



Development • Planning • Environment

PACKET BOAT MARINA, UXBRIDGE

FLOOD RISK ASSESSMENT

Final Report v1.0

June 2014

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Flood Risk Assessment
Final Report v1.0

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1 INTRODUCTION

1.1 PURPOSE OF REPORT

Weetwood Services Ltd ("Weetwood") has been instructed by British Waterways Marinas Ltd to undertake a Flood Risk Assessment (FRA) for the proposed change of use of ten existing leisure moorings to residential moorings at Packet Boat Marina, Uxbridge.

The FRA has been undertaken in accordance with the requirements of the National Planning Policy Framework (NPPF) and supporting Planning Practice Guidance.

Weetwood prepared a FRA in March 2012 (ref: 2014/FRA_v1.0) in association with proposals for a landscape improvement scheme (planning ref: 53216/APP/2012/604). Planning permission was granted on 6 August 2012.

1.2 STRUCTURE OF THE REPORT

The report is structured as follows:

- Section 1** Introduction and report structure
- Section 2** Presents national and local flood risk and drainage planning policy
- Section 3** Provides background information relating to the development site, the development proposals, ground conditions and existing site access arrangements
- Section 4** Assesses the potential sources of flooding to the development site
- Section 5** Presents flood risk mitigation measures based on the findings of the assessment
- Section 6** Addresses the effect of the proposed development on surface water runoff and presents an illustrative surface water drainage scheme to ensure that surface water runoff is sustainably managed and flood risk is not increased elsewhere.
- Section 7** Presents a summary of key findings
- Section 8** Presents the recommendations

2 PLANNING POLICY AND GUIDANCE

2.1 NATIONAL PLANNING POLICY

The aim of the NPPF and supporting Planning Practice Guidance is to ensure that flood risk is taken into account at all stages in the planning process and is appropriately addressed.

2.1.1 Sequential Test

Paragraph 100 of the NPPF states: *'Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk but where development is necessary, making it safe without increasing flood risk elsewhere'*.

This policy is implemented through the application of the flood risk Sequential Test which aims to steer new development to areas with the lowest probability of flooding.

2.1.2 Exception Test

If, following application of the Sequential Test, it is not possible for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied, if appropriate.

As detailed in paragraph 102 of the NPPF, for the Exception Test to be passed:

- It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA where one has been prepared; and
- A site-specific FRA must demonstrate that 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.

2.2 LAND DRAINAGE BYELAWS

The EA has discretionary powers, within the Water Resources Act 1991, to carry out works to a designated 'main river' for which access must be maintained.

The Land Drainage Byelaws require the prior written consent of the EA for *'Works Affecting Watercourses'* for any proposed works or structures in, over, under or within a distance of 8 metres from the top of the banks or landward toe of any designated main river. This shall not be unreasonably withheld.

2.3 RELEVANT DOCUMENTS

The FRA has been informed by the following documents:

- Strategic Flood Risk Assessment (SFRA), London Borough of Hillingdon, November 2008
- Preliminary Flood Risk Assessment (PFRA), London Borough of Hillingdon, May 2011
- Surface Water Management Plan (SWMP), London Borough of Hillingdon, January 2013

3 SITE DETAILS AND PROPOSED DEVELOPMENT

3.1 SITE LOCATION

The site is located to the south of Packet Boat Lane in the Cowley Peachey area of Uxbridge at Ordnance Survey National Grid Reference TQ 054 810, as shown in **Figure 1**.

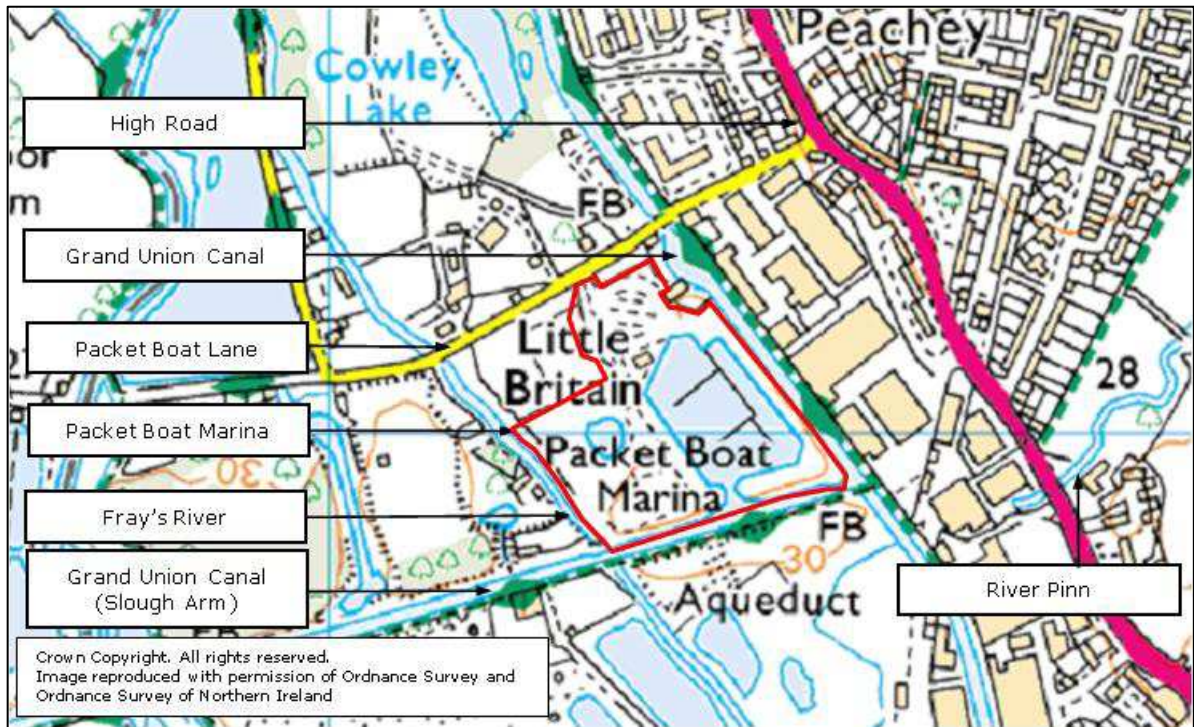


Figure 1: Site Location

3.2 EXISTING AND PROPOSED DEVELOPMENT

The marina includes approximately 157 leisure/residential moorings and associated facilities including pump out, Elsan disposal, toilets/showers, laundry and a car park.

Proposals are for the change of use of ten of the existing leisure moorings to residential moorings. The proposal would not increase the total number of moorings within the marina as the ten moorings already exist and are used by boat owners on a semi-permanent basis for unlimited leisure use. The use of moorings for permanent residency within the Packet Boat Marina has already been established with 20 existing residential moorings.

The NPPF classifies marinas as 'water compatible development'¹.

¹ NPPF Technical Guidance, Table 2

3.3 WATERBODIES IN THE VICINITY OF THE SITE

The site is bounded by the Grand Union Canal (Slough Arm) to the south, the Grand Union Canal to the east and Fray's River to the west. The River Pinn is located approximately 145 m to the south east of the site and flows in a south westerly direction, under the Grand Union Canal to its confluence with Fray's River approximately 350 m to the south of the site.

3.4 SITE LEVELS

A topographic survey of the site was undertaken by Weetwood in January 2012 and is provided in **Appendix A**.

Site levels around the marina are generally in the region of 29.82 metres Above Ordnance Datum (m AOD) to 33.08 m AOD. The coping level² around the marina is shown to be 29.85 m AOD and the water level on 18 January 2012 (when the survey was undertaken) was 29.48 m AOD.

3.5 ACCESS AND EGRESS

Access/egress is provided via Packet Boat Lane to the north of the site. Although no levels on Packet Boat Lane are available, the level at the lowest part of the access from the marina to Packet Boat Lane is 29.25 m AOD.

² Top of basin

4 REVIEW OF FLOOD RISK

4.1 FLOOD ZONE DESIGNATION

The NPPF defines flood zones as follows³:

- **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.
- **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 flooding from the sea in any year.
- **Flood Zone 3a: High Probability.** Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- **Flood Zone 3b: The Functional Floodplain.** Land where water has to flow or be stored in times of flood. The identification of the functional floodplain should take account of local circumstance and not be defined solely on rigid probability parameters. However, land which would flood with an annual probability of 1 in 20 or greater in any year should provide a starting point for consideration and discussion.

4.1.1 Environment Agency Flood Map for Planning (Rivers and Sea)

According to the Environment Agency (EA) Flood Map for Planning (Rivers and Sea) (**Figure 2**) the site is located in Flood Zone 1.

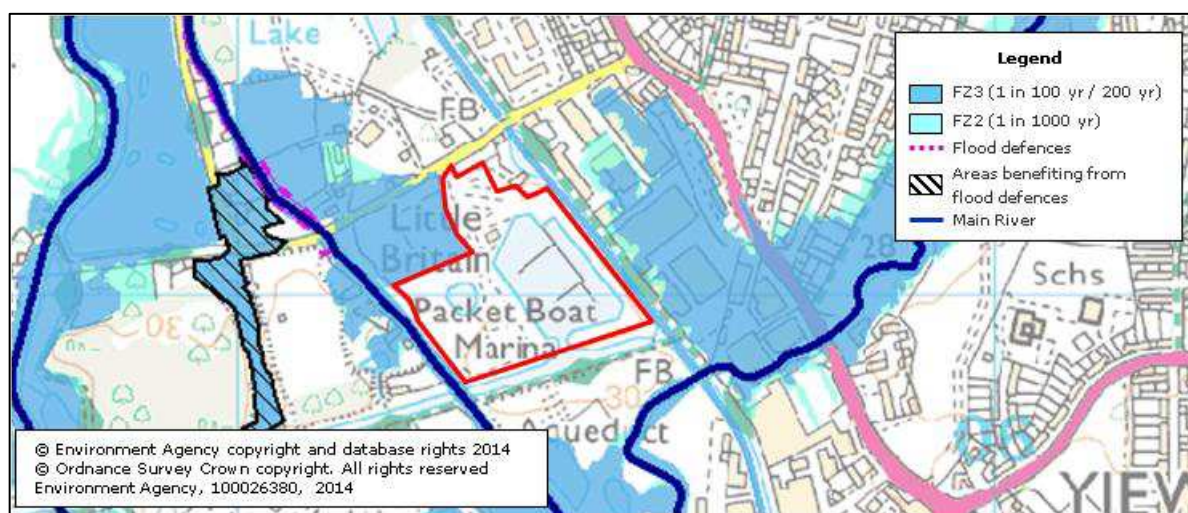


Figure 2: Environment Agency Flood Map for Planning (Rivers & Sea)

(Source: Environment Agency website)

³ NPPF Technical Guidance, Table 1

4.2 SEQUENTIAL TEST AND EXCEPTION TEST

As detailed in Paragraph 104 of the NPPF, applications for change of use should not be subject to the Sequential or Exception Tests⁴.

4.3 HISTORICAL RECORDS OF FLOODING

Figure A-2.2 of the PFRA indicates that historically there have been no instances of flooding from fluvial/tidal sources.

The EA has provided a map of historic flood events within the vicinity of the site. This indicates the site is not known to have flooded historically.

The British Hydrological Society (BHS) Chronology⁵ does list any details of historical flooding at the site⁶.

4.4 FLUVIAL FLOOD RISK – FRAY’S RIVER AND RIVER PINN

As already detailed in **Section 3.3**, the site is bounded by Fray’s River to the west and the River Pinn is located approximately 145 m to the south east; however the EA flood map indicates the site is not at risk of flooding from these sources. In order to confirm this, modelled flood levels have been obtained from the EA and compared with site levels.

4.4.1 Modelled Flood Levels

Modelled flood levels for Fray’s River and the River Pinn have been provided by the EA for the 1 in 100 year, 1 in 100 year climate change and 1 in 1000 year events.

The flood levels derived for these events for the modelled nodes illustrated on **Figure 3** are provided in **Table 1** (the bold cells indicate the modelled nodes situated adjacent to the site).

⁴ Except for any proposal involving a change 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

⁵ British Hydrological Society Chronology www.dundee.ac.uk/geography/cbhe/

⁶ Based on the following keyword searches ‘Uxbridge’,

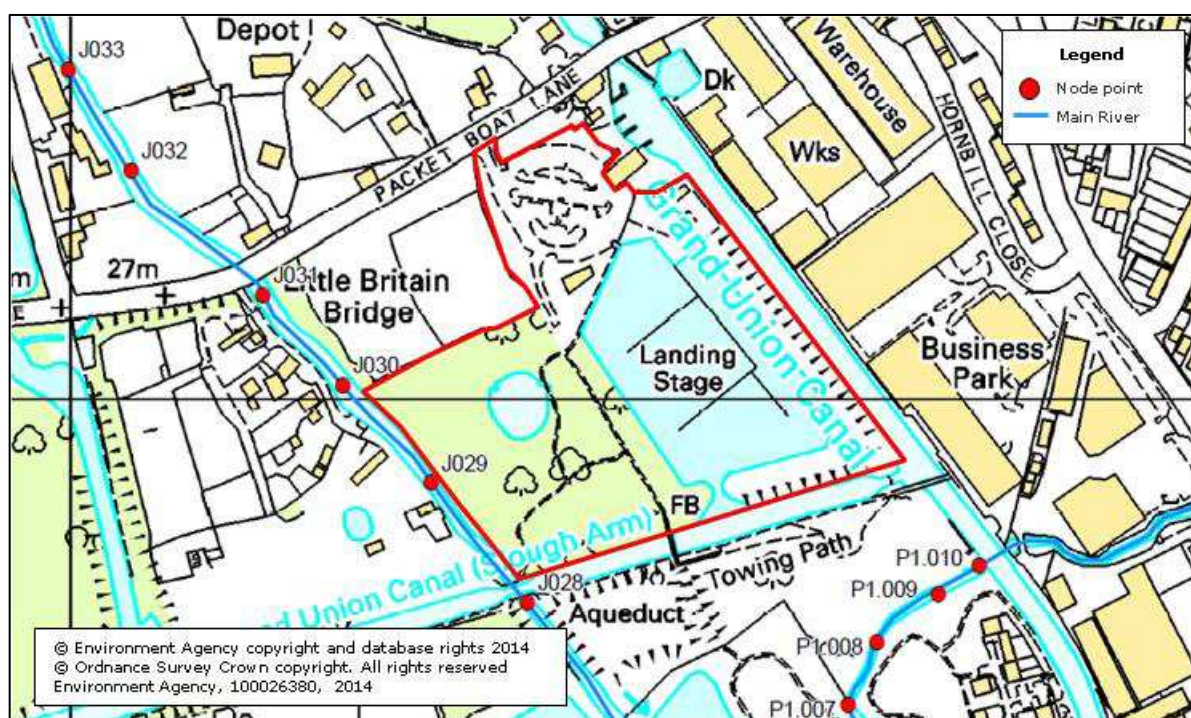


Figure 3: Fray's River and River Pinn Modelled Node Locations

(Source: Lower Colne Modelling and Mapping Study, Mott MacDonald 2012)

Table 1: Fray's River and River Pinn Modelled Flood Levels

Model Node	Flood Level (m AOD)		
	1 in 100 year	1 in 100 year plus climate change	1 in 1000 year
J031	27.65	27.68	27.72
J030	27.64	27.67	27.71
J029	27.64	27.67	27.70
J028	27.64	27.67	27.68
P1.010	28.23	28.26	28.31
P1.009	28.20	28.23	28.27
P1.008	28.11	28.13	28.16
P1.007	28.00	28.02	28.05

Note: The model nodes starting with 'J' are for Fray's River and those starting with 'P' are for the River Pinn.

When a comparison is made between the site levels in **Section 3.4** and the modelled flood levels in **Table 1**, no flooding of the site would be expected in any of the modelled flood events from either Fray's River or the River Pinn.

As already detailed in **Section 3.5**, access and egress is provided via Packet Boat Lane to the north of the site. By exiting the site and travelling in an easterly direction towards High Road (A408) dry access can be provided in up to the 1 in 1000 year flood event.

Based on the above, the risk of fluvial flooding at the site is considered to be low.

4.5 FLOOD RISK FROM RESERVOIRS, CANALS AND OTHER ARTIFICIAL SOURCES

Reservoir or canal flooding may occur as a result of the facility being overwhelmed and/or as a result of dam or bank failure.

As already detailed in **Section 3.3**, the site is bounded by the Grand Union Canal (Slough Arm) to the south and the Grand Union Canal to the east. There are no known historical instances of canal flooding at the site. Furthermore, the marina water level is the same as the Grand Union Canal (Slough Arm) and therefore any breach in the canal would drain the marina. The marina has its own stop plank facility and this can be put in place in the case of an emergency.

The EA Risk of Flooding from Reservoirs map (**Figure 4**) indicates that the site is not at risk of flooding from such sources.

There are a series of lakes to the west of the site; however there are no known instances of flooding from this source. Figure 4 of the PFRA indicates the site is not at risk of flooding from 'other sources' including artificial water bodies.



Figure 4: Environment Agency Risk of Flooding from Reservoirs Map

(Source: Environment Agency website)

Based on the above the risk of flooding from reservoirs is considered negligible and the risk of flooding from canals and other artificial water bodies is considered to be low.

4.6 FLOOD RISK FROM GROUNDWATER

Groundwater flooding generally occurs during intense, long-duration rainfall events, when infiltration of rainwater into the ground raises the level of the water table until it exceeds ground levels. It is most common in low-lying areas overlain by permeable soils and permeable geology, or in areas with a naturally high water table.

Figure 2 of the PFRA indicates the site is not at risk of flooding from groundwater. Irrespective, as the marina is a permanent water body the risk of groundwater flooding is not considered to be significant.

4.7 FLOOD RISK FROM SURFACE WATER

Surface water flooding comprises pluvial flooding and flooding from sewers and highway drains and gullies.

4.7.1 Risk of Pluvial Flooding

Pluvial flooding results from rainfall-generated overland flow, before the runoff enters any watercourse or sewer, or where the sewerage/drainage systems and watercourses are overwhelmed and therefore unable to accept surface water.

As the marina in which the moorings are located is a permanent water body, surface water flooding would not directly affect them; however if surface water flooding occurred within the vicinity of the site it may flow towards and into the marina itself. Although this has the potential to raise water levels within the marina, this would not affect the moorings as they would rise with the water level.

The EA Risk of Flooding from Surface Water map (**Figure 5**) indicates the site is not at risk of flooding from surface water.



Figure 5: Environment Agency Risk of Flooding from Surface Water

(Source: Environment Agency website)

Appendix A1 of the PFRA indicates that there have been no historical instances of surface water flooding at, or within the vicinity of, the site.

Apart from a couple of very small areas, Packet Boat Lane is not considered to be at risk of flooding from surface water and therefore dry access/egress should be possible during any of the modelled surface water flooding events.

The overall risk of pluvial flooding at the site is assessed to be low.

4.7.2 Risk of Flooding from Sewers and Highway Drains and Gullies

Flooding of land and/or property can occur when the capacity of the sewer/drainage system is overwhelmed by heavy rainfall, becomes blocked or is of inadequate capacity or where the normal discharge of sewers and drains through outfalls is impeded by high water levels in receiving waters.

Figure A-4.2 of the PFRA provides a summary map of historical sewer flooding incidents (correct as of June 2010). This indicates that between 21 and 50 instances of sewer flooding have occurred within the 'UB8 2' area in which the Packet Boat Marina is located. It is not however known whether any of these flood events affected the site. Thames Water was contacted in 2012 to ascertain whether it held any records of sewer flooding at the site. It confirmed that it held no records of flooding at the site as a result of surcharging public sewers.

The London Borough of Hillingdon was also consulted in 2012 to ascertain whether it holds any records of highways flooding at or within the vicinity of the site. It provided a response which confirmed it was not directly aware of any flooding from highway drains and gullies at the site. The council has been contacted again to obtain the most up to date information; however at the time of writing this report, a response has not been received.

5 FLOOD RISK MITIGATION MEASURES

Although the risk of flooding at the site is considered to be low; Packet Boat Marina contains modular section moorings that are supported by floats and are secured to vertical piles. This allows moorings to rise and fall. The residential moorings will therefore be afforded free movement with any change in water level.

6 SURFACE WATER MANAGEMENT

6.1 REQUIREMENTS FOR SURFACE WATER MANAGEMENT

The NPPF and its supporting Technical Guidance requires developers and local authorities to seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of Sustainable Drainage Systems (SuDS).

As the planning application is for the change of use of existing leisure moorings to residential moorings, there will be no change in impermeable areas at the site and therefore no changes in surface water runoff from the site. As a result, surface water drainage calculations have not been considered as part of this FRA.

7 SUMMARY

This FRA has been prepared on behalf of British Waterways Marinas Ltd and relates to the proposed change of use of 10 existing leisure moorings to residential moorings at Packet Boat Marina, Uxbridge.

According to the EA Flood Map for Planning (Rivers and Sea) the proposed development site is located outside of the 1 in 1000 year flood outline and is therefore defined by the NPPF as being situated within Flood Zone 1.

As the proposals are for a change of use, the Sequential Test need not be addressed.

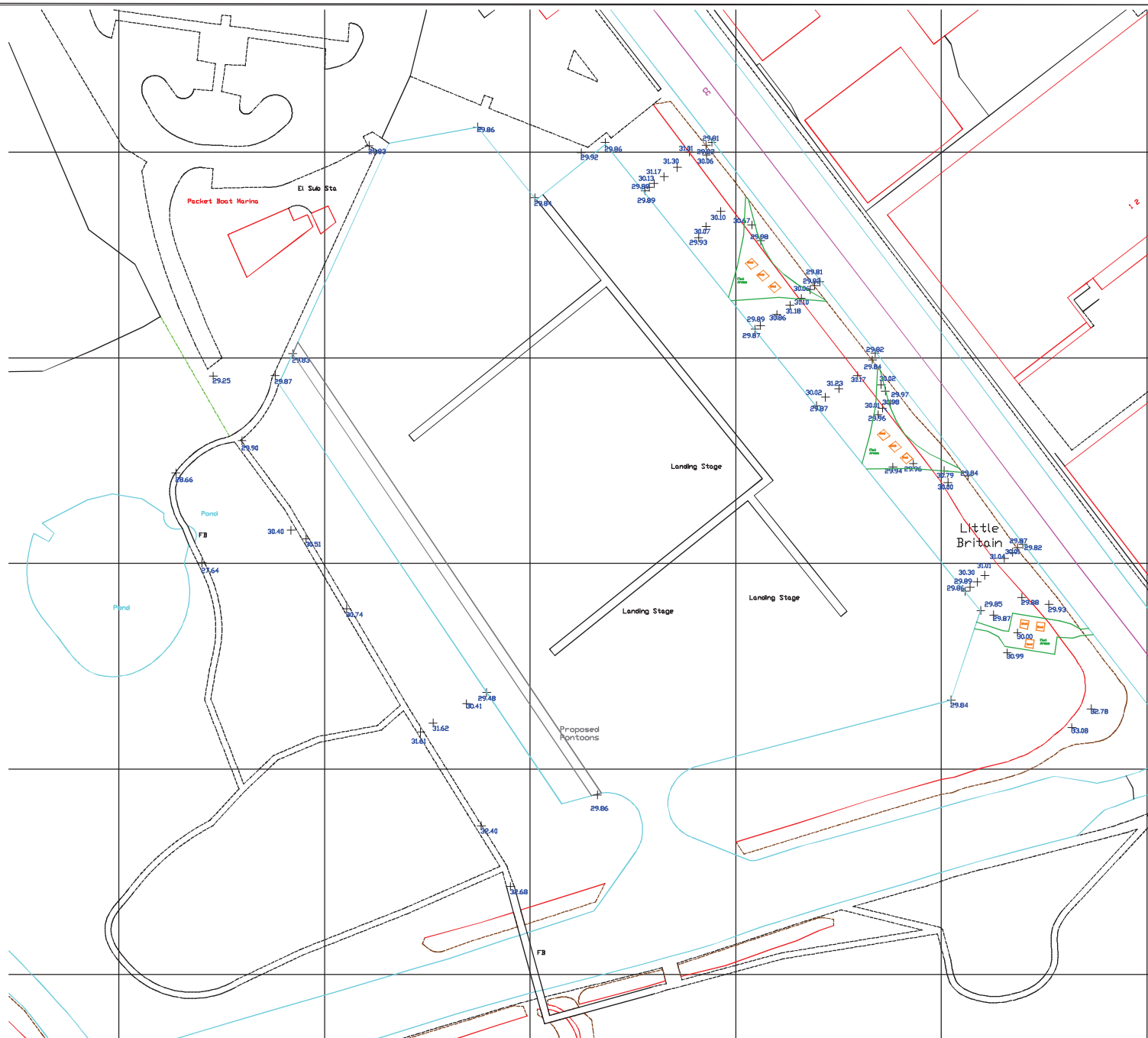
There are no historical records of flooding from any source at the site and the site and access/egress route is considered to be at low risk of flooding from all sources.

Packet Boat Marina contains modular section moorings that are supported by floats and are secured to vertical piles. This allows moorings to rise and fall. The residential moorings will therefore be afforded free movement with any change in water level.

As the planning application is for the change of use of existing leisure moorings to residential moorings, there will be no change in impermeable areas at the site and therefore no changes in surface water runoff from the site.

APPENDIX A:

Topographic Survey



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All levels are in metres above Ordnance Datum.
This map has been scaled to fit this paper. Do not scale from this drawing.

Drawn by: Rebecca Ellis
Checked by: Yeshantha Naidoo

Date: January 2012

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