSc
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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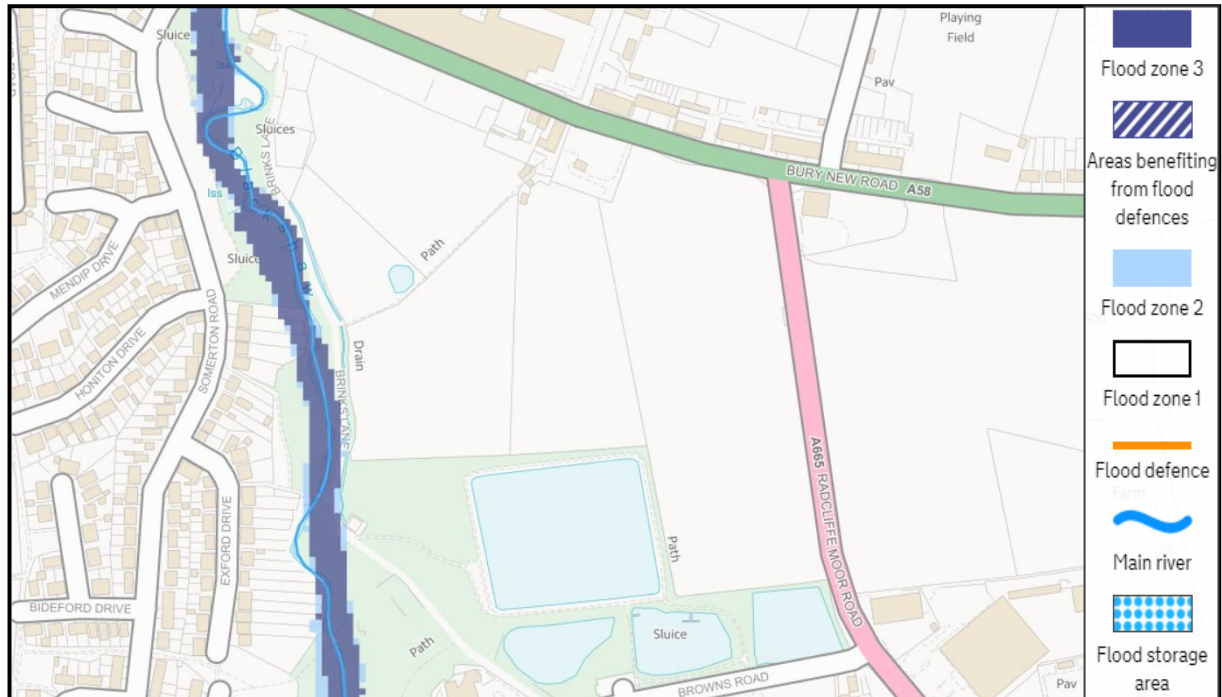
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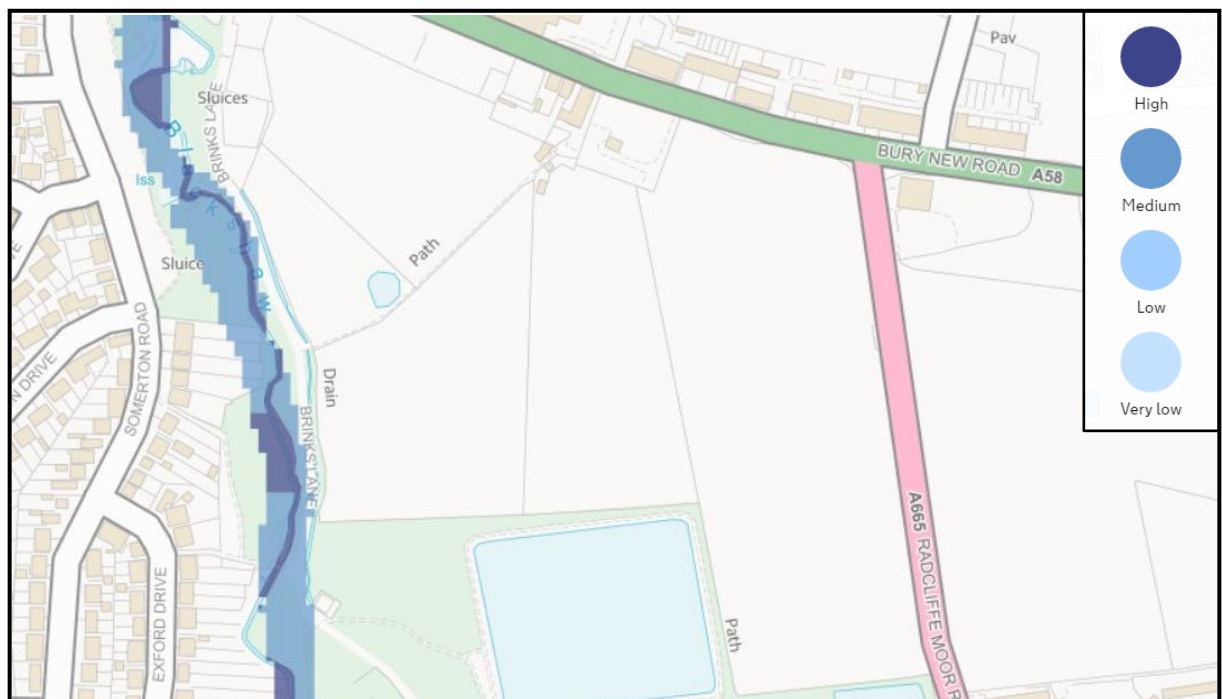
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Flood Map for Planning

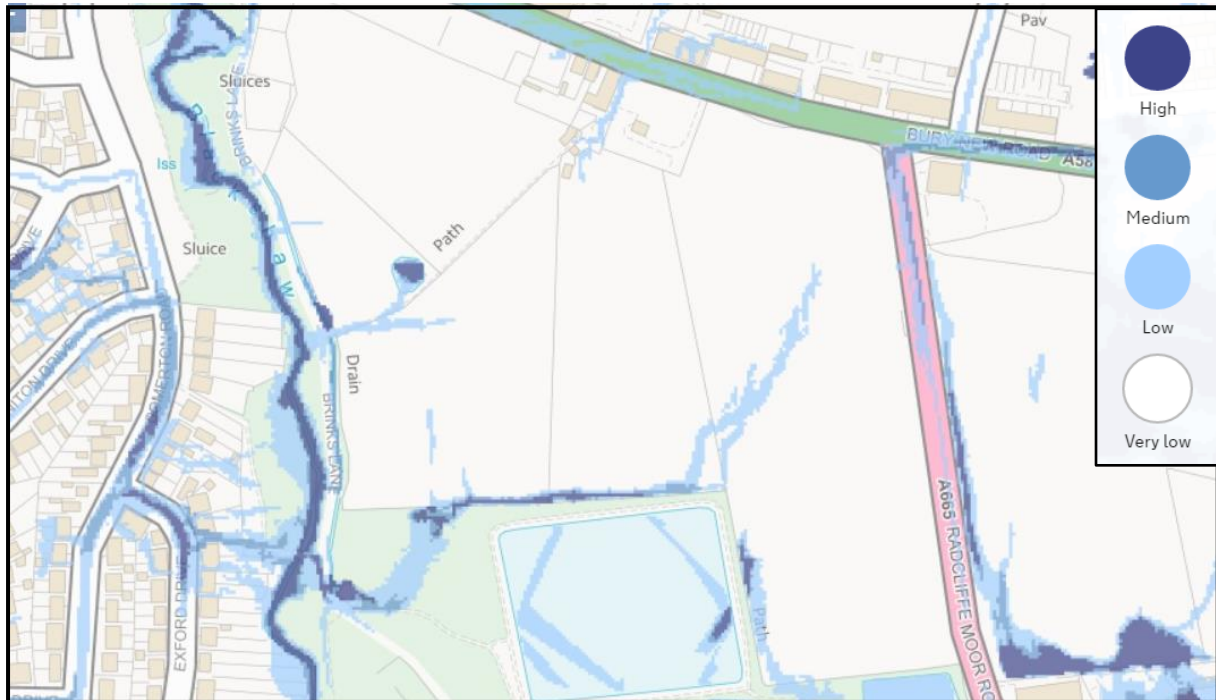


Long Term Flood Risk – Rivers or Sea

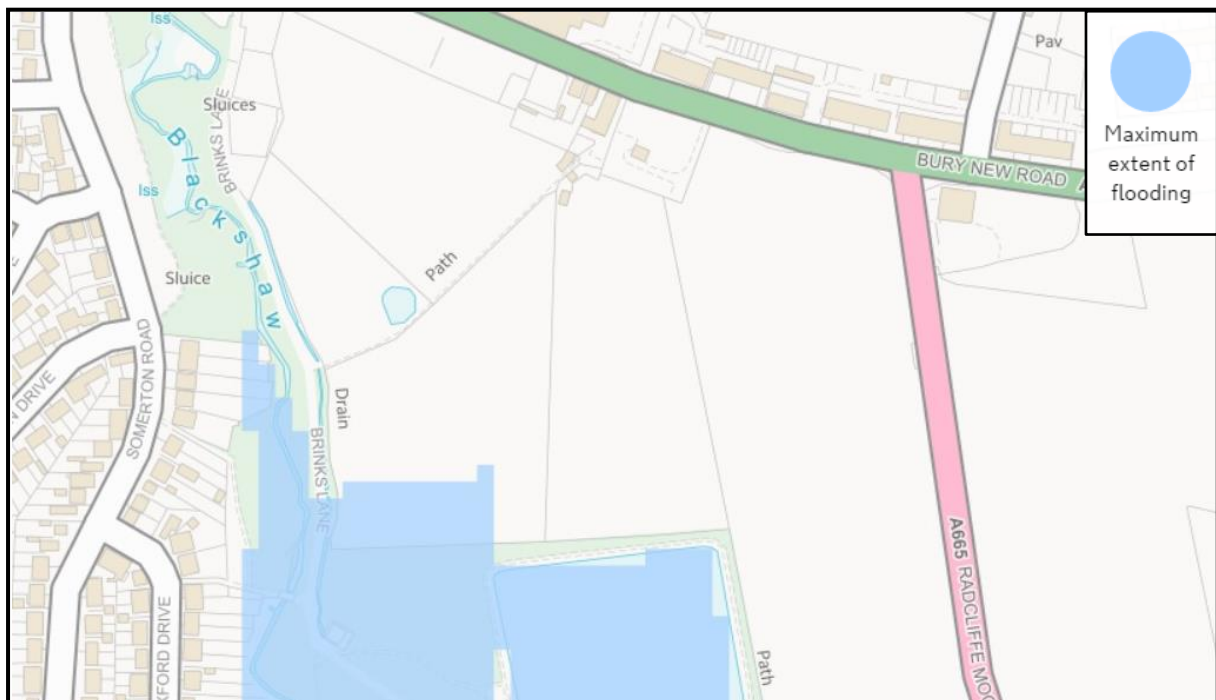


NATIONAL FLOOD MAPPING

Long Term Flood Risk – Surface Water



Long Term Flood Risk - Reservoirs



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APPENDIX C: UU CORRESPONDENCE

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Hannah Buchanan

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 30 June 2021 11:48
To: Hannah Buchanan
Cc: Wastewater Developer Services
Subject: RE: Sewer Flood Risk Information UUref GENQ 4200041059

Hannah,

Thank you for email.

United Utilities has no record of flooding on or in the vicinity of this site. No record should be taken as there has definitely been no flooding as there may have been flooding that wasn't reported to United Utilities.

There are combined sewer with the vicinity of the proposed site, however we would expect the surface water to go the nearby watercourse in line with the drainage hierarchy.

Please be aware United utilities offer a Wastewater pre-development service were we will work with you to agree your site drainage strategy, points of connection to the wastewater network, and discharge rates. For more information on this service please see our website or use the following link. <https://www.unitedutilities.com/builders-developers/pre-development/wastewater-pre-dev/>

Kind Regards,



Alistair Graham

Wastewater Developer Engineer
Developer Services & Metering
Customer Services
M: 07765941555
[unitedutilities.com](https://www.unitedutilities.com)

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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 WastewaterDeveloperServices@uuplc.co.uk

Coronavirus

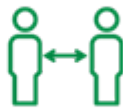
Prevent the spread



Wash your
hands



Disinfect
common surfaces



Practise social
distancing



FEVER +
COUGH

Stay home if you
have symptoms

[Click for our message to customers](#)

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

Sent: 21 June 2021 15:51

To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Subject: Sewer Flood Risk Information

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,

Pitch Development, Bury New Road, Little Lever, BL2 6QB

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.

Hannah Buchanan BSc
Graduate Flood Risk Analyst

BETTS HYDRO
Consulting Engineers

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hannahbuchanan@betts-associates.co.uk
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APPENDIX D: LPA/LLFA CORRESPONDENCE

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Hannah Buchanan

From: Hannah Buchanan
Sent: 21 June 2021 15:46
To: 'drainageconsultation@bury.gov.uk'
Subject: Historic Flood Risk Information
Attachments: LOCATION PLAN.pdf

To whom it may concern,

Pitch Development, Bury New Road, Little Lever, BL2 6QB

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.

Hannah Buchanan BSc
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 E: LOCATION PLAN

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LOCATION PLAN

Pitch Development, Bury New Road, Little Lever, BL2 6QB



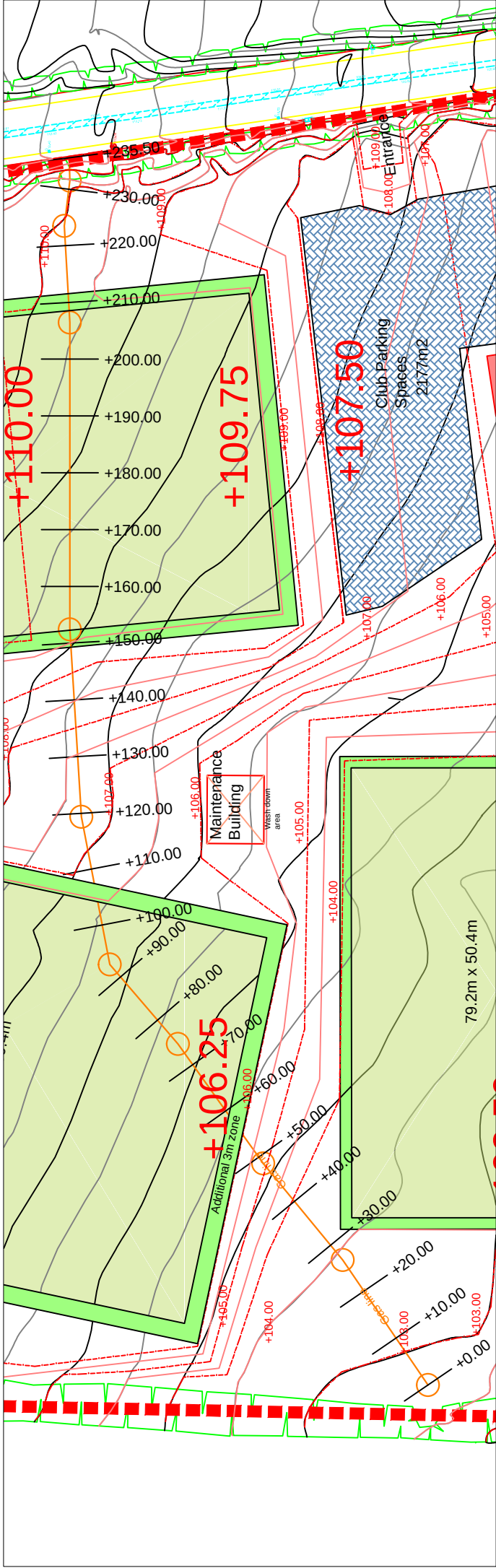
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OS Y (Northings)	409104
Nearest Post Code	BL2 6QB
Lat (WGS84)	N53:34:41 (53.577956184792676)
Long (WGS84)	W2:22:15 (-2.3708278560719718)
Lat, Long	53.577956184792676, -
2.3708278560719718	
Nat Grid	SD755091 / SD7554409104

APPENDIX F: TOPOGRAPHIC SURVEY

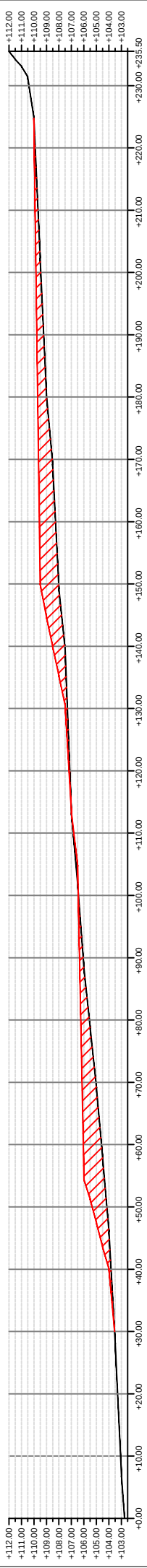
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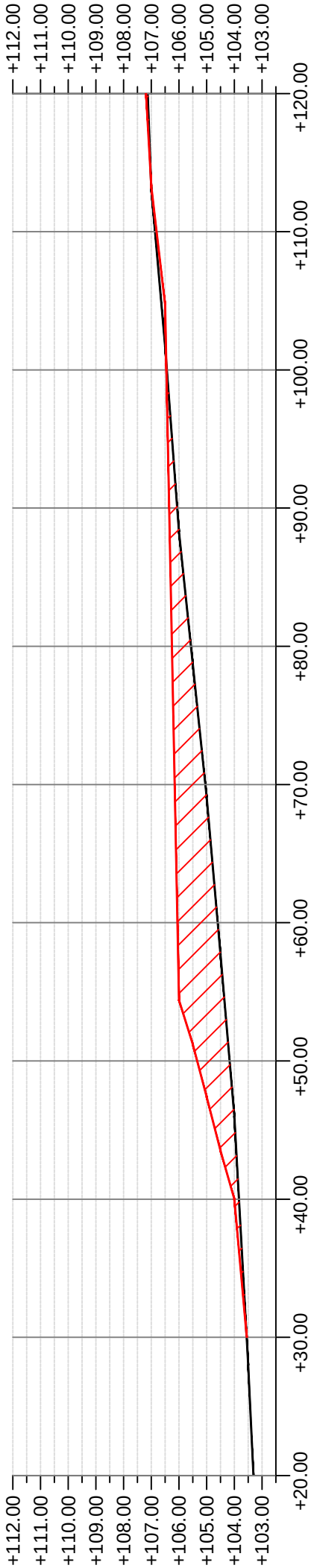
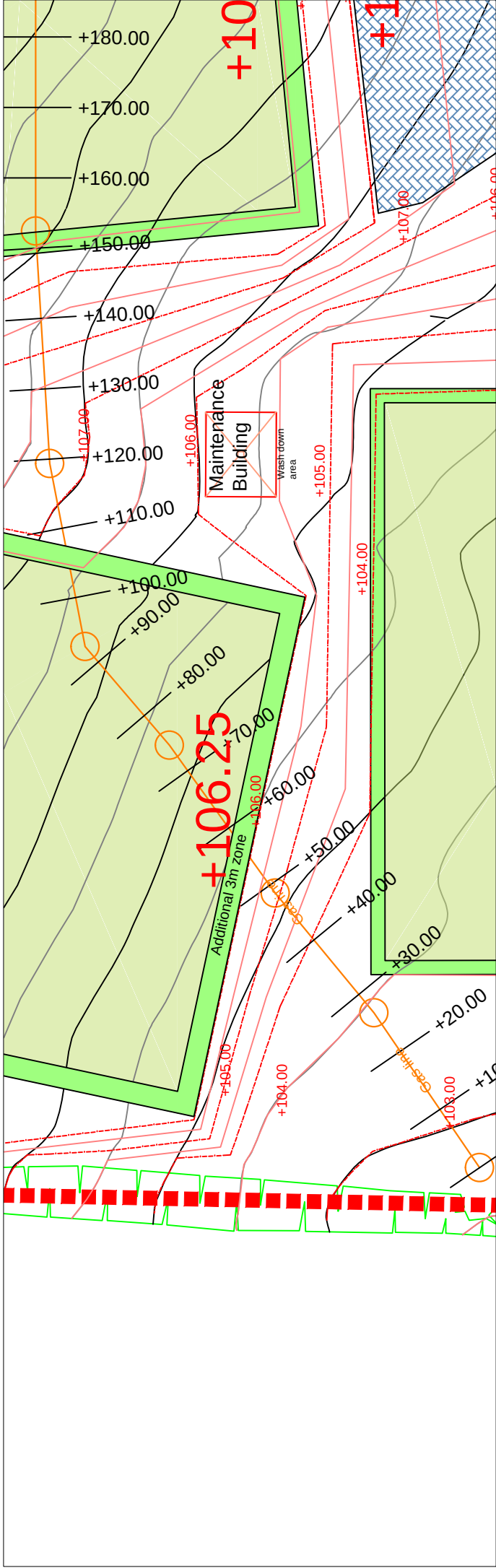
CLIENT:	PROJECT:	DRAWING TITLE:	DATE:
	PROPOSED FOOTBALL PITCHES, LAND SOUTH OF BURY NEW ROAD	EXISTING SITUATION	February 2021
			LAYOUT:
			ISO A4



— EXISTING TOPOGRAPHY PROFILE
— PROPOSED TOPOGRAPHY PROFILE
▣ PROPOSED AREA OF FILL



CLIENT:	PROJECT:	DRAWING TITLE:		DATE:
	PROPOSED FOOTBALL PITCHES, LAND SOUTH OF BURY NEW ROAD	HP GAS MAIN: EXISTING & PROPOSED CONTOUR PROFILE		June 2021
		LAYOUT:		ISO A4



CLIENT:	PROJECT:	DRAWING TITLE:	DATE:
	PROPOSED FOOTBALL PITCHES, LAND SOUTH OF BURY NEW ROAD	HP GAS MAIN: EXISTING & PROPOSED CONTOUR PROFILE	June 2021
		LAYOUT:	ISO A4

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APPENDIX G: PROPOSED PLANNING LAYOUT

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COORDINATED STATIONS			
STATION	EASTING	NORTHING	LEVEL (m)
GPS1	375765.472	409053.186	119.764
GPS2	375709.145	409063.864	118.668
A	375742.985	408997.753	114.927
B	375751.023	408942.336	112.002
C	375779.317	408814.378	106.401

NOTES:
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DO NOT SCALE OFF THIS DRAWING.
All dimensions to be checked on site and any discrepancies to be referred to the architect before proceeding.

ALL LEVELS TO BE CHECKED ON SITE.
All discrepancies between information shown on the drawings and the information in the specification to be referred to the architect before proceeding.

All component sizes and references to be checked prior to the ordering of materials.

Positions and designation (i.e. combined, surface water or foul) of existing drain runs on site are to be checked / confirmed by the building contractor prior to commencement of any drainage works. Any existing drains, to which additional connections are to be made, are also to be checked as necessary to ensure they are suitable to accommodate additional capacity and the type of effluent being connected.

All relevant boundary positions are to be checked prior to proceeding.



A Building and car park layout updated JLC 03.08.21

Rev Revision IntL Date

Client:

Bolton Wyresdale F.C.

Project:

Proposed New Facility

Location:

On Land At:
Radcliffe Moor Road,
Bolton

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Drawing Title:

Site Layout Plan

ABBREVIATIONS

AV AIR VALVE/VENT
BOL BOLLARD
BS BELUSHA BEACON
BM BENCH MARK
BL BED LEVEL
BS BUS STOP
BT BRITISH TELECOM
CL COVER LEVEL
DI DIAPHRAGM
DIS DISUSED
EL EAVES LEVEL
ELE ELEC JUNCT. BOX
EP ELECTRICITY POLE
FH FIRE HYDRANT
FL FLOOR LEVEL
FOS FULL OF SEDIMENT
FP FLAG POLE
G GULLY
GM GAS METER
GV GAS VALVE
IC INSPECT CHAMBER
IL INVERT LEVEL
JKW JAPANESE KNOTT WEED
LH LAMP HOLE
LP LAMP POST
NP NAME PLATE
MH MANHOLE
PS POST/SIGN POST
PB POST BOX
PX UNKNOWN SERVICE
RE RODDING EYE
RL RIDGE LEVEL
RS ROAD SIGN
ST STOP TAP
TH TRIAL HOLE
TL TRAFFIC LIGHT
TP TELEGRAPH POLE
TV CABLE TV BOX
UH UNABLE TO LIFT
WM WATER METER

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Drawing Purpose: Planning Drawing Status: S4 Revision: A

BSM Project: 2102-GTA-00-00-DR-A-1002 Origin: Zone: Level: Type: Role: Dwg No:

APPENDIX H: PFRA/SFRA PLANNING EXTRACTS

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3.2.4 Flood Hazards

- During the 1 in 100 year flood event, greater flood hazards are associated with deep flood waters within the functional floodplain
- Higher flood hazards ('Dangerous for Some/Most') are noticed around Stubbins Lane due to faster and deeper flood waters underneath the railway
- During the 1 in 1000 year flood event, 'Dangerous for All' flood hazards have been classified for the majority of Ramsbottom which is inundated. This is due to very deep flood waters and fast flowing inundation zones surrounding defence assets

3.3 Bury-Radcliffe

The area of Bury and Radcliffe is situated along the River Irwell between Buckley Wells and the weir adjacent to Mount Sion Road. The main source of risk is fluvial flooding from the River Irwell. Both Flood Zone 2 and 3a are extensive throughout the meanders of the Irwell representing the wide low lying floodplains. Both banks of the Irwell are heavily developed with residential communities, old industrial and commercial estates and treatment works. The River Roch also contributes to risk in this area as a tributary to the Irwell.

On review of the asset survey, the majority of current defences along this section of the Irwell are in poor condition and sporadic providing little protection to adjacent areas. Therefore a current risk scenario was modelled, which was essentially undefended.

The flood depth and hazard maps for all scenarios are presented at the back of this Volume.

During the 1 in 100 year flood event, the natural floodplain of the Irwell becomes inundated as meanders are bypassed by flood waters downstream of Bury/Radcliffe Road around Redvales, A6053 (Dumers Lane), Blackford Bridge and Close Park. Warth Mills is also inundated by flood waters entering the area underneath the railway from Lower Hinds in the north. The majority of deep flooding surrounds industrial and commercial units directly adjacent to the Irwell with depths reaching up to 2m. Flood depths reach 1m in some residential areas north of Dumers Lane. The area surrounding the East Lancs Paper Mill site (Rectory Lane) also becomes inundated with depths of around 0.5-1m.

An important flood mechanism is the presence of Hutchinson's Goit. During the 1 in 100 year flood event, flood water spilling from the River Irwell enters Hutchinson's Goit downstream of Radcliffe Road. Flows remain low and are contained within bank due to the limited capacity of the culvert underneath Radcliffe Road, which limits the volume of inflow into the downstream reaches. The culvert at Bury Street is exceeded and water overtops the Goit from its left hand bank flooding surrounding residential properties and a school. However, flood depths remain below 0.5m.

The flood mechanisms of the Irwell are only exacerbated during the extreme 1 in 1000 year flood event. For the majority of the area, the channel of the River Irwell is bypassed by floodplain flow reaching over 2m in Redvales, Dumers Lane and the sewage works. The residential area north of Dumers Lane could see flood depths of 1-2m. Shallow flooding extends north of Redvales to residential areas surrounding Redvales Road and Radcliffe Road.

In both scenarios, high ground surrounding Swan Lodge (disused tip) and the railway line constrain flood flows, resulting in deeper flood depths throughout Bury-Radcliffe.

Approximate flood depths are presented below. These have been extracted over large areas and for more detailed depths, the Level 2 SFRA maps should be referred to.

3.3.1 Undefended 1 in 100 year flood event

- 0.5-1.5m flood depths around commercial and residential areas of Warth Mills
- 0.5-1m flood depths at commercial units between the River Irwell and Swan Lodge
- Over 2m of flooding at Redvales
- 1-1.5m flood depths south of Dumers Lane
- 1.5-2m flood depths at Close Park
- 0.5-1m flood depths at East Lancs Paper Mill site
- 0.5m flood depths resulting from Hutchinson's Goit flooding at Bury Street culvert

3.3.2 Undefended 1 in 100 year plus climate change flood event

- Increase in extent of shallow water around Warth Mills residential area

- Over 2m flood depths at Close Park
- 1.5-2m flood depths at Paper Mill site

3.3.3 Undefended 1 in 1000 year flood event

- 1.5-2m flood depths around commercial and residential areas of Warth Mills
- 1.5-2m flood depths at commercial units between the River Irwell and Swan Lodge
- Over 2m flood depths south of Dumers Lane
- 0.5-1.5m flood depths surrounding residential areas north of Dumers Lane
- Over 2m flood depths at East Lancs Paper Mill site

3.3.4 Flood Hazards

- During the 1 in 100 year event, flood hazards throughout the Bury-Radcliffe area are 'Dangerous to Most'. Some key flow paths along Warth Road and around Redvales are 'Dangerous for All'
- During the 1 in 1000 flood year event almost the entire natural floodplain is classified as 'Dangerous for All'. Hazards reduce towards the extent of the floodplain where depths reduce

3.4 Littleborough

Littleborough is situated in the north east extent of Rochdale. The main source of flood risk to Littleborough is fluvial flooding from the River Roch. Smaller watercourses such as Ealees Brook, Featherstall Brook, Lydgate Brook and Town House Brook also contribute to the overall fluvial risk in the area.

Currently, the Environment Agency Flood Zone 3 is confined to areas directly adjacent to Town House Brook, small sections of the A6033 and Stubley Mill Road. Flood Zone 2 is more extensive, covering a number of properties in the area. As part of the BRO Level 1 SFRA, the Flood Zones were updated using a detailed ISIS-TUFLOW model and updated hydrology (using the undefended scenario). The 1 in 100 year flood event extent is more extensive along the Roch in Littleborough, especially in the areas along the A6033 and the confluence of the Roch with Ealees Brook. The 1 in 1000 year flood event extent remains similar to the current Environment Agency Flood Zone 2, with small reductions in extent along Queen Street and Stockton Street.

The risk of fluvial flooding in Littleborough is mainly residual as there are a number of Environment Agency raised defences spanning the River Roch, Town House Brook and Ealees Brook. The defences along the River Roch provide a 1 in 100 year SOP and have a number of associated ABDs. There are also some defences with a 1 in 50 year SOP; however this is often the default value used in the Environment Agency's NFCDD and so this is unconfirmed. There are a number of Environment Agency defences downstream of Green Vale Brook's confluence with the Roch which have a 1 in 25 year or lower SOP. Littleborough is also covered by the Environment Agency Flood Warning system.

The flood depth and hazard maps for all scenarios are presented at the back of this Volume.

During the 1 in 100 year defended scenario, the majority of Littleborough remains dry due to defences with a 1 in 100 year SOP. However, those defences identified with lower SOPs are overtopped on both banks with flood waters entering commercial buildings which flow down the A6033 to Church Street. Flood depths are below 0.5m along this flow path and between 0.5-1m at the A6033/Church Street junction.

During the 1 in 100 year plus climate change event, floodwaters downstream of the Roch confluence with Ealees Brook remain in bank due to the presence of defences. There is also a limited impact on flood depths from defence overtopping further upstream, with peak depths, remaining below 1m.

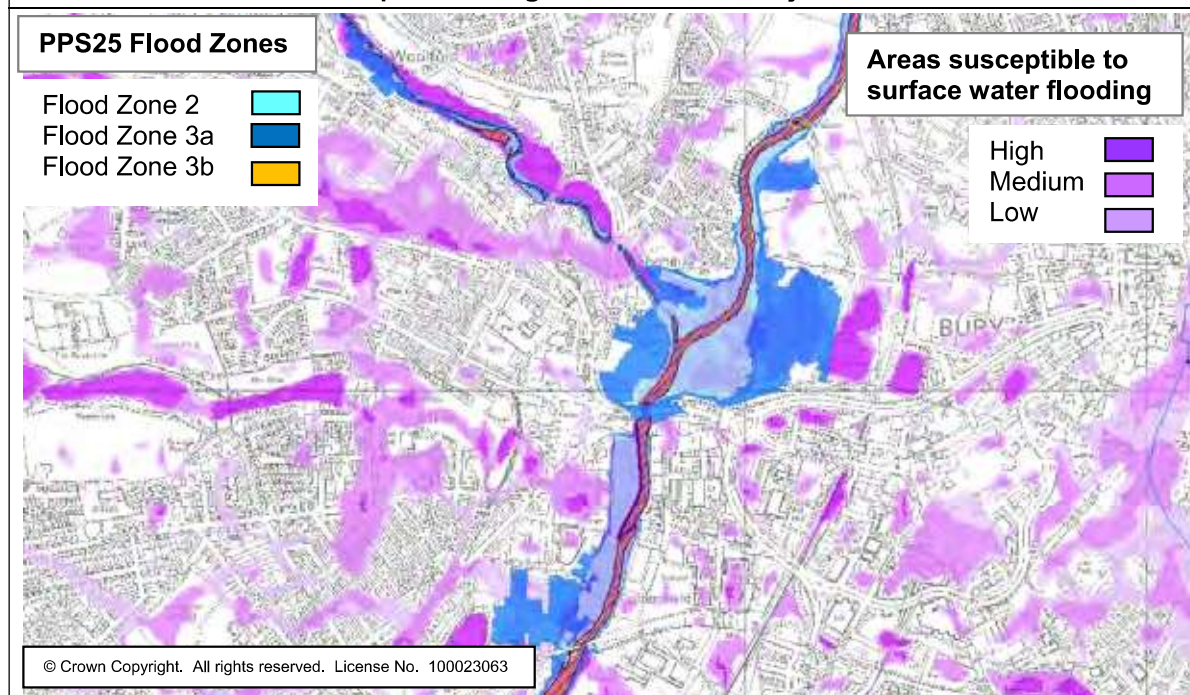
In a 1 in 1000 year defended scenario the defences further downstream around Stubley are overtopped, causing flood depths of around 1m to 1.5m to properties off William Street. The junction of the A6033 with Church Street and Victoria Street becomes a key risk area as a number of flow paths converge resulting in flood depths reaching up to 1.5m.

Approximate flood depths are presented below. These have been extracted over large areas and for more detailed depths, the Level 2 SFRA maps should be referred to.

Table 8-2: Risk of flooding in Bury

Community	Chamberhall and Western Waterside			
Catchment	Irwell			
Main Source of Flood Risk	River Irwell and Kirklees Brook			
Secondary Sources of Flood Risk	Surface Water			
	Number of Sites	Total area	Sites in Flood Zone 3a	Area in Flood Zone 3a
Housing Sites	102	66.35ha	3	3.06ha
Employment Sites	50	65.05ha	4	6.03ha

Map Illustrating General Community Area



Understanding Flood Risk

Significant Risk during 1 in 100 year Event?	Yes	No
Consistent Standard of Protection?	Yes	No
Consistent Condition Standard?	Yes	No
Significant Risk of Assets Breaching?	Yes	No
Could Assets Overtop with Climate Change?	Yes	No
Could Assets Overtop in an Extreme Event?	Yes	No
Significant Residual Risk?	Yes	No
Is Residual Risk a Significant Proportion of Flood Zones?	Yes	No
Issues of Surface Water Flooding?	Yes	No
Is Flood Risk an Environmental Constraint?	Yes	No

Managing Flood Risk

Does Development Need to be Considered Strategically?	Yes	No
Can Development Proceed in a Piecemeal Basis?	Yes	No
Flood Risk Management Strategy Required?	Yes	No

Likelihood of Passing Exception Test

Will there be off Site Effects?	Yes	No
Will Flood Risk be an Urban Design Issue?	Yes	No
Can Residual Risk be Successfully Managed?	Yes	No
Could Development Reduce Risk?	Yes	No

Table 8-3: Risk of flooding in South Bury and Radcliffe

Community	Bury (South) and Radcliffe			
Catchment	Irwell			
Main Source of Flood Risk	River Irwell and River Roach			
Secondary Sources of Flood Risk	Surface Water, Elton Reservoir, Hutchinson's Goit and Manchester, Bury and Bolton Canal			
	Number of Sites	Total area	Sites in Flood Zone 3a	Area in Flood Zone 3a
Housing Sites	65	53.14ha	6	4.67ha
Employment Sites	22	62.46ha	10	20.27ha

Map Illustrating General Community Area

1 in 100 year undefended fluvial event

0 - 0.5m

0.5 - 1.0m

1.0 - 1.5m

1.5 - 2.0m

> 2.0m

Areas susceptible to surface water flooding

High

Medium

Low

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Understanding Flood Risk		
Significant Risk during 1 in 100 year Event?	Yes	No
Consistent Standard of Protection?	Yes	No
Consistent Condition Standard?	Yes	No
Significant Risk of Assets Breaching?	Yes	No
Could Assets Overtop with Climate Change?	Yes	No
Could Assets Overtop in an Extreme Event?	Yes	No
Significant Residual Risk?	Yes	No
Is Residual Risk a Significant Proportion of Flood Zones?	Yes	No
Issues of Surface Water Flooding?	Yes	No
Is Flood Risk an Environmental Constraint?	Yes	No
Managing Flood Risk		
Does Development Need to be Considered Strategically?	Yes	No
Can Development Proceed in a Piecemeal Basis?	Yes	No
Flood Risk Management Strategy Required?	Yes	No
Likelihood of Passing Exception Test		
Will there be off Site Effects?	Yes	No
Will Flood Risk be an Urban Design Issue?	Yes	No
Can Residual Risk be Successfully Managed?	Yes	No
Could Development Reduce Risk?	Yes	No

Defences

Privately owned defences that are important for flood risk management along the River Roch are shown in Table 10-1.

Table 10-1 mentions the embankment at the allotment gardens. This is currently in poor condition and it offers a minimal flood defence benefit. It would be preferable to remove the earth embankment (Ref: SFRA_ROCH_50) to allow more frequent flooding and flood water storage at the allotment gardens.

10.2.3 Buckley Brook

Defences

Privately owned defences with current maintenance issues that provide a flood risk management function along Buckley Brook are shown in Table 10-1.

10.2.4 River Spodden

Culverts

The CFMP reported that culverts have caused historic flooding problems. Ongoing culvert maintenance and debris clearance is important. The historic problems suggest that the hydraulic efficiency of some culverts should be improved.

10.3 Bury

10.3.1 River Irwell CFMP

The CFMP made reference to a number of possible responses under a policy 4 for the maintenance of watercourses and river assets in the Bury area (Policy Unit 6). These include:

- Undertaking a risk based review of the condition and capacity of the culverts within the unit to identify any potential flooding issues (by the Environment Agency),
- Continuing to investigate the condition of defences and improvements if necessary (by the Environment Agency),
- Investigation into partnership opportunities concerning the renovation of canals in the area (by the Environment Agency and British Waterways), and
- Upstream sediment source management and making improvements to conveyance.

10.3.2 River Irwell

Weirs

There are weirs at Tintersfield and Buckley Wells that are not currently included in the NFCDD database. The impoundment behind this weir is likely to be small.

Defences

There are very few defences in Bury along the River Irwell. There is a private defence on the right bank of the River Irwell south of Bury Bridge.

The defence shown in NFCDD at Warth Mills (NGR 379339 409313) seems to be ineffective as a flood defence structure. Floodwater can potentially flow past the north end of the structure. To protect the existing Warth Mills estate and defend the proposed sites in this location, a new defence would be required to prevent water flowing through the openings in the railway embankment.

Privately owned infrastructure that is important for flood risk management along the River Irwell are shown in Table 10-1.

10.4 Radcliffe

10.4.1 River Irwell CFMP

The CFMP made reference to a number of possible responses under a policy 5 for the maintenance of watercourses and river assets in the Radcliffe area (Policy Unit 5). These include:

- Developing a sustainable approach to gravel management across the catchment (by the Environment Agency),

APPENDIX I: 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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