

# Technical Memorandum – Review of Clonburris Site 4 SSFRA

#### 1. Introduction

JBA Consulting was appointed by SDCC to prepare a Site-Specific Flood Risk Assessment (SSFRA) for the proposed Site 4 development in Kishoge, Clonburris. The first section of the SSFRA (Introduction) details the approach to the assessment and report, and introduces the development proposal and application site. MCC agrees with all the information presented in Section 1.

#### 1.1 Terms of Reference and Scope

The section makes appropriate reference to the 'Planning System and Flood Risk Management - Guidelines for Planning Authorities' (DEHLG / OPW, 2009), and to SDCC as the relevant planning authority.

#### 1.2 Flood Risk Assessment: Aims and Objectives

The section appropriately outlines the aims and objectives of the SSFRA. It may be of benefit to reference that the report has been prepared as a Stage 3 Flood Risk Assessment and the scope as set out by the OPW Guidelines (see Section 2.21 of the OPW Guidelines).

#### 1.3 Development Proposal

The section provides a brief introduction to the development proposal at the site, and refers to a full description of proposed development available separately. Further detail in so far as intended use and therefore vulnerability classification of the proposed development may be beneficial here.

#### **1.4 Report Structure**

Report structure outlined per Table of Contents.

#### 2. Site Background

The second section of the SSFRA (Site Background) provides context in regard to the site location, and local topography, hydrology, and geology. MCC agrees with all the information presented in Section 2.

#### 2.1 Location

The site is located in Clonburris, bordered by the Dublin-Kildare railway line and Kilmahuddrick Stream to the north, to the south by Grand Canal Way, to the west by greenfields until the Griffeen River, and to the east by Kilmahuddrick Stream and the R136 (location of the R136 is unclear in Figure 2-1). The section suitably details the site location and the Figure illustrates the wider context in the west of Dublin. Description of current land use of the site may be of value here.

#### 2.2 Hydrological Features

The section appropriately introduces key hydrological features in the vicinity of the site, providing context for future assessment.

#### 2.3 Site Topography

The section appropriately outlines local and site-specific topography as relevant to support the assessment.

### 2.4 Site Geology

The section appropriately reviews soil and groundwater mapping in the area. Reference to the source of the Soil maps in Figure 2-3 may be of value. Findings are considered appropriate and of value.

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The sources reviewed are appropriate and as expected by MCC, and MCC has no reason to disagree with the findings.

# 3. Flood Risk Identification

The third section of the SSFRA (Flood Risk Identification) provides an initial desktop assessment of flood information and sources to inform further detailed assessment. The sources reviewed are appropriate and as expected by MCC to support Stage 1 Initial Flood Risk Identification. MCC agrees with all the information presented in Section 3.

#### 3.1 Flood History

This section reviews OPW and internet records of flooding in the area. Reported events are not indicated at the site. The sources reviewed are appropriate and as expected by MCC, and MCC has no reason to disagree with the findings.

# 3.2 Predictive Flooding

This section reviews available OPW and SDCC flood mapping, prepared as part of the Eastern CFRAM study and adopted within the Clonburris Strategic Development Zone (SDZ) Planning Scheme and SDCC Strategic Flood Risk Assessments (SFRAs). The sources reviewed are appropriate and as expected by MCC, and MCC has no reason to disagree with the findings.

As per OPW Guidance the Clonburris SDZ adopts the present-day CFRAM 1% AEP and 0.1% AEP flood extents as Flood Zones A and B, respectively. The site is not indicated as located in the present day flood extents.

It may be beneficial from a planning context to review the status of the site in regards to the SDCC CDP (2022-2028) and the Clonburris SDZ (2019).

The SDCC SFRA and County Development Plan (CDP) were in 2022 the first in Ireland to adopt climate change scenario flood extents as part of the County Flood Zones. As set out in this section the SDCC Flood Zones adopt the CFRAM fluvial flood extents including a High-End Future Scenario for climate change. Thereby, the site is partially located in Flood Zone B, per the SDCC CDP and SFRA.

The adjacent Kilmahuddrick Stream is notably not modelled as part of the CFRAM study, as noted in Section 3.2.1 of the SSFRA.

In terms of the relevance of predictive flood data sources, it is relevant to note that the applicable statutory plan and supporting SFRA are not overridden by the CDP.

#### 3.3 Flood Sources

This section reviews the initial desktop identification of flood risk to form an initial assessment of flood mechanisms.

The sources reviewed are appropriate and as expected by MCC, and MCC has no reason to disagree with the findings. Risks associated with pluvial/ surface water flooding, the Grand Canal and potential breach, are identified and assessed appropriately, and groundwater and tidal flooding are not identified as a predicted risk to the site.

JBA has supplied supplementary information to confirm assessment of risk in the event of a canal breach, whereby flow paths would be restricted by the link road, and the site has been designed to a high level of resiliency..

Hydraulic modelling is identified as necessary to confirm fluvial flood risk associated with the Griffeen River and Kilmahuddrick Stream. Given the proximity of the unmodelled Kilmahuddrick Stream, site-specific modelling of the watercourse is required to delineate flood zones at the site, as the risk is at yet unassessed.



# 4. Hydrology and Hydraulics

The fourth section of the SSFRA (Hydrology and Hydraulics) details the hydrology and hydraulic modelling undertaken to inform detailed flood risk assessment at the site. Given the limited information presented, MCC has no reason to disagree in principle with the approach, and we assume that the hydraulic model is fit for purpose where it has been prepared by a reputable and suitably qualified and experienced consultant.

JBA has supplied supplementary information to confirm sufficient resiliency following additional sensitivity testing in line with OPW guidance for climate change and urbanisation.

### 4.1 Topographical Data

This section outlines topographical data utilized in model preparation. LiDAR and topographical data is consistent with that used as part of the Eastern CFRAM study, and supplemented with recent (December 2024) surveys of the Kilmahuddrick Stream and structures on both the Kilmahuddrick Stream and Grifeen River undertaken as part of local road infrastructure works.

2m LiDAR data was sourced via the CFRAM project c.2009 and there is significant development in place since that data capture. Where the flood modelling reported later in the project relies on that data then it is recommended that the SFFRA should report on changes in land use and local topography based on aerial data and site knowledge, with a view to ensuring that the LiDAR is fit for purposes and flow paths are appropriately represented in the 2D domain. Given the incorporation of updated topographical survey data and local development, it is assumed the ground model has been reviewed and is sufficiently representative.

# 4.2 Hydrology

Hydrological catchments appear to have been delineated based on the FSU derived catchments. Qualitative catchment characteristics have been reviewed, and quantitative catchment descriptors adopted. A single downstream catchment flow is conservatively applied to the Kilmahuddrick Stream.

The FSU flood estimation method is applied to each of the HEPs. The FSU method is considered the most up-to-date and robust method in Ireland, and is considered appropriate for flow estimation on the Griffeen River. The present-day flow estimation method adopted for the Griffeen River is considered appropriate, and MCC agree with the methodology used.

Given the small catchment size of the Kilmahuddrick Stream, the application of the FSU method should be used with discretion where the catchment size is considerably smaller than the 5km<sup>2</sup>threshold for the FSU method, and sensibility checks by alternate methods are recommended. . As part of this review, MCC has undertaken a comparable analysis using a suitable small catchment method, and has determined that the adopted flow is acceptable. Further, JBA has supplied supplementary information confirming a range of hydrological estimation methods were considered as a part of the undertaken hydrology QA process.

As outlined in Section 4.2.4, the flows applied as part of the SSFRA vary from those utilized in the Eastern CFRAM study. While the differences attributed to QMED estimation and adopted growth curves are considered appropriate as part of site-specific analysis, the absolute differences in climate change flow calculation are significant in the context of the SSFRA outcome where design flows (0.1% HEFS) are 64% (79.25 vs 28.3 cumecs) lower than CFRAM flows which inform the CDP SFRA Flood Zone B.

As set out by the OPW Climate Change Sectoral Adaptation Plan, per the Plan and Table 2.3 of the SDCC SFRA, urbanisation should be accounted for as part of the Mid-Range Future Scenario (MRFS) and High-End Future Scenario (HEFS) *on a case-by-case basis*. While the CFRAM study for Hydrometric Area 09 (encompassing the subject site) applied an allowance of 1% and 2.5% annual increase in URBEXT across a 100-year horizon for the MRFS and HEFS, respectively, the SSFRA does not include an allowance for increase in urbanisation within the catchment, applying the FSU reported URBEXT value of 0.1626 in each of the Present Day (PD), MRFS, and HEFS scenarios.

SDCC is almost unique in that it is one of two local authorities in Ireland adopting climate change scenario flood zones for purposes of its CDP, and so there is limited comparable precedence for flood map challenges relying on improvements to hydrological estimates. It is further noted that the CDP is understood to be not relevant at this land and the Clonburris SDZ SFRA should take precedence. Our commentary is on the basis of our brief to compare the SSFRA with the CDP SFRA and Flood Zones.



In light of the significant difference between CFRAM and SSFRA modelled flows, MCC has undertaken a highlevel independent appraisal of potential urbanization impacts on flows in the catchment, in order to inform the potential significance of effects to predicted flooding. Updated URBEXT parameters affect flood estimates by adjustment to the index flood, and applying an urbanization factor to the flood growth curve. Key findings are as follows:

- **CFRAM Estimate** the proposed impact of urbanization reported for CFRAM reported flows are based on a projected population increase rather than any spatial analysis or distribution. The projected HEFS URBEXT descriptor value exceeds the stated limit set by the HA09 CFRAM hydrology methodology; where CFRAM HEFS URBEXT is at least 0.89 and HEFS URBEXT should not have been permitted to exceed a maximum catchment urbanization of 85%.
- **Revised URBEXT estimate** A revised estimate of HEFS URBEXT can be determined by a number of methods. In our experience at OPW flood relief projects, a future urbanization limit is determined based on land zoning allocations in the extant relevant development plan. Alternatively it is possible to project urbanization based on trends to 2100 (the nominal HEFS temporal horizon) from CORINE land use mapping. The URBEXT descriptor is dependent on imperviousness factors assigned to different CORINE land classes which are not published and so cannot be precisely replicated; however a broad correlation can be adopted by comparing the full CORINE urban extent in 2006 (FSU baseline) vs the FSU URBEXT value, and adjusting that to suit the projected urban extent depending on the method used.
- **Revised Flood Flow Estimate** Our analysis indicates that inclusion of revised URBEXT parameters would result in an additional HEFS uplift of between of 8-20% of peak flows, where lower bounds are representative of the footprint of planned development in the CDP and so consistent with the approach taken by OPW in flood relief projects.

In our opinion the use of the lower bounds would be reasonable, and where the effect of urbanization would be reduced (but not eliminated) by implementation of SuDS across all new planned development, and so the proportionate effect of URBEXT in any future recalibration of FSU methods may be feasibly reduced.

In terms of end consequences to revised Flood Zone mapping presented in the SSFRA; review of the very modest effects realized when considering onerous blockage scenarios reported at SSFRA section 4.3.5.4 would tend to indicate that the assessment is unlikely to be overly sensitive to a variation in flood flow of up to +8%, and the SSFRA findings are unlikely to be significantly materially altered..

Further, JBA has supplied supplementary information whereby impact of urbanisation has been appropriately investigated, and a 40% climate change flow increase has been modelled to align more closely with an assessment of a further +10% increase in flow as a result of footprint of planned development in the CDP.

# 4.3 Hydraulics

This section details the site-specific hydraulic modelling undertaken as part of the assessment.

Section 4.3.1 outlines the approach to modelling, where a 2D HEC-RAS model represents the model area. No further information is given regarding the specifics of the model geometry, validation / verification or benchmarking, or sensitivity testing. For purposes of this review it is assumed the hydraulic model is for fit purpose as prepared by a reputable and suitably qualified and experienced consultant, and the subsequent review is based upon this assumption.

In our experience it would otherwise be typical to supply sufficiently detailed information regarding model preparation and validation, including sensitivity analysis appraising impacts of roughness, boundary conditions, and flows; none of which are included. The sensitivity testing of culvert blockage outlined in Section 4.3.5.4 is acknowledged and is appropriately robust. JBA has supplied supplementary information confirming sensitivity testing and model verification were suitably undertaken as part of the modelling QA process.

It is apparent that the most significant change to flood risk at the site is as a result of changes to the Griffeen River. The baseline mapping that has been used for the assessment is that produced from the updated



model (following ongoing road construction in the vicinity impacting local topography and changes to the River Griffeen's configuration), and it is presented in Figures 4-8 and 4-9 of the SSFRA. The results indicate that flooding in the area associated with the Griffeen River has changed significantly following road development and channel culverting and works preventing surcharging and overtopping (at Hayden's Lane).

Updated baseline mapping (Figure 4-10) indicates part of the site is marginally affected by the 0.1% AEP flood extends for PD/MRFS/HEFS flood events, upstream of the under-construction road bisecting the site. The results appear to MCC to be acceptable in principle, given the aforementioned assumptions regarding input flows and model development. We interpret the lack of variation between PD/MRFS /HEFS flood extent as being that the flood is as a result of a confined storage with a level dictated by overtopping on the road under construction.

The SSFRA details that 6 model scenarios (Table 4-6) have been used to inform the proposal. We note that the final post-development model (Model 6) considers the 0.1% AEP (Present Day) flood only and there is no assessment of the post-development 0.1% HEFS flood. This is consistent with the Clonburris SDZ SFRA. JBA has supplied supplementary information whereby the 0.1% HEFS flood has been appropriately modelled to confirm flood resilience. Modelling was undertaken for completeness, given there is no requirement under the acting Clonburris SDZ SFRA, or the Planning Guidelines.

The SSFRA seeks to demonstrate that the development in the floodplain causes no unacceptable effect to flood risk elsewhere, and that the risk to the proposed development is managed. The modelled post-development flood extents in Figure 4-12 demonstrate the site is removed from the predicted floodplain.

Further, JBA has supplied supplementary information whereby impact of urbanisation has been appropriately investigated, and a 40% climate change flow increase has been modelled to align more closely with an assessment of a further +10% increase in flow as a result of footprint of planned development in the CDP.

JBA notes the results of this modelling indicate there is some minor off-site sensitivity on the Griffeen upstream of the new link road, but is low impact and does not present any significant issue to the proposed design of the park, housing or other infrastructure. The assessment conservatively does not include a model inclusion of the attenuation pond to the south of the link road which would reduce impacts, and the assessment of climate change and urbanisation is considered suitably robust, and the resiliency of the proposed development confirmed.

Compensation storage is proposed laterally along the Kilmahuddrick Stream at the northern site bound. Given the floodplain displaced as modelled is 0.1% AEP floodplain, volumetric compensation storage as proposed is considered acceptable, and demonstrated by flow validation in the post-development proposed scenario.

Culverts proposed as part of the proposed development have been appropriately designed in accordance with OPW Section 50 requirements.

# 5. Flood Risk Assessment and Mitigation

The fifth section of the SSFRA (Flood Risk Assessment and Mitigation) summarizes the design approach to mitigate flood risk at the site. Given the design approach is in line with appropriate modelling, MCC finds the proposed approach acceptable.

# 5.1 Flood Risk

The SSFRA states the "detailed hydraulic and hydrological modelling conducted by JBA has identified localised flood risks in the southeastern part of the site, where a small part falls within Flood Zone B". This is correct and in accordance with the Flood Zone definitions used in the Clonburris SDZ and SFRA. For purposes of this review, it is noted that (when compared with SDCC SFRA definitions) the site is partially located in Flood Zone A, per SSFRA Figure 4-9.



# 5.2 Mitigation Strategy

The SSFRA states that the proposed development accommodates culverts design and flood mitigation measures for compensatory storage, ensuring that flood risk is appropriately managed while maintaining compliance with South Dublin County Council flood risk management guidelines.

The SSFRA states that proposed finished floor levels (FFL) have been set in accordance with SDCC SFRA requirements, incorporating freeboard allowances to mitigate against extreme events. MCC agrees with the requirement to set a flood resilient floor level; however, the current SDCC CDP SFRA referred to is silent in relation to freeboard requirements or flood protection standards. The Clonburris SDZ refers to the SDCC CDP 2016-2022 SFRA, which sets out recommendations for Clonburris. Freeboard provided is in accordance with that Plan.

The SSFRA states that culverts proposed as part of the proposed development have been appropriately designed in accordance with OPW Section 50 requirements. MCC agrees that this is required.

The SSFRA states that compensation storage is designed to account for the floodplain volume loss identified to offset increased ground levels. The proposed storage reduces the flow in the Kilmahuddrick Stream at the railway section, restoring it to baseline levels and reducing any impacts due to the site development. MCC agrees that this is required.

The SSFRA states that the proposed surface water system will manage surface water run-off from the site and should be in accordance with SDCC policy and guidelines, and further details are provided under separate cover. MCC agrees that this is required.

# 6. Justification Test for Development Management

The sixth section of the SSFRA (Justification Test for Development Management) sets out the Justification Test for Development Management as undertaken for the proposed development following assessment. Given the SDCC SFRA and published flood zones, and the site-specific modelling and mapping undertaken by JBA locate the subject site in an inappropriate flood zone, MCC agrees that this is required, and MCC has no reason to disagree with the findings given the assessment has been undertaken in line with the SSFRA as it stands.

#### 7. Conclusion

The seventh and final section of the SSFRA (Conclusion) summarizes the report and key conclusions. MCC agrees the conclusions largely reflect the findings of the report.