

MODERN METHODS OF CONSTRUCTION: MAINTENANCE ISSUES IN THE REGISTERED SOCIAL LANDLORD SECTOR

Jim Kempton

*School of Environmental Design and Management, University of Portsmouth, Portland Street,
Portsmouth PO1 3AH, UK*

There is a current drive for 3 million new homes by 2020. One mechanism proposed to ensure delivery is the use of Modern Methods of Construction (MMC). There are however several problems with this premise including the legacy of non-traditional housing formats employed in the past, demand side suspicion of MMC, and a lack of capacity on the supply side. The paper concentrates on the potential implications of MMC on asset management (i.e. the long-term maintenance) of the Registered Social Landlord housing stock. It was decided to focus on the RSL sector because of its particular maintenance responsibilities and associated constraints. In depth interviews with RSL asset managers were undertaken to elicit their views. Seven themes emerged from the interviews, highlighting the main issues that need to be addressed if MMC housing is to be successfully employed in the RSL sector, whilst also ensuring it is able to carry out long term maintenance programmes in an effective and efficient manner. The research undertaken should be of interest to a range of people, including asset managers and surveyors, developers, planners, and local, regional and national policy.

Keywords: modern methods of construction, social housing, maintenance.

INTRODUCTION

The UK Government's Department for Communities and Local Government (DCLG) has set a target of 3 million new homes by 2020 and recognised that delivery is a significant challenge for the building industry and its associated stakeholders (DCLG, 2007). Several authoritative sources (e.g. Barker, 2004; Callcutt, 2007) have proposed Modern Methods of Construction (MMC) as a potential mechanism to ensure delivery of that target. The research sought to assess the implications of MMC on asset management in the Registered Social landlord (RSL) sector, given RSLs' particular maintenance responsibilities and associated constraints.

DEFINING MODERN METHODS OF CONSTRUCTION

The literature notes the difficulty in defining "Modern" methods, with Windle (2004: 2) considering that a definition has "... perplexed many in the house building industry" and a number of other terms and acronyms are also used such as Modular Construction, Off-Site Manufacture (OSM), Prefabrication and Non-Traditional. MMC is a generic term describing a range of construction techniques that are different to traditional construction methods. Within the UK traditional methods for housing are defined by the author as building with brick/ block walls, and a timber supported, pitched, tiled or slated roof.

To simplify a complex issue, the term “Non-Traditional Methods” (NTM) will be used to describe dwellings built pre-1990 and the term “Modern Methods of Construction” (MMC) will be used to describe dwellings built post 1990, in both cases where construction does not comply with the traditional method as described above. In an attempt to classify MMC, the information shown in Table 1 is based on a BRE research report (Ross, 2005), the definitions used by the Housing Corporation (HC, 2003) and information produced by English Partnerships (EP, 2008 [Online]). MMC includes those building systems that are either manufactured and joined away from the site (Off Site Manufacture – OSM) or a series of components that are manufactured off-site and brought together on-site for assembly, of course a mixture of these could be used.

Table 1: MMC Classifications

Type	Description
Volumetric Construction	Also known as “Pod” and “Modular” Construction, produced in factory conditions, and transported in modules to site. These range from basic shells to fully fitted units such as kitchens and bathrooms.
Panellised Construction	Flat panel units produced in a factory and transported to site for assembly. Two main types - “Open panels”, consisting of a skeletal structure with services, external cladding etc fitted on-site, and “Closed panels” – which involve a higher degree of factory-based fit-out
Hybrid	Utilises both panellised and volumetric methods. Typically, volumetric units are used for the highly serviced and more repeatable areas such as bathrooms with the rest of the dwelling built using panel technology
Sub-Assemblies and Components	This covers building approaches that fall short of being classified as Off-Site Manufacture or MMC, but do include elements of them. For example, floor or roof cassettes or pre-assembled mechanical services etc, but are otherwise more traditional in nature
Site-Based Methods of Construction (SBMC)	Examples of construction forms that are generally accepted as SBMC include TunnelForm, Gluelam and thin joint blockwork

DEFINING ASSET MANAGEMENT

Larkin (2001) defines RSL asset management as the physical aspects of housing i.e. its repair, long term maintenance and refurbishment. However Golton (2002) considers that the occupants of a property should be the main concern of asset management i.e. the social aspects. The Cave Review (Cave, 2007) also highlighted the need for RSLs to ensure that, whilst providing quality homes was important, management issues such as choice and mobility were also paramount. However, within the scope of this paper, asset management will be defined mainly in terms of the physical aspects of housing.

MMC AND THE IMPORTANCE OF ASSET MANAGEMENT IN RSLs

There is a significant difference in maintenance liabilities between housing for sale on the open private market, whereby the purchaser (at least for a house) takes on the

responsibility, and housing for the rented stock of an RSL, who will need to consider the implications of long term maintenance as their responsibility. The Housing Corporation announced that it expected a minimum 25% of RSL new build stock to use MMC (HC, 2005) resulting in higher numbers of MMC dwellings ending up as the responsibility of asset management departments. The DCLG also have a maintenance standard that existing stock must meet by 2010 – the Decent Homes Standard (DCLG, 2006) and maintained to that standard into the future and this may have further implications for MMC. There is some evidence that the long-term implications of MMC on maintenance are not high in the minds of the development functions of RSLs. A survey undertaken by CABE (2005) of RSL development managers found, in answer to the question – “*What were the main advantages of choosing MMC?*”, a relatively low response to maintenance issues at 10% (see Figure 1). Figure 1 perhaps also gives an indication of development manager’s focus on achieving performance measures, the highest rated factors all related to various new build construction standards.

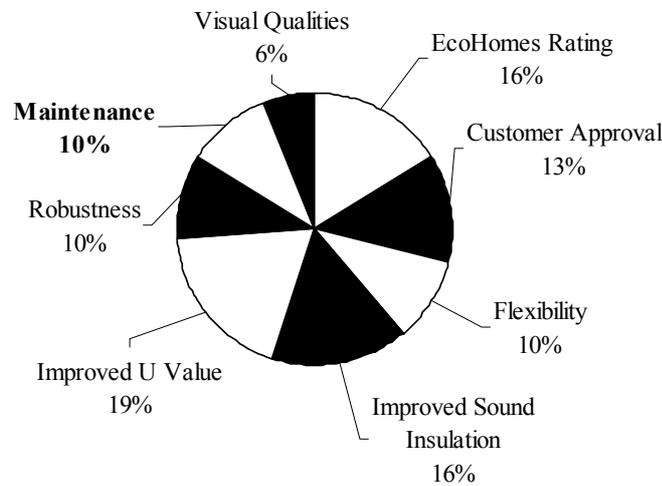


Figure 1: RSL Developer Views on the Drivers of MMC (Source: Adapted from CABE, 2005)

THE DRIVERS OF AND BARRIERS TO MMC

The drivers and barriers may be split into two main areas – supply side factors concerning housebuilders and other suppliers, and demand side factors, concerning those that purchase and/or live in MMC dwellings. There are of course links between the drivers and barriers, however given the paper’s focus on asset management the following serves to give an overview only. Goodier and Gibb (2007) and Pan *et al.* (2005) provide a more detailed analysis of these links.

The Drivers of MMC: Supply Side

The drivers shown in Figure 2 were obtained from a Loughborough University report on behalf of “BuildOffsite” (Pan *et al.*, 2005), which concentrated on the top 100 house builders in the UK. The data has been condensed by the author to the top six reasons as to why developers felt MMC offered significant advantages. It can be seen that addressing skills shortages is the most important driver for housebuilders (61%). Close behind are increased certainty of time and cost and higher quality.

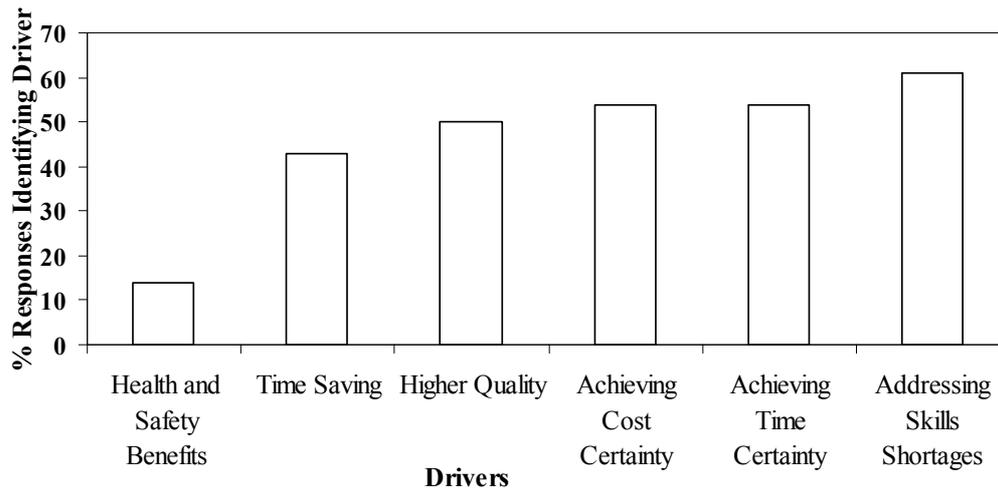


Figure 2: Supply Side Drivers for MMC (Source: Data adapted from Pan et al., 2005)

The Barriers to MMC: Supply Side

Several barriers can be discerned from the literature. However, for brevity, the BuildOffsite/ Loughborough University report highlighted earlier (*Ibid.*) provided the summary data on the main barriers perceived by the top 100 housebuilders as shown in Figure 3. The current higher costs of using MMC (68%) and lack of associated economies of scale (43%) were perceived as the major barriers.

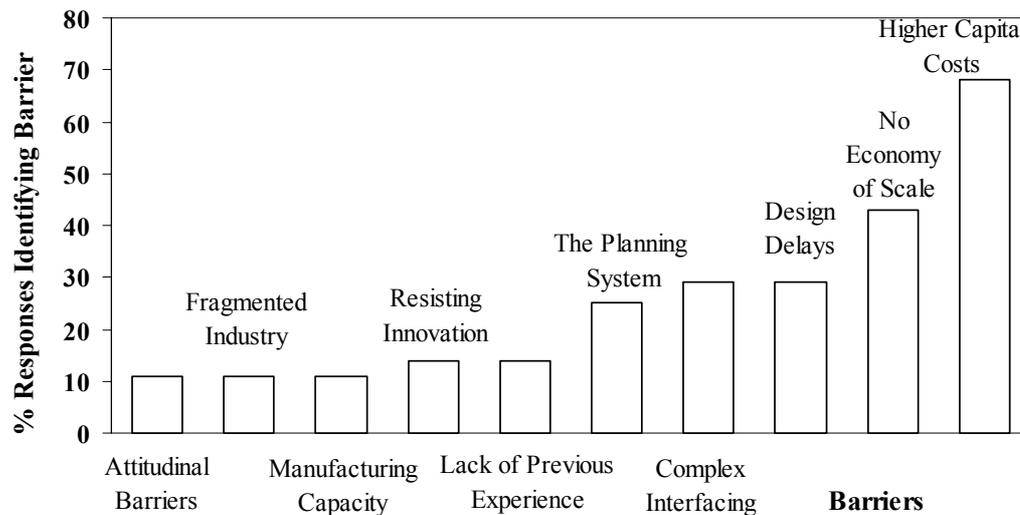


Figure 3: Supply Side Barriers to MMC (Source: Data adapted from Pan et al., 2005)

In summary it is clear that many barriers need to be addressed before housebuilders are confident in the credibility and profitability of MMC. Perhaps a paradox is that the author considers that housebuilders themselves are one of the main barriers to mainstreaming MMC. Unless they support it how will it gain credibility? But there are of course reasons for housebuilders' resistance to MMC. In addition to the barriers identified in Figure 3, Goodier and Gibb (2007) highlight a lack of understanding by suppliers of the tendering process, sometimes resulting in difficulties adjusting to design changes and longer project lead times – both potentially affecting profit margins. A further barrier identified by Blismas *et al.* (2006) is suppliers' inability to conduct detailed cost analyses of building elements - again linked to the traditional tendering process; the strong influence of advisory roles such as the quantity surveyor

may impact negatively on the final procurement advice given to clients regarding the use of MMC – resulting in a rejected tender. The sometimes speculative nature of land acquisition and development could also impact on the acceptance of MMC by housebuilders, again, for example, the desire to minimise lead times.

Demand Side Issues and MMC

If MMC is to prove successful, people must be comfortable purchasing/ renting such properties. As stated earlier RSLs are required to develop 25% of new build stock using MMC, so one could argue, within that context, that MMC has a “captive audience”. Of course while the RSL might be the commissioning client, the property will subsequently be sold or rented to others – so the needs of the client groups serviced by RSLs are of paramount importance. The stigma of Non Traditional Methods may impact on the way potential purchasers or tenants view MMC (*op cit.*). A survey found that 46% of social housing tenants would object to being offered a home built using MMC (Inside Housing, 2003). The Callcutt Review (2007: 31) noted: “House buyers have traditionally been resistant to MMC, possibly influenced by memories of post-war prefabs and the system build houses of the 1960s”. There is, perhaps, a deep cultural issue to deal with here; other countries seem to have far more acceptance of MMC housing (Barlow *et al.*, 2002; POST, 2003). The literature found on demand side barriers has been condensed by the author in Table 2.

Table 2: Demand Side Barriers to MMC (Main Sources: CML, 2002; Gaze *et al.*, 2007; NHBC, 2006; Phillipson, 2003; Ross, 2005)

Barrier	Explanation
General Image	Previous use of non-traditional construction methods resulted in many problems for people living in such dwellings. The legacy of that time may still be at the forefront of potential purchasers minds, and have “knock-on” effects on views of MMC
Perceived Performance	Linked to the above, potential purchasers may be suspicious of the life span of MMC, based on the history of NTM. But not least they may not understand modern construction methods and therefore prefer to remain with what they feel more comfortable with – traditional methods
Investment Agenda	House purchasers may acquire property for investment reasons, rather than as a home to live in. Buying into MMC construction may seem to be riskier for an average buyer if they feel that they do not understand how a dwelling that is constructed non-traditionally might affect its rental or re-sale value
Customer Expectations	It was mentioned earlier that it is held that the stereotypical English house buyers aspire to a “traditional” way of living, and MMC may conflict with that aspiration. So again as with supply side barriers, there may be issues with the “General Public” being generally aware of the potential of MMC

It proved difficult to locate literature on demand side drivers and MMC, perhaps due to its relative rarity in the market. However a review of a number of MMC suppliers’ websites did produce some interesting factors which they felt provided advantages to themselves and consumers, as summarised in Table 3.

Table 3: MMC Suppliers' View of Advantages to Occupiers (Source: MMC Supplier Websites e.g. <http://www.fusionbuild.com>)

Advantage	Description
Improved Quality	MMC, particularly steel frames, are less prone to issues such as cracking and shrinkage
Thermal Performance	The use of elements such as Structural Insulated Panels can give higher thermal insulation, reducing bills and running costs.
Energy Efficiency	It is claimed that the use of MMC can also reduce CO ₂ emissions from dwellings, and subsequently reduce occupiers' carbon footprints
Acoustic Performance	The use of innovative party wall systems such as a double layer isolated panels/frames can double the sound insulation levels between dwellings
Snagging and Defects	MMC's almost immediate integrity is claimed to result in less post-occupation problems and defects requiring rectification, such as cracking, movement etc

It appears that despite a number of positives for MMC, the barriers, on both the supply and demand side, currently outweigh them. Egan's (1998: 18) report "Rethinking Construction" stated in relation to MMC that: *"We have repeatedly heard the claim that construction is different from manufacturing because every product is unique. We do not agree. Not only are many buildings such as houses, essentially repeat products which can be continually improved but, more importantly, the process of construction is itself repeated in its essentials from project to project.* It seems over the subsequent decade that the viability of MMC to suppliers and housebuilders, and its acceptance by customers, has not yet materialised.

A number of RSL asset management practitioners were interviewed to elicit their views on the potential implications of MMC, as explained in the following sections.

THE SAMPLING FRAMEWORK

The sample was purposive, i.e. Participants were selected on some pre-assessment of their knowledge of MMC in RSLs and were selected on the basis that they were able, and were willing to, contribute to the research. The final sample comprised of nine Participants all experts on RSL asset management. Whilst a relatively low number, it is still felt that the sample provides a broad, comparative view of the field - the Participants worked for different organisations, rather than all representing one organisation. Additionally three Participants were consultants, working as interim asset managers for various RSLs, furthering the comparative aspect.

DATA ANALYSIS METHOD

The method employed was a preliminary coding exercise utilising the Atlas.ti textual analysis software package, followed by a code reduction process - i.e. similar codes were grouped together to form overall themes for later discussion. The scope of this paper does not permit a detailed explanation of the codes and it is perhaps sufficient to say that the author read each interview transcript within the Atlas.ti package and marked significant parts of the text with appropriate codes. Following this preliminary coding the author reduced groups of codes into seven themes as shown in Table 4 along with an overview for their creation and indicative quotes.

Table 4: Themes, Overview and Indicative Quotes

Theme Name	Overview	Indicative Quotes
Maintenance Skills for MMC	Participants felt that the current skill levels of maintenance operatives did not fit well with the maintenance needs of MMC	You do have issues where the reactive maintenance guy goes out and they don't know how to work with it [MMC]
Impact of Occupiers on MMC	The impact of occupiers on the longer-term integrity of MMC housing was mentioned several times.	If we make homes too complicated for people to live in, they aren't going to live in them in the right way. They will adjust the home to the lifestyle, not the other way round. People aren't easy to change
External Regulations and Funding	Of particular concern was a feeling that government was not thinking about future maintenance enough	We're being pushed towards MMC by our regulators, by the Housing Corporation, New build. Grant funding
NTMs Impact on MMC Views	Participants noted that previous negative experiences with Non Traditional Methods made them feel negative towards MMC	Now, they talk about factory-built, more control. We had that before.. a lot of the issues you had with non-trad are going to manifest themselves with the new modern methods
Design Factors	Issues relating to the broad category of design were noted including aesthetics and the use of new technology and materials	I think its more about architectural issues, really, you try to introduce something different that looks different, big ego trip, I think, for a lot of the architects. [but] how are they going to maintain it? that's where it's going to fall down
Data and Records	Storing electronic data on housing stock caused particular concern with MMC housing, due to the variety of element types and materials that did not lend themselves easily to current data systems	Our stock condition survey form... there's not a mention of MMC in there... so we need to kind of start to rethink the way we're actually acquiring data and configuring it... [to] accommodate modern methods of construction
Working Relationships	Relationships included those between different departments within RSLs, and also between RSLs, Consultants and Contractors, all of which has adverse effects on the long-term maintenance of MMC housing	People in development are not looking to say,, that's well-built ... they're saying, is it the right price, have we hit all the criteria, we build them, we get our targets met, people from asset management are very rarely involved before construction starts

DISCUSSION

All the themes in Table 4 are valid in their own right, and they interconnect. Figure 5 shows some of these interconnections. However the author found the theme of Working Relationships to be a particularly interesting, and unexpected, finding. To keep the paper within scope this theme is explored further. Table 5 gives examples of indicative quotes that were used to inform the Working Relationships theme.

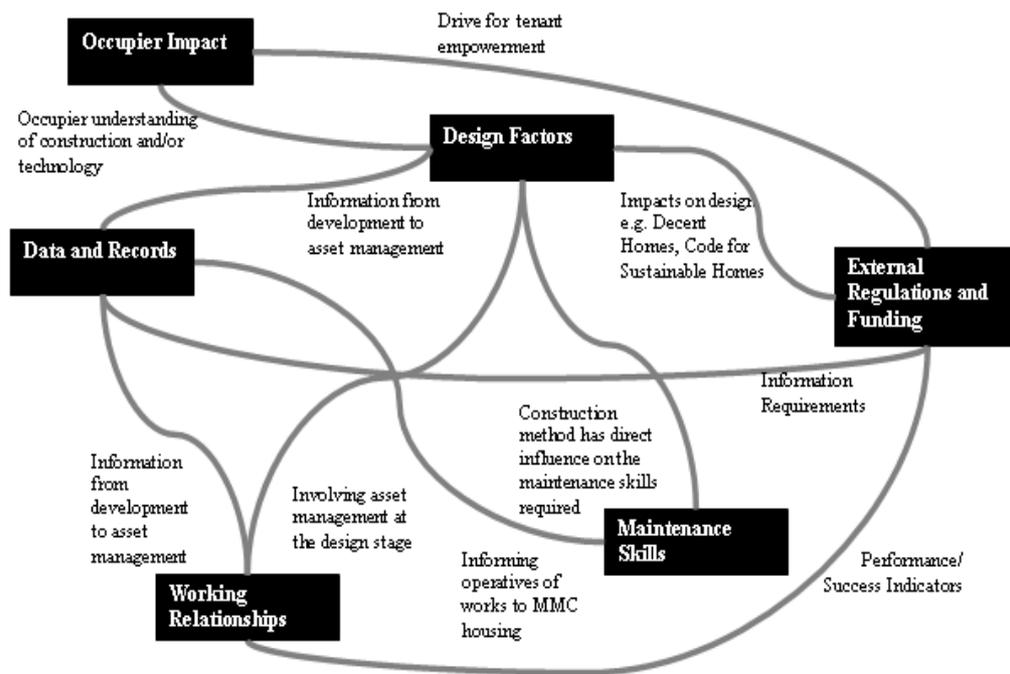


Figure 5: Indicative Theme Inter-Connections

The following discussion is informed by Table 5. Each Participant is referred to as P1, P2... etc. P1 gave a rather sceptical view on the relationship between development and asset management, and felt that development treated his department in a patronising way – and were lax in supplying essential information. P2 further stated that development were somewhat distant from asset management, and indeed, felt delighted when development actually bothered to ask them for advice on new construction in relation to future maintenance requirements. P3 noted that the relationship between asset management and development was not strong, and stated that once a development had been completed that was it, there was no going back and they were left to maintain difficult housing. P4 further stated that asset management and development struggled to work together, and pointed to a lack of understand between the departments and a “culture clash”. P4 further pointed out that his department rarely got involved in design issues for new developments.

In a similar manner to P1, P5 tied in the lack of inter-working with data issues – that development was lax in supplying critical information to asset management. P6 pointed out the differing success factors between development and asset management – that development wanted to satisfy criteria such as price and numbers of houses constructed, rather than considering longer-term maintenance issues. P8 also noted the differing performance indicators were a factor in producing inefficient working relationships. As with P4 earlier, P6 also stated that his asset management department was not often asked for advice at design stage. P7 and P9 reiterated the lack of inter-working between the departments.

In summary this brief presentation of the data highlights a significant problem with communication and a lack of coordination between the corporate aims of RSL development and asset management departments, an issue linking back to the discussion around Figure 1. The author considers that a starting point would be to mesh performance/ success indicators applicable to both asset management and

Table 5: Working Relationships Theme – Example Indicative Quotes

Indicative Quotes - Working Relationships Theme
(P1) This split between development and asset management, there's not much information coming from development on the Modern Methods of Construction, so much as to say, a development view might be not for you to worry your head about it, we'll build them, you look after them afterwards... I've always encountered that
(P2) But you know what it's like with development at the moment they're completely detached from us. Because development still put in stuff that we wouldn't dream of doing because we can't maintain it like they come to me and say what is the best type of lift to put in our new blocks of flats, and I think, hey! Thank God!
(P3) The liaison between us and development isn't as strong as it could be. Modern Methods of Construction, they're not on the radar. We haven't got the information. Particularly from the maintenance perspective, you get what you're given. We can't go back and say, this is ridiculous, you inherit whatever [the RSL] builds
(P4) Yeah, two internal departments that never agree on anything. The trouble is the development department they'll look at the cost. But in the long term it doesn't add up for asset management. The people in development don't understand the long-term [maintenance] responsibilities; there is a clash of culture between the two departments, lack of co-operation beforehand, development don't talk to asset management, we rarely get involved in any of the design criteria
(P5) The health and safety files. We've got a health and safety manual, but we try to get more, you need more information than that, because it's not specific, and then you try to get it off the data from the original property, you never get it back from development
(P6) People in development are not looking to say that's well-built ... they're saying, is it the right price, have we hit all the criteria, we build them, we get our targets met, people from asset management are very rarely involved before construction starts
(P7) We need to work together..... we just don't
(P8) The targets don't align [Housing Corporation Performance Indicators] we are after one thing, they are after another.... Doesn't work out
(P9) Development rarely ask our opinion on new developments... we could advise them, but they rarely ask

development together; this would involve the cooperation of external bodies/regulators etc. The author feels that a concerted effort needs to be made to include asset management in design decisions, particularly the selection of construction methods and materials.

CONCLUSIONS

It is concluded that the use of MMC and its impact on asset management is a complex, and interrelated issue. It seems that there are no simple (and certainly no single) answers as to how MMC can be employed in the RSL sector whilst also ensuring that asset management can also undertake its maintenance operations in an effective manner. Whilst the Working Relationships theme was singled out for further discussion in this paper, all the themes are important, and the research has highlighted some of the main problems that need to be addressed. Further research will now extend the findings from this qualitatively based project by employing a quantitatively based questionnaire study to be issued to RSL asset management departments.

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