Instituting space for the environment. How might we give the spatial demands of environmental policy goals a firm presence in the planning system?

A think piece

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Executive summary

Planning policies in the UK increasingly acknowledge environmental targets for dealing with climate change and biodiversity decline, but there remains significant ambiguity in how these targets 'bite' on the plan-making and development control processes. The relationship with environmental targets is especially fuzzy in relation to strategic policies for the land resources themselves i.e. for nature-based climate solutions, green infrastructure and green and blue networks. If society is to adequately tackle mounting crises in climate, nature and other environmental media, then there is a clear need to think through how the planning system may better deliver on environmental goals, targets and objectives.

The goal of this think piece is **to identify ways in which one might tighten the links between environmental goals, targets and objectives and the policy-making and land allocation processes of the planning system**. It draws upon a desk review of the existing research literature, developing environmental and planning policy in Scotland, and interviews with experts in the UK and other European countries.

The think piece suggests a number of environmental fields in which targets relevant to planning and the land resource may be developed:

- instituting targets for reduced consumption of greenfield land;
- building on standards for accessible public open space;
- drawing on carbon budgets and climate change legislation, to identify estimated contributions from land-based solutions;
- constructing meaningful targets for biodiversity and nature recovery;
- identifying the land requirements from a precautionary approach to future flood risk and climate change adaptation;
- potentially, drawing together all of the above (and more) within a unified framework to maintain and enhance 'natural capital'.

However, constructing targets is just part of the task. Equally important are the tasks of **translating** targets into formats meaningful to the arenas in which they will be used (i.e. planning), and **institutionalising** them in ways that reinforce the necessity of achieving them and make them resistant to being marginalised or eroded. This could be achieved by:

- Issuing targets at national level in planning policy, and allowing sub-national scales of planning the scope to work out how best to deliver. Given the likelihood of uneven responses, and the need for consistent change across-the-board, this may be inadvisable.
- Conducting more of the work to link environmental targets to the land resource at national level, constructing broad spatial representations at this level, and then

transposing it into lower-level land requirements in the manner of a 'national development'.

- However targets are institutionalised, it may be helpful to charge an agency with achieving the targets, to work alongside individual local planning authorities, as a supportive measure.

Instituting firm environmental targets for the land resource – whether to help absorb carbon, facilitate ecosystem recovery or mitigate flood risk – that are commensurate to the scale of the problem, faces some immediate challenges when it comes to the interface with planning. Firstly, pursuing the forms and levels of environmental protection necessary to deliver on environmental targets and goals requires much closer integration between planning and agricultural and forestry policy, as much of the responsibility - and many of the relevant levers - may lie in these domains. A second, connected challenge is funding. Planning may have an important role in helping to identify sufficient, appropriate space for land- and nature-based solutions, green and blue networks etc, but the resources required to ensure that these spaces fully deliver will exceed what can be funded via planning mechanisms.

There are other challenges involved in reconstructing the planning system to support the delivery of environmental targets, but some responses can be found by looking at a key area of target-oriented planning – planning for housing. A number of lessons are salutary:

- Targets may seem simple but the experience of planning for housing shows the complexity of linking planning to targets. Consequently, to commit to a target-based approach to environmental planning also requires the commitment to engage in the significant, detailed analytical work that goes with them, not least in translating broad targets into more concrete requirements, and following through into delivery.

- Targets do not 'work' in isolation. They require wider supportive policies, so that they are pursued in ways likely to co-deliver other environmental, social and economic goals – as is the case with housing targets. They also require other supportive mechanisms, in research, resourcing, and the existence of vigilant, committed actors able to hold decision-makers to account.

In considering how to tighten the links between planning and environmental targets, it is important that our expectations are appropriate. One should not advocate a tighter role for environmental targets in planning in the belief that it represents a simple, perfectible 'magic bullet' solution, or that it will convert tricky societal and political dilemmas into neat technical activities. In many ways, tightening the role of environmental targets in planning is highly challenging. However, we should strive to do it to for the same reasons that governments have struggled relentlessly with issue of housing delivery. We should tighten

the role of environmental targets in planning because the outcomes are important, failure is highly consequential, and therefore the struggle to succeed is necessary.

1.0 Introduction

Across governments and societies, there is significant pressure to tackle the intertwining climate and biodiversity crises, along with other environmental challenges in air quality, water pollution, nitrification (Dasgupta 2021) and resource consumption (Green Alliance 2021). Within the arsenal of governance devices that can be applied to these challenges, systems of goals, objectives and targets are widely regarded as essential (Zeiger et al 2017). Indeed, the growing sense of environmental crisis has brought with it an intensifying interest in environmental targets, that are measurable and substantive in what they demand (rather than directional or percentage-based), significant in the scale of change they require and foreshortening in the timescales by which they are to be achieved (e.g. Salvidge 2021).

This agenda now bears heavily on the planning system and the way that it deals with the natural heritage – our habitats, species, landscapes and green spaces – that forms the core focus of this think piece. As an integral mechanism for shaping future development, the planning system should clearly play an important role in addressing environmental challenges – but there is something of a conundrum when it comes to targets. Although national planning policies and spatial plans at all scales are increasingly peppered with references to climate change targets, nature-related aspirations and other environmental goals, it is often unclear how firmly they bear upon plan formulation, land allocation or individual development decisions (and ultimately 'outcomes'). This conundrum remains when we turn to consider the resource at the centre of planning and natural heritage: land. How we use land or allocate space is one of the key ingredients in tackling climate and biodiversity crises, and this is recognised in high-level support for 'land-based solutions', 'nature recovery networks' or 'green infrastructure'. Yet there are gaps between the rather general policy encouragement for these actions on the one hand, the substantive environmental policy goals that such actions might deliver on the other, and actual outcomes on the ground (Cowell and Lennon 2014; Scott 2019; Hislop et al 2019; Cowell et al 2020).

The aim of this think piece is **to identify and assess ways in which the links might be tightened between environmental goals, targets and objectives and the policy-making and land allocation processes of the planning system**. It was written at a critical juncture in the evolution of the Scottish planning system, as the Scottish Government is implementing a series of reforms to the planning system following from the Planning (Scotland) Act 2019. Linked to this, the ongoing process of revising the National Planning Framework (NPF4) seeks to encourage local development plans to deliver on higher-level goals, which begs the question of how the environment fits into this agenda.

On the face of it, tightening the links between planning and environmental targets and objectives appears to be a straightforward task. However, this apparent straightforwardness is itself something of a problem. It is indeed very easy to assert in general terms that planning should 'help deliver' on this, that or another goal, and to come away thinking 'job done'. But thinking through how the links may be made firm, and relatively non-negotiable, is a much more challenging exercise. Furthermore, the environment does not follow simple mathematical formulas, and the connection between notionally target-driven actions and outcomes can be immensely complex and uncertain. Intellectually, this takes us into novel terrain: relatively little attention has been given to the use of environmental targets in planning, either by researchers or policy-makers.

To deal with this methodologically, our think piece has approached its task from a number of directions, drawing on:

- **desk study of existing academic and policy-relevant research** pertaining to this issue. This included examination of experience from other countries with concepts and regimes of land-based targets (though the UK is by no means a laggard in this regard; Ganser and Williams 2007);
- **policy analysis**, especially of the opportunities and risks presented by the current reforms being applied to the Scottish planning system;
- **content analysis of a sample of Scottish development plans**, to sharpen our understanding of the current state of play and identify emerging issues;
- **interviews with experts**, from the worlds of academia and practice, in the UK and beyond, to help us to identify, test and refine our ideas.

In addition to the above, we also apply a particular and novel way of thinking. We ask, 'what might be learned for the institutionalisation of environmental targets in planning from the way that key development targets - especially for house-building - are institutionalised in the system?' This is valuable: in Scotland, the planning system already operates a sophisticated set of goals and land-allocation processes for housing. Furthermore, these regimes serve to privilege these developmental goals in plan-making; by comparison, environmental goals are often relatively negotiable. It may well be that measures to institute environmental targets more firmly into planning can draw lessons from the experience of planning for housing, in terms of potential institutional mechanisms for aiding delivery, or pitfalls to avoid. The net result we believe is at least a (hopefully helpful) provocation to the way that environmental goals have normally been considered, and what might be required for change.

The think piece is structured as follows. In Section 2, we outline key features of the 'march towards environmental targets' in the Scottish planning system, reviewing how far the NPF4 position statement (Scottish Government 2020a) takes us, the current situation in local development plans, and how housing goals are currently institutionalised in planning. This

section helps to show the importance not just of target creation, but target translation (into terms relevant for planning) and institutionalisation. Section 3 contains the key ideas for how links between environmental targets and planning might be tightened, organised into three sets: pressures from the top down, from national policy; pressures from the bottom up, for better development management; and acting on the land resource itself. Section 4 reviews potential criticisms of a more target-centred approach to addressing environmental problems in planning, and suggests potential answers. The concluding Section 5 summarises the argument and the key points. We also suggest some tools by which environmental targets might be instituted into planning, and give these in Appendices 1 and 2.

2.0 The rationale for and rationalities of targets

2.1 The growing emphasis on environmental targets

In a whole number of areas, the rise of environmental objectives and targets is shifting 'the factual universe' (Power 1994) in which planning takes place. This can be seen in climate change, where 'Carbon-neutral targets are a "new normative" for cities and regions around the world' (Ravetz et al 2021 p.150). Many cities are already engaging in carbon budgeting, which 'translates global commitments and national multi-year budgets into tangible goals for the city-region' (op. cit. p.154). In the sphere of biodiversity, intensifying concerns for ecological collapse are propelling the advocacy, review and extension of targets (House of Commons Environmental Audit Committee 2021; Welsh Parliament CCERA 2021); notably the European Union's development of legally binding nature restoration targets, to restore damaged ecosystems by 2030. Firm standards and targets are also a defining feature of many areas of environmental policy, across issues of air and water quality and waste, especially where the underpinning legislation comes from the EU (Cowell et al 2020).

If the growing salience of these environmental targets to planning is clear, what is less clear is how these targets should shape how planning is done. This reflects a tendency in the wider research field to focus on issues of target setting and design, and on monitoring *post hoc* progress. Two key tasks have attracted much less attention:

- **Translation**. Many environmental targets are identified outside planning, based on judgements of what would be *inter alia* safe, desirable or sufficient to attain certain outcomes. There is always therefore a question of how and whether targets can be *translated* into formats that enable them to be operationalised in planning. The challenge is relatively tractable (though still substantial) where targets apply to particular categories of development: e.g. renewable energy capacity to be delivered, or standards for 'carbon-neutral homes'. It is more difficult in the land use sphere, with many environmental targets having land use dimensions or implications. Furthermore,

environmental targets may not always translate into the most appropriate mechanism, e.g. having a target to plant x number of trees if the ultimate goal is the creation of healthy ecosystems.

- **Institutionalisation.** For targets to steer the way that decisions are made, they also need to be institutionalised in the policies, processes and practices of planning such that significant emphasis is given to achieving them. This would shape the way that decisions are made in planning, to prioritise delivery in the face of conflicting environmental, social and economic goals, such that the objective of the environmental target conditions how those other goals are supported.

2.2 The Scottish context – pressures for change

There is much need to think through processes of target creation, translation and institutionalisation in the Scottish planning context, and the Planning (Scotland) Act 2019 creates valuable windows for change. The proposal for a ten-year life for local development plans – when juxtaposed with environmental crisis narratives identifying a ten-year window for achieving substantive improvement – requires that major steps are taken in the next round of new plans and policies.

A key document is the new National Planning Framework: NPF4. The significance of this Framework is magnified by steps taken through the 2019 Act reforms to give it a major and more direct role in steering how planning is done. The new NPF4 will incorporate Scottish planning policy, and it will be given the same statutory status as local development plans. The new NPF4 also provides for means of delivering environmental goals as part of 'national developments', which are given priority, and 'regional spatial strategies'. It is an appropriate place, therefore, to institutionalise specific environmental goals and targets.

The November NPF4 position statement (Scottish Government 2020a) shows a sustained interest in prioritising the climate and nature crises in planning; but one can also see – from what is said and what is not said – the challenges of converting this desired direction of travel into firm requirements. These challenges can be observed in two main domains: climate change; and 'environmental assets and networks', broadly construed.

In the context of climate change, the position statement is clear in the intent to meet Net Zero targets (p.2), and that this needs 'a swift and decisive response to the global climate emergency at all levels – national, regional, local and community' (op. cit. p.7). Consequently: '(t)he time is right to give greater weight to climate change as a crucial factor influencing decision-making on our future land use' (op. cit. p.7). But - as yet - there is little clarity as to how 'greater weight' is to be achieved, beyond an acknowledgement of the

prospective scale of change required, stating that: '(t)o achieve a net-zero Scotland by 2045 ... an urgent and radical shift in our spatial plan and policies is required' (op. cit. p.8). There is also an indication of a lack of consensus: 'Views vary on the most effective solutions. Some suggest a targets-based approach at either a national or a regional level. Others propose increasing the requirements for new developments, and want to make it easier to put in place new infrastructure that would help reduce emissions' (op. cit. p.7).

There is recognition of the role of land- and nature-based solutions to climate change, too: 'Land can generate, and reduce, emissions. It will be important to align with wider land use management to tackle issues including woodland creation, peatland restoration, natural flood management, bioenergy and improving biodiversity' (op. cit. p.7). However, there is little clarity on how land-based solutions will be driven forward. That these issues go beyond the town and country planning system is recognised, e.g. the need to 'work alongside the development of Scotland's next Land Use Strategy to guide long-term land use change' (p.8). There is also some momentum behind the view that:

> 'the impacts of climate change may be best tackled at a strategic scale – i.e. managing flooding through upland management, and capturing carbon through tree planting and strategic peatland restoration. These are some ways in which regional spatial strategies are reflecting these opportunities' (op. cit. p.8).

Otherwise, prospective policy changes remain broad and directional rather than substantive, for example (p.10, emphasis added):

- *Promoting* nature-based solutions to climate change, including woodland creation and peatland protection and restoration.
- *Integrating* development with natural infrastructure, including blue-green networks, to deliver multiple benefits including carbon sequestration, community resilience and health improvement.'

Exactly how this promotion and integration will be achieved is as yet unclear.

The position statement also acknowledges the strong overlap between nature-based solutions to climate change and the benefits of environmental networks more widely, viz. (p.17):

> 'Blue and green infrastructure will be an essential part of our approach to building our long term resilience to climate change and can also contribute to reducing emissions and carbon sequestration. In particular, opportunities for natural infrastructure to address the long-term risk of flooding, water and drainage issues, temperature management and everyday liveability of places will inform our approach to planning and enhancing our spaces and places.'

Perhaps the NPF4 agenda will drive delivery through the mooted 'infrastructure first' approach to planning, extending it beyond conventional 'built' infrastructure to embrace the environment viz. (p.16):

> 'Natural (blue and green) infrastructure will be an integral part of a strategy for people, rather than an afterthought, helping to achieve multiple benefits for nature, communities and businesses.'

However, the language remains at the level of issue recognition, expressing a desire to promote such goals, but remains open on how much blue and green infrastructure, is 'sufficient' and exactly how such goals will be translated into planning-relevant terms. In addition, these expressions of ambition for land-based solutions and green networks extend beyond the capacity of planning to deliver, and raise wider questions about how such public goods are to be funded – points we return to below.

The new NPF4 will also embed the UN Sustainable Development Goals and Scotland's national outcomes (p.4).

Overall, there is a palpable willingness to 'do more' for these environmental agendas through planning but - as yet– this has to move beyond the language of 'promoting'. Moving from a broad desire for improvement to firm measures is not easy, and this will require careful work (as we explain below). It is perhaps unfortunate, therefore, when it comes to the 'Delivery' chapter of the Position statement (pp.37-39), that there is nothing on the more specifically environmental measures.

2.3 The Scottish context – targets in development planning

Another window on the challenge ahead is provided by reviewing current, adopted local development plans (LDPs) in Scotland. We conducted a contents analysis of a sample of ten such plans, embracing planning authorities from across Scotland, to identify where environmental targets were mentioned in the plan and how they featured i.e. in what ways, and with what firmness were they connected to planning policies and land allocations. The key patterns are as follows:

- The most frequently mentioned targets are national (Scottish) targets for climate change. However, the applicability to planning decisions and land allocations is most pronounced where these targets are translated into more specific development requirements, notably for renewable energy.

- The need to meet specific environmental standards features widely in development management policies, across topics from biodiversity to air and water quality; some referencing the need to be compliant with the EU Water Framework Directive. In many cases, these standards come with particular policy tests.

- Plans also reflect and transpose spatial policies to achieve environmental goals, such as Low Emissions Zones to meet air quality goals, though these prevail most directly on transport behaviours, modal choices and policy rather than land use planning.

- There is widespread reference to green networks and green infrastructure (GI). However, only a small proportion of plans translate broad support for GI into prospective site allocations. North Lanarkshire (2018) offers one example, building on the strategic planning work of the Glasgow and Clyde Valley Green Networks partnership to identify four 'Strategic Delivery Areas' where there are opportunities to deliver on network priorities around health, climate change adaptation, access to greenspace and habitat connectivity. Policies on green networks and GI were also rarely tied with any closeness to wider environmental standards, goals and targets, either in terms of (upstream) policy derivation or (downstream) expectations of what might be delivered (for a wider review, see Hislop et al 2019; linkages with accessible greenspace are discussed below).

- Plans also contain large numbers of policies that seek to maintain the value and extent of protected sites (be they for landscape, biodiversity or built heritage) and many stretch this to embrace priority greenspace. A few extend this to maintaining the extent and connectivity of green and blue corridors, though often without clear sanction for failing to do so. Some have instituted policies to protect carbon sinks and stores, particularly soils and peat, from disturbance (e.g. Cairngorms National Park Authority 2021).

This analysis raises a number of points that affect the promotion of environmental targets in planning more broadly.

First, overall one might deduce that Scottish LDPs display something of the broad logic of sustainable development interpreted as 'maintaining environmental/natural capital' (Dasgupta 2021): more clearly so as it applies to protected sites, more patchily when it comes to environmental networks and probably least pronounced when it comes to non-protected undeveloped land (for example the greenbelt, agriculture and forestry). What is less evident are efforts to promote the enhancement of those environmental capital stocks to levels that are environmentally desirable in relation to wider systems of targets. This raises a wider point (to which we return) that the levels of environmental quality that

planning can deliver by conventional planning means may not match what is required for wider environmental goals.

Second, there is clear variation between local planning authorities in their attentiveness to environmental goals or targets: some do little more than pay lip service, others integrate them across their plan(s). One might expect the 2019 Act reforms, with their emphasis on delivery, to reduce this differentiation, and there are signs that more recent plans go further (e.g. Aberdeen City Council 2020; North Lanarkshire 2018). However, this variation raises a wider issue – how can target-based systems of planning governance navigate spatial variation? Some of this variation might reflect materially important geographical differences; some relate to different social and political priorities. The sense of climate or nature crisis may look very different in rural areas, in which environmental capital can appear superficially abundant, compared to urban areas – especially places where it is widely felt that development pressures are eroding valued features. Systems of target-based governance need to be able to navigate these geographical, social and political differences, responding to legitimate differences while disciplining the resistant – not an easy balance to strike.

2.4 Insights for environmental targets from development planning

Requiring the planning system to contribute to the delivery of targets is a challenging exercise, but it is not wholly unprecedented. Across the UK, for many decades, the planning system has been charged with delivering housing requirements in which targets play an important role. However, those concerned with environmental dimensions of planning have rarely looked sideways to planning for housing for inspiration. This is an oversight. At a very basic level, the system of targets and wider arrangements for orchestrating housing delivery goes a long way towards explaining the pre-eminent position of housing in plan formation, which ought to give those concerned with environmental priorities pause for thought.

Institutional arrangements for planning for housing have evolved continually over the years, in Scotland as in the rest of the UK, but have generally sought to ensure that there is sufficient land made available to meet housing demand. The prevailing policy position has been that (Scottish Government 2014, para 110):

> ‘The planning system should ... identify a generous supply of land for each housing market area within the plan area to support the achievement of the housing land requirement across all tenures, maintaining at least a 5-year supply of effective housing land at all times’.

This has been supported by (op. cit. para 113) 'a robust housing need and demand assessment'; these inform housing supply targets and, in turn, the housing land requirement for plan-making. This approach is due to be replaced through the new NPF4 (Scottish Government 2020a) with an approach that is 'longer term' in its perspective, better enables plans to 'proactively steer development to appropriate locations in line with the plan's spatial strategy' (*op cit*. p18), and seeks simplification through centralisation (*op. cit*, p.15).

It is not the details of these arrangements that are important here, but what the experience of planning for housing says about governance approaches that are thinkable and actionable.

The first point is to note the contrast between the often rather open and hesitant connections between policy and planning in the environmental sphere with the situation in housing. For housing, successive governments have been willing and able to orchestrate how planning at lower tiers is done in order to ensure that a particular, tangible planning objective is given a high likelihood of being achieved. This, in turn, has given planning for housing a pivotal position within the core strategic levels of plan-making and land allocation. These commitments, as institutionalised in policy also give a firm basis for holding planning to account for delivery. Target-driven housing goals also, in many instances, take precedence over, and condition the achievement of, other goals. These are qualities one may well wish for environmental goals in planning, in the context of environmental crises.

Secondly, making housing targets 'work' is a complex exercise, requiring a lot of effort. Targets and land requirements are not simply asserted, they come with a wide set of analyses and assessments (housing projections and markets, land assessments etc), and require defence against conflicting perspectives. We should expect a more target-driven approach to environmental planning to also require wider analytical, deliberative and political work (and we refer to one such area, natural capital accounting, in Appendix 2).

Thirdly, the experience of housing also shows that targets, goals and objectives need not be enshrined in legislation to be effective (housing targets are not) though there may be advantages to doing so in terms of being able 'to prove transparency and certainty' (Zeiger et al 2017, p.16). In the environmental sphere, target-based governance for planning may derive its legitimacy from 'higher level' legal commitments, rather than institutionalising such commitments directly within planning legislation.

Fourthly, systems of planning for housing have never been perfect. Outputs (land allocated, planning consents) rarely translate perfectly into outcomes (houses built, valued places), because of myriad problems and complexities at the delivery end (Cochrane et al 2015). There is also recognition that over-emphasising crude quantitative delivery can be at the expense of quality. Arrangements show regular flux in the balance between central

direction and local flexibility, as concerns about 'top-down imposition' vie with calls for cross-national consistency. But all these problems demonstrate an important point: what gives these systems of governance their significance and endurance is not that they are perfect, but that key actors are sufficiently committed to addressing the problem that they are not defeated or paralysed by the unavoidable imperfections, and work to resolve them. The same is likely to apply in the environmental sphere.

We take forward these insights from planning for housing as we turn to consider strategies for tightening the links between planning and environmental targets.

3.0 Tightening the links

In this section of the report we consider ways in which the links between environmental targets and planning might be tightened, a task which requires consideration both of how environmental targets might be translated into some format that could be operationalised in planning, and institutionalised in planning processes in ways that ensure commitment.

Before proceeding further, we deal with an obvious reflex question – shouldn't this be the task of strategic environmental assessment (SEA)? In theory yes but, as we have previously argued (Cowell et al 2020), the likelihood that SEA will be used to drive environmental integration in planning is as much a reflection of, rather than itself a driver of, the extent to which environmental goals have a non-negotiable status in the planning system. This reality affects numerous other measurement-driven analytical frameworks for planning, like the RTPI's *Measuring What Matters* (RTPI 2020; see also Schetke et al 2012).

We organise approaches to tightening the linkages between environmental targets, goals and objectives and planning into three sets:

- Pushing from the top down – exhorting and legitimising a role for making planning responsible for delivering national targets

- Pushing from the bottom up – pressures arising from the need for more effective development management

- Acting on the land resource itself – applying environmental goals and targets directly to the land resource

3.1 Pressure from the top

This approach focuses on the national system of targets and covers two things. First it embraces ongoing steps to enhance the national systems of environmental targets in public policy. Across the UK one can see significant action in this sphere: for example, the pursuit of statutory environmental targets for air, waste, water and biodiversity as part of the Environment Bill in England (DEFRA 2020b); recommendations emerging from the Dasgupta Review of the Economics of Biodiversity commissioned by H. M. Treasury, for 'the creation of binding targets on public investments in natural capital to ensure that globally agreed objectives are met' (Dasgupta 2021, p.496).

Secondly, it entails steps to transpose or translate these high-level environmental targets into national planning policy. This seems to be where revisions to NPF4 are heading, on net zero legislation and moves to embed the UN Sustainable Development Goals within the framework (Scottish Government 2020a, p.4).

To an extent, committing the planning system to support the delivery of environmental targets, in high-level policy, without minutely specifying what local planning authorities must do to comply, may be sufficient in driving change and brings some systemic merits. Leaving open the precise relationship between the targets and plan-making gives flexibility to lower-level planning processes in how they respond, enabling responses that are tailored to local contexts. There is also plenty of evidence from across the UK, spanning the past thirty years, of local planning authorities using national or international target-based commitments to justify new solutions to local planning problems. In particular:

- High-level goals for greenhouse gas emissions reduction have been used by local planning authorities to rationalise innovative planning policies and decisions that challenge prevailing directions of development. One example is the creation of policies requiring developers to meet project energy demands from on-site renewable energy, legitimised by early 21st century climate change commitments (TCPA 2006). More recently, net zero legislation and declarations of climate emergencies have animated local planning authorities to reverse high-impact development projects (e.g. Hereford by-pass) and re-think development plans (as in Oxfordshire). Net zero legislation has also informed legal cases against infrastructure projects (power stations, airport expansion) and related programmes in England.

- Back in the 1990s, local authorities were also early leaders in responding to calls made in national planning policy for 'planning for sustainable development'. Some pursued conceptions of sustainable development based on 'maintaining environmental capital' in their development plans, and used them to challenge the prevailing 'predict and provide' approaches to planning for minerals and housing (in Berkshire and West

Sussex, respectively; Cowell and Owens 1997; Counsell 1999). In each case, in effect, observing environmental 'capacity constraints' was placed ahead of meeting development goals. Importantly to our analysis here, these approaches foundered at the time because there was insufficient authoritative government policy support for these specific conceptions of sustainable development. In Scott et al.'s terms (2018), there were no 'hooks' in the form of legislation, duties or priorities on which such approaches could hang their authority. It is possible to imagine how a range of new national commitments in NPF 4 – on net zero, or on 'protecting and investing in our natural assets' (Scottish Government 2020a, p.22) – could stimulate and legitimise responses among local planning authorities and other actors.

So, targets expressed in national policy – where they are sufficiently stringent and specific - can animate action in planning, and rationalise change, without detailed central instructions on local implementation. Keeping open the relationship between national targets and local plans also creates a space for experimentation and policy learning. It also sidesteps the complexities of translating substantive environmental goals into requirements for each planning area. However, there are also problems in keeping the relationship between targets and plan-making open in this way:

Uneven responses. Allowing flexibility of response also enables the flexibility to opt out or minimise the application of high-level targets. As our earlier contents analysis suggests, one might expect LPAs to respond most vigorously to the implications of national environmental targets where they share the interpretations of 'environmental crisis' that lie behind them; less vigorously where they do not (see also Vigar 2002; Fischer 1999; see also Scottish Government 2019).

Time frame. With the next round of plans to last for ten years, and the time frames for making progress in many environmental target areas really biting by 2030, there is little time to wait and see how Scottish local planning authorities respond.

Knowledge. As we noted above in the context of housing targets, it takes considerable analysis, effort and resources to assess and justify a particular approach that would then be able to stand up at inquiry, in the face of potential likely challenges; even more so when talking about novel environmental action.

Conservatism. Previous experience shows that local planning authorities have been happiest to talk about 'maintaining environmental capital' where that can be interpreted in relation to existing systems of designated areas, which enjoy degrees of protection already institutionalised in planning policy. If this is felt to be insufficient, then action needs to be taken to legitimise planning action on wider systems of places and land uses.

Part of the solution lies in putting in place systems for scrutinising and holding to account planning actors at all levels for their performance. We return to the issue of accountability below.

3.2 Bottom up target pressure from development management

Individual planning applications may well need to comply with a range of environmental standards, many of which link to quantified targets or objectives – for example air and water quality, biodiversity etc. – and there is much to gain from instituting firm environmental standards in the development control sphere. Where the appropriateness of development proposals is judged against a firm set of targets or goals, then it becomes easier to design and police the delivery of meaningful restorative or mitigatory measures where they are required (Cowell et al 2020). An example of how this might be done for urban greening is given in Appendix 1.

Of greater interest to us here – and generating more systemic pressure for change – is the march of targets and standards that require developers to fully off-set or compensate for the unavoidable environmental impacts of their development (a practice seen in numerous countries: Rundcrantz and Skärbäck 2003; Forest Trends' Ecosystem Marketplace 2017) or to deliver environmental gain. In England the biodiversity net gain agenda is well advanced (Crosher et al 2019) and in Scotland the NPF4 Position Statement talks of 'Securing positive effects for biodiversity from new developments' (Scottish Government 2020a, p.36). There are mounting pressures, likewise for infrastructure developers, too, to target the delivery of environmental net gain (National Infrastructure Commission 2021; House of Commons Environmental Audit Committee 2021), with some major Scottish infrastructure companies already taking forward such approaches (Donnelly 2021).

While the metrics by which 'no net loss' or 'net gain' is calculated attract a great deal of attention (and these do matter, as we discuss below), studies of the implementation of these policy approaches reveal a more prosaic problem: finding land or space (Boucher and Whatmore 1993; Cowell 1997). No matter how smart and thoughtful our logics of exchange become, the land that is actually provided for mitigation and enhancement has – in most instances, in many countries, to date – been profoundly shaped in quantity, quality and location by what is available and convenient, rather than what would be sufficient or best for meeting the environmental goal in hand. In planning vernacular, it is often 'SLOAP' (space left over after planning). Limited space makes it harder for enhancements to deliver comparable value or functionality to what is lost (Cowell 2000), and willingness to use compulsory purchase powers to address this is usually low.

Even if one tightened the regulatory arrangements to ensure that measures provided were better in their scale and content, there remains the risk that a market-driven logic of supply for mitigation/enhancement sites would drive a pattern of environmental 'investments' that are too fragmented, incoherent, or too close to harmful impacts, and so do not deliver sufficiently on wider environmental, economic or social goals. In this context, we may learn from experiences in Australia with the new carbon market. Here, developers revert to restoration processes for degraded lands rather than, for example, planting trees on 'new' land (Clement, 2021), something that could be attractive to developers in Scotland, too, for example with regards to the greenbelt. NGOs have sought to redirect these tendencies, for example by mapping where woodland planting would maximise environmental gains and minimise risks e.g. to soil carbon (RSPB 2021).

Herein is the 'bottom up' pressure to tighten the links between environmental targets and planning. There is a role for planning to help identify and secure sufficient space for environmental enhancement measures, in appropriate locations, within a wider strategic spatial framework, to help delivery. In effect, planning has a role in enabling environmental targets and standards to be met better.

There are challenges here of course. One is institutional. To argue that planning should have a role in helping to determine and map the best indicative areas for delivering environmental enhancement inevitably extends planning oversight beyond areas of prospective built development and into rural land uses – agriculture, forestry – where planning powers have been relatively limited.

A second is the issue of who should pay? Doing a better job of delivering on developer-led mitigation and enhancement measures, to help them better meet relevant standards, should not be elided with believing that developer contributions will be sufficient to deliver the levels of environmental quality our wider, national targets for climate change, biodiversity or flood management (Scottish Government 2021a) may demand. For example, analyses of the capital funding required to deliver the Central Scotland Green Network estimated that only 26% could be met via developer contributions, secured through planning conditions (Hislop 2016). The cost of ongoing management is additional.

Some spaces for land-based solutions to climate change may scarcely fall within the purview of planning control at all e.g. upland peatlands. These points raise wider issues of funding, and again require that what can be delivered through planning is linked to other delivery mechanisms in other rural sectors.

3.3 Acting on the land resource itself - environmental targets for land and space

From the above one can see how planning is coming under mounting environmental target pressure from 'above', in the gathering of tougher substantive environmental targets at national and international level, and from 'below', to accommodating effective impact management responses to projects so that standards can be better met. Both have deficiencies as ways of making sure the next round of plans is sufficiently attuned to environmental targets, which leads to the third approach - considering how environmental targets might be translated into meaningful, substantive targets for the allocation of land itself, and, importantly, for the delivery of 'healthy' ecosystems. The tasks here involve considering how planning might help to ensure that sufficient land is identified to deliver on environmental targets, inscribed into appropriate plans at a strategic level, and then protected from attrition or marginalisation.

Perhaps 'first base' in this agenda is ensuring that the consumption of 'greenfield' land is kept to the minimum necessary. This matters, because a key dimension of many solutions to environmental crises is to protect space in which natural processes can unfold, for their intrinsic value as well as to deliver vital ecosystem services (Dasgupta 2021). The UK has some history here. Targets for delivering a share of housing on brownfield sites have been a consistent feature of planning in England, and a headline indicator of sustainable development (Ganser and Williams 2007). For almost two decades, Germany has adopted an aspirational target to reduce the volume of greenfield land conversion into urban uses to an average of 30 hectares per day - the so-called '30 hectares rule'(Von Haaren and Nadin 2003; Ganser and Williams 2007). Scottish planning policy is also moving in this direction, in the expressed desire to shift development away from greenfield land (Scottish Government 2020a, p.3).

This prior experience offers some useful lessons for constructing new environmental targets for the land resource. Broadly speaking, it may be better to express targets in substantive terms, reflecting the desired outcomes, rather than as percentages: although England's target of '60% of new housing to be on brownfield land' had the advantage of immediate transferability to other levels of planning, and could be directly binding, it has an ambiguous relationship to wider desired outcomes (Ganser and Williams 2007). However, with substantive targets for land allocation or outcomes, the task of translating the broad goal into something meaningful for arenas of implementation at all scales becomes more challenging.

Of course, the dichotomous demarcation of land into brownfield versus greenfield is a major simplification of the diverse environmental qualities and ecological richness of either category (Mabey 1973). What spheres of environmental policy might be able to generate

more specific, substantive targets for the land resource, which could potentially be translated into spatial terms? There are a number of contenders.

1) Accessible green space

Starting with an environmental agenda that is firmly in the planning domain, some planning initiatives have made powerful strides in giving green space a more robust and spatialised presence in plan-making, by building on standards that require all citizens to be within five minutes walk (400m) of quality green space, linked to wider green networks. This is what the Glasgow and Clyde Valley Green Network (undated) have done: taking these standards, combining them with GIS data for other social and environmental goals, and using it to inform opportunities mapping and a Green Network Blueprint. These spatial representations can then be used to guide delivery, focused on 'Strategic Delivery Areas'[1].This is a good example of firm environmental standards driving spatial policy and (beginning) to make those environmental standards more robust, and strategically important in plan-making. However, in terms of scale, accessible, quality green space only embraces a fraction of the environmental assets and services our ecological predicaments may require (Hislop et al 2019).

2) Climate change.

Governmental efforts to reduce greenhouse gas emissions, to steer towards the Paris Climate Change Agreement and now net zero legislation, are a potentially powerful basis for action because they involve wider carbon budgeting efforts, which deal in substantive, measurable outcomes – stores and fluxes of greenhouse gases and interim targets, with specific time frames. It might be possible to use this machinery to estimate a volume of emissions avoidance or absorption to be achieved from land/nature-based solutions and then to consider what this might require in terms of hectares from different land uses (peatlands, forests/increased afforestation, other land uses). In its NPF4 Position Statement, the Scottish Government (2020a, p.9) echoes the following:

> 'It is estimated that around a third of the global mitigation effort needed to deliver the goals of the Paris Climate Agreement could be achieved through nature-based solutions'.

One quality of carbon budgets is that they allow for a degree of substitution between contributions and withdrawals: i.e. local planning authorities might gain some flexibility in what measures they undertake to deliver targets provided the likely carbon storage or sequestration effects were equivalent. Insofar as the development goals of particular plans could lead to increased emissions, then more land might be required to be found and put into land-based solutions to offset this.

[1] See https://www.gcvgreennetwork.gov.uk/, for the Blueprint and (under 'Publications') the opportunities mapping completed for each local planning authority in the network.

3) Biodiversity

Biodiversity is a policy area where there is already a strong element of outcome-driven policy. The basis of the EU's Natura 2000 site network is to conserve the full range of Europe's natural habitats, flora and fauna. Sites identified by Member States needed to be adequate to this task; once identified, conserving the specified features of each site creates robust tests for development that threatens them. However, the need to address declining biodiversity and foster recovery of natural ecological processes is widely recognised to translate into requirements for more space, hence biodiversity is a policy area likely to yield new targets with direct or indirect implications for the land resource. Action here raises big challenges for the biodiversity conservation community. There is a need to ensure that targets and standards are set at a level sufficient to deliver substantive maintenance and recovery of natural systems, and avoid dilution by giving significant weight to short-term 'socio-political feasibility' (Carwardine et al 2009). In this vein, there is a discussion to be had on whether the Scottish Government's commitment to increase the area of land protected for nature to 30% (Scottish Government 2020c) is driven by vital ecological outcome goals, or an incremental extension from the present position (23%, including National Parks). There are also challenges in working out how to give concrete, institutional form to the spatial requirements, given that biodiversity decline inevitably goes beyond the protection of certain areas (see e.g. Hill et al 2015), which have tended to dominate indicator sets (Zeiger et al 2017).

4) Flood risk and climate change adaptation

Flooding is an issue that has already moved towards making increasingly non-negotiable demands on plan-formulation and development control, and could move further in this direction in response to policy commitments to reduce exposure to flood risk, or adapt to the increased flooding and other hydrological risks arising from climate change, and deliver wider ecosystem services from hydrological systems. The scale of the issue already has figures, metrics and models attached: hence we know that 'SEPA have reported that around 284,000 properties in Scotland are currently at medium risk of flooding and by the 2080s this could increase by over 100,000 due solely to the impacts of climate change' (Architecture and Design Scotland 2020, p.30). Comparable risks arise at the coast. It is possible to envisage a set of spatial requirements arising from firmer prohibitions of development on land in certain risk categories, plus more flexible spatial requirements for hectares of land to be put into more water-absorptive land uses, or to facilitate managed realignment of coastline and the creation of natural defences. The Scottish Government (2021a) strategy Water Resilient Places pushes in this direction, and the adoption of 'the precautionary principle' in emergent legislation may add further impetus (i.e. the European Union (Continuity) (Scotland) Act 2021). Lessons might be taken from the Dutch 'Room for the River' programme (Zevenbergen et al 2013). This initiative sought to integrate improved safety from river flooding – including specific goals for improved river discharge capacity –

with enhanced environmental quality of riverine areas. In this policy sphere, the need to forge tighter links between river and land management may be facilitated by sharing targets.

5) Natural capital

If the above might be considered 'single issue' targets, then there are candidate concepts that are more all-embracing and could generate tangible and firm environmental requirements for the planning process. One leading contender is the concept of 'natural capital', and the associated normative principle that planning specifically - and public policy in general - should work to ensure that natural capital is maintained (or enhanced to a level required to redress deficiencies and achieve long-term sustainability). The target areas 1-4 would all form part of natural capital, along with other facets of the environment. 'Maintaining natural capital' is a venerable conception of planning for sustainability (Jacobs 1993), with some past experience of application on which to draw, but its profile has been boosted recently. Maintaining natural capital is integral to HM Treasury's report on the economics of biodiversity (Dasgupta 2021). Natural capital and natural assets receive supportive name-checks in the NPF4 position statement (Scottish Government 2020a, p.22, p.29) including:

> 'We will explore opportunities to ensure that our approach to using and managing natural assets is sustainable and regenerative, restoring and enhancing our stocks of natural capital.' (p.36)

Local planning authorities around the UK have also begun researching and mapping cognate ideas like ecosystem services and, in some cases, mainstreaming them into planning policy (Scott et al 2018).

Yet the language often remains tentative. The key institutional move is going from seeing natural capital stocks as just an accounting device to evaluate progress that sits alongside other indicators, towards instituting requirements that natural capital should be maintained and enhanced at the heart of decision-making. We suggest how this might be done, in Scotland, by linking natural capital accounting to the evidence reporting and Gateway check stages of the reformed plan-making system – see Appendix 2.

As we have previously noted, identifying appropriate targets is one thing, but working out how to institutionalise them in planning creates their own challenges. There are two broad ways this might be done.

Hand local planning authorities the target, and get them to find space?

To some extent, this is what has happened with planning for housing to date. Here planning authorities have not been told which land to allocate, but rather to 'allocate sufficient

space' to meet the relevant target. The land allocations that local planning authorities propose are then subject to scrutiny, assessment and revision in the plan-making process to test whether targets have been adequately achieved. Perhaps this could be applied to environmental outcome targets?

This might work for environmental areas for which there is presently some expertise and knowledge in the planning system: i.e. greenfield/brownfield land and accessible greenspace. However, leaving the task to local planning authorities could be problematic for those environmental areas that are largely novel and fall outside their conventional expert domains. The knowledge gap could be mitigated by simultaneously charging an agency with responsibility for delivering on the targets for Scotland as a whole, which would then work collaboratively with individual planning authorities. This is what happened with brownfield land targets in England (Ganser and Williams 2007): alongside local planning authorities seeking to deliver their 60% target, the agency English Partnerships was given a substantive target (and funding) to secure the reclamation of a certain area of brownfield land. In the Clyde Valley, the Glasgow and Clyde Valley Green Network partnership body performs similar supportive roles; so do Community Forest bodies in other parts of the UK.

Identify the land requirements at a higher-level, and require that lower-level planning arenas take them on board

The approach here is for national-level government to do the work of translating environmental targets into sufficient spatial/land requirements and also – even if only at a schematic level – mapping their spatial distribution at a national scale, which then cascades into lower tiers of the system. This has commonalities with national processes of drawing up designated areas (such as Natura sites, or NSAs). In terms of delivery, environmental targets could be translated into a 'national project', like other pieces of nationally important infrastructure, the delivery of which is then prioritised and accommodated in local planning. The Central Scotland Green Network was afforded this status in NPF3, so it is not unprecedented, though the 'need statement' that accompanied it may be insufficiently detailed for ensuring such spaces are fully secured and can deliver on multiple environmental goals.

A key policy variable is working out the proportion of space that could or should be prescribed at national level and how much could be left to lower levels to determine. For most targets it is possible to imagine some elements that would require cross-national near-absolute protection, with other elements being more flexible (in terms of which spaces were allocated) provided overall outcome goals could be secured. In the context of climate change, for example, the 'near-absolute protection' category could be peatlands – Scottish policy is already pushing this way. The more spatially flexible carbon absorptive land uses might be afforestation or re-wilding schemes. The Dutch 'Room for the River' programme

involved decision frameworks for flood risk safety and spatial quality set by national government, while allowing the specific plans and designs of component projects to be taken by regional and local stakeholders (Zevenbergen et al 2013).

There is wider interest in actions that could support this mode of institutionalisation, and which indicate how effort might be divided between national and sub-national levels. For example, Architecture and Design Scotland (2020 p.8) endorse the following:

> 'Mapping the existing country-wide resources and the geographical opportunities to enhance our natural assets could inform a nation-wide planning strategy to enable Scotland's green network to significantly contribute to the balancing of our national carbon emissions."

And at regional level (p.8):

> 'There is an opportunity to establish baseline data on existing and established assets across regions and current administrative boundaries through the indicative Regional Spatial Strategies (iRSS). Location of assets on a regional scale will allow for challenges and opportunities to be identified and for connections between them made.'

Scottish Government (2020a) clearly considers that Regional Spatial Strategies (RSS) are an important arena for advancing these agendas, stating that *inter alia* 'Regional spatial strategies are considering ways in which our land and natural assets can form the basis of a green recovery' (p.31). However, analysis of the iRSS[2] suggests that most are simply re-stating broad aspirations and name-checking basic categories of natural capital and the benefits each can deliver, but in a fairly superficial way. A small number (e.g. Edinburgh City Council 2020) are using them to push 'upwards' for more robust action from Scottish Government, notably on net zero, to enable firmer demands to be made from development. None have yet applied significant analysis, or generated further quantitative or spatial specificity for these environmental requirements. Indeed, one might question whether their voluntary, self-assembled format, and orientation towards strategic (economic) development, would ever make them appropriate for this task.

One could look at what the Scottish Government proposes for planning for housing (2020a, p.15), as introduced above, and consider whether this considerable national enterprise and effort might be adapted for environmental purposes. In sum:

[2] Undertaken from an analysis of the report on *Indicative Regional Spatial Strategies Summary of Emerging Work November 2020* and *Regional Spatial Strategies Planning for Scotland in 2050 NPF4* January 2020, both Scottish Government, and the iRSS for Argyll and Bute, South-East Scotland and South of Scotland.

> 'we will set out the land required in each local authority area to support local development plans over the life of the plan, informed by national analysis with local input. This will ensure a nationally agreed approach to housing land is used as a starting point for local development plans, and is aligned with local housing strategies and wider strategic investment priorities.'

The Housing to 2040 route map (Scottish Government 2021b) explains further how, 'informed by local input, NPF4 will set out how much land each local development plan should allocate for housing, as a minimum'. Further details remain limited at the time of writing (March 2021), and it is not our suggestion that this approach provides a blueprint for the environment. Nevertheless, these planning for housing proposals bring together elements that may have relevance to the spatial requirements of addressing environmental targets: a willingness to work nationally to construct a framework of requirements, translated into spatial/land allocation terms; an apportionment of those requirements between local planning authorities, and a governance framework that combines national direction with local input.

4.0 Environmental targets – candidate solutions for potential problems

The idea of setting environmental targets for the land resource itself – or using environmental targets to specify representations of land requirements more closely – faces a number of potential problems, and we use this subsection to suggest possible responses. Moreover, some of these problems have also arisen in the context of development targets (as with planning for housing), which also offers potential solutions.

4.1 Over-simplification

Translating our diverse demands for the land resource into a single target, or small number of targets, inevitably simplifies very complex situations (Ravetz et al 2021). Given where we are in this field, perhaps this is inevitable - '(m)ost approaches to solving complex problems start simple and evolve; target-based ... planning is no exception' (Carwardine et al 2009, p.6) – but targets will always remain surrogates to some degree. Is this a fatal problem? Not necessarily.

As Ravetz (2000) notes, quantitative frameworks are useful for their simplification, but provide a framework for deliberation of more complex and nuanced arguments (Clement 2021). Appropriately constructed, targets can serve as 'boundary objects', 'hooks' (Scott et al 2018) or 'trading places' (Ravetz et al 2021), that facilitate the productive collaboration between different actors, because they become relevant objects to those wider worlds. As

the Melbourne example below suggests, specificity and measurability can help in this regard.

Sufficient precision

Fastenrath and Coenen L (2021), writing about Melbourne's 'Metropolitan Urban Forestry Strategy' – a flagship initiative of the wider local resilience agenda - talk of aspirations to increase tree canopy cover as a means of addressing a wider series of environmental, climate and health challenges. A key issue is that there remains significant 'interpretative flexibility' (p.143) around aspects of the action, including definitions of canopy cover and targets. Nevertheless, the percentage increase target was able to facilitate the articulation of different stakeholders' interests, and open up discussions towards wider goals of liveability. They contrast this with the more limited progress of the cycling strategy, where its vaguer goal ('transformation to a cycling city') lost momentum, because it was less clear what it is trying to achieve. So '(t)his points to the challenge of specifying the boundary object sufficiently for problem-solving to occur while at the same time keeping the problem-framing sufficiently open to allow for sufficient fluidity for inscription and contestation by different stakeholders' (p.146).

Moreover, planning provides a mechanism by which simple targets can – in their implementation – achieve multiple goals. The targets that govern planning for housing are relatively simplistic but, by influencing the location, configuration and design of housing planning should (ideally at least) ensure that other social, economic and environmental goals are jointly achieved. One might anticipate the same for a whole series of land- and nature-based solutions to environmental crises: targets inform the broad quantity, perhaps the optimal spatial arrangement, but through detailed siting and design the various components – of afforestation schemes, re-wilding, natural flood management and coastal adaptation strategies (see e.g. van Buuren et al 2015) – achieve additional benefits. Consequently, next to the simple formula of 'more space', one may also need criteria for 'better' space, e.g. more healthy ecosystems. So, as well as having a system of environmental land-based targets against which progress could be assessed, the performance of those arrangements would still need to be assessed against environmental outcomes (Hislop et al 2019).

In addition, it is of course the case that many land- and nature-based solutions to climate and nature crises can themselves can achieve multiple environmental goals. Some habitats may simultaneously support carbon storage, biodiversity, flood risk mitigation and recreational benefits. One can readily imagine 'win-win' solutions, or the relevance of 'no regrets' approaches i.e. where spatial policies driven by environmental targets can be rationalised by a firm expectation that certain goals will be delivered, even as others remain more speculative and uncertain. The prospects of land- and nature-based solutions having

multiple benefits adds force to the merits of using a strong element of national mapping, to identify areas where the synergies look most compelling, and prioritise them for protection and financial support.

4.2 Challenges in implementation and flexibility

Measures that aim at delivering environmental targets need to be able to react to unforeseen problems (as there are in all situations of uncertainty) and diverse contextual conditions. This is an important lesson from SEA implementation in Slovenia where SEA outcomes were considered strictly binding up to 2016. However, a fixation on sticking to agreements once reached led to ineffective measures being implemented, even in the presence of evidence for those not working. It is because the pursuit of targets can create dilemmas that they often need to work in conjunction with other devices, like 'principles, qualitative goals and other expert information' (Carwardine et al 2009, 8), to help the actors involved to work out what best to do.

One implementation issue where flexibility may be required, and where solutions are available, is site viability. Not all land allocated at plan level may turn out to be viable for the anticipated environmental purposes when subjected to closer scrutiny. Although careful testing of options in advance can diminish this problem, it cannot eradicate it. The response might usefully echo what takes place in planning for housing. Across local planning authorities, sites that come forward for housing may not, on closer inspection, be fully viable for that land use. The response, however, is not to abandon targets on the grounds of insufficient omniscience, but to accommodate a certain level of flux in the land made available for housing, subject to the requirement that the overall supply remains sufficient.

4.3 Dealing with apportionment

As we noted earlier, challenges invariably arise in translating targets for a nation as a whole into action across the diversity of space and places in which planning takes place. Some of the strains can be mitigated by allowing, as above, some flexibility in how targets are met. But it may well remain the case that some local planning authorities feel that they have insufficient space (or environmentally, socially and economically optimal space), to allocate to achieving environmental targets. Looking again to planning for housing, the solution in such cases is to look at the situation from a higher spatial level, to deliberate the best spatial apportionment of contribution to the target across the constituent bodies. Traditionally, regional planning forums have been the arena for this kind of work (Cowell and Murdoch 1999).

4.4 Collaborative development of targets

Planners have, quite reasonably, argued that although they are content to see planning tied more closely to the delivery of environmental targets (Cowell et al 2020), it would be unreasonable to expect planners to identify what all of those targets should be. One can empathise with that: many areas in which environmental targets may emerge will necessarily draw on areas of distinct expertise, in climate science, biodiversity, flood hydrology etc.

Nevertheless, one should certainly expect that those responsible for developing targets do so with an eye on how they might be translated into planning (Schetke et al 2012). This may entail sensible ways of spatialising those targets, as well as sensitivity to the limitations imposed by data availability and applicability in planning contexts. Where actors work with data that they feel they own, that too can help drive commitment (op. cit). These are relevant considerations for the Scottish Government's proposed 'high-level policy-focused strategy' for biodiversity, to be delivered after the CoP 15 meeting of the Convention on Biological Diversity (Scottish Government 2020c).

Collaboration also needs to be systemic. Targets are always crude representations of a more complex situation. However, for planning and other policy areas to begin contributing swiftly to the environmental crises, it is important that targets are judged through a pragmatic lens – i.e. in terms of the outcomes that they drive. As in other areas of public policy, imperfections, omissions and side effects need to be addressed by a commitment to collaboration between actors and governmental levels, and to reflexivity – i.e. a willingness to learn, respond and revise in relation to outcome information. Planning is vital here. Although planners may express discomfort in steering target design, it is in the arenas of planning – working at the interface between targets, plan-making and real places – that there are opportunities to generate important lessons about the effects and sensibility of targets.

4.5 Dealing with claims that targets have a distorting effect

It might be claimed that instituting firmer targets for the environment, in planning, will have an unfortunate distorting effect. In effect, this is two criticisms rolled into one. The first is that it is inappropriate to give such strategic weighting to environmental goals in a planning process that is, and should, be about balance. A response to this is that three decades working with vague and optimistic notions of 'balancing' environmental, economic and social impacts under a sustainable development umbrella has been insufficient to avert mounting environmental crises, and that discourses of 'balance' have been a smokescreen for processes that in reality strongly prioritise development. Dealing with environmental crises requires a policy framework that does give high priority to delivering the necessary

environmental improvements, and targets, and supports its implementation to ensure that this is not traded away.

The second criticism is that working with targets embodies beliefs about controllability and prediction that are, in their apparent self-confidence, symptomatic of a wider cultural inability to deal with environmental uncertainty and risk. Such is the logic of suggestions that plans should be more about resilience and adaptation (e.g. Davoudi et al 2013). We think this criticism can be set aside. For one thing, business as usual, in its pervasive assumptions that environmental assets can be traded off, lost or readily compensated makes plenty of problematic assumptions about knowability, control and risk. Plus, insofar as a drive for delivery of environmental targets leads to more space being allocated to the relatively open unfolding of more natural processes, then the frontiers of human control are being rolled back.

4.6 Target strength

Although targets, goals and standards may have the aura of firmness and precision, much depends on how they are constructed and mobilised. As Majone (1976, p.593) neatly put it:

> 'The actual outcomes of environmental policies are affected more by the institutional arrangements emerging from the political process than the technical characteristics of the instruments used.'

It is important that targets are set at a level that is consistent with the scale of the challenge and the changes that must be achieved. With climate change, the emergence of 'net zero' goals, and the bringing forward of time frames (to 2040 in Scotland), creates a robust position – indeed, this is why these climate change targets have a potentially 'disruptive' implications for business as usual (Fisher et al 2017). One has to hope that targets in the biodiversity realm, too, are set in relation to what is required to address the scale of the problem. Another facet of firmness is meaningful timescales, to avoid difficult challenges being fudged by deferral.

Risks of weakness in the use of targets and goals arise not just in the setting of 'levels', but also from constructing, translating and institutionalising them in ways that allow excessive substitutability between solutions, or implementation in ways that vitiate the potential gains. An example of the former would be the creation of metrics for 'biodiversity enhancement' that allow trade-offs to proceed that legitimise significant losses of environmental value for inadequate replacements.

4.7 Pursuing targets needs wider, supportive governance arrangements

Simply instituting a system of targets will have little effect unless they unfold within a governance system that clearly allocates responsibility (Zeiger et al 2017), enables the exercise of monitoring and scrutiny in relation to those targets (Simmons 2021), and mandates redress in the face of slippage. Effective systems of monitoring are also important for allowing 'transparency, learning and reflexivity' (Fastenrath and Coenen 2021, p.147). By way of illustration, what gives EU environmental legislation its relative power in driving change in environmental performance across member states is not just the propensity to use firm targets, standards and time frames, but their deployment within governance systems that require monitoring and reporting, allow complaints for infractions, and can issue sanctions in case of failure (Burns et al 2016). Equally, effective accountability and monitoring is furthered by having measurable targets and objectives.

Moving forward with target-driven environmental governance thus puts a premium on the efficacy of new governance arrangements emerging in Scotland to cover the 'governance gap' left by Brexit. The proposed arrangements arising from the European Union (Continuity) (Scotland) Act 2021 centre upon the creation of a new watchdog, Environmental Standards Scotland (ESS). This offers a framework for ensuring Scotland's public authorities remain compliant (and dynamically aligned) with ex-EU environmental legislation, which matters because much of such legislation comes with binding environmental standards, targets and time frames, which diminish domestic discretion. The Continuity Act regime also matters because it has been extended beyond post-Brexit environmental governance repair (e.g. reactive responses to complaints), to embrace wider oversight of performance (Reid 2021). It requires the Scottish Ministers to produce a report on the effectiveness and appropriateness of post-Brexit environmental governance arrangements. In addition, as summarised by Reid (2020) there is:

> "a requirement on Ministers to produce an environmental policy strategy setting out objectives for protecting and improving the environment, policies and proposals for achieving this and arrangements for monitoring progress. Regard must be had to the desirability of securing a number of objectives, including aiming at a high level of environmental protection, contributing to sustainable development and responding to the global crises in relation to climate change and biodiversity. Annual reports on progress are required and Ministers must have due regard to the strategy in making policies, including proposals for legislation."

These will form key arenas for the development of objectives, and it is vital that both – and the ongoing oversight role of the ESS – also embrace the environmental performance of planning.

But are the opportunity structures (Kitschelt 1986) of accountability arrangements enough? Planning for housing again offers important lessons. In this context, target-focused planning processes are held in place in part by procedures for monitoring, assessment and scrutiny i.e. through the local plan-making process. But they are also held in place by the active use of those procedures by other key actors, notably major house-building interests. These organisations have the resources and incentives to monitor planning processes closely, at all levels (national policy, local plan-making and implementation). We need to consider what actors might be adequately resourced and empowered to do the same job for the environment (Simmons 2021).

4.8 We need to bear in mind what planning (and developers) can deliver

It is vital that public policy systems are geared towards taking the necessary steps to avert environmental crises. Targets, goals and standards are a key tool in our governance arsenal and planning, as an important mechanism for steering change, must be embraced within this agenda. However, it remains important to bear in mind what planning can actually deliver, and what it cannot. Although many in planning circles are supportive of their work being more closely directed to delivering important outcomes (Cowell et al 2020), there remains justifiable anxiety about being made responsible for goals that planning cannot itself deliver (RTPI 2020). And of course, there are considerable problems in attribution i.e. working out which interventions did or might in future achieve the desired ultimate outcomes.

One of the most important factors delimiting the ambit of planning in relation to environmental goals and land-based solutions is that much action would need to take place in types of rural land use that are not regulated by planning (forestry, farming, sporting estates). Moreover, as we have noted above, just because planning has an important role does not mean that planning mechanisms – regulation and the securing developer contributions – will always be a major delivery agent. This may be especially true in places like Scotland, with its significant expanses of open landscape and relatively low levels of urbanisation.

Consequently, this is an agenda in which the actions of planning and (rural) land management sectors need to become more closely integrated, to work together in the realisation of environmental objectives for the land resource (Simmons 2021). The Scottish Government (2020a, p.33) acknowledges this link: the NPF4 position statement talks of the need to link planning to the Land Use Strategy. However, while cross-sectoral collaboration is essential, mere ‘linkage’ is insufficient. Indeed, better collaboration may be fostered by making environmental targets the shared responsibility of relevant governmental departments, to foster a corporate approach. Cooperation may also be fostered by the need

to construct the kind of tangible spatial representations of the land demands of environmental targets that have been discussed previously in this think piece.

5.0 Conclusions

If society is to adequately tackle the impending environmental crises in climate, nature and other environmental media, then significant changes are required now. This is recognised in emergent strategic policy for the planning system, with the Scottish Government teeing-up the need for 'an urgent and radical shift' (2020a, p.8) and, importantly, recognising the need to drive action for the land resource itself. Setting targets, objectives and goals are a key governance tool for this endeavour.

In our think piece we have suggested a number of ways in which targets may be instituted for the land resource itself, to support addressing the climate and nature crises:

- Instituting targets for reduced consumption of green field land.
- Building on targets for public open space.
- Drawing on carbon budgets and climate change legislation, to identify estimated contributions from land-based solutions.
- Constructing meaningful targets for biodiversity and nature recovery.
- Identifying the land requirements from a precautionary approach to future flood risk and climate change adaptation.
- Potentially, drawing together all of the above (and more) within a unified framework to maintain and enhance 'natural capital'.

However, constructing targets is just part of the task: equally important are the tasks of **translating** targets into formats meaningful to the arenas in which they will be used (in this case, the planning system) and **institutionalising** them within policy systems in ways that reinforces the necessity of achieving them, and makes them resistant to being marginalised or eroded. This could be achieved by:

- Issuing targets at national level in planning policy, and allowing sub-national scales of planning the scope to work out which land best supports delivery. Given potential issues of environmental expertise in local planning authorities, and the likelihood of uneven responses, this may be inadvisable for novel environmental targets where the clock is ticking on the need for change.
- Conducting much of the work to link environmental targets to the land resource at national level, constructing broad spatial representations at this level, and then transposing it into lower-level land requirements in the manner of a 'national development'.

- However targets are institutionalised, charging an agency with achieving the targets, to work alongside individual local planning authorities, may be a helpful supportive measure.

A number of challenges face the institutionalisation of new environmental and land-based targets for planning. Arguably the most significant arise from moving from the forms and levels of environmental protection and enhancement that can be delivered through planning mechanisms, towards the forms and levels of environmental protection necessary to deal adequately with major environmental problems. The latter requires much more significant change, and requires close integration between planning, agricultural and forestry policy, as many of the relevant levers may lie in these domains. These sectors could be mutually aligned within a shared, target-driven policy framework, including any relevant spatial strategy representing where action is required, but relative responsibilities for delivery need to be worked out.

Linked to this, the second major problem is funding. Planning may have an important role in identifying sufficient space for land- and nature-based solutions, green and blue networks etc, and perhaps for constructing more detailed localised mappings, but the resources required to ensure that these spaces fully deliver exceed what can be achieved via planning mechanisms.

There are other challenges involved in reconstructing the planning system to support the delivery of environmental targets. In many instances, answers to them can be found by learning from what has long been a key area of target-oriented planning – planning for housing. A number of lessons are salutary.

Targets may seem simple but the experience of planning for housing - and other ostensibly 'simple' target-based policies like brownfield land - all show 'the complexity of a seemingly simple policy aim' (Ganser and Williams 2007, p.615). To commit to a target-based approach requires the commitment to engage in the significant, detailed analytical work that goes with them, not least in translating broad targets into more concrete requirements, and following through into delivery.

Targets do not 'work' in isolation. They require wider supportive policies, so that they are pursued in ways likely to co-deliver other environmental, social and economic goals – as is the case with housing targets. They may require other supportive mechanisms, in research and resourcing. They also require mechanisms by which relevant agents can be held to account for progress, and the existence of vigilant committed actors able to hold those agents to account. Mechanisms may not be the problem: but who will be the environmental equivalent of the ever-vigilant housing sector that closely monitors the adequacy of land supply for housing?

Various factors could dissipate the efficacy of a targets-based approach: targets may be set too low, or with too little regard to the specific values that ecosystems generate, to adequately redirect business as usual. Perhaps this presents the greatest challenge. With net zero legislation for climate change, we have a taste of targets that derive in good part from an environmental outcome goal. With biodiversity and other ecological objectives there is now a need to do the same in this arena: derive goals and targets relevant to the scale of the required outcome, rather than as incremental extensions of current practice, pre-softened for short-term palatability, which avoid undue reductionism while allowing diverse stakeholder participation.

We conclude by summarising how we characterise the entire exercise. One should not advocate a tighter role for environmental targets in planning, because it is easy, because it represents a simple, perfectible 'magic bullet' solution, or because it will convert tricky societal and political dilemmas into neat technical activities. We do not put forward this argument because tightening the role of environmental targets in planning is free from problems – quite the opposite. We should do it to address the substantive improvements to environmental quality that the twin climate and nature targets demand, and we should do it for the same reasons that governments have struggled relentlessly with issue of housing delivery, in which targets have been used to give a persistence, direction, tangibility to the task. We should tighten the role of environmental targets because the outcomes are important, failure is highly consequential, and therefore the governance struggle is necessary. We should start it without delay.

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Appendix 1: Regulating development for urban greening

There are tools available that seek to specify the GI or 'urban greening' requirements that new development should meet.

An interesting idea involves the application of a generic urban greening factor (UGF) to specific development proposals under consideration by any Scottish Planning Authority (SPA) once a new Local Development Plan (LDP) has been adopted. This approach involves estimating the impact of development on existing green infrastructure as set out in a research report commissioned by the Greater London Authority: The Ecology Consultancy (2017) *Urban Greening Factor for London Research Report*, London: Greater London Authority. The UGF will be used to assess the impact of development proposals in the recently published plan for Greater London: Mayor of London (March 2021) *The London Plan: The Spatial Development Strategy for Greater London*, London: Greater London Authority.

Policy G5 Urban Greening states:

"Major development proposals should contribute to the greening of London by including urban greening as a fundamental element of site and building design, and by incorporating measures such as high-quality landscaping (including trees), green roofs, green walls and nature-based sustainable drainage.

"Boroughs should develop an Urban Greening Factor (UGF) to identify the appropriate amount of urban greening required in new developments. The UGF should be based on the factors set out in Table 8.2, but tailored to local circumstances. In the interim, the Mayor recommends a target score of 0.4 for developments that are predominately residential, and a target score of 0.3 for predominately commercial development (excluding B2 and B8 uses).

"Existing green cover retained on site should count towards developments meeting the interim target scores set out in (B) based on the factors set out in Table 8.2." (p.322).

Table 8.2 in the new plan then provides the conversion factors applied to proposed developments to ensure that they comply with the UGF requirements. A similar approach could be applied by SPAs.

Appendix 2: Introducing environmental targets into LDPs through requirements to maintain natural capital

One potentially valuable tool for introducing environmental targets or goals into Scottish LDPs is presented by the adoption of a recommendation made in our initial think-piece (Cowell et al 2020), namely that each SPA should produce an environmental report, which is updated annually. The environmental report would be used as part of the evidence base presented for a gate check when preparing a new LDP. This offers the opportunity for SPAs to estimate the impact of their planning policies on the stock of natural capital in their local area.

The practice of estimating the natural capital accounts for an area has recently been explained in guidance issued by the Department for Environment, Food and Rural Affairs (March 2020) *Enabling a Natural Capital Approach: Guidance*, London: DEFRA. The relevant part of the DEFRA guidance for estimating natural capital accounts for a local plan is provided in *Ch.5: Place-based natural capital approaches*. Sections 5.2, 5.4 and 5.5 explain how to use these tools. Three potential approaches for assessing and exploring natural capital are offered:

- mapping natural capital stocks (habitat and land-use surveys; mapping ecological networks for wildlife; assessing the condition of ecosystems);
- quantifying ecosystem service flows (simple scoring tools; process-based and rule-based spatial modelling; monetary and non-monetary valuation);
- opportunity mapping (analysing ecosystem service supply and demand to look for gaps; opportunities to improve networks for wildlife and people; cost-effectiveness analysis).

The guidance indicates how each of these approaches can be undertaken. If an SPA is prepared to use its annual environmental report to this end, then it would be possible to monitor estimated yearly changes in the local natural capital stock through the environmental report, as well as providing an indication of the estimated impact that the proposed new LDP could have on the natural capital stock.

Adopting this approach would require all SPAs to include their current local natural capital budgets drawn from their annual Environmental Reports in the evidence report prepared for the Gateway check under the new arrangements for preparing LDPs following the Planning (Scotland) Act 2019. After having their evidence base approved, when preparing their full report subject to SEA and final examination prior to adoption, Scottish planning authorities would need to demonstrate how the policies and proposals set out in their new LDPs contributed towards net gains in the current local natural capital budget used in the evidence report.

In this way, the overall impact of the new LDP would be assessed *inter alia* in terms of the effect it had on local stocks of natural capital, and this would also provide a basis of measurement for the application of SEA to the draft LDP during its preparation. Such a procedure would offer a way of introducing environmental targets or goals into the

preparation of new Scottish LDPs, which would be compatible with the new arrangements being introduced for these plans under the Planning (Scotland) Act 2019.

We offer these additional observations:

- Firstly, while much effort in the nascent natural capital field has been devoted to strategies for measurement and resource accounting, equally important is that the policy framework issues firm requirements that natural capital is maintained and/or enhanced.
- Secondly, the choice of how to measure natural capital – whether as stocks or ecosystem service flows – has important implications for the costs of the measurement activity, and the ultimate 'firmness' of targets. This is because expressing natural assets in terms of the monetary value of service flows allows more substitution.
- Thirdly, there is a need to shift the dial from measuring and maintaining the natural capital we presently have, towards thinking how much natural capital we need, and where, to best achieve environmental goals. This brings into focus how natural capital relates to wider environmental goals, targets and standards.