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*Published in:*  
Built Environment Project and Asset Management

*DOI:*  
[10.1108/BEPAM-11-2012-0053](https://doi.org/10.1108/BEPAM-11-2012-0053)

*Publication date:*  
2014

*Document Version*  
Peer reviewed version

[Link to publication in ResearchOnline](#)

*Citation for published version (Harvard):*  
Thomson, C & El-Haram, M 2014, 'Potential and implications of sustainability action plans: lessons from the Greater Middlehaven Regeneration Project', *Built Environment Project and Asset Management*, vol. 4, no. 1, pp. 108-122. <https://doi.org/10.1108/BEPAM-11-2012-0053>

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# **Potential and implications of sustainability action plans: lessons from the Greater Middlehaven Regeneration Project**

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## Introduction

Increasingly across all levels of policy, the built environment is recognised as a key context in delivering a more sustainable future due to its extended lifecycle and associated impacts (economic, environmental and social), but significantly in its role in shaping our lives (DECC, 2009; DEFRA, 2005). As 'custodians' of the built environment (Vanegas, 2003), the construction industry is challenged to evolve its product and practices to promote a whole life building approach ensuring quality-of-life and environmental systems integrity (BIS, 2008; Sullivan, 2007). In the UK, a step change in building regulations promotes carbon reduction targets aligned with the Climate Change Act; however this potentially limits a broader coverage of sustainability issues and promotes targets which some argue are insufficient and movable (Rees, 2009). A cultural change is required amongst professionals to view sustainability as an aspiration to deliver as a core project value associated with delivering as 'sustainable a building as possible for the context' as opposed to an enforced agenda to comply with (Head, 2008). However, the ability of the construction industry to deliver such a change is questioned by UK Government citing the need for further improvement in process management, level of integration between project stages and professional teams and the need to consider overall building lifecycle in all project decisions (BIS, 2010; Wolstenholme, 2009; Reed and Gordon, 2000).

Inspired by the Agenda 21 Plan for Action (UNCED, 1992), the sustainability action plan has emerged and is utilised in the delivery of policy (i.e. Low Carbon Transition Plan) and in promoting industry initiatives for sustainable construction e.g. plasterboard and windows (Greenwise, 2010). The plan provides an agreed shared vision reflective of context, with a framework of objectives, targets and KPI's and a planned delivery process which is agreed and provides focus on assessment and feedback to decision makers. These are principles which this research argues are common to project management and could play a pivotal role in embedding sustainability as a core project consideration. The potential is provided for a framework to guide and support its delivery across the project phases, ensuring it is assessed and that the plan is updated and revised as the project progresses. The growing role of the sustainability action plan is observed in a review of best practice in sustainable design and construction by SUE-MoT (Thomson et al., 2008) and in recent publications (RIBA, 2011; Betterbricks, 2010; UTB and BSRIA, 2009). Such an action plan has the potential to move away from viewing sustainability as a project add-on, and instead to view it as an integrated element of management practice (Chance, 2009; Khalfan, 2006).

Current sustainability assessment practice has largely failed to achieve integration between the phases of a project, with tools viewed as static and applied in a reactive manner resulting in isolated snap shots of sustainability performance which lack the potential for feedback and change. An action plan has the potential to allow discourse amongst stakeholders associated with delivering a sustainable project and enable tangible

information with potential to forge common understanding about sustainability and its implications (Thomson et al., 2009; Mathur et al., 2008).

An inclusive and transparent approach to developing an action plan is advocated enabling sustainability issues to be identified and targets set by the stakeholders. This reflects the ethos of sustainability; however it can inadvertently skew the focus towards energy and carbon emissions as current priority issues. Ensuring flexibility to reflect the project context is necessary; however safe guards are necessary to ensure that a holistic view of sustainability is established and for an action plan to reflect this through specific objectives, associated measured goals and a detailed execution plan, a view shared by Vanegas (2003). A fundamental rethink is required around the way sustainability is approached during the management of construction projects. Although sustainability action plans are still not common, it is possible to observe two emerging approaches driven either by the client with developers asked to reflect their sustainability values (often in their corporate strategy) or for a limited group of developers to promote sustainability in their own management practices and to work with clients to incorporate this into the projects. Such developers are evolving their management practices by providing a framework (of sustainability principles, indicators, actions and evaluation mechanisms) around which sustainability can be managed with assessment playing a key role.

The research explores the potential of a sustainability action plan as a management tool to aid the planning and monitoring of sustainability across the entire building lifecycle, and its role in facilitating cultural change. A case study is explored following the application of a sustainability action plan by developer BioRegional Quintain Ltd. in the Greater Middlehaven Regeneration project. Reflecting a holistic interpretation of sustainability represented by Principles of One Planet Living (OPL) (Desia and King, 2006) the research considers the potential and implications of such a proactive approach to delivering sustainability. Applied during detailed design, a comparison is possible with the management approach to sustainability before and after its implementation.

## **Methodology**

The methodology forms part of a broader exploration of the urban regeneration process, and the approach to managing sustainability and related knowledge through the case study. The research is inductive by nature, with the sustainability action plan emerging as a focus as its role in managing sustainability became clear and that this was an innovative approach.

A qualitative approach is adopted to provide the opportunity to explore the social setting around which decisions are taken and to consider the role of the sustainability action plan in shaping the construction project. A series of interviews were conducted with those members of the project team involved or influenced by its application within the case study. The interviews were split in two stages, the first with the project director (Tees Valley Regeneration Company) to establish an understanding of the background, the approach to

sustainability and its management across the project process. The second used a snowballing technique to determine the sample with interviews conducted with a key member of the design team; sustainability manager and assessor; sustainability integrator (responsible for delivering sustainability on site), a member of the contractor's team and a member of the local business community; exploring their insight into the rationale, structure and experience of using a sustainability action plan.

Each interview lasted around 2 hours with a topic guide developed to support the discussion, with the detailing of the questions reflecting and responding to the context. The topic guide was focused on the slightly broader line of enquiry and aimed to identify:

- key project activities (by phase) to develop process map
- key activities relating to delivering sustainability (by phase) to understand its management
- project stakeholders and nature of their involvement in sustainability related activities (by phase)
- sources and flow of sustainability related knowledge between the stakeholders (by activity and phase) to develop knowledge maps
- drivers, barriers and potential lessons to inform future projects

The interviews were recorded, transcribed and analysed using open coding techniques to enable categories and messages to emerge. Support was provided through its triangulation with secondary data such as the sustainability action plan, assessment reports, project plans and reports, and consultant's reports. Finally, those interviewed were revisited to explore the emerging findings, ensuring their legitimacy, reflect potential changes and wider implications. The findings were presented during two workshops with a range of practitioners, experts and academics working in the area of sustainable design and construction with 25 attending (in London) and 23 (in Loughborough). The views were incorporated in the key findings and consideration given to the extent it was innovative, its applicability and appropriateness to other contexts.

## **Case study background and evaluation**

Greater Middlehaven (Middlesbrough, Teesside UK) suffered from 10 years of failure to regenerate the district resulting in a new strategic plan being developed to promote investment. Blighted by high levels of deprivation and poor environmental quality following the decline of its industrial base, an inspirational vision was required and a desire for sustainable legacy sought by the Regional Authorities and Urban Regeneration Company. Renowned urban designer Will Alsop was commissioned to develop a master plan in 2003 that would inspire the realisation of a new Middlesbrough College, 2,400 homes, 800,000 ft<sup>2</sup> of commercial offices, sports and leisure facilities and outdoor spaces, hotels, bars,

restaurants and shops; which aims to provide ‘a reason for people to go over the tacks’ and to support the Riverside Stadium (Alsop Architects, 2009). Initial plans for phase 1 represented 750 residential flats and a mix of bars, café’s, office units and shops on the lower levels (Riverside One, 2012). The plan aimed to stimulate economic activity, create jobs, promote a mixed use of development, enhance the public realm both aesthetically and through landscaping, facilitate a sustainability community, improve ecology of the site and provided renewable energy solutions (combined heat and power generation), with unique buildings, unusual use of colours and space providing a development that provokes discussion and interest.

Table 1 identifies the sustainability related activities across the project phases (using RIBA Plan of Works) and this reveals a distinction between the approach to managing sustainability prior and following the selection of the developer. Sustainability was a key element of the project’s vision from the outset, highlighted by the broad nature of the sustainability issues identified i.e. quality of life, creation of jobs etc. The issues and assessment tools deployed during phases A to D reflect an urban regeneration project which is focused on delivering improved environmental performance within the traditional socio-economic priorities reflected. The assessment tools identified reflect a culture of compliance with the outlined requirements of the planning process and by the funding bodies.

**Table 1: Key sustainability activities in relation to the project phases**

RIBA PLAN OF WORKS PHASES	SUSTAINABILITY ACTIVITIES
PHASE A APPRAISAL	IDENTIFY SUSTAINABILITY ISSUES DRIVING THE DEVELOPMENT PUBLIC CONSULTATION TO AID IDENTIFICATION OF APPROPRIATE ISSUES ALIGNMENT WITH LOCAL AUTHORITY CHECKLIST APPRAISAL
PHASE B DESIGN BRIEF  AND  PHASE C CONCEPT	APPOINTMENT OF A VISIONARY MASTER PLANNER REDEFINE THE IDENTIFIED SUSTAINABILITY ISSUES DEVELOPMENT OF MASTERPLAN SUBMISSION FOR OUTLINE PLANNING PUBLIC CONSULTATIONS ON THE MASTER PLAN LOCAL AUTHORITY, REGIONAL DEVELOPMENT CHECKLIST APPRAISAL, ENVIRONMENTAL IMPACT ASSESSMENT
PHASE D DESIGN DEVELOPMENT	DEVELOPERS INVITED TO COMPETE FOR DEVELOPMENT FOR PHASE 1 2 DESIGN AND DEVELOPMENT WORKSHOPS WITH 25 POTENTIAL DEVELOPERS SUSTAINABILITY FORMS 15% OF SELECTION CRITERIA
PHASE E TECHNICAL DESIGN	IDENTIFICATION OF SUSTAINABILITY ISSUES DRIVING THE DEVELOPMENT ALIGNED WITH ONE PLANET LIVING PRINCIPLES DEVELOPMENT OF SUSTAINABILITY ACTION PLAN PRE-ASSESSMENT REPORT FOR ECOHOMES
PHASE F TO H PRODUCTION INFORMATION, TENDER DOCUMENTATION AND TENDER ACTION	SUSTAINABILITY ACTION PLAN TO GUIDE PROCUREMENT AND CONSTRUCTION DOCUMENTATION MONITORING OF ECOHOMES AND OPL ASSESSEMENTS
PHASE J MOBILISATION  AND  PHASE K CONSTRUCTION TO PRACTICAL COMPLETION	SUSTAINABILITY ACTION PLAN USED TO GUIDE DEVELOPMENT OF A SUSTAINABLE CONSTRUCTION PLAN MONTHLY MEETINGS TO MONITOR PERFORMANCE OF SUSTAINABLE CONSTRUCTION PLAN IN LINE WITH OPL
PHASE L POST PRACTICAL COMPLETION	SUSTAINABILITY ACTION PLAN USED TO GUIDE ESTATES MANAGEMENT SUSTAINABLE MONITORING OF ACTUAL PERFORMANCE AND REVIEW MEETINGS

(USE)	SUPPORTED BY A LOG RECORD OF IMPLICATIONS FOR MAINTENANCE, REFURBISHMENT, AND RENOVATION
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Once planning approval was received and funding secured to start phase 1, a competition was launched for an innovative developer to match the developments iconic aspirations with 15% of the selection criteria based on sustainability. BioRegional Quintain Ltd. (2010) won the competition based on their innovative approach to the construction process which included the application of Principles of One Planet Living (OPL) applied through a sustainability action plan. This represented a shift in the approach to managing sustainability with the arrival of a consistent set of principles applied across the phases of the project, with activities planned and an assessment framework outlined to evaluate performance with a view to enabling feedback to inform the evolution of the project. The approach aims to not only demonstrate sustainable construction, but to aspire to deliver through design and estates management an enabling environment where residents can live a sustainable lifestyle. BioRegional Quintain Ltd. have developed this approach from lessons learnt from the BEDZED eco-village in South London (BioRegional, 2009) which highlighted the need to deliver a holistic view of sustainability in order to address estates management and lifestyle factors (Chance, 2009). The 10 Principles for One Planet Living are displayed in Table 2.

**Table 2: 10 Principles for One Planet Living (Desia and King 2006)**

Zero Carbon	Local and Sustainable materials	Land Use and Wildlife
Zero Waste	Local and Sustainable food	Culture and Heritage
Sustainable Transport	Equity and Local Economy	Health and Happiness
Sustainable Water		

Much has been written about the merits of such principles or similar (i.e. The Natural Step (Natural Step, 2009); Bellagio Principles (IISD, 2009), Ceres Principles (Ceres, 2009)) and their ability to articulate the concept of sustainability. However, this research is limited to an evaluation of the potential offered by a set of principles when supported by a structured management approach such as an action plan.

*The sustainability action plan*

The sustainability action plan sets out the sustainability vision and how it relates to the project context, and for each of the 10 OPL principles the plan provides: an outline of the established standards and targets (regulations, building standards); aspirational standards and targets set for this project; the agreed minimum targets set by the project board;

outlined methods for achieving these and an identification of those responsible for their delivery, with an illustrative layout provided in Table 3 for Low and Sustainable Materials.

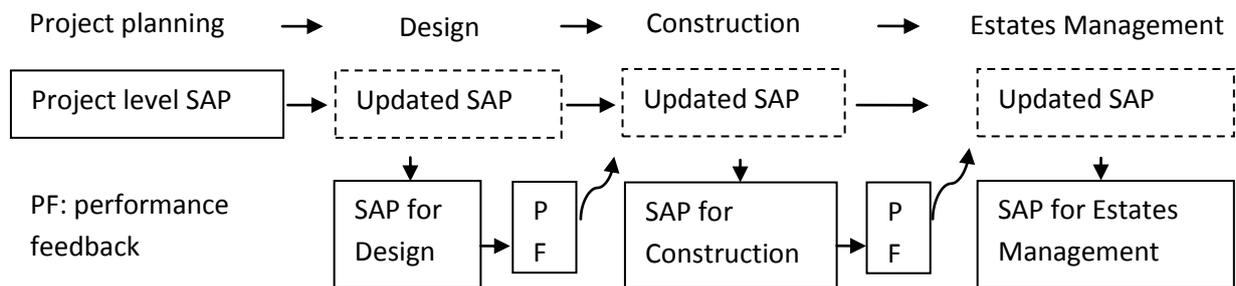
**Table 3: Illustrative layout of the action plan for Low and Sustainable Materials**

<b>Low and Sustainable Materials- <i>materials chosen for buildings and infrastructure to give high performance in use with minimised impact on manufacture and delivery.</i></b>	
Context	-Global and regional context/ local context and base line established.
Targets	-Targets developed with reference to EcoHomes and BREEAM standards 'Excellent rating' -Target for embodied CO2 in buildings to be <900kg/msq (excluding any energy/ ventilation plan etc) -Target for >10% of materials to come from recycled reclaimed sources (including recycled aggregate) -BREEAM/ EcoHomes Materials-related credits targeted with regards to sustainable timber use and the use of materials with low environmental impacts
Assessment	-Assessment tools, expected performance targets and project stage of application, responsibilities
<b>Approach</b>	<b>Mechanism</b>
Materials with low embodied energy	-Use of lifecycle methodology and 'whole life costing' approach, BRE Green Guide to Specification, embodied energy/ CO2 audit.
Healthy and non-toxic materials	-Materials specification outlining discouragement of PVC use, MDF containing formaldehyde, greater low levels of VOC, Ozone depleting potential, or global warming potential >5. -Encouragement of natural materials and products considered healthy, non-toxic and with low environmental impacts
Specifying sustainable timber	-Accordance with credits under BREEAM and EcoHomes, priority for FSC- certification
Specifying local materials	-Lifecycle analysis, use of locally-sourced construction products (50 miles radius)
Reused and recycled materials	-Innovate and optimise recycled and reclaimed sources, in addition to waste products -On site and local demolition waste contribute >10% of the materials (focus on external works)

A key component of the plan was the identification of assessment tools at set points across the project for each of the principles. The plan provides an overall project document, which is then distilled to form separate sustainable action plans for design and construction phases tailored to the needs of the stakeholders involved. For example the construction plan provides tough targets aimed at defining the behaviour and code of conduct for contractors,

sub-contractors and suppliers to ensure their alignment with the OPL principles. The targets are deliberately ambitious with a view of stimulating innovation in the processes adopted on site. An updated sustainability action plan will be established to guide estates management around the same principles. A key advantage is the provision of a framework to the team and supply chain which explains the philosophy in a practical language. The action plan is not static and responds to the evolving needs of the project, and is regularly updated following performance monitoring against the agreed OPL targets and this iterative process is illustrated in Figure 1.

**Figure 1: Illustration of the iterative development of the sustainability action plan**



Its delivery is supported by the introduction of specific roles at project management level (sustainability manager) and at site level (sustainability integrator). Figure 2 highlights these roles by illustrating stakeholder involvement across the project phases, demonstrating the handover of project delivery to BioRegional Quintain Ltd. but also highlighting the utilisation of expert consultants to guide their delivery of the action plan. A series of knowledge maps revealed the central role the sustainability action plan plays in communicating the rationale for sustainability, helping provide information and foster expectations for the project stakeholders in line with the OPL principles; a marked contrast with the ad hoc nature of the flow of information related to sustainability in the early phases.



practices with OPL principles, they have limited control over the behaviour of future residents and users of the buildings and need to rely on an array of incentives to make sustainability the easy choice.

## **Lessons for wider practice**

Whilst sustainability action plans are emerging in practice, the innovative approach of BioRegional Quintain Ltd. provides an opportunity to consider lessons which can be drawn for wider practice.

### 1) To establish sustainability as a project aspiration

Stakeholders indicated that the action plan was able to promote a culture of change by placing sustainability at the core of the project vision, its delivery through objectives and illustrated the value of providing a clear structure to coordinate its delivery. A member of the design team argued that from the outset BioRegional Quintain Ltd. made it clear to the rest of the project team that delivering sustainability wasn't just a bonus for the project, but *"that it was central to how its success would be judged"*. This view was supported by a member of the contractor's team who argued that the action plan positioned sustainability in the same light as traditional indicators of project performance such as cost, time and quality. The sustainability manager argued that *"a mindset change in the way projects view sustainability is necessary, as only when it is viewed proactively can sustainability be regarded as something to aspire to through innovation and change in practice"*. Interviews with the project director revealed the importance of the developer's ability to communicate this philosophy in the decision to award them the contract for phase 1. A culture whereby the project team were encouraged to go beyond established practice and to rethink the way they approach sustainability was recognised to varying degrees by the respondents, although the contractor did express caution over the future willingness of some due to increased risk and potential cost. However, only through innovation will the scale of the change be realised, and therefore it is necessary to remove a culture within projects that simply reacts to sustainability and merely complies with targets set by planning and building standards. The approach presented by BioRegional Quintain Ltd. aims to provide the opportunity to aim higher than those artificial ceilings, with the action plan embodying this culture by providing a supportive framework.

### 2) The provision of a clear framework and assessment methodology

The sustainability action plan provides a clear framework to the project team to consider sustainability and its implications for project activities. The benefits are evident when comparing the approach within the case study prior to its application. During phases A to D (including Masterplanning), the Regeneration Company provided strong leadership to place sustainability within the overall vision for Greater Middlehaven, but this was very much shaped by traditional socio-economic issues, and the latest environmental requirements. The project director argued that the means of assessment were responsive to local

authority and public funding sustainability appraisals, in addition to an EIA. Analysis revealed no overall framework to support the assessment of the different sustainability issues and thus its overall performance could not be monitored. The member of the design team suggested that it was the holistic representation of sustainability through Principles of One Planet Living which allowed for sustainability to be effectively represented, communicated, and understood by the project team. The contractor stressed the importance of ensuring that the sustainability philosophy was simple for professionals to understand and relate to. All the respondents argued that buy in from the project team was secured partly due to the transparent and agreed nature of the sustainability indicators and associated targets around which an assessment regime could be provided for each project phase. The sustainability integrator argued that *"the action plan provided an understandable reference document around which members of the team could relate the OPL philosophy to the individual indicators and tools required to assess the performance of the emerging design, construction and operation of the project"*. A key finding was to ensure that the action plan was initiated in the earliest project phase, as it is possible the reactive approach observed prior to the developer's involvement could have been avoided and an integrated approach to managing sustainability from phase A to L provided.

### 3) Encouraging a holistic view of sustainability and promoting achievable targets

Whilst the master plan considered sustainability, it was approached in a slightly haphazard manner focused on aligning with different strategic and policy agendas. The approach taken by the developer aims to shift to a broader view of sustainability around the OPL philosophy by providing a framework around which existing indicators and assessment tools can be aligned. Although it is too early to conduct an assessment of the post-occupancy performance, indications from preliminary design based assessments are reported to be encouraging by the sustainability manager. Lessons have been learnt from the post-occupancy assessment of the BEDZED development (BioRegional, 2009), illustrating reductions in the ecological footprints of its resident's lifestyles and the need to demonstrate a holistic approach. The sustainability action plan aims to provide a holistic set of issues, with targets set to encourage innovation and change in practice; however a strong warning came during the interviews for care to be taken to ensure that they are realistic in their delivery given the parameters set. The sustainability integrator argued that *"you are not going to get buy in from the project team unless the targets are seen to be achievable and have an understandable logic behind them, this is potentially the primary role of the sustainability action plan"*. This backs an observation made by the contractor that from a site perspective acceptance will only come if the targets are reflective of the context of practice. Targets which are not specific, realistic and accepted will therefore not be engaged with heavily by project teams.

### 4) Ensuring experts are utilised to guide project sustainability

BioRegional Quintain Ltd. recognised the value of expertise as part of their management approach and ensuring that this was accessible to the team during the project. The sustainability manager and sustainability integrator highlighted the importance that drawing on available expertise has played in helping the developer establish and then deliver the OPL principles in past projects. Drawing on experts when appropriate allows those involved to learn from them, and in future projects apply this accumulated knowledge and experience. Both the designer and contractor felt that the specialist sustainability roles in the form of a sustainability manager, integrator and assessor greatly facilitated the flow of sustainability related information and knowledge within the project team. They were described as providing guidance at different levels of the project hierarchy and aid the integration of the sustainability objectives and their assessment across the lifecycle. Understanding the OPL principles and providing technical expertise, these individuals aided the team's engagement with the sustainability principles, consideration of their practical implications and to effectively interact with its assessment across the project. External expertise was demonstrated in the shape of specialist consultants to provide advice and deliver aspects of the assessment that were out with the skill set of the project team (figure 2). The ability to recognise and support a limited knowledge base within a project team is essential, and the sustainability manager argued that without this it would be impossible to deliver *"such a novel approach to sustainability and its assessment"*.

#### 5) Facilitating the flow and sharing of knowledge

Knowledge mapping highlighted the importance of managing the flow of knowledge between those involved in the delivery of the key sustainability decisions and the assessments. Crucial to delivering the assessment of the OPL principles was the flow of information between the design team and the sustainability assessor, and both argued that an effective flow enhanced the ability to recognise the opportunities for evolving the design with a view to improving performance. The sustainability manager argued that *"having information available to decision makers enables a more flexible approach to design development, however contact is required between these parties to help realise this potential"*. Through regular meetings and a monthly report outlining the sustainability performance against each of the OPL targets, the designer reported that sufficient opportunity was been provided to support the necessary formal and informal contact between the team members. This enables the design team to communicate directly with the developer's sustainability management team allowing for questions to be asked and to learn about Principles of OPL and the implications of the assessment regime. The same approach is being deployed for the site based teams in the hope that this significantly enhances the teams' ability to benefit from 'social learning' which is necessary to improve practice (Thomson et al., 2010; Pope et al., 2004). The contractor felt the sustainability integrator was providing a key link in facilitating the flow of information between developer and site based team.

## 6) Provision of leadership for sustainable practice

An important characteristic of the management of sustainability within the project is that of leadership. The Regeneration Company placed sustainability as a priority in the development of Greater Middlehaven and demonstrated their commitment through the selection of a developer with a strong articulation of the principles of sustainability within their project vision. The local businessman stated that this commitment to sustainability was recognisable from the outset and is a strong message in the current marketing for the development. The project director stated that *"this provided a confidence to the rest of the project team and they wanted to learn more about how this can be delivered in practice"*. The removal of scepticism amongst construction professionals is vital, and the contractor suggested the importance of providing a firm rationale and targets that are achievable. The contractor stated that *"one of the reasons this project works is that the site team can relate sustainability to what is expected to their role, as it is well explained and is realistic in a practice based setting"*. It is apparent that the sustainability action plan acted as a communication tool outlining the principles, targets, assessment points and individual responsibilities required for its delivery. The basis is provided for all project documentation, and allows sustainability to be formally considered within project meetings, ensuring involvement and feedback is provided to the key decision points across the project. The sustainability integrator emphasised this commitment, as he ensured that at site level the agreed specifications and standards displayed within the sustainability action plan were being delivered. His role involved the checking of materials arriving on site to ensure they comply with the agreed specification, and that the conduct of sub-contractors complied with the site waste management plan and wider carbon reduction targets. The integrator argued *"if they don't align with the agreed terms of the contract then they are off the project. We treat sustainability that seriously"*. The contractor argued that this was well understood amongst the site team and welcomed this role as a gatekeeper for realising Principles of OPL. Providing leadership to this degree creates a project culture where sustainability is viewed as being as important as traditional performance indicators like quality, time and cost.

## **Challenges for wider practice**

Portrayed as a largely positive view of how sustainability is being managed by a developer, the research aligns itself with the view that as much can be drawn from good practice as it can from exploring problems. Sustainability action plans are slowly emerging within the construction industry, but as yet most remain tied to basic requirements and targets set in planning and building standards. Not many developers have gone as far as BioRegional Quintain Ltd. and this may indicate that a potential business case has yet to be made or tolerated by the market. The contractor suggested during interview that the high profile enjoyed by the Greater Middlehaven project provided the supply chain with confidence to chase higher sustainability levels than would otherwise be possible. Supply chain members

view potential in future opportunities stemming from their involvement in this project. Despite delays in phase 1 caused by economic downturn, £13 million of investment was announced from the private sector in March 2011 reflecting confidence in the vision. However, it was suggested during interviews with members of the contractor and design teams that in other contexts such an approach may put unrealistic risk on the supply chain as the drive remains around value for money. On such a big project, it was clear that the developer had the authority to enforce the delivery of many aspects of the action plan, and contractors and supply chain members reported that they were happy to agree to these as part of the contract. However, a key conclusion from the workshops was that future projects where the contractors and supply chain demonstrate less buy in for what is being achieved difficulties may be encountered contractually when apportioning responsibility for failure to meet targets set.

In November 2011 the developer announced that after phase 1 they will be disbanded due to the slow down in the UK construction market (Gardiner, 2011). Quintain Estates (parent company) aim to apply the principles and use of the sustainability action plan within their future development projects. Whilst it is clear the economic recession is placing unprecedented pressures on innovative companies in the sector, the workshops suggested that sustainability action plans could emerge as an effective tool for project managers as they try to integrate and communicate the principles of sustainability into project practice. However, the workshop observed that Greater Middlehaven would not achieve one planet living in practice, but a feeling existed that it did demonstrate a change of mindset worthy of exploration in construction projects with sustainability being viewed as an aspiration to achieve as opposed to being merely a requirement. This cultural shift they argued would allow the team to work together to target performance above the current planning and building standards.

Firm quantitative evidence will need to wait till post-occupancy evaluation has been conducted on the completed buildings, however encouraging data is emerging from sister project One Brighton (2012) which follows a similar assessment methodology.

## **Conclusions**

The case study revealed that sustainability action plans have a future for managing the delivery of sustainability through project management. In taking a holistic view, based on a clear principles-based framework and methodology; the action plan provided a unifying project management tool a benefit recognised by the experts in the two workshops. When implemented during the design phase, the action plan provided a managed approach to delivering sustainability as opposed to the ad-hoc approach which evolved during the planning phases. This indicated a need to ensure a sustainability action plan is developed from the inception of the project and used as the basis of the projects management across all phases from planning through to estates management so a truly consistent approach can be promoted.

## Acknowledgments

Appreciation is extended to BioRegional Quintain Ltd. and Tees Valley Regeneration Company for access to the project, and the funding of the EPSRC (EP/C008030/1) as part of the SUE-MoT research project. An early version of this research was presented at the 26th ARCOM at Bristol in 2011 and received the RICS award for Best Research Paper (Thomson et al., 2011).

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