

5. Flood Risk and Water Resources

5.1 Liverpool FC Stadium Expansion Flood Risk Assessment



Liverpool FC Stadium Expansion

Flood Risk Assessment

May 2014

Liverpool Football Club and Athletic Grounds

CONFIDENTIAL

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Anfield Road
Liverpool
L4 0TH

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1 Introduction

It is proposed to expand the existing football stadium at Anfield, Liverpool. Mott MacDonald has been appointed by Liverpool Football Club and Athletics Group Ltd to undertake a Flood Risk Assessment (FRA) for the site.

The red circle on Figure 1.1 shows the general location of the development site. The proposed development comprises the expansion and redevelopment of the existing Anfield Stadium at Anfield.

The FRA has been carried out in accordance with the National Planning Policy Framework (NPPF, 2012) and associated Technical Guidance, and assesses the risk of flooding to the site from all sources of flooding, the possible impact of the development on flood risk elsewhere, and makes allowances for increased flows due to climate change. The scale and nature of the FRA is considered appropriate for the proposed development.

Figure 1.1: Location Plan



1.1 Background

Anfield has been the home of Liverpool Football Club (LFC) since the Club was formed in 1892. In the intervening years the Club has grown and several permissions granted to enable the stadium to be expanded to meet its growing needs. LFC is now one of the leading Premiership clubs in the country and Europe and has an extensive worldwide fan base.

In order for the Club to remain in its top position, for both the domestic and European game, a larger stadium is necessary to generate additional revenues, leading to investment in players and greater success on the field. Liverpool FC is an important visitor destination in the city; the continued success of the Club is of local, city-wide and sub-regional importance.

Liverpool City Council (LCC) has recently adopted a Spatial Regeneration Framework (SRF) for the Anfield area that acknowledges the expansion of the stadium and the importance of investment by LFC as a catalyst to the regeneration of North Liverpool.

The existing LFC stadium comprises four stands, with adjacent tarmac areas used for parking and access. The stands contain Club offices, administration and maintenance facilities, hospitality areas, police facilities, and the Club shop and museum. The stadium is bound to the north by cleared land formerly occupied by Victorian villas and more modern premises on Anfield Road with Stanley Park directly beyond; to the east and the west by high density terraced residential properties dating back to the late 19th century, and to the south by mixed commercial and residential development on Walton Breck Road.

1.2 Liverpool FC Proposed Development

The proposed development comprises two phases. Phase 1 includes the expansion and redevelopment of the existing Main Stadium at Anfield and will include (see Appendix A for the proposed development plan):

- i. An application for full planning permission to erect a new Main Stand with associated player, media, conferencing and banqueting facilities and the provision of its surrounds to provide high quality public realm, improved circulation space and an improved public connection between Walton Park Road and Stanley Park,.
- ii. An application for outline planning permission to redevelop the Anfield Road Stand, principally to create additional spectator facilities to increase the capacity of the stadium.
- iii. Overall the development will increase the capacity of the stadium from c.45,000 to c.53,800.

Phase 2 proposes the expansion of the Anfield Road stand to further increase capacity to c. 58,500. The application for the phase 2 development is submitted in outline with all matters, save access, reserved for subsequent approval

2 Assessment of Flood Risk

2.1 Fluvial and Tidal Flood Risk

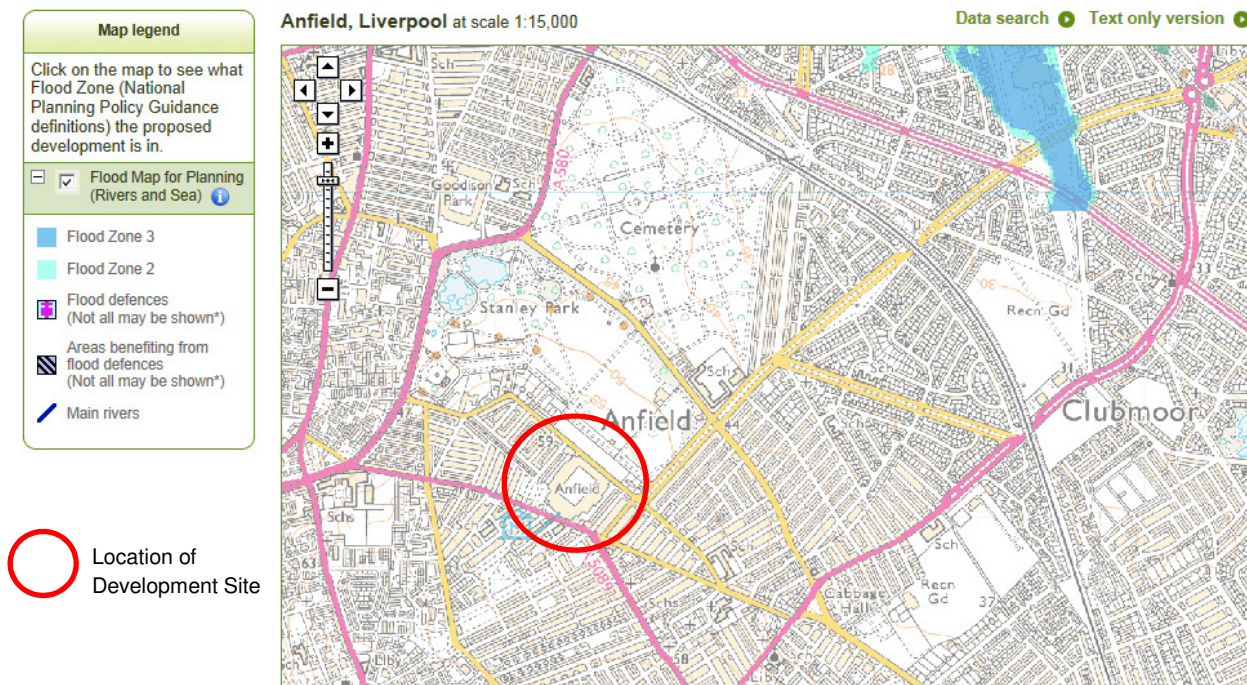
The closest watercourse to the proposed development site is the River Mersey which flows some 3 km to the east of the site.

2.1.1 Flood Map

The Environment Agency (EA) publishes floodplain extents for all significant watercourses throughout England and Wales. These extents are available to the public via the internet and are the primary source of publicly available flood risk information. The extent of the indicative Flood Zones in the vicinity of the site boundary are shown Figure 2.1.

Table 2.1 gives the definition of the Flood Zones as stated in Table 1 of the Technical Guidance to the NPPF. It should be noted that the boundaries given on the flood map are only indicative and do not take into account any man-made structures such as railway embankments and roads or flood defences.

Figure 2.1: Environment Agency Flood Map for Planning (February 2014)



Source: www.environment-agency.gov.uk

Table 2.1: Flood Zones

Flood Zone	Description	Annual Exceedence Probability
Flood Zone 1 – Low Probability	Land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year.	< 0.1% sea or river flooding
Flood Zone 2 – Medium Probability	Land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding, or between a 1 in 200 and 1 in 1000 annual probability of sea flooding in any year.	1% - 0.1% river flooding 0.5%-0.1% sea flooding
Flood Zone 3a – High Probability	Land assessed as having a 1 in 100 or greater annual probability of river flooding, or a 1 in 200 or greater annual probability of flooding from the sea in any year.	> 1% river flooding > 0.5% sea flooding
Flood Zone 3b – The Functional Floodplain	Land where water has to flow or be stored.	Identified in the SFRA

Source: NPPF Technical Guidance

The EA floodplain map in Figure 2.1 indicates that the proposed development is at “Low Probability” risk from flooding (Flood Zone 1). This means that each year, this area has a chance of flooding from fluvial or tidal sources of less than 1 in 1000 (0.1%).

2.1.2 Sequential and Exception Test

As set out in the National Planning Policy Framework, the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. Since the development will be in Flood Zone 1, the requirement to avoid areas of highest flood risk has been satisfied.

Reference to Table 3 of the NPPF Technical Guidance indicates that for leisure facilities to be located in Flood Zone 1 application of the Exception Test is not required. Therefore the primary focus of this FRA is on the proposed arrangements for surface water drainage from the site, to demonstrate that the proposed development can be built to operate in a safe manner and will not increase the risk of flooding elsewhere.

2.2 Surface Water Flooding

2.2.1 Surface Water Risk to the Site

The existing site of the proposed development is largely urban, including the football stadium itself, and adjacent roads and housing.

The Environment Agency Risk of Flooding from Surface Water Flood Map (Figure 2.2) shows there is some risk at the proposed development site from surface water flooding. The area at risk is, however,

small and constrained to the football pitch itself. There is a small area at “High” risk, meaning that each year, this area has a chance of flooding of greater than 1 in 30 (3.3%). However, other than this small area, the site is shown to not be at risk from this source.

The Liverpool Preliminary Flood Risk Assessment (PFRA) shows that the road to the south of the site is within an Area Susceptible to Surface Water Flooding (intermediate), however the proposed development is not in a “Known Flooding Area” (PFRA 2011, Figure 5.2.1) and the Environment Agency has “no records of flooding at the site” (email correspondence, 10 March 2014, see Appendix D).

Liverpool City Council (LCC) provided a Surface Water Flood Map for a 1 in 200 year rainfall event (Figure 2.3), taken from the draft Surface Water Management Plan currently being developed by the council. The map also shows there is a small area at risk from flooding on the football pitch, and there is some risk from surface water flooding along the southern edge of the site, with depths of up to 0.5m for the 1 in 200 year event. Walton Breck Road is also shown to be at risk from flooding of depths greater than 0.5m for the 1 in 200 year event.

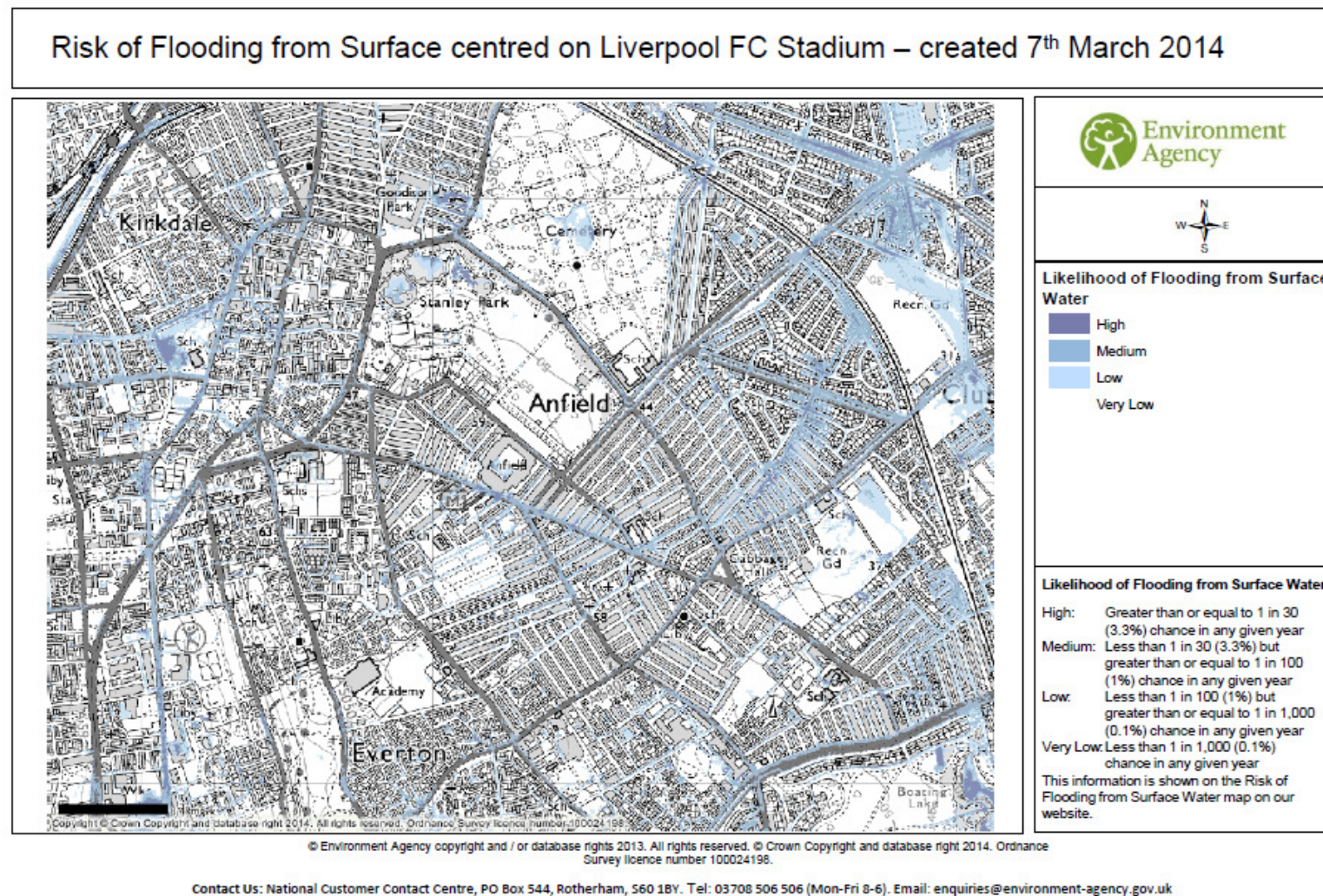
It should be noted that the Environment Agency Surface Water Flood Map, the PFRA Area Susceptible to Surface Water Flooding Map and the LCC Surface Water Flood Map do not take into consideration the local drainage system in place. The United Utilities sewer records (Appendix B) show there is an existing drainage system in place which would satisfactorily remove surface water from the site.

The Drainage Strategy for the proposed development (Appendix C) provides a drainage system to remove surface water from the site. The Drainage Strategy uses new and existing sewer systems to dispose of surface water for Phase 1. Any intention to discharge surface-water run-off into the sewerage system is subject to the utility providers (UU) approval. In an email sent on the 21 November 2013 UU confirmed that “UU will not impose any restrictive discharges over and above the existing regime” (see Appendix E).

During Phase 2 it is proposed to drain the Anfield Road stand’s roof, via rainwater pipes, and surrounding impermeable surfaces to an attenuation tank. From here water will discharge through a flow control device and then outfall into the United Utilities public sewer which runs to the back of the fan zone / car park on the north side of Anfield Road.

The surface water drainage design takes into consideration increases in peak surface water run-off due to climate change. The drainage system is designed to contain surface water run-off resulting from 1 in 100 year rainfall event including climate change. It is therefore considered that the proposed development is not at risk from surface water flooding.

Figure 2.2: Environment Agency Risk of Flooding from Surface Water Flood Map (March 2014)



Source: Email from Environment Agency Dated 07 March 2014

Figure 2.3: 1 in 200 year Surface Water Flood Map



Source: Liverpool City Council

2.2.2 Surface Water Risk from the Site

As described in Section 2.2.1 above, surface water runoff from a 1 in 100 year rainfall event including climate change will be disposed of in line with the Drainage Strategy for the site (Appendix C). It is therefore considered that the proposed development will not increase the risk of surface water flooding elsewhere.

2.2.3 Construction Phase

It is recommended that during the construction phase care is taken to ensure materials are not washed into the drainage system causing blockages which could lead to localised flooding.

2.3 Groundwater Flooding

The Liverpool PRFA (2011) states the site is not in an Area Susceptible to Groundwater Flooding, and the Environment Agency has “no records of flooding at the site” (email correspondence, 10 March 2014, see Appendix D). No evidence of historic groundwater flooding has been reported at the site, it is therefore concluded that the site is not at risk from groundwater flooding.

2.4 Sewer Flooding

United Utilities sewer records show there are combined sewers within the site boundary. The Liverpool PRFA does not contain any historic information of sewer flooding at the site and the Environment Agency has “no records of flooding at the site” (email correspondence, 10 March 2014, see Appendix D). No evidence of historic sewer flooding has been reported at the site. Therefore, it is concluded that the site is not at risk from sewer flooding.

2.5 Reservoirs, Canals and other Artificial Sources of Flooding

The EA website indicates that there is no risk of flooding to the site from the potential breach of reservoirs. There are no canals or other artificial sources of flooding within the vicinity of the site. Therefore, it is concluded that the site is not at risk from reservoirs, canals and artificial sources of flooding.

3 Conclusions

This Flood Risk Assessment demonstrates that the proposed development site is not at risk from fluvial, tidal, groundwater or sewer flooding, or flooding from artificial sources.

The Environment Agency Risk of Flooding from Surface Water Flood Map (Figure 2.2) shows there is some risk at the proposed development site from surface water flooding. The Liverpool PFRA shows that the road to the south of the site is within an Area Susceptible to Surface Water Flooding (intermediate) and the Liverpool City Council (LCC) Surface Water Flood Map for a 1 in 200 year rainfall event (Figure 2.3), shows there is a small area at risk from flooding on the football pitch, and there is some risk from surface water flooding along the southern edge of the site. However, according to the PFRA, the proposed development is not in a "Known Flooding Area" and the Environment Agency has "no records of flooding at the site" (email correspondence, 10 March 2014, see Appendix D).

It should be noted that the Environment Agency Surface Water Flood Map, the PFRA Area Susceptible to Surface Water Flooding Map and the LCC Surface Water Flood Map do not take into consideration the local drainage system in place. The United Utilities sewer records (Appendix B) show there is an existing drainage system in place which would remove surface water from the site. The Drainage Strategy for the proposed development (Appendix C) provides a drainage system to remove surface water. The proposed drainage system uses new and existing sewer systems to dispose of surface water for Phase 1. During Phase 2 it is proposed to drain the Anfield Road stand's roof, via rainwater pipes, and surrounding impermeable surfaces to an attenuation tank. From here water will discharge through a flow control device and then outfall into the United Utilities public sewer which runs to the back of the fan zone / car park near to Stanley Park.

The surface water drainage design takes into consideration increases in peak surface water run-off due to climate change. The drainage system is designed to contain surface water run-off resulting from 1 in 100 year rainfall event including climate change. It is therefore considered that the proposed development is not at risk from surface water flooding and will not increase the risk of surface water flooding elsewhere.

It is recommended that during the construction phase care should be taken to ensure materials are not washed into drainage system causing blockages, which could lead to localised flooding.

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Appendix A. Development Plan

KEY

Planning Application Boundary

MATERIALS KEY

- HARDWORKS**
- EXPOSED AGGREGATE SURFACING
- Stadium Concourse: Scarf
- Colour: LFC Red
 - EXPOSED AGGREGATE SURFACING
- Stadium Concourse: Scarf
- Colour: TBC
 - EXPOSED AGGREGATE SURFACING OF VARYING COLOUR TO CONCOURSE
- Colour: TBC
 - EXPOSED AGGREGATE SURFACING
- Stadium Concourse: Chequerboard
- Colour: LFC Red
 - CONCRETE ASPHALT - To OB Area
- Colour to match concourse
 - LFC SUPER GRAPHIC
- To sit flush with surrounding surfacing
- To include LFC crest and stadium colours
- Subject to detail design
 - RAMPS TO 'OB' AREA
- To include LFC crest and stadium colours
- Stainless steel handrail
 - RESIN BOUND AGGREGATE
- To 'Grove' steps
 - Open Textured Surface to Poros Fresh
- To include LFC crest and stadium colours
- Colour by CED Ltd or equal
 - EXISTING MACADAM HIGHWAY
- Re-surfaced as required
 - CONCRETE RETAINING WALL
- 500mm high, low retaining wall to edge of OB area
- Subject to detail design
 - STEPS (does not include podium steps)
- To Anfield Square edge
 - Steps to be DDA compliant with handrails & tactile zones.
 - PARALLEL PARKING BAY FOR ASBURY ROAD
- To include concrete block paving
- Colour TBC
 - Floor markings for 3no. 5-a-side football pitches or 1no. large pitch
 - Thermoplastic macadam marking
- Location: Anfield Rd. Fanzone

FURNITURE

- TREE CONTAINER
- 1.5m x 1.5m
- Material: TBC
- SEATING
- Solid stone approx 600mm deep.
- Finishes and detailing subject to further design.
- To include LFC crest and stadium colours
- To include backrests and armrests as required.
- FEATURE STONE TOTEMS
- To arrive space off Walton Brick Road and near 'OB' area
- To include LFC crest and stadium colours
- Possibility to include feature artwork
- BOLLARDS
- Corner tenorom bollard. Subject to further detail design following development of corner tenorom strategy.
- RETRACTABLE BOLLARDS
- Corner tenorom bollard. Subject to further detail design following development of corner tenorom strategy.
- RESPONSE RECESSED TREE ABSORBSLOT SYSTEM
- Tree pits in concrete surfacing
- Steel curbs support framework for hard landscaping
- 3.8m x 3.5m
- OB. Substation Building
- 6.5m x 3.8m

EXISTING FURNITURE RELOCATED (LEGACY)

- BILL SHANKLY STATUE
- BILL SHANKLY GATES & PLAQUES (2no.)
- BOB PASLEY GATES & PLAQUES (2no.)
- MEMORIAL PLAGUE & LEDGE
- MEMORIAL FLAG POLES (2no.)

SOFT WORKS

- CLEAR STEM FEATURE TREES:
- To include LFC crest and stadium colours
- Varieties and Sizes to be agreed
- Minimum 2m Clear stem
- MULTI-STEM TREES
- To create area of enclosure and variety in scale
- Varieties and Sizes to be agreed
- EDGE
- Location: Rear of Anfield Rd Fanzone
- To include LFC crest and stadium colours
- To include post & wire reinforcement
- NATIVE & ORNAMENTAL PLANTING
- A balance of ornamental and native species
- Visual impact.
- LAWN
- Low maintenance, hardwearing turf

LIGHTING

- COLUMN MOUNTED BEAM LIGHTING
- Please refer to detail lighting layout drawing

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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plant

Project: New Anfield

Client: Liverpool Football Club

Design: Phase 2 Overall Masterplan

Drawn: PL0101-001-001

Scale: 1:500 @ A2

Sheet: Planning

Appendix B. Sewer Records