24 May, 2022.

Re: Settlement Strategy. Potential designation of infill land between Celbridge Dart Terminus and Celbridge boundary as Key Development Area.

A Chara,

 On behalf of the three shareholders who hold the majority share of a property in Loughlinstown townland of circa 5.5ha adjacent to Celbridge Train Station, I request that the property be included in any ‘Key Development Area’ designation of infill between the current south boundary of Celbridge town and what will shortly be the terminus of the Dart + southwest high frequency, high capacity, electric rail service to Heuston/Grand Canal Dock.

 The land in question is mainly within 500 metres, and all of it is within the one kilometre, 10 minute walking distance of the best connected transport hub in Co. Kildare if not on the island of Ireland. The land is dissected by the major OPW flood channel excavated in 2001 as part of the Shinkeen arterial drainage programme, and since then, all land east of the Shinkeen is immune from flooding even in a High End Future Scenario.

 I attach a submission which raises issues about the real level of flood threat in the Celbridge/Hazelhatch Station area.

 Dr. Seamas Caulfield

Submission to Kildare County Council Draft Development Plan relating to supposed flooding at Celbridge/Hazelhatch Train Station .

With particular reference to ‘Sustainable Mobility and Transport : Objective TM09, TM034 and PolicyTMP3.

Dr. Seamas Caulfield, 28 Henley Park, Churchtown, Dublin 14.

 Celbridge Train Station is due to become a Dart terminus during the lifetime of the new Development Plan, following the imminent electrification and full four tracking of the Dart + Southwest line from Heuston to Celbridge. Services from the station are already at a high level with dual destinations inward to Heuston and Grand Canal Dock and outward to all parts of Ireland served by rail from Waterford around to Ballina in Co. Mayo. The rail services from the Station also provide excellent access by rail within the county to Sallins/Naas, Newbridge, Kildare, Monasterevan and Athy. The Station is also a major bus hub. Even before the upgrade to Dart service, Celbridge Train Station is one of the best connected hubs on the island of Ireland.

 National Government, regional assembly and local government, together with overarching transport policy, have for many years recommended development, including high density residential development within one kilometre or ten minute walking distance of such a hub. However, development within the one kilometre radius of this key hub and even of the hub itself is threatened by the publication of the Hazelhatch Further Study. Extensive tracts of land within the one kilometre radius previously deemed to be free of flood risk (Flood Risk Zone C) are now considered extreme Zone A Flood Risk, susceptible to flooding on a ten year return basis. As this perceived risk of frequent flooding applies to the Station itself, now about to be electrified, the perceived risk could influence decisions about the scale of development of the Station itself.

 The purpose of this submission is to bring to the attention of Kildare County Council that due to two simple mistakes in preparing the hydrographs on which the flood volumes are calculated, all flood volumes in the Hazelhatch Further Study relating to the Hazelhatch stream and probably also the Shinkeen, have been multiplied by a factor of three. At any rate, the Balscott/Shinkeen is impacted because of the significant but unquantified modelled transfer overland of flood water from the Hazelhatch. The key flood volumes supposedly with a return period of ten years, have as a result, a return period of hundreds of years.

 The two relevant diagrams are the time captions on hydrographs in Fig. 3.13 and Fig. 3.14 in the Hazel Further Study. (Copyright does not allow publication of the actual diagrams without permission).

The time axis on Fig. 3.13 is marked in quarter days using the ‘ zero hundred hours’, ‘six hundred hours’, ‘twelve hundred hours’, ‘eighteen hundred hours’ naming system. It should have read as follows with time progressing from left to right:

00.00 > 06.00 12.00 18.00 00.00 06.00 > 12.00 I

Instead, the division of the days into quarters is given as if reading from right to left:

00.00 < **18.00** **12.00** **06.00** **00.00** **18.00** **12.00** < I

In the Final Design Hydrograph, Fig. 3.14, the final six hour period, reading right to left in Fig. 3.13, denoted by ‘eighteen hundred hours to 00.00 hours’ is mistaken for 18 hours and is divided into three six-hour periods when in fact they are 2-hour periods.

00.00 < **18.00** **12.00** **06.00** **00.00** **18.00** **12.00** < I Fig. 3.13

 0 > 6 >12  **18** 24 30 **36** 42 48  **54** 60 66  **72** 78 84 **90** 96 102 **108** 114 120 Fig. 3.14

The hydrograph time axis is therefore mistakenly multiplied by three and thus the volume of discharge is accordingly multiplied by three. Every block in the hydrograph supposedly representing 1 cumec for six hours (21,600 cubic metres) now represents 1 cumec for eighteen hours (64,800 cubic metres). The red hydrograph in the Semi-Dimensional Hydrograph Comparison diagram shown in Fig.3.13 (which is verified by the actual readings from the Hazelhatch gauge) shows a flood peaking at fourteen hours and still flowing at over 40% of peak flow 40 hours after the rainfall event. Because of the error, the same hydrograph, now yellow in Fig.3.14 shows the flood peaking after 42 hours and discharging at over 40% of peak flow, 120 hours (5 days ) after the rainfall event.

 The striking feature of the comparison of the 10, 100 and 1000 year flood extents of the original ECFRAM study and the more recent Hazelhatch Further Study is the fact that the HFS flood expected to occur on average once every ten years is much more extensive than the flood expected only once every thousand years in the ECFRAM study. The explanation put forward for this is that the catchment area of the Hazelhatch stream has been increased by 30% (but see added note below) and catchment descriptor alterations and additional small streams and tributaries ‘has resulted in significant flooding in the upper reaches of the Hazelhatch catchment’. This alone does not explain how the HFS 10-year flood could be so much more extensive than the ECFRAM 1000-year flood. The real reason is the erroneous multiplication of the flood volume by a factor of 3 due to the hydrograph errors.

Below are the four main return periods starting with the 2-year or 50% base unit in the ECFRAM study represented as 1X and the growth factors for the relevant return periods:

Return Period (years) 2 10 100 1000

ECFRAM 1X 1.8X 3.3X **5.9X**

HFS (54% increase) 1.54X 2.8X 5.1X 8.5X

HFS Error ( x3) 4.6X **8.4X** 15.3X 25.5X

Because of the hydrograph time error and hence volume error combined with the 54% increase for other reasons, the Hazelhatch Further Study 10-year flood has been assigned a far higher volume than the ECFRAM 1000-year flood.

 (Note re 30% increase in Hazelhatch stream catchment area. The 30% increase in area is exaggerated as significant land to the east of Lyons Road has been transferred in error from the Coolfitch catchment. The result of this on the Hazelhatch stream is minor compared to the major error identified above. It does have major significance for the Coolfitch catchment in that significant flooding both sides of the Ardclough road mapped in the ECFRAM study has all but disappeared in the Hazelhatch Further Study due to the erroneous transfer of part of the Coolfitch catchment to the Hazelhatch.)