

# Fen Drayton Road, Swavesey Flood Risk Summary

## 1 Tidal/Fluvial Flood Risk

### 1.1 Risk of flooding from tidal/fluvial sources

The site is shown on the Environment Agency (EA) web based Flood Map for Planning (see Figure 1) to lie within Flood Zone 3 (high risk). Flood Zone 3 is the area described as having a 1% or greater annual probability of fluvial flooding or a 0.5% or greater annual probability of tidal flooding. Flood Zone 1 (low risk) is shown towards the south of the site.

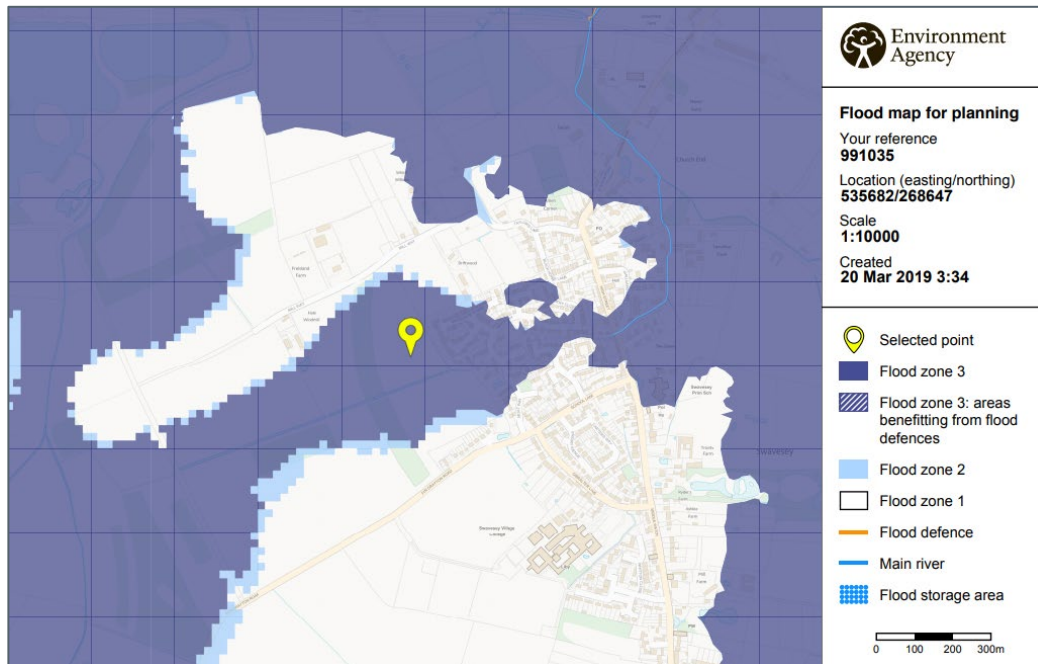


Figure 1 – EA Flood map for planning

The flood risk is principally from the Great River Ouse which is tidally influenced to the lock at Brownhill Staunch and Sluice approximately 4 kilometres (km) to the north of the site.

The EA flood maps show that the site floods from the Covell’s Drain to the west of the site. Covell’s Drain flows northwards discharging into the Great Ouse approximately 1.5 km to the north. The Great Ouse flows north to discharge into The Wash.

The EA Product 4 flood modelling data gives the flood levels at the site, these are summarised in the table below.



Job Title: Fen Drayton Road, Swavesey  
Document Reference: 991035-MLM-ZZ-XX-MK-C-0001  
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Date: 21 March 2019

Table 1: Flood levels

Return Period (years)	Flood Level (mAOD)
100 (1% AEP)	5.00 – 5.49
200 (0.5% AEP)	5.51 – 5.75

AEP = Annual Exceedance Probability

The EA Product 6 data shows that the modelled flood level is 5.70 mAOD for Covell's Drain.

Consented works were undertaken to raise and maintain the eastern bank to Covell's Drain to a minimum protected level of 6.0 mAOD to provide a defence to the land to the east of the drain. However, following a review of these works by the EA it was deemed that the works to the South Track embankment were not completed to a satisfactory standard due to the surface material being loose, and could not be relied on in the event of a flood and as such excluded from and modelling works undertaken. A baseline hydraulic model of the flooding in the vicinity of the site was constructed using the levels, as surveyed by the EA in May 2016.

In addition to the raised flood banks on Covell's Drain and South Track Bund, the Fen Drayton Lakes access road, with a minimum level of 5.57 mAOD, assists to prevent flood water from reaching the site in the event of failure of the defences to Covell's Drain. The modelling has demonstrated that when the embankments are made good, the site will not be at risk of flooding from a 1 in 100 year event (1% AEP).

Following a review of the South Track embankment work, the EA raised concerns regarding the suitability of the material and requested the baseline model be amended to use levels for the South Track previously surveyed by them in May 2016. Therefore, the January 2018 baseline model was amended to these levels, demonstrating that the site is at risk of flooding during the 1% AEP event under the present day scenario.

Proposed mitigation measures to protect the site from flooding include the proposed raising of the 'South Track Bund' to make good the surface material and tie in with the existing raised bank to Covell's Drain and to Fen Drayton Road, raising site levels to 6.12 mAOD and tying in with adjacent raised ground and local raising of consolidate banks. The construction will need to be designed to EA approval and it is recommended that it is undertaken generally based on the details contained within EA Document Technical Design Details – Embankments.

The hydraulic model was run with the proposed mitigation measures to determine the flood risk to the site. This scenario showed that there was no flooding at the site for the present day scenario or for the +35% and +65% climate change scenarios. Flooding to the west of the site in the +65% climate change scenario was reduced from 6.14 mAOD to 5.87 mAOD.

The baseline and post mitigation models were compared to determine whether there were any significant increases in off-site flood levels from the proposed works in the +35% and +65% climate change scenarios. This showed that the works provided protection to previously flooded areas and that the areas where the flood level has increased are arable fields. The maximum increase in flood level was 0.05m. The EA confirmed that the proposed ground raising will have no significant impact on third party land, whilst providing more benefits to properties on the western side of Swavesey. It is anticipated that circa 120 existing properties on Moat Way and Whitegate Close will be reclassified as benefiting from defences and may even see improvements in their insurance premiums and property value (see light blue area on Figure 2 - Final Flood Extents).



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Figure 2 – Final Flood Extents

Despite the site not being at risk of flooding in the present day event, the site should be raised to a minimum level of 6.14 mAOD with minimum finished floor levels (FFLs) of 6.17 mAOD, 300 mm above the +65% flood level once the mitigation measures are in place. In the event of a breach or failure of the defences the FFLs are above the 6.14 mAOD level from the baseline scenario, i.e. with no mitigation measures in place, and will therefore be above the potential flood level. The minimum finished ground level of 6.14 mAOD will ensure that in the worst case scenario (baseline scenario) there would be no flooding on site.

The proposed works to protect the site from flooding have been shown to have no significant impact off-site, with minimal increases in the flood level of a maximum of 0.05 m in areas used for arable farming.

The January 2018 modelling shows that provided the proposed mitigation works to raise the South Track drain and increase on-site flood levels are undertaken, the site is not at risk of flooding in a 1% AEP event inclusive of 65% climate change. These measures mean that once mitigation is in place the site will be located in Flood Zone 1 and not at risk of flooding and the development will be safe.

Maintenance of the flood defences will be provided.

## 1.2 Flood compensation

The January 2018 modelling report has shown that the loss of floodplain storage due to the proposed works will be adequately compensated by the additional proposed bunds to retain water within the landowner's boundary and there will be no detrimental impact on third party land.



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## 2 Pluvial Flood Risk

### 2.1 Surface water from off-site

Due to the presence of the Award Drain to the west of the proposed allocation site, and the raising of land on which it is proposed to site the development, any surface water would not flow onto the site. *Flood risk from surface water* mapping (see Figure 1) shows a high risk shown in the Award Drain and in the northern part of the site which corresponds with lower ground levels shown on the topographical survey.

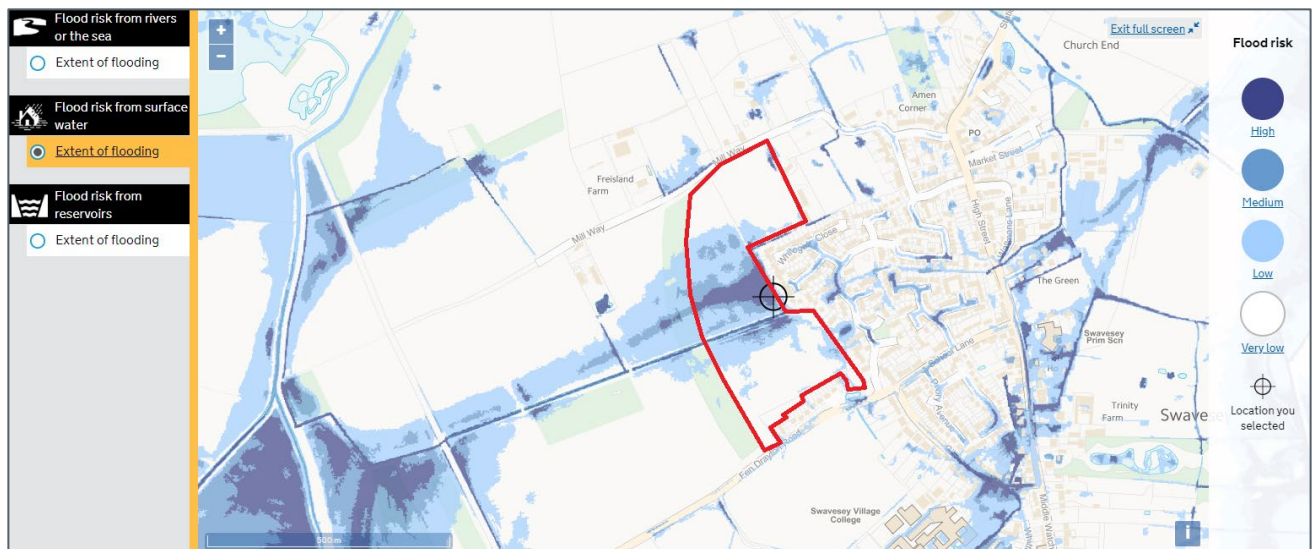


Figure 1 (red outline denotes site)

The risk of flooding from this source is considered to be low.

### 2.2 Surface water from on-site

The increase in the post-development impermeable area could lead to an increase in off-site surface water discharge and an increased flood risk if not managed. Surface water run-off from the site will be collected, attenuated and discharged in line with the requirements of the LLFA and Cambridgeshire policy, to the Award Ditch. This drain flows west and is discharged to Covell's Drain via the Frelsland Farm Pumping Station and does not flow to the east where there are known flooding issues.

## 3 Risk of Flooding from Water Bodies

The *Risk of flooding from reservoirs* mapping (see Figure 3) shows that the site is at risk of flooding from reservoir failure. However, it is likely that the site would be protected from this form of flooding by the flood defences that prevent the site from flooding in a fluvial event.



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Figure 3 (red outline denotes site)

The flood levels in the reservoirs cannot exceed the levels in the River Ouse and therefore do not pose a greater risk of flooding. The benefit of raising the site and the finished floor levels mitigates against the risk of bank failure.

The site is considered to be at low risk of flooding from this source.

## 4 Risk of Flooding from Groundwater

British Geological Survey (BGS) mapping shows the site as being underlain by West Walton Formation and Ampthill Clay Formation (Mudstone). The underlying bedrock geology is expected to be of low permeability.

The site is not considered to be at significant risk of flooding from groundwater.

## 5 Flood Risk Summary

The information given in this statement outlines that the proposed development north of Fen Drayton Road will include improvements to Covell's Drain embankments, new flood defence banks along Fen Drayton Road and Swavesey Road and ground raising at the development site north to Mill Way. The works will include allowance for up to 65% increase in flood size due to climate change, and are designed to avoid impact elsewhere in the catchment.

These improvements will mean that:

- Flood risk to Swavesey from Covell's Drain will be reduced with protection into the future;
- The development site and land to the east of it will be defended against flooding from Covell's Drain in the 1% chance event, including allowing for climate change;
- It is intended that these areas will be reclassified as an "Area Benefiting from Defence" on the Environment Agency's flood maps, and be considered to be at medium rather than high risk of flooding for planning and insurance purposes;



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- Approximately 120 existing properties on Moat Way and Whitegate Close will be reclassified as benefiting from defences; and
- Fen Drayton Road and Swavesey Road will also be defended against flooding from Covell's Drain in the 1% chance event.

All rainfall falling within the development site will be drained westwards away from Swavesey, reducing the risk of flooding from the drainage network. This should be regarded as significant public benefit. Figure 2 above shows clearly the extent of the betterment (shaded light blue). As can be seen this benefits both the appeal site, but also the wider area. With the introduction of flood defences there is no technical reason why the wider site should not be developed for housing.