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Predicting Floods to Protect Property Regimes: Situating Flood Modelling in the River Poddle Catchment, Dublin

Laure de Tymowski

Maynooth University, Maynooth, Ireland; laure.detymowski.2021@mumail.ie

Elliot Hurst

Independent researcher, Canberra, Australia; ehurst@posteo.net

ABSTRACT: Water models are world-making devices that stabilise or remake social structures and power relations. This has spurred calls for deeper explorations of how models are situated within historical and political contexts. The paper examines the flood model used for flood management planning in the River Poddle catchment in Dublin, Ireland. Starting from the death of Celia de Jesus during a 2011 flood in this catchment, we argue that Dublin's neoliberal property regime is an essential context for situating this model. Using a method grounded in discourse analysis and interdisciplinary dialogue, our situating approach follows the modelling process across two levels: the policy context and the model outputs and outcomes. Irish flood management policy sets strong boundaries for modelling, while embedding property assumptions in the model's aims, scenarios and maps. Model outputs are shown to effectively serve the interests of real estate actors while negatively impacting those marginalised in property relations. Our critical situating has important implications for those hoping to use or critique models in order to challenge injustice.

KEYWORDS: Flood modelling, situated knowledge, property regime, land justice, Dublin, Ireland

INTRODUCTION

On the night of 24 October 2011, during the worst Dublin flood event of the last decade, Celia de Jesus, Filipino-born Irish citizen and household assistant at a local hospice, was trapped in the basement flat she was renting and died as a result. To date, the dominant narrative surrounding her death has been that she was killed by the flood after the River Poddle burst its banks. The Dublin District Coroner (2012), for example, reached a verdict of "drowning as a result of a surge of water and flooding", while a subsequent flood report commissioned by the Irish government concludes that she was "trapped by flood waters" (OPW, 2011: 1). Such summaries obscure crucial details of Celia de Jesus's death. To maximise profit, her landlord had divided his property into five unauthorised rental units, breaching various health and safety guidelines (Dublin District Coroner, 2012). Celia de Jesus was renting one of the two basement units of the property (Figure 1). The sole window of the flat was blocked with metal bars, leaving the door as the only exit. On the night of the flood event, she was unable to open her door and did not have access to any alternative means of escape. In line with critical disaster risk literature (Katz, 2008; Malm, 2023), the tragic death of Celia de Jesus can be better understood to result from the unsafe housing conditions into which she was forced due to the housing shortage and lack of affordability that are key outcomes of Dublin's neoliberal property regime (Hearne, 2020).

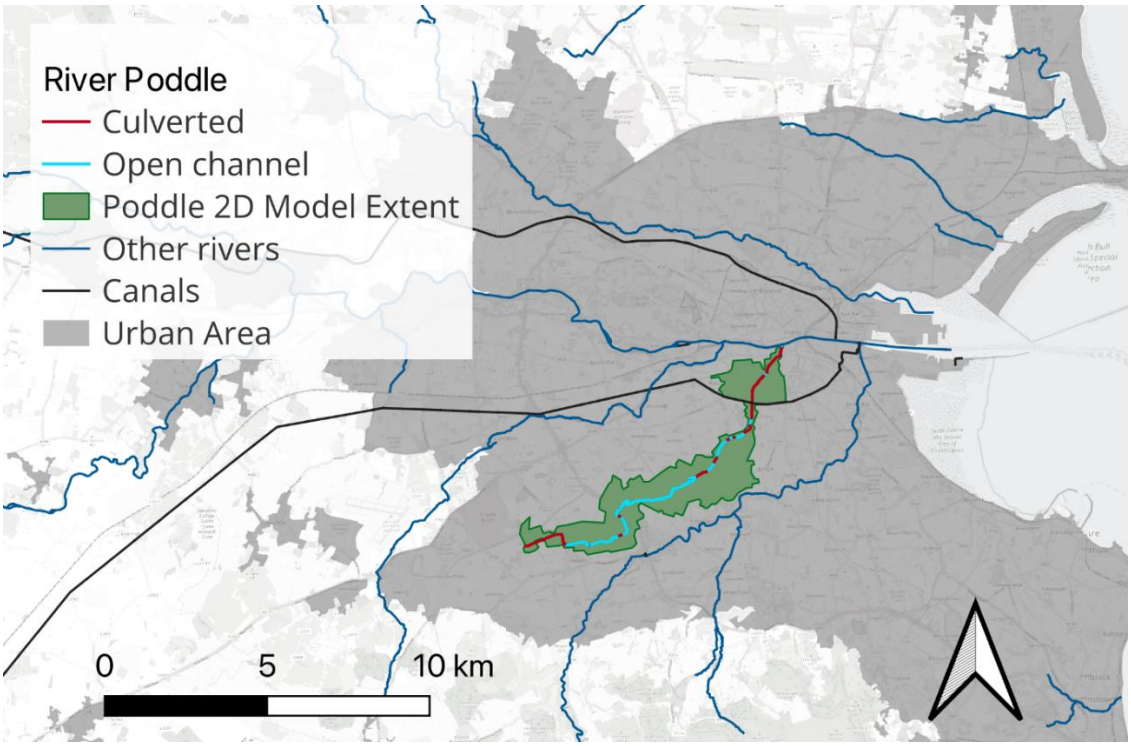
Figure 1. Entrance to Celia de Jesus's basement flat after the 2011 flood event.

Source: Photo by Sasko Lazarov (2011).

After the flood, the Office of Public Works (OPW) accelerated the flood risk management process for the River Poddle, which is one of more than 135 watercourses in the Dublin area (Doyle, 2012), rising in suburban Tallaght in South Dublin and flowing for 12 km northeast to meet the River Liffey in central Dublin (Figure 2). Hydraulic models were central to this flood risk management process. A Poddle model was built by RPS Group consultants using the industry-standard flood modelling software, Infoworks ICM (RPS Group, 2014b). In the model's representation, virtual water is added at 64 sub-catchment points (Black & Veatch, 2020). This water flows through stormwater pipes towards river outfalls and then down the main channel of the River Poddle. As rising virtual water breaks out of the channel, it flows over a ground surface that is represented by a mesh of triangles of between 1 and 25 square metres, with the two-dimensional shallow wave equations distributing out-of-channel floodwaters during the simulated period, balancing gravity, pressure, inertia and viscosity (Innovyze, 2025). The model incorporated data from previous modelling studies and underwent several rounds of revision during prioritisation studies and the subsequent design of the flood alleviation scheme. The design process, underpinned by this modelling, led ultimately to a €10 million flood alleviation scheme whose construction began in 2024.

The varied uses of models in water politics – spanning research and management arenas – have come under critical evaluation from researchers (Landström et al., 2011; Sanz et al., 2019; Krueger and Alba, 2022; ter Horst et al., 2024; Godinez Madrigal et al., 2024; Klein et al., 2024). This work draws on a broader tradition in science and technology studies that examines the world-shaping role of models within broader assemblages (Babel et al., 2019; Harris, 2022; Kumar et al., 2022). Such work rejects the notion that models are neutral tools, instead linking models to particular projects and ideologies (Lane et al., 2011a). In the words of ter Horst et al. (2024: 4158), models are, "based on ideas about how the world functions or should function, enabled or limited by technology and sustained by particular forms of (expert) knowledge, values, and understanding". A critical examination of models and their underpinning ideas contributes towards mapping the power relations that sustain or remake waterscapes.

Figure 2. The River Poddle and modelled catchment within Dublin.



Source: drawn by Elliot Hurst (2025), data from Open Street Map contributors.

This paper draws on a four-year PhD research project that assessed the 2011 flood event and its response from an urban environmental justice perspective, outlining the power of property market actors to drive flood risk management in the River Poddle catchment (de Tymowski, 2024). From this starting point, our aim is to uncover how the Dublin property regime shaped the modelling of the River Poddle and how, in turn, the model is used to sustain the property regime. In developing this critical approach, we take aim at the hegemonic position of the present property regime and at its resulting inequities.

In the next section, we situate our research at the intersection of two critical conversations. First, we explore how models are embedded in processes of 'flood risk management' (FRM) and we introduce the theoretical and analytical lens of situated modelling. Drawing on urban environmental justice scholarship with a specific focus on the Irish context, we then situate property within past colonial to current neoliberal governance regimes. Following a discussion of our research methods, we explore the inextricability of property relations within two moments of the extended modelling process: the policy context that shapes model requirements, and the use of model outputs by different actors. By working across levels of analysis, we show that a policy framework oriented towards property protection is embedded in the technical schematisation of the model, that the model outputs are mobilised to support the continuation of an unjust property regime, and that property is therefore the crucial context for situating this model.

SITUATING FLOODS, THEIR MANAGEMENT, AND THEIR MODELS

Dublin is not the only city impacted by deadly flooding. Floods, created and converted into hazards by different mechanisms, are intensified by the capitalist organisation of space and the acceleration of global heating (Malm, 2023; Sharma, 2023; CrimethInc.; 2024). Critical water scholarship has engaged with the

topic of flooding with a respect for the localised complexities of "policies, projects, discourses, beliefs, assumptions and anxieties" (Cons, 2017: 50). This spans from attention to the production of flood vulnerability (Ranganathan, 2015; Merten et al., 2021), to critiquing the social inequities and harms generated during post-flood responses (Clark, 2019; Millington, 2021). The political ecologies of flooding described in this literature impel us to critically examine the technical and supposedly neutral institutional responses to flooding, which, particularly in Europe and Anglophone contexts, are collectively referred to as flood risk management.

As expounded by its proponents, flood risk management (FRM) is about understanding flood risk and then planning and implementing responses, whether these are so-called 'hard infrastructure' such as walls and levees or a variety of other measures such as flood warning systems. Crucially, flood risk management as a paradigm not only responds to flood risk, but also proposes depoliticised models of how flood risk is produced (see, for example, OPW, 2004). Critical scholarship has explored how FRM is aligned to a risk-based paradigm, though there is a need for scrutiny of the novelty of such a governing approach both to floods and more broadly (Lane et al., 2011a; Krieger, 2013; Escobar and Demeritt, 2014; Kuklicke and Demeritt, 2016; Revez et al., 2017).

Flood models are crucial technologies for understanding flooding within a risk paradigm. The predictions produced by flood models inform plans, policies and priorities; perhaps even more significantly, they inform the material distribution of funding and flood measures. Those commissioning flood models within FRM processes would thus readily accept the argument that models are world-making devices (Jensen and Morita, 2015; Viveiros de Castro, 2019; Krueger and Alba, 2022; Lehman and Johnson, 2022; ter Horst et al., 2024; Klein et al., 2024). In describing models this way, we follow Ballestero's theorisation of devices as, "instruments for organizing and channelling technopolitical work" (Ballestero, 2019: 9; Ballestero and Oyarzun, 2022). This means drawing attention to the aspects of a model's social impact that FRM practitioners may not so readily acknowledge. The significance of flood models in FRM, when combined with critiques of the depoliticised nature of FRM in general, raises the question of how such modelling might be done differently (Lane et al., 2011b).

Recent scholarship has developed these ideas under the heading of situated modelling (Klein et al., 2024). The term 'situated' draws from Haraway (1988), who introduces the concept of situated knowledge as part of the theorisation of feminist objectivity that can generate "better accounts of the world" (ibid: 590). Situated knowledge thus entails a critique of positivism, which views the aim of knowledge production as producing universal knowledge through value-free objectivity and rationality (Harding, 2015). 'Situated modelling' is used by Klein et al. (2024) to advocate for a reflexive modelling praxis that is attuned to social inequities and power imbalances; being situated, however, is an inescapable reality. The "view from nowhere" (Haraway, 1988: 589) is always a trick. While the modellers who worked on the River Poddle may not have been highly reflexive about this fact, all models are already situated in their respective social contexts (ter Horst et al., 2024). For the River Poddle model, we aim to show that a crucial aspect of this context is the Dublin property regime. In focusing on property relations, we draw attention to how not only waters but other aspects of society can be (re)produced through modelling practices. Situating models, we believe, should serve to challenge the aspects of their context that are taken for granted by those who benefit most from current economic and political structures.

Situated modelling literature draws upon critical theories of 'the social', attentive to power and "the unequal parts of privilege and oppression that make up all positions" (Haraway, 1988: 579). This has led to a call for "power-sensitive" modelling (ter Horst et al., 2024); however, there are multiple ways to conceptualise power. Allen (2021) highlights the distinction between power concepts that are focused on the actions or abilities of individual actors, and concepts that understand power as structural and thus not necessarily exercised by a specific actor (also see Mau, 2023: 46). This is important, as different ways of conceptualising power will lead to different ideas of what it means to situate a model in its social context. Research that advocates ethnographic approaches in order to understand modeller's choices

(Krueger and Alba, 2022; Melsen, 2022) aligns with concepts of power as something exercised by specific actors. In connecting the Poddle flood model to the Dublin property regime our analysis adopts a structural concept of power, one that privileges broader political and economic forces over the positionality of individual modellers.

We also see situated modelling as being aligned to the critical approach of a broader hydrosocial literature. The hydrosocial critique of the hydrological cycle offered by Linton and Budds (2014) applies equally well to flood models. Their aim is to explain how the hydrological cycle, "emerged in a specific historical context in pursuit of particular objectives and interests" (Linton and Budds, 2014: 171). A key aspect of hydrosocial study is the contextualisation and critique of concepts that are naturalised within conventional hydrological accounts. Concepts such as the hydrological cycle or the watershed are shown to be contextual and contingent readings of hydrology that normalise particular approaches to water management (Linton, 2010; Loftus, 2011; Budds and Hinojosa, 2012; Mollinga, 2020). One aim of this paper is to understand how a property regime may be normalised within a flood modelling process.

SITUATING IRELAND'S PROPERTY REGIME

This paper situates flood modelling through the lens of property regimes. As a pillar of flood governance, the concept of property, itself embedded in defined modes of governance, must be thoroughly scrutinised. If we are serious about opening the black box of flood modelling (ter Horst et al., 2024), we in turn must follow Safransky's (2016: 8) call to open "the black box of private property". As Safransky (ibid) puts it,

> The act of drawing property lines does more than mediate the distribution of land. Property is intimately involved in the creation and ordering of racialized bodies, the formation of political subjectivities, our sense of belonging in relationship to one another, and whose lives are valued and whose are not.

For many critical property theory scholars, the emergence of private property and its enabling legal apparatus must be traced back to colonial times (Jones, 2019; Eidelman and Safransky, 2021; Beirne, 2023). In an Irish context, a distinct trait of English colonialism is that "dominance was ultimately secured through the changing of property relations, most importantly by turning land into private property" (Jones, 2019: 198). Control over land was achieved through abstraction into "simple unit(s) of property, easily exchanged" (ibid: 191). Surveys and maps proved instrumental in such land abstraction processes (Jones, 2019; Kearns, 2022). The newly defined units were swiftly enrolled in logics of commodification and rent maximisation (Jones, 2019). Kearns (2022) describes the Irish Down Survey (1655 – 58) as "a sort of real-estate prospectus intended to whet the appetites of potential colonial settlers and investors". Centrally, colonial "enclosure was not just a legal change" (Jones, 2019: 201); rather, it was enacted through violent processes of social exclusion and ecological erasure (Deckard, 2016; Kearns, 2022).

In recent decades, a major Global North political economy context in which property-related urban struggles have taken place is the neoliberalisation of urban governance (Soja, 2010; Angelo, 2021; Kotsila et al., 2023). Neoliberalisation is defined as a set of regulatory responses to the crisis of the Keynesian welfare state and the end of the industrial economy in the late 1980s. These responses include the privatisation of public services, cutbacks on public funding, and a free market-oriented economy. Neoliberal urban governance regimes have resulted in renewed widespread privatisation and commodification of urban land (Angelo, 2021; Armstrong et al., 2023). The renewed enclosure is most evident in the increased marketisation and financialisation of housing provision (Hodkinson, 2012).

Land justice scholars and activists (Figure 3) contend that current neoliberal private property regimes in great part reflect their colonial legacy (Safransky, 2016; Beirne, 2023). Kitchin et al. (2012) argue that Ireland's neoliberal regime and its Celtic Tiger property boom (2002-2008) have strong colonial roots. According to those authors, the frenzy around homeownership, buy-to-let, and other forms of property investment cannot be understood in isolation from the nation's "postcolonial anxiety around land" (ibid:

1317). In other words, uneven property regimes inherited from colonial times have continued to be valued as a means of gaining social power and recognition. Furthermore, from a neoliberal governmentality perspective, "the changing of property relations" (Jones, 2019: 198) has continued to be mobilised to prevent/address social unrest, most notoriously through encouraging homeownership (Hodkinson, 2012; Hearne, 2020). Finally, from colonial to more recent neoliberal times, the hegemony of private property regimes has obfuscated the existence of other modes of property ownership. In Ireland, "[p]eople who made use of resources at various times of the year without excluding others from sharing them at other times are nowhere to be seen on maps of landowning" (Kearns, 2022). In Vancouver and Detroit, alternative property ownership claims made by marginalised communities are collective ("belongs to us" in Safransky, 2016: 17) and based on the "land's use value rather than exchange value" (ibid; Blomley, 2008).

Figure 3. Artwork by Irish artist-activist Spicebag, entitled *The Eviction*, which draws parallels between a property eviction during colonial times and one that occurred in Dublin in 2018.

Source: Artwork by Spicebag (2021).

In Ireland, the period following the 2008 property crash has seen a reinforcement of neoliberal policy (Kitchin et al., 2012), setting the path for what is now known as the worst housing crisis in the history of the State. While the number of those housed in emergency accommodation has now surpassed 15,000 for the first time since figures began to be compiled more than a decade ago (Holland, 2025), the impact of the crisis is much wider in scope. Taken altogether, Hearne (2020) estimates that one in six of all households in Ireland are affected by homelessness or some form of housing insecurity (Figure 4). With low income as a key determinant, the most affected include "disadvantaged women and children in lone-parent families, migrants, Travellers, people with disabilities, young people leaving care, and single men" (Hearne, 2020: 46). Importantly, housing insecurity cannot be determined based on property tenure alone, rather it must be seen through the intersectional lens of class (Cho et al., 2013). As an example, homeowners in long-term mortgage payment arrears who are at risk of losing their home are fully part of the 'unpropertied': between 2012 and 2019, 8,007 Irish homes were repossessed (Hearne, 2020). The structural crisis is described as the direct result of the intensified neoliberal housing policy that has been in place since the 2010s. Such a policy is most evident in the increased role that is now played by the private sector in the provision of housing and the corresponding decrease in public housing throughout the country (Hearne, 2020). Homes are being converted into "financialised assets" (Hearne, 2020: 13;

Reynolds, 2022). More than ever, property is at the heart of highly uneven rent and interest payment extractive processes increasingly driven by global finance (Ward and Brill, 2023).

Figure 4. Rough sleeper tent blown by the wind in the River Poddle catchment.

Source: Photo by Laure de Tymowski (2022).

Neoliberal private property regimes have greatly influenced flood governance: in a Global North context, it is mostly centred on protecting high-value properties from devaluation (Taylor, 2020). In Ireland, Gillespie et al. (2020) find clear evidence of a "flood discount" in the housing market: after the publication of flood risk information in 2011, dwellings in medium to high flood risk zones lost 3.1% of their value. Property value and real estate market expansion are safeguarded for the most part through the implementation of flood alleviation infrastructure and, increasingly, by flood re/insurance (Taylor, 2020). The implementation of flood alleviation infrastructure in particular has been found to neutralise the flood discount effect (Beltrán et al., 2018; Gillespie et al., 2020). As for land use management, it is too often subsumed under property market interests (Collins, 2010; Koslov, 2016; Collins et al., 2018; Tubridy et al., 2020). In Ireland, the Celtic Tiger property boom was facilitated by a planning system that was largely influenced by property developers and investors (Kitchin et al., 2012) and which resulted in floodplain overdevelopment (O'Dowd, 2015).

The property-oriented flood governance described above, in turn, reinforces various forms of social and environmental harm. Flood re/insurance, for instance, has several long-documented flaws; these include: its relevance mostly limited to property owners who are able to afford it (O'Hare et al., 2016; Collins et al., 2018), the individualised, consumerist flood adaptation approach it promotes (O'Hare et al., 2016) and, finally, the riskscape it produces through its levee effect and increased financialisation (IPCC, 2001; Collins et al., 2018; Taylor, 2020; Taylor and Weinkle, 2020). In Florida, for instance, risky coastline real estate developments are sustained through insurance-linked securitisation, "a new financial product for capital market investors" (Taylor and Weinkle, 2020: 411). Concerning flood alleviation infrastructure, in addition to its levee effect and harmful environmental impact (IPCC, 2022), it too often dramatically reinforces housing inequities. Building on Smith's (1979) rent gap theory, Anguelovski et al. (2019) show that green/climate gentrification occurs when municipalities, private investors, and privileged residents are given the opportunity to bank on an existing gap (such as the lack of flood protection) and later capture a rent from the benefits of the improved conditions (such as the building of flood protection). As flood alleviation infrastructure is "capitalized into property prices" (Beltrán et al., 2018: 2362; Anguelovski et al., 2019), it negatively impacts housing affordability, leading to "climate gentrification" (Shokry and Anguelovski, 2022). Put simply, those unable to afford the rising rents that follow from implementation of flood alleviation measures are inevitably forced out of their homes.

METHODOLOGY

Situating our project

The present interdisciplinary collaborative project is born from discussions that were first initiated during the IRI THESys summer school *Situating Hydrological Modelling* that took place in September 2023. Of the two researchers involved in the project, Researcher 1 worked as a flood modeller in the UK and Researcher 2 recently completed a PhD in human geography assessing flood adaptation governance in the River Poddle catchment from an urban environmental justice perspective. The main ground for collaboration was a common interest in researching capitalism-produced inequities, here in the context of flood management (Hurst, 2024). Taking the tragic death of Celia de Jesus and PhD research findings as a starting point for enquiry, the project asks whether and how flood modelling as conducted in the River Poddle catchment is shaped by, and in turn reinforces, uneven neoliberal property regimes. Data collection was conducted through discourse analysis, which is described next.

Critical discourse analysis

The two researchers involved in the project were located in different countries (UK/Australia and Ireland), and the research project was thus conducted through regular online exchanges that took place between June 2024 and January 2025. At an early stage, the researchers agreed that an enquiry into the property regime assumptions embedded in the flood modelling process would be well-served by applying a qualitative critical discourse analysis to flood modelling reports and related documents. 'Discourse', in our method, is understood as encompassing both language and its sociomaterial impact (Sharp and Richardson, 2001; Krueger and Alba, 2022; Statham, 2022). Luger et al. (2023: 9) highlight "the usefulness of discourse analysis as a method that can reveal dominant power dynamics". Language often operates to build consensus around the interests of powerful groups and to facilitate their fulfilment (Statham, 2022). According to Statham (ibid), it is through language that these interests are naturalised and legitimised as commonsensical. Critical discourse analysis is therefore well-suited to an enquiry about the assumptions of the dominant 'propertied' class embedded in the flood modelling process. Importantly, critical discourse analysis looks not only at what is present but also at what is "omitted" (ibid).

Method application

The documentation that was to be considered for discourse analysis in the research project was initially composed mainly of what Researcher 2 brought in from her PhD research. This was later expanded by Researcher 1 who was able to include model reports and other related technical documents. The document gathering was driven by the respective concerns and expertise of the two researchers. Researcher 1 was more focused on looking for documents related to the model and its policy context (what might shape modelling practices) while Researcher 2 was more focused on looking for documents related to the application of the model (the grounded impact of flood modelling on the 'unpropertied'). The interdisciplinarity of the project thus proved fruitful from the outset. The parameters for document selection for inclusion in the discourse analysis were not set out at the start of the project, nor was there a systematic approach to selection. Instead, the selection was conducted inductively throughout the exchange process between the two researchers. Sharp and Richardson (2001) describe a similar approach in their discourse analysis work, noting that in their respective projects the selection process – such as which documents to look at – was continued into the main fieldwork stages.

Practically speaking, our critical discourse analysis method took the form of a property-literature-informed reading of a range of documents relating to the flood modelling process. The critical reading was equally applied to visual content, and especially to maps in recognition of their political embeddedness (Harley, 1992) and their early pivotal role in violently grounding uneven private property regimes in Ireland (Jones, 2019; Kearns, 2022). Our main research question was operationalised through

a set of sub-questions inspired by the property literature and mobilised to guide our reading. These sub-questions were: 1) Does discourse sustain/protect/reinforce an exclusive use of property and its commodification? 2) Does discourse empower property owners and other real estate economy actors? 3) Does discourse obscure property-related inequities, including by omitting them?

While some discourse analysis work was conducted individually by the two researchers, a significant part was conducted collaboratively during the online meetings. Collaborative discourse analysis unfolded over 10 hours and 46 minutes of recorded online exchanges that were guided by the listed sub-questions (quotes from these recordings, numbered 1 to 8, are incorporated in the paper). During the online exchanges, the two researchers discussed particular content and points of interest they had encountered during their individual work. The collaborative aspect of discourse analysis proved especially productive in two ways. First, it allowed for a fully interdisciplinary practice of discourse analysis during which text, visuals and sociomaterial arrangements were discussed from both a flood modelling and housing/land justice perspective. Second, this particular dialogue configuration proved highly favourable to reflective analysis – a pillar of critical discourse analysis (Sharp and Richardson, 2001; Statham, 2022) that greatly helped locating the property assumptions of the two researchers.

Notes were produced from each of the eight discourse analysis recordings, highlighting the main points and content discussed. At the end of the collaborative discourse analysis process, all recording notes were summarised by gathering similar points and content of discussions together under three categories: 1) discussions and content relating to the EU/national policy context of the River Poddle flood model; 2) discussions and content relating to model reports; 3) discussions and content relating to the outputs of the model and their impact. These data were used to produce the final write up of the paper, which presents those among them that were deemed most significant by both researchers from their own vantage point and as a collective. They draw from the documents listed in Table 1 and are presented next in two parts: neoliberal property discourse in the policy context of the flood model, and neoliberal property discourse in its outputs and impact.

Table 1. Documents grounding the data and arguments presented in the paper.

Focus	Document title	Year	Source
Policy context	Report of the Flood Policy Review Group	2004	Office of Public Works
	Directive 2007/60/EC: On the Assessment and Management of Flood Risks	2007	European Parliament
	Eastern Catchment Flood Risk Assessment and Management (CFRAM) Study: HA09 Hydraulics Report Poddle Model	2014	RPS Group
	Eastern CFRAM Study: Poddle Options Report	2014	RPS Group
	Eastern CFRAM Study: HA09 Hydrology Report	2016	RPS Group
Model outputs and impact	River Poddle 1% AEP Flood Extent Map	2018	Black & Veatch
	Map of the River Poddle Flood Scheme Benefitting Areas	2020	Nicholas O'Dwyer
	New Mill Development: Civil Engineering Infrastructure Report for Planning	2014	Barrett Mahony
	Harold's Bridge Court: Site Specific Flood Risk Assessment	2023	DBFL

THE PROPERTY REGIME IN FRM POLICIES AND MODELLING STANDARDS

The technical approach used in Poddle modelling builds on a long history of hydrological and hydraulic modelling, however the modelling was shaped most strongly by the policy framework that was developed from the early 2000s onwards. This was a period in which Dublin experienced a surge in new construction – in what was considered the second period of the Celtic Tiger property boom (Kitchin et al., 2012) – accompanied by a severe flood in 2002. In response to these events the Irish government established a Flood Policy Review Group which considered 'international best practice' and developed a list of recommendations; these were provided in a 2004 report (OPW, 2004). This work developed alongside an EU-level management approach that was formalised in the 2007 Floods Directive (European Parliament, 2007). These projects set the contours of a flood management approach with specific institutions, aims and methods.

The FRM policy context is key to tracing how property assumptions were embedded in the modelling and how modelling and presenting model outputs can reinforce a dominant property regime. The institutional structure of FRM in Ireland – recommended by the Review Group and subsequently adopted – placed the Office for Public Works (OPW) as the organisational hinge connecting flood understanding to the development of protection schemes. The Irish implementation of the Floods Directive took shape through the Catchment Flood Risk Assessment and Management (CFRAM) project that ran from 2011 to 2017 (OPW, n.d.). The national-scale CFRAM project was implemented through six regional studies, each managed by engineering consultants. RPS Group was commissioned to model the eastern region catchments, which included the Poddle; this modelling was later continued by Nicholas O'Dwyer who updated the RPS model for the design of the Poddle flood alleviation scheme. The regional studies generated further spatial subdivisions into 'Hydrometric Areas', 'Areas for Further Assessment' and 'High Priority Watercourses', each area requiring its own hydraulic model (including fluvial, pluvial and coastal flood mechanisms, depending on the location). Facing a proliferation of models, a National Technical Coordination Group was created to "determine common standards and methodologies" (Adamson, 2018: 29). These common standards were not published, but they can be understood through the model reports published within the Poddle project and by CFRAM more broadly. These reports also show how other decisions, such as setting the sub-catchment boundaries, were inherited from previous modelling projects in this area. This means that, although the model set up was adjusted to address community concerns (Quigley et al., 2013), many of the model-making options that might have been available to the Poddle consultants had in fact been determined before modelling began (for a similar dynamic in England and Wales where management constrained modelling choices, see Lane et al., 2011a).

Modelling aims

As high-level policy documents, a key purpose of the Floods Directive and of the Flood Policy Review Group report is to define aims for flood risk management. The technical language of the Directive provides a multifaceted view of flooding's harms, spanning "human health, the environment, cultural heritage and economic activity" (European Parliament, 2007: 27). Absent from the Directive's text is any recognition of how the impact of floods is differentiated by class, race and gender. The socially differentiated impact of flooding is not explicitly drawn into the flood management process. Meanwhile, the Flood Policy Review Group report summarises that, "the future policy is to minimise the national level of risk of loss of life and/or damage to property and personal well-being that might arise from flooding in a sustainable and cost-effective manner" (OPW, 2004: 15). Whether explicitly (as property damage) or more abstractly (as an impact on economic activity), these aims call for a modelling approach that can account for flooding's impact on property.

Flood infrastructure prioritisation

A central concern of flood management activities, as set out in the Floods Directive and the Flood Policy Review Group report, is a process of "priority setting" (Floods Directive) or "prioritisation" (Review Group) that should take place before any flood protection infrastructure is built, the objective being to ensure that investments in flood protection are maximally cost-effective. The requirement to make prioritisation decisions across all Irish catchments added additional weight to the requirement for technical standardisation discussed above. This prioritisation approach is not altogether negative; it avoids the potential for investment to flow only to areas which have recently experienced flooding or have more political power. Prioritisation makes the choice of what is built and where into a more rigidly determined calculus. Removing a degree of political contention from individual decisions, however, means that the politics of flood management is more strongly embedded in the prioritisation method.

Prioritisation, in the contemporary Irish context, is a combination of economic and broader assessments (RPS Group, 2014a; Adamson, 2018), in both of which property and property values take centre stage. The economic assessment, used across all CFRAM projects, calculates the costs of flood damage for different classes of property as a function of flood depth. Flood depth is taken to be the maximum flood level surrounding the building, as determined by an analysis of hydraulic model results. This is then used to calculate an expected property damage figure for a given flood event. By integrating over floods of different magnitudes, linked to calculated hydrological exceedance probabilities, the Annual Average Damage (AAD) can be calculated. Once options for reducing flood risk are developed, the AAD can also be used to generate a benefit-cost ratio; this involves calculating a separate AAD for a scenario that includes flood defences and then summing the difference between the two figures over the design life of the scheme. Prioritisation calculations may seem distinct from technical modelling, however it is in order to calculate AAD figures and benefit-cost ratios that the hydraulic model is run with a range of calculated hydrological probabilities.

These calculation methods also embed a set of deeper assumptions about property relations. The method of calculating AAD and benefit-cost ratios – aggregating damages at different probabilities and then summing them over the life of the scheme – only makes sense if there is an expectation that houses retain their current value, without property market fluctuations or redevelopment. The 2008 crash in Irish property markets saw a 54% drop in Dublin residential property prices (Kitchin et al., 2012), illustrating the shaky nature of this assumption. More significantly, an expectation of constant value also means that we assume homes are not decommodified, that is, that they will continue to remain part of the existing property regime. This, after all, is the precondition for private property to hold value. Without this assumption of property market continuity, the benefit – cost logic falls apart. Through this chain of calculations, the prioritisation calculation embeds an implicit political forecast about the future of housing.

Technical details of the application of these methods in the Poddle process indicate just how closely these economic prioritisation measures are linked to a commodified property regime. The damage calculation method creates the possibility for the damage on a single house to be more than the market value of that house as property. The Poddle report which presents these damage calculations as a component of the options assessment states, without explanation, that "where such a situation occurs it is necessary to cap the damages at the market value" (RPS Group, 2014a: 32). For the purposes of the assessment, market value was assigned as €320,728, "the regional average market value of second-hand properties for Dublin taken during the first quarter of 2013" (ibid). This becomes more significant when we consider what are termed the "intangible" damages; this refers to the impacts of flooding that extend beyond property damage but are more difficult to quantify, for example the stress of being flooded or the cost of temporary accommodation. In quantifying these damages RPS Group followed OPW policy, assigning intangible damages to all residential properties as simply equal to the direct (that is, property) damages, which means that these are also capped at "the regional average market value of second-hand

properties for Dublin taken during the first quarter of 2013" (ibid). In summary, to implement prioritisation the OPW developed an approach that made property the essential metric.

Considering only property damage and the potential cost of flood measures overlooks additional social and ecological benefits or impacts that flood management measures may have. Recognising this, the OPW added a Multi-Criteria Analysis (MCA) method to CFRAM prioritisation. This method meant that model results from different flood risk reduction scenarios were assessed against 18 objectives that were split between technical, economic, social and environmental domains. The two objectives with the highest weighting are "minimising economic risk" and "minimising risk to human health and life of residents" (RPS Group, 2014a: 40). The economic risk metric used for scoring is the reduction in AAD. To capture social impacts of flooding (risk to health and life) the chosen metric – one easily read from model results – was the number of residential properties at risk from flooding (ibid). The MCA method provides another instructive example of how property comes to dominate flood planning processes, facilitated by the spatial abstraction of the model results.

Mapping in service of property

A significant part of the FRM process, emphasised across both the Review Group report and the Floods Directive, is that flood risk needs to be mapped. Why the focus on flood mapping? The European Commission presents mapping as a multivalent technology for flood risk management, "an effective tool for information, as well as a valuable basis for priority setting and further technical, financial and political decisions" (European Parliament, 2007: 28). The Review Group report provides a summary of what flood maps enable:

- "Land-use zoning for strategic development plans, (…)
- Development control, (…)
- Planning of infrastructure, (…)
- Identification of property at risk and the needs for flood mitigation measures, (…)
- Planning and management of flood warning and response, i.e.; identification of properties that should be warned of impending flooding (…)
- Identification of available land suitable for development,
- General awareness amongst the public of the risk to property, and possibly life" (OPW, 2004: 145)

There is a significant imbalance in this list between multiple functions linked to property (including in the guise of development) and the single reference to general awareness of possible risk to life. Perhaps it could be charitably argued that risk to people is implicit in sustainable zoning and good planning decisions. Even so, we cannot help but read this list as evidence of a property regime hegemony, as 'properties' become synonymous with their residents to the extent that it is even properties rather than people who should be warned of impending flooding! The maps envisioned by the Irish Flood Policy Review Group hence reinforce a property-centred approach to flood management.

The Floods Directive describes mapping as an effective tool for information, but for whom is the information encoded in the flood maps useful? Flood maps are presented as a valuable basis for setting priorities and making technical-financial-political decisions, but how does the production of maps shape which priorities are seen as central and which options make it to the decision-making arena? References to development in the list above indicate that flood models and management processes are not only oriented towards the protection of existing properties but also play a role in facilitating development within the existing property regime. In the next section we will take up these questions by examining maps produced in the Poddle project.

Hydrological urbanisation

While the aims, prioritisation process and mapping approaches were set at a higher level of policy, zooming in to specific aspects of the modelling approach also uncovers a further set of embedded property assumptions. Specific flood probabilities – for example the 1% annual exceedance probability (AEP) – were the main scenarios of the hydraulic model, conceptualised as a combination of rainfall depth and duration. A hydrological model translates this rainfall into runoff. This translation is a crucial determinant of flood magnitudes. Urban hydrological models are built on a binary of pervious and impervious surfaces. While pervious surfaces have some capacity to absorb rainfall, an impervious surface such as a road or rooftop converts almost all the rainfall landing on it into 'runoff' water that is then distributed by the hydraulic model. This hydrological perspective views urbanisation as simply, "the transformation from natural surfaces to artificial surfaces" (RPS Group, 2016: 150). Hence, in the hydrological model report we learn that the Poddle catchment is "heavily urbanised" (ibid: 18), with "heavily" here evoking not towering skyscrapers but only a high percentage of urban land. When expressed in this way, as a percentage of catchment area, urbanisation is transferred from a social into a hydrological process. The 'hydrological urbanisation' offered in the hydrology report sets aside the processes that produce urban space.

What is overlooked in this simplification? First, the generation of excess runoff from impermeable surfaces is not an inevitable outcome of urbanisation, but the result of a specific mode of urban development that aims to maximise value. The historical correlation between urbanisation and increased runoff – established through hydrological statistics from across Ireland – should not be understood detached from a social process. At least until the recent requirement to adopt "sustainable urban drainage systems" (Dublin City Council, 2022), developers were able to treat the negative hydrological impacts of their development as an externality for which they did not have to pay.

Second, this approach treats urbanisation as a one-directional binary process: either already or not-yet urban. The hydrological report states, for example, that there is "low" uncertainty about future urbanisation scenarios as the catchment is "already fully urbanised" (RPS Group, 2016: 170). This binary and static conception of urbanisation ignores cyclic processes of land valorisation. Geographer Neil Smith (1979) has described how urban development oscillates between cycles of dereliction and regeneration, with the latter occurring once there is a profitable opportunity for developers. This is very relevant to the River Poddle catchment where large former industrial lands traversed by the river are being redeveloped (Figure 5). To put it plainly, "the view of urbanized once and for all is a lie" (Researcher 2, Recording 8). This cyclical development pattern has enormous social impacts, sharpening the divide between those profiting from rising property values and those displaced by gentrification.

While encapsulating past urbanisation dynamics, hydrological scenarios are also imagined futures. The continual remaking of urban space – if it can be levered away from the maximisation of value – represents a potential opening for changing urban hydrology. Urban (re)development can be implemented in a way that reduces runoff volumes. Just because the Poddle catchment is 'highly urbanised' does not mean that its urban hydrology couldn't be remade. These possibilities are not explored in the hydrological scenarios applied in the Poddle catchment. The hydrological modelling approach is adopted from CFRAM standards, which requires modellers to consider only scenarios that represent the current situation or ones where increasing urbanisation results in increased runoff. So far, the maximisation of value (which drives the current property regime) has limited the hydrological possibilities of urbanisation; this is in turn reflected in the modelled scenarios. This limitation of the modelling is not apparent to those who see only the final results of the model, for example in a mapped flood extent. Through the lens of a binary hydrological 'urbanisation', the constant remaking of urban space is overlooked, as is the political potential for challenging this remaking. This means that a straightforward link between urban extent and hydrological runoff is also a projected extension of the current property regime, foreclosing alternative urban futures.

Figure 5. Property redevelopment of a former industrial site in the Poddle catchment.

Source: Photos by Laure de Tymowski (left: 2021, right: 2025).

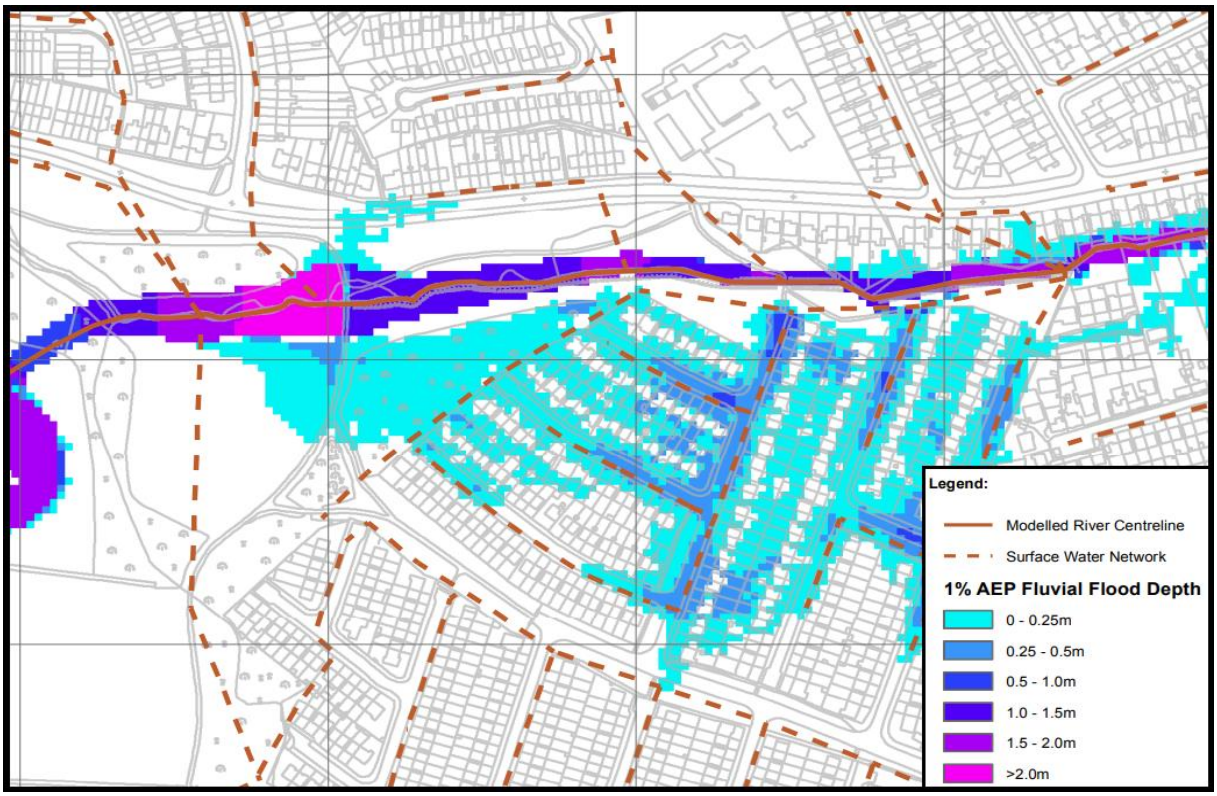
THE RIVER PODDLE FLOOD MODEL OUTPUTS: THEIR USES BY STATE AND REAL ESTATE ACTORS

In this second empirical part, we look at how the River Poddle flood model outputs are mobilised by state and real estate actors to sustain/reinforce existing neoliberal property regimes. Based on the official State narrative, the central objective of the model was to conceive the design of a flood alleviation scheme for the catchment, which construction began in 2024. According to Black & Veatch (2020: 2), the company appointed to produce flood modelling for the River Poddle catchment, "the hydrological and hydraulic modelling (…) contributed to the environmental impact assessment and design of the Scheme". In this section, however, we use our critical discourse analysis method to enquire about the practical impact of discourse and, most importantly, about any discrepancies between "what is said and what actually happens" (Sharp and Richardson, 2001: 201). The data outline how the model outputs are mobilised by different state and real estate actors to fulfil objectives that go beyond producing the "environmental impact assessment and design of the Scheme" (Black & Veatch, 2020: 2). We present the findings in three parts. First, we assess two types of map derived from the model; second, we look at how property developers make use of these maps in flood risk assessments; and, third, we look at how these uses in turn negatively impact the most marginalised in current property relation arrangements.

Reproducing neoliberal property regimes through mapping

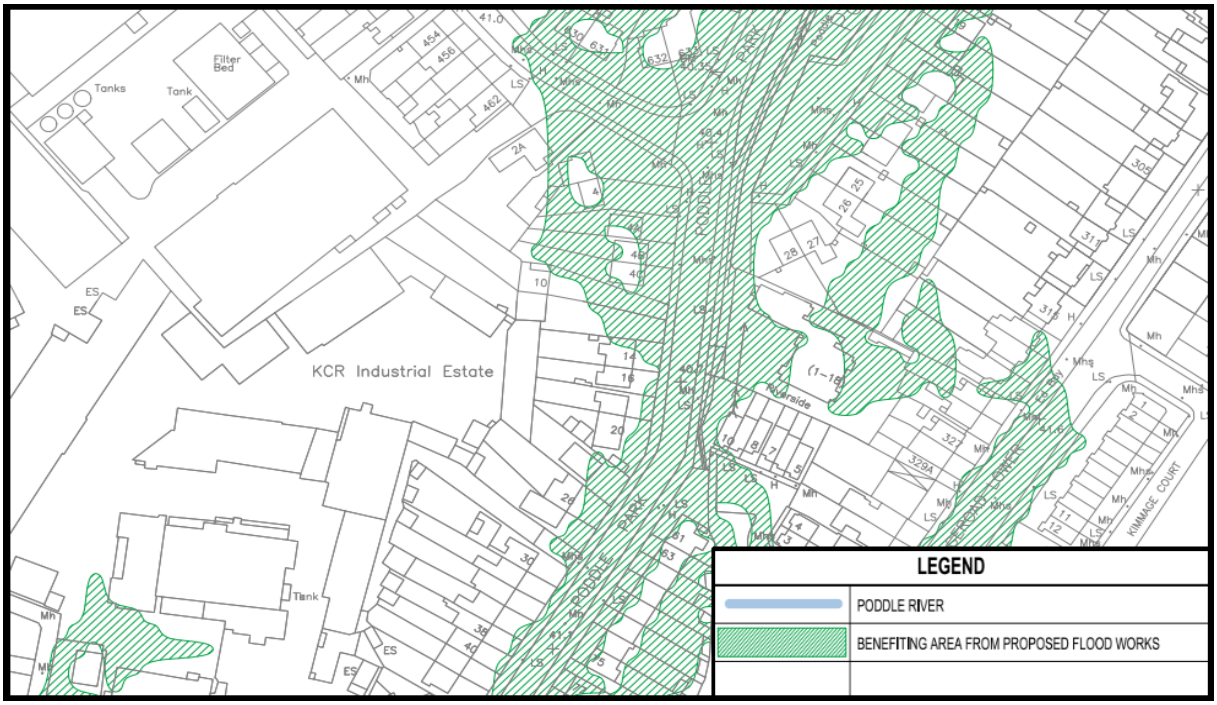
The two maps derived from the final version of the River Poddle flood model are the 1% AEP flood extent map (Figure 6) and the map of the areas that are to benefit from the planned flood scheme (Figure 7). The flood extent map shows the projected extent and depth of a flood with a 1% probability of being exceeded in any given year, commonly referred to as a 100-year flood event. The benefitting areas map shows the areas of the catchment that are to be protected by the planned flood scheme during a 100-year flood event.

Figure 6. Extract from the River Poddle 1% AEP flood extent map.



Source: Black & Veatch (2018).

Figure 7. Extract from the map of the flood scheme benefitting areas.



Source: Nicholas O'Dwyer (2020).

In line with the strong property focus of flood modelling governance outlined so far (including its mapping dimension, see previous section), one of the main features of both background maps is property boundaries. Background maps are produced by Ordnance Survey, which was originally the British colonial institution involved in mapping colonised territories in response to rebellion movements (Jones, 2019). As previously outlined, mapping proved instrumental in asserting colonial power through private property determination (Jones, 2019; Kearns, 2022). In the words of Harley (1992), through mapping the world is "disciplined" and "normalized". In this sense, the two maps contribute to reproducing neoliberal 'propertied' space, obfuscating the existence of the 'unpropertied' and negating the possibility of more collective forms of property ownership (Blomley, 2008; Safransky, 2016; Kearns, 2022). Importantly, in this case, more collective forms of property ownership could result in more collective approaches to managing flood risk. During a recorded exchange (Recording 2), Researcher 2 observed that alternative backdrops could have easily been envisaged such as a line that demarcates residential land but does not go into the detail of individual private properties. Furthermore, while the sharp flood/benefitting area extent line is best suited to respond to real estate actor concerns – allowing for straight answers to questions such as whether a property can be built or considered for insurance – it is largely at odds with flood modelling uncertainties (Ran and Nedovic-Budic, 2016; Krueger and Alba, 2022; de Tymowski, 2024).

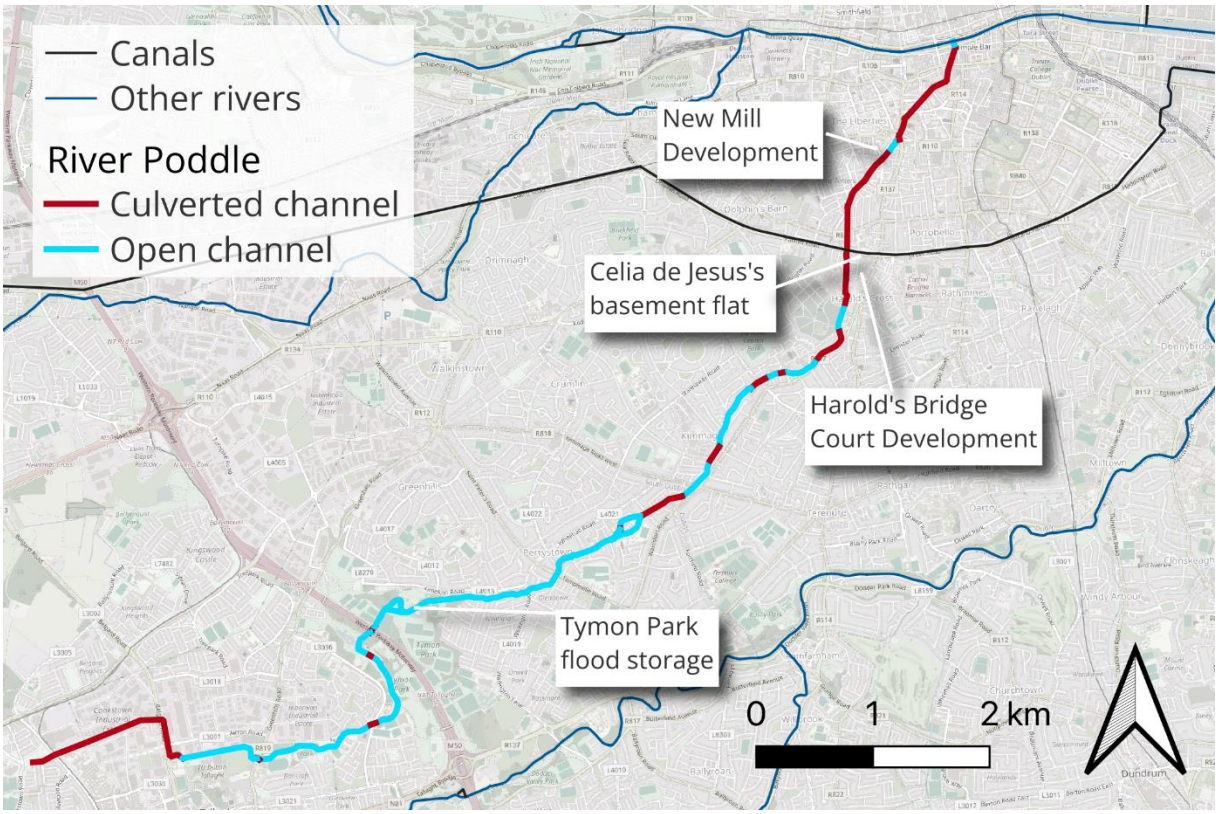
One significant difference between the two background maps is that the map of benefitting areas contains additional information such as street numbers and place names, which makes it easier to locate individual private properties and therefore (re)claim flood insurance. Indeed, the provision of "'benefit area' maps" in the context of the implementation of new flood schemes is a requirement of Insurance Ireland, a stipulation with which the OPW agreed to comply (OPW and Insurance Ireland, 2014: 6). While flood insurance is a means of safeguarding property transactions in flood-prone areas (Tranum, 2024), it is irrelevant to tenants and other 'unpropertied' as was Celia de Jesus: in 2022, over a third of Irish households were tenants (CSO, 2022).

In sum, our assessment of the property discourse embedded in the two maps reveals, first, how their property line background helps reproduce neoliberal 'propertied' space and, second, how their content responds primarily to real estate actors' concerns.

From maps to lucrative property developments

Even when published in "draft" form and "for consultation purposes only" (RPS, 2013; Black & Veatch, 2018), flood and benefitting areas maps are mobilised in flood risk assessments commissioned by property developers to secure planning approval for developments located in flood-prone areas. In what follows, we look at two of these flood risk assessments, one mobilising a draft map of benefitting areas derived from an earlier version of the River Poddle flood model dated 2013 (RPS), and the other mobilising a draft 1% AEP flood map derived from the final version of the River Poddle flood model dated 2018 (Black & Veatch).

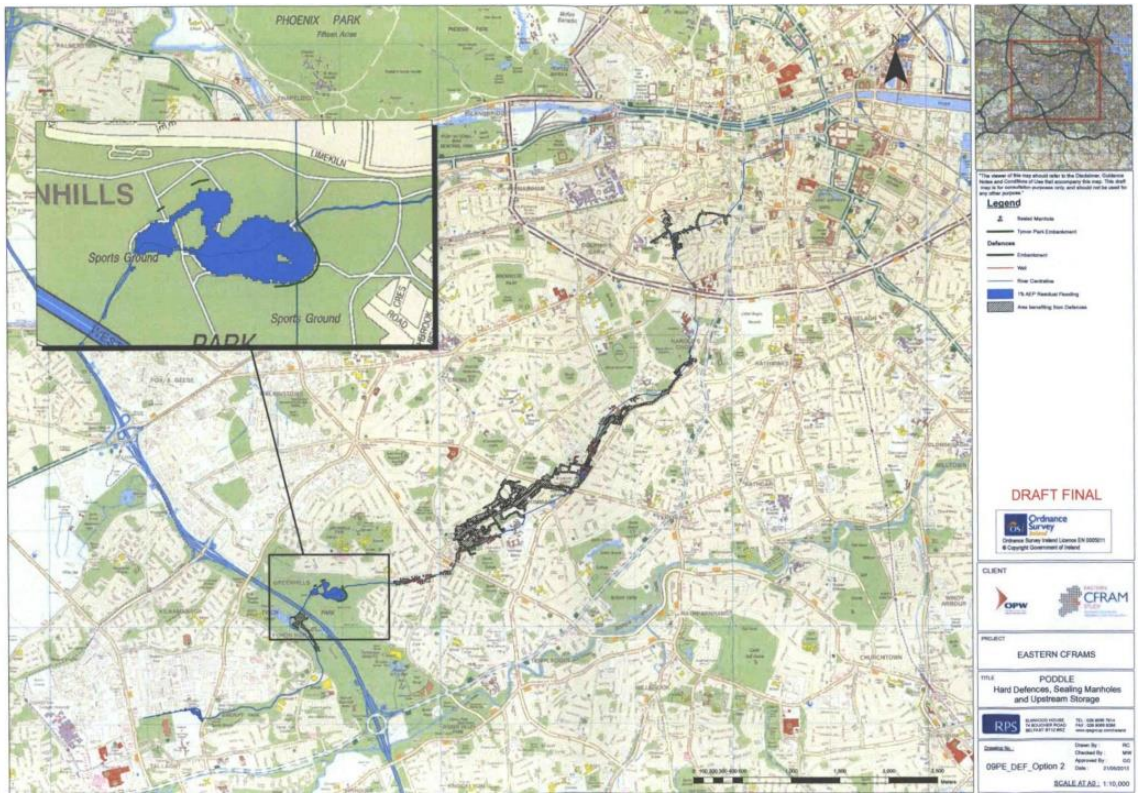
Figure 8. Map locating the planned flood storage, the two housing developments, and Celia de Jesus's flat along the River Poddle.



Source: drawn by Elliot Hurst (2025), data from Open Street Map contributors.

The first flood risk assessment was produced as part of a planning application for New Mill (Figure 8), a private build-to-rent development project aimed at students and completed in 2018. The project's developer was UK-based Global Student Accommodation, which is now located in 10 countries with circa US$6 billion of assets under management (GSA, 2024). The development site is located in a flood-prone area of the Poddle catchment (0.1% to 1% AEP zone) and is traversed by the River Poddle culvert (Barrett Mahony Consulting Engineers, 2014). In such flood-sensitive locations, flood risk assessments are determinant in securing planning approval. A significant argument developed throughout the assessment and in its conclusion is that the River Poddle flood scheme, once completed, would mitigate flood risk at the site: "the flood relief works (…) should eliminate the risk completely" (ibid: 14). The 2013 benefitting areas map (Figure 9) is provided in the appendix of the assessment to support their argument. In other words, a main assumption grounding the assessment was that the River Poddle flood scheme would soon be implemented. The report even mentions explicit exchanges between flood consultants and Dublin City Council officials on the subject: "It is understood from DCC (Dublin City Council) that this scheme (the River Poddle flood scheme) is approximately two years from commencement" (ibid: 10). In 2014, however, at the time of the flood risk assessment, the flood scheme was still six years from planning submission stage (2020) and nine years from statutory planning approval (2023)! This means that the flood scheme was promised to developers and their consultants long before its statutory approval, overlooking existing planning approval processes! In sum, the model and its mapped results helped turn a speculative scheme into a promise of concrete protection.

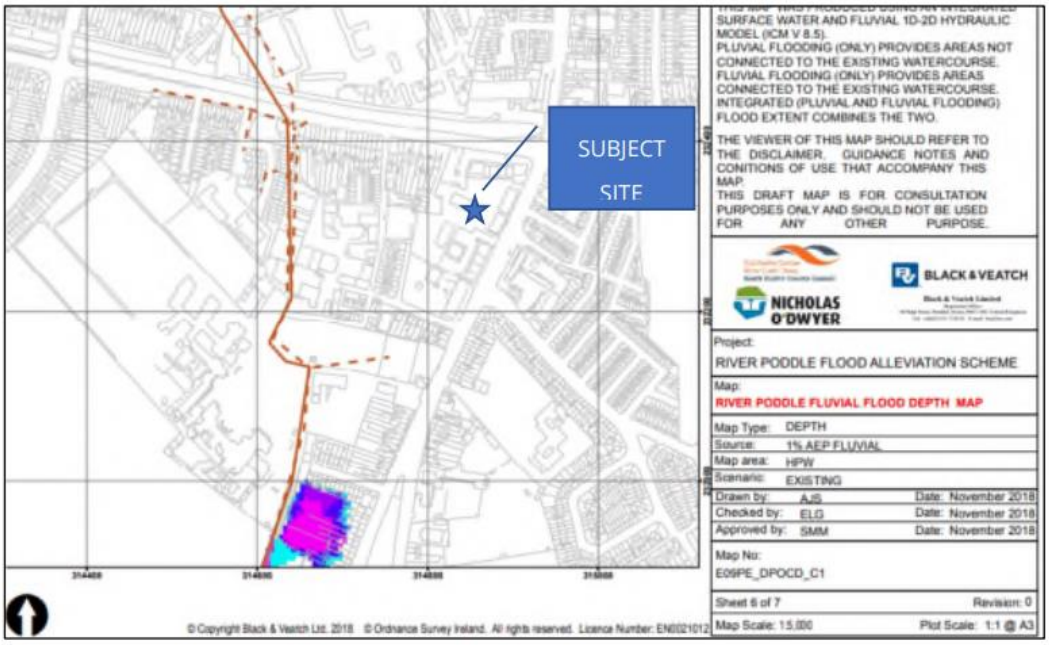
Figure 9. The 2013 benefitting area map (RPS) used in the New Mill flood risk assessment.



Source: Barrett Mahony Consulting Engineers (2014: Appendix V).

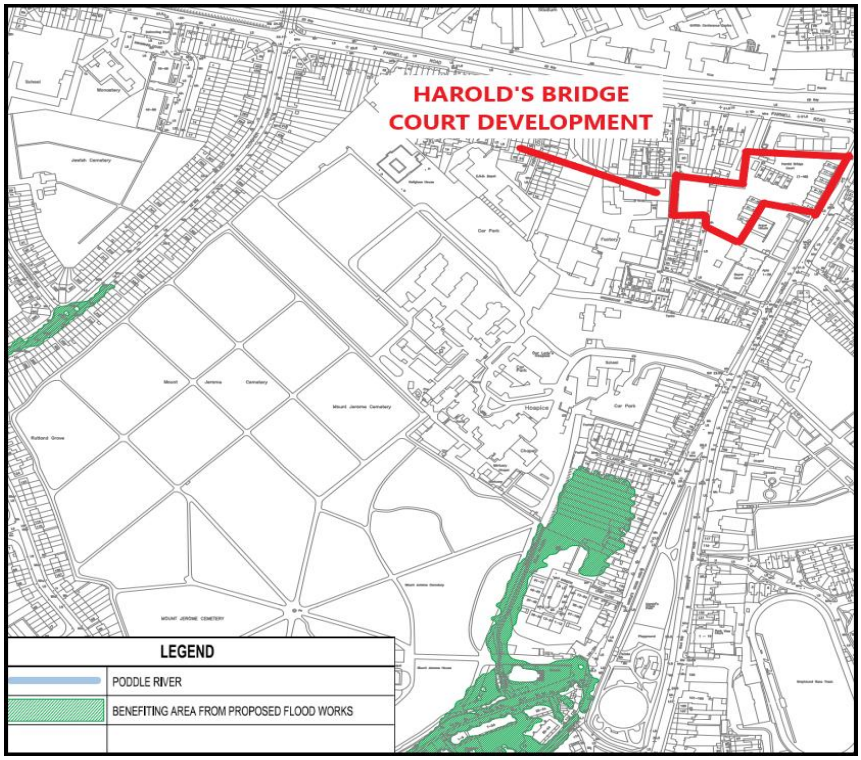
The second flood risk assessment was produced as part of a planning application for a private build-to-rent development named Harold's Bridge Court (Figure 8), which was granted planning permission in 2024. In this case, the planning application was submitted by the Dublin-based Adroit Company Ltd. Adroit is a real estate company owned by the Lydon family who, by 2017, had already built more than 2,000 houses in Ireland (O'Donoghue, 2017). As with the New Mill development, the Harold's Bridge Court development is located in a flood-prone area of the Poddle catchment (0.1% to 1% AEP zone), only metres away from Celia de Jesus's former habitation and where flood water has significantly accumulated during past flood events (Dublin Corporation, 1986; OPW, 2011). This time, it is the 1% AEP flood map derived from the model (Black & Veatch, 2018) that is included in the flood risk assessment (DBFL Consulting Engineers, 2023) to show that the development site is not located in the projected 1% AEP flood extent (Figure 10). The conclusion drawn from the flood map, however, is inconsistent with another central argument developed in the flood risk assessment: that the development site is to be protected from future 1% AEP flood events by the coming River Poddle flood scheme (whose implementation is again assumed prior to it receiving statutory planning approval). The protection claim is made throughout the report, including in its conclusion which states that, "Once complete, these flood alleviation works (the River Poddle flood scheme) will protect the subject site and surrounding area from the 100 Year (1.0% AEP) Storm Event" (ibid: 34). The claim that the development site will be protected by the coming flood scheme, however, is not supported by the scheme benefitting area map, which clearly shows that the site is located outside the protected area (Figure 11). In other words, in this case, two outputs of the model were mobilised in inconsistent ways so as to maximise the chances of obtaining planning permission: the flood map to emphasise the *absence of risk* during 1% AEP events and the flood scheme to emphasise *protection* during 1% AEP events.

Figure 10. Extract from the 2018 1% AEP flood map (Black & Veatch) presented in the Harold's Bridge Court flood risk assessment.



Source: DBFL Consulting Engineers (2023: 19).

Figure 11. Extract from the map of the flood scheme benefitting areas showing Harold's Bridge Court outside the protected area.



Source: Nicholas O'Dwyer (2020), red marks added.

In sum, the model maps' enrolment in flood risk assessment language and practices furthers their contribution to the reinforcement of neoliberal property regimes. By mobilising the maps in various ways in flood risk assessments, be it unauthorised ("draft" versions for "consultation purposes only"), at odds with planning approval processes, or inconsistent, consultants enable property developers to expand their property wealth and control over land use management in flood-prone areas.

From lucrative property developments to increased risk exposure

In terms of flood risk exposure, data presented in the previous section highlight how the model outputs are enrolled in flood risk assessment discourses that enshrine property developers as dominant stakeholders in land use management in flood-prone areas. This, in turn, is very likely to negatively impact residual flood risk, which is especially significant to residents like Celia de Jesus who are the most precariously housed in the catchment.

Now looking at the housing impact of the two private build-to-rent developments, in the described context of marketisation of housing provision in Ireland (Hearne, 2020), they are both to contribute to reducing local affordable housing opportunities and reinforcing gentrification dynamics. This is especially salient in the case of the New Mill development which is located in the Liberties (Figure 12), an inner-city working-class neighbourhood of Dublin that has been under strong gentrification pressure over the past decade (Kelly, 2014; Anguelovski et al., 2022). In this neighbourhood, student accommodation developments have flourished rapidly; however, while they constitute a profitable business for investors, they are affordable only to a class of wealthy, mostly international, students (Anguelovski et al., 2022; Reynolds, 2022).

Figure 12. The gated New Mill student accommodation.

Source: photo by Laure de Tymowski (2025).

The coming Harold's Bridge Court development is even more directly linked to tenants' displacement as the project involves the demolition of an existing flat complex which will leave 53 households – about 200 residents in total – homeless (Dalby, 2022).

Researcher 2's PhD project involved collecting the testimony of a Filipino single mother facing eviction after a rent increase in a private build-to-rent development in South Dublin. The mother's account, in a recorded interview, gives crucial insight into the multifaceted risks posed by rent increase and eviction threat:

> [F]or the third time, my daughter got worse, she cut herself really hard and she was bleeding profusely. So, I told my daughter, because she rang me, I was actually on my way to work, she said Mum I'm very sorry, I'm very sorry, you have to come back. I said why, what's wrong? I did it again. I said again what? I'm bleeding, so I know, when she said I'm bleeding Mum, I know that she cut herself again. So that's the third time. I'm nearly being hit by a car because I ran to find a taxi. So, anyway. I rang her I said look, knock at the neighbour's, knock at the neighbour's and ask help so they will bring you to the hospital because I don't have a car. I couldn't fly. (…) So thankfully the neighbour's from Morocco helped her and brought her to the hospital. So the wound was deep, it was actually stitched. So, because it's the third time then that my daughter attended to kill herself, I said this is getting worse, the one day I am sure that she will kill herself, because of homelessness.

While flood modelling and its outputs cannot alone account for these dramatic effects, the two maps derived from the model have been mobilised in support of the construction of two private developments that have either contributed to gentrification pressures or will lead directly to tenant evictions. As a result, for the 'unpropertied', and especially for the most marginalised among them, the flood scheme project becomes synonymous with higher levels of multifaceted risks instead of the sense of safety and promise of profitability it brings to others.

PREDICTING FLOODS TO PROTECT PROPERTY REGIMES: MAIN FINDINGS AND LEARNINGS FOR FUTURE SITUATED MODELLING PROJECTS

Main findings

This paper has unfolded in the context of renewed calls to attend to the social inequities and power imbalances embedded in, and reinforced through, modelling practices (Melsen et al., 2018; Krueger and Alba, 2022; Klein et al., 2024; ter Horst et al., 2024). Taking as a starting point the tragic death of a tenant in substandard housing during a major 2011 Dublin flood event, the aim of the paper was to situate flood modelling in the Poddle catchment through the lens of property regimes. It asked how flood modelling is shaped by, and in turn reinforces, uneven neoliberal property regimes. The assessment was conducted through qualitative interdisciplinary critical discourse analysis applied to content drawn from two main levels of the modelling process: first, its policy context, and second, its output.

At the policy context level, the neoliberal property regimes focus proved significant. From the broad-scale context of the EU Floods Directive to the specific technical standardisation of Irish CFRAM projects, our findings highlight the ubiquity of neoliberal property regimes assumptions. These were evident in, first, the overall objective of the Irish flood risk management (FRM) policy, which focuses in great part on minimising the risk of property damage; second, in flood scheme prioritisation processes which are based on property value as their main metric; third, in FRM mapping that is predominantly centred on the protection of existing properties and on facilitating future property developments; and, fourth and last, in urbanisation assumptions found in model scenarios which obfuscate the way in which urbanisation processes are largely driven by land value and property development, sustaining various forms of inequity and foreclosing alternative urban futures.

At the model output level, discourse analysis unveils how the outputs are enrolled in uses that go beyond contributing to the flood scheme design and its environmental impact assessment. First, model maps reproduce 'propertied' space and are tailored mainly to respond to real estate actors' concerns. Second, their further enrolment in flood risk assessment discourses proved instrumental in enabling two property developers to expand their property wealth. In that case, data show that it was not so much the

maps' content that mattered; rather, it was the fact that the maps were there to be mobilised in one way or another by the developers' consultants, signalling a power distribution greatly in favour of property developers. The approved developments, in turn, negatively impact residual flood risk and housing security, which is of especially high significance to the most marginalised in current property relation arrangements.

These findings are significant, especially when combined with a lack of reference to property inequities in the content and practices assessed throughout the discourse analysis process. They show how various stages of the modelling process at large from its policy context down to its sociomaterial impact are echoing each other in promoting neoliberal property regimes assumptions. Based on the wide range of content, institutions, stakeholders and practices involved in producing the assessed discourse, findings highlight the structural and systemic embeddedness of neoliberal property regimes assumptions in flood modelling governance. In other words, the structural neoliberal property inequities depicted in the literature review were in turn found to be embedded in flood modelling governance, resulting in increased combined housing and flood vulnerability for the most marginalised in current property relation arrangements.

Situating (flood) modelling through interdisciplinary critical discourse analysis

Discourse analysis is well-suited to exploring uneven power arrangements and their structural grounding, including their political economy, historical inequities and policy context. In the research, the method proved fruitful for locating the structural entanglement of flood modelling governance and neoliberal property regimes assumptions. During the recorded exchanges, our focus on discourse was contrasted with other empirical focuses such as those enquiring about the modeller choices' rationale (Recording 8). Situating modelling processes by looking at the modeller choices' rationale is not without limitations. Krueger and Alba (2022: 12), for instance, warn that unpacking "thick layers of entrenched practices and power structures" through "interviews with modelers" may only elicit "rationalized interpretations of the research process and any choices made". Most importantly, the "intentionality" focus in structural processes of oppression has long been challenged, most famously by Pulido (2000) in her work on environmental racism. Pulido argues that such a focus deflects attention from collective, structural forms of discrimination as well as exonerates other "dimensions of the social arena" such as the "unconscious" (ibid: 19). As observed by Researcher 1, to talk about "this is what the model does" is not the same as talking about "this is the intention of like the idea that modellers have for their model"; in other words, "if you went and talked to the people who are doing the modelling", it is unlikely that they would say "well obviously our main focus is property, right" (Recording 8). In the project, the enrolment of flood model maps in planning malpractices goes well beyond the scope of modellers' intentionality; rather, it is enabled by a wide range of actors and institutions that are governed by centuries-old uneven property regimes assumptions. Therefore, while Krueger and Alba (2022: 12) suggest that some of the limitations of a focus on modeller choices' rationale could be addressed through "ethnographic methods like participant observation – 'following modelers around' in laboratory studies tradition", the present paper outlines a shift of empirical focus onto discourse as a productive complementary alternative.

Importantly, a focus on structures does not preclude acknowledging the individual agency involved in sustaining them. In fact, a first necessary step for discourse analysis practitioners is to situate themselves in the web of power structures they are exploring (Sharp and Richardson, 2001; Statham, 2022). In our project, locating neoliberal property regimes discourses in the River Poddle flood modelling process was only possible through locating and challenging our own 'propertied' class assumptions. From our social positionings, the property value focus of flood modelling governance seemed nothing less than "normal"; to quote Researcher 2, "this concern [property value] looks normal to us, *because we are of that class*, you know" (Recording 8). In this particular work of situating our neoliberal property regimes assumptions, the dialogue configuration proved extremely useful: it is through such informal discussions that these assumptions were best challenged. Similarly, assessing the entanglement of neoliberal property regimes

discourses and flood modelling required acknowledging the limitations of our own defined expertise (flood modelling and environmental justice), which could only be expanded through collaborative interdisciplinary dialogue. In other words, locating neoliberal property regimes discourses in the River Poddle flood modelling process was only possible through collaboratively acknowledging, challenging and expanding our respective situatedness.

Situating (flood) modelling through the lens of property regimes

Our situated modelling enquiry was conducted through the lens of property regimes. Drawing on the work of Safransky (2016: 4), which calls for renewed attention to "the racial and cultural politics of land and property" in urban struggles, we started our enquiry by retracing some of the main historical developments of property governance in a Global North/Irish context. Two key moments of property injustice were highlighted: its violent colonial origin and its more recent neoliberal embodiment. By retracing the history of colonial oppression that lies at the origin of the current neoliberal property regimes, we have highlighted them as socially situated, outlining how the River Poddle flood modelling process sustains *some property regimes over others*. In contrast, from its policy context down to its outputs and grounded impact, the flood modelling process naturalises who has access to, and profits from, property, and who does not. By not asking the property question – *what/whose* property regimes – flood modelling obfuscates existing property inequities and how they are further reinforced through the modelling process.

We believe that the property regimes lens of analysis that we have applied to the Dublin flood modelling context can usefully inform future situated modelling projects in other places and other environmental modelling fields. Indeed, from colonial to neoliberal times, the land question has been central to all emancipatory struggles. In the words of Malcolm X, "Land is the basis of freedom, justice, and equality" (quoted in Safransky, 2016: 1). Access to land is the necessary means of fulfilling our most basic needs and rights, "bread and, above all, dignity" (Frantz Fanon, quoted in Safransky, 2016: 1). Therefore, if we are serious about situating modelling, we must ask what uneven property regimes are taken for granted in the modelling process and whether and how they are further reinforced as the model does its world-making work.

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