# A FLOOD RISK EXPLANATORY NOTE FOR THE SOFT FRUIT POLYTUNNEL DEVELOPMENT, JACK'S DYKE FIELD, GROVES FARM, UPPER BOGNOR ROAD, COLWORTH, CHICHESTER, WEST SUSSEX, PO20 2DX

## Introduction

A planning application for 12 hectares of polytunnel (Spanish Tunnel) development at Jack's Dyke field, Groves Farm, Upper Bognor Road, Colworth (Chichester District Council), has been submitted on behalf of Merston Farm Ltd., by planning consultants Douglas Briggs Partnership (Application No. BE/81/10). This explanatory note discusses the flood risk associated with the site following on from a Flood Risk Assessment (FRA) written by Envireau Water in August 2010 (ref: P:\HHP Groves Farm (5934)\Jacks Dyke\FRA v1.doc).

This explanatory note has been prepared by Envireau Water [EW], a specialist, independent water resources and water management consultancy. The lead consultant was James Dodds, the Managing Director of EW, who has some 25 years experience in water management consulting.

The boundary of the proposed development site at Groves Farm is shown on Figure 1. The site is currently used for general agricultural use. The planning application is for the erection of polytunnels that incorporates the "in ground" method for growing soft fruits. The site is located near Colworth, approximately 4km to the southeast of Chichester. The farm is centred at grid reference SU 902 026 covering an area of approximately 80ha with elevations across the farm ranging from 3m to 5.8m AOD.

Based on Ordnance Survey mapping at a scale of 1:10 000 and OS DTM data at 10m grid spacing, the topography of the application site is contained by one small drainage catchment (Figures 1) that has gradients of 0.2° or less. The average gradient across the site is approximately 0.1°. The catchment drains to a series of drainage ditches to the north and east of the application area. These drainage ditches converge with the Elbridge Rife approximately 250m to the northwest of the application area.

The Soil Survey of England and Wales classify the soils north of the site as Sub-group 571z: Deep stoneless well drained silty soils and similar soils affected by groundwater; over gravel locally. The majority of the soils at the site are classified as Sub-group 841e: Deep stoneless silty soils variably affected by groundwater. It is likely that groundwaters are perched at the site.

Planning permission has already been granted for two existing polytunnel areas north of the proposed polytunnel area (planning applications 0/08/02777/FUL and 0/09/00433/FUL) (Figure 1).

## Hydrological Characterisation

Figure 1 shows the area of polytunnel development, together with the direction of overland runoff and drainage directions associated with the polytunnels.

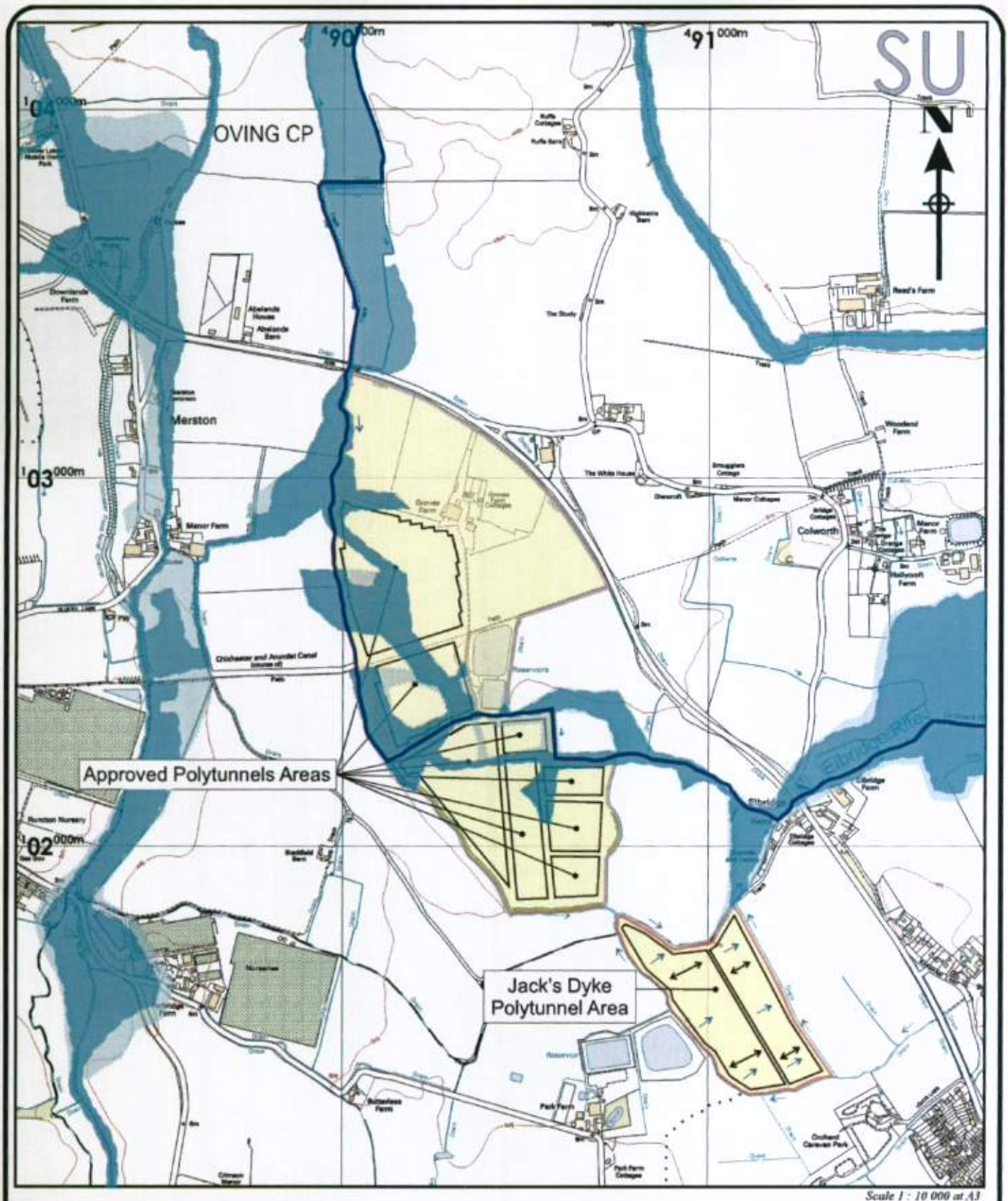
When soft fruits are grown in the ground, the drainage from the polytunnels is achieved by a series of vegetated/grass lined, straw lined or Mypex lined channels that run along the line of the polytunnel leg stands. The line of the leg stands, are commonly referred to as "leg rows". The leg row channels will have flow restrictors in the form of dams placed at regular intervals along them. The overall result in the leg row channels is to increase the resistance to flow and therefore, reduce flow velocities.

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LEGEND

- EA Flood Risk Zone [Extreme Event - Flood Zone 2]
- EA Flood Risk Zone [Flood Zone 3]
- Polytunnels
- Land Boundary and Rainfall Runoff Catchment of Groves Farm
- Natural and Polytunnel Induced Runoff Pathways
- Existing DrainageDitches
- Eldridge Rife
- Topographic Contours
- Polytunnels Orientation

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| Ref: P:/Groves Farm(5934)/ Jack's Dyke/Fig 1 Exp Note.cdr Date: 28/01/2011 | **Jack's Dyke, Groves Farm - Explanatory Note** |
| Figure 1 | Polytunnel Placement, Orientation and Farm Drainage Pathways |

With flow restrictors in place, the leg row channels also provide storage. The net result is to reduce the flow velocities and runoff rate of the overall polytunnel area, when compared to simple open channels.

In essence the polytunnel growing system produces a series of drainage routes spaced 7.8m apart, which act as retention zones, seepage zones, and velocity reduction zones. Therefore, with flow restrictors in place the leg row channels become swales.

**PPS25 Sequential Test and Exception Test**

The Sequential Test from PPS25 guides new development to areas at the lowest probability of flooding (Zone 1); the zones being listed in Table D.1. When trying to identify potential areas for the polytunnel development, the proposed site was identified to be available and within Flood Zone 1 therefore meeting the criteria of the Sequential Test.

Under guidelines laid out in PPS25, the development has been classified (in Table D.2 of PPS25) as "less vulnerable" and is considered appropriate (in Table D.3 in PPS25) for Flood Zone 1. Table D.3 of PPS25 indicates that the Exception Test is not relevant to this development.

**Quantitative Analysis**

The approach detailed in Defra/Environment Agency document "Preliminary rainfall runoff management for developments. R&D Technical Report W5-074/A/TR/1 Revision C, re-published June 2007", has been undertaken. The analysis uses a 1 in 100 year storm as a basis, and takes into account a 20% climate change surcharge in accordance with PPS25.

The results demonstrate that runoff can occur from the polytunnels in excess of the "Greenfield" runoff rate and that in line with Environment Agency policy that this runoff should be catered for. Long Term Storage calculations resulted in an additional storage requirement for the polytunnel area subject to the planning permission of 220$m^3$/ha.

**New Storage**

The whole of the storage required at the polytunnel development will be provided within the leg row swales. The storage in the leg row swales will be developed by placing sand bags or the like across the leg row at regular intervals to compartmentalise the channel. This forms a small dam behind which runoff is intercepted and water is stored in the leg row swales and allowed to infiltrate to ground. This allows the full width of the swale to become available for infiltration, and will significantly reduce peak flows from the swale area.

For the topographic gradients at the farm; a leg row width of 1.2m; and a leg row swale length of 1275m/ha, the dam spacing and height requirement to fulfil the storage requirement are given in table 1 below.

**Table 1** Leg row swale dam spacing and height to fulfil storage requirement.

| Topographic Gradient (°) | Leg row Swale Dam Spacing (m) | Leg Row Swale Dam Height (m) | Storage Provided ($m^3$/ha) |
|---|---|---|---|
| 0.01 – 0.1 | 73 | 0.2 | 296 to 208 |
| 0.1– 0.2 | 36 | 0.2 | 258 to 210 |

The average gradient at the farm is approximately 0.1°. Therefore, in order to facilitate the storage requirement, the dams should be spaced within the leg rows at 36m apart and at a height of 0.2m.



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## External Sources of Flooding

With the exception of the local rife system, no other external sources of flooding affecting the site have been identified.

## Conclusion

The polytunnel development at Jack's Dyke field will not have a detrimental impact on drainage and flooding providing storage is provided for in the proposed storage areas. This storage will be provided in the form of leg row swales.

These storage areas will restrict flows to equal to or less than the Greenfield runoff rate and provide an element of rainwater harvesting and recycling.

It is important that the drainage system is actively managed, to provide storage and reduce flow velocities in the leg row swales and to distribute drainage over grassed areas.

The leg row "swales" generally provide a greater ratio for impermeable surface to swale for the polytunnel development than that of an urban development. Additionally, storage can be provided in the polytunnel leg row "swales" to allow standing water.

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