The NOW House Project

Bayne, KM and Kane, CD

Part 2: The NOW House – information for new owners

A confidential report prepared for Beacon Pathway Ltd

September 2004

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Beacon Workstream: NOW Home Knowledge and Future Monitoring Recommendations

Project: NOW 1

Approved for distribution

Date

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EXECUTIVE SUMMARY

This report presents a summary of the recognisable intellectual property, which was developed or captured during the NOW house conceptualisation and design process over the period from June 2002 - June 2004, and outlines the owner obligations of Beacon due to transference of ownership. For the majority of this time Forest Research administered the project, and so the majority of the project documentation resides either with the NOW House project manager or with Forest Research. Some BRANZ-originated documentation has also been included where it did not duplicate that already available above. However because of the wide-ranging nature of the team, the authors do not claim to have captured all NOW house-related documentation – this is not possible. In April 2003, The NOW House Project Manager, Kimball Fink-Jensen, was requested to provide Forest Research over time with all documentation and cc: emails, relating to the project, so the NOW 1 team is confident that the documentation collated contains the majority of information, and key documentation, from the project.

Where learning could be distilled from the review of the documents, these are presented – as lists of New Owner responsibilities or interest points, for example. Where material, knowledge, or IP was created as a stand-alone item, this is presented in its current form - for example the Design Brief – as Appendices. The full documentation is given on the CDROM and hardcopy report folder accompanying this report.

As the new owners of the NOW house project, Beacon Pathway Ltd have assumed some responsibilities. Primary amongst these is the need to ensure that contracts let during the original project are concluded to the satisfaction of both contractual parties. These contracts include those with the project manager, designer, and peer reviewers.

Before submitting the final drawing for Building Consent, the design ought to be checked against the brief: this will involve expert input and must be budgeted for. Similarly, Beacon must make certain that the house is designed to be relocatable if ownership of the NOW house cannot be reliably transferred to EcoMatters Trust through secure underwriting.

The table of potential commercialisable ideas presented is a distillation by the authors of the most promising ideas from the larger log assembled during the process – the whole document can be found on the accompanying CDROM.

The Materials Selection Database is not satisfactorily complete to function as a true specification resource. Both Forest Research and BRANZ spent considerable time on populating the document, however this was focussed on ensuring that the Olympic Place materials choices could be supported where possible from available fully referenced information. However, the process served to highlight how little reliable, referenced information WAS available about the sustainable aspects of materials and systems on the marketplace, despite an overwhelming amount of technical specifications and product literature to draw from, and hence how valuable the resource may be once completed.

In order to ensure that all unresolved issues are at least recognised and prioritised before proceeding to the Building Consent application point, the authors strongly recommend that Beacon Pathway Ltd re-convene the NOW house core, design, and owners team for a final time, and debrief these reports. This will also help to ensure two-way information flow with some of the key stakeholders in the project (EECA, CCO, HNZC etc), and establish the direction for the THEN and FUTURE projects should they proceed.

INTRODUCTION

This report aims to present as far as practically possible all of the written material collected and derived during the NOW House conceptualisation and design process over the two-year period from July 2002 – June 2004. Some of the information presented is derived from the wider collection of material – and is given as recommendations. Other resources, created expressly for the NOW project (such as databases or decision tools), are presented in their entirety. At the time of writing, the value of this information has not been established.

Emphasis is placed on contextualising the information contained herein – the reader is advised to first read and understand Part 1 - "The NOW House Design Process and Insights for Future Projects".

INTELLECTUAL PROPERTY

Intellectual property created from the NOW House project takes the form of:

a) Documentation, design drawings, management and governance deeds
b) Potentially commercialisable ideas/systems
c) Knowledge and key learning from the process
d) Differential knowledge gained by individuals between June 2002 and June 2004, due to being part of the process

IP transference to Beacon Pathway Ltd. will include only elements a) and b), as differential knowledge is 'learned knowledge' and cannot be divorced from a person, or undone (you cannot forget you now know something and were part of the NOW process, and it will influence later decisions individuals make). Element c) is transferred via the Interview Summary Report, which is referred to in the section "Recommendations For Future 'Post-Kyoto' House Projects" of the NOW House report Part 1 . The authors also recommend a debrief forum be held between the NOW home team members and Beacon Pathway Ltd, to discuss the key learning and way forward for the NOW house project (THEN and FUTURE Houses, for example), and aid in the transfer of elements c) and d) in terms of Beacon awareness of the knowledge and understanding of the core team from undertaking this project.

The stated IP to be transferred[1] from the NOW house project to Beacon Pathway Ltd is:

- Design of the house including working drawings[2]
- Documentation associated with design (hardcopy notes and CDROM files)
- Materials Selection Database[3]
- Ideas log[4]
- Design brief which includes the sustainability scoring system (bound copy included)
- Sustainability framework[5]

All of the above, excluding the design of the house colourboards (which are with Greg Burn), can be seen as transferred via the electronic CDROM disc and hardcopy folder. The IP to be transferred with respect to elements a) and b) is therefore now considered to have been transferred from Forest Research to Beacon Pathway Ltd. An overview of the key IP elements follows.

[1] As outlined in the document "NOW Home IP Transference" – refer pp 30-32 of the hardcopy notes.
[2] Refer to pages 19-22 of hardcopy notes
[3] Material Choices v10 –Master.xls
[4] Updated Ideas Log. xls (as sent to Design team on 11 Feb 2004 by Karen Bayne)
[5] i.e. sustainability scoring system – refer Appendix C, pages C57 – C64

Documentation

Document transference will include only those documents that are significant to the project, and are still in existence (some will have been destroyed or modified over time), and take the form of the following:

- Electronic data file – includes minutes and agendas of meetings, initial thinking and project formation documents, and workshop outcomes (features and benefits documents, vision linkage documents) This file includes also, a file entitled *Updated Ideas Log.xls*; which is a spreadsheet collation of statements, suggestions and ideas made between June 2002 and March 2004. This CDROM contains all known (to FR) electronic documentation of the project, as transferred by Kimball Fink-Jensen (under terms of his PM role[6]) throughout the project. Also included are all known documents not included above which existed at BRANZ independently of the collection held by Kimball and Karen.
- Hardcopy folder – includes historic documentation, handouts from meetings, including iterations in the design of house, and non-electronic documentation.

IP disclosed as a result of interviews

No further IP was disclosed as a result of the interviews being undertaken. In fact, the majority were dismissive of there being any IP of value created at all[7]. Most viewed the IP created as being non-existent as all material utilised/collected or collated was readily available. The only IP stated that was not previously disclosed being "the IP in the forming and running of a collaborative business beyond the technical aspects". This is, however, mentioned in part in the IP transference document stating the preference and intention of continuation of participants who were key to the project[8], and recognition of the 'vibe' created and input given.

Intellectual property generated during the NOW house project

The following lists the IP arising from the NOW house project. The IP takes three forms.

Explicit IP contains those elements for which there are specific documents and outputs available as a record of the knowledge generated. This IP is appendicised to this report.
Implicit IP includes methodologies, documentation and learning associated with the project
Background IP lists those independent IP sources that were utilised in order to derive further knowledge and IP throughout the process. This IP, although used during the process, does not belong to Beacon as NOW House IP, but is retained with the original owners.

Explicit

Vision and vision linkages documents (Appendix A)
Features and Benefits templates (Appendix B)
Design Brief (including Filtering Elements Framework) (Appendix C)
Design (layout, landscaping)(Appendix D)
Materials database (Appendix E)
Ideas log (Appendix F)

[6] From a meeting between Kimball, Russell and Karen at Forest Research, 17th April, 2003.
[7] Refer to response to Question 20 of Garry Tonks Interview Summary Report
[8] Refer point 10 on page 32 of hardcopy notes

Implicit

Process learning and knowledge gained by team
Design Process documentation (refer to CDROM and Hardcopy notes)
Branding and brand equity of 'Beacon' and 'NOW house'
Research methodology used
Monitoring methodologies suggested
Conference papers and journal articles/ published information written about the NOW House (authors, and/or author organisations hold copyright)[9]

Background IP used during the process (things brought to the table to aid process)

Consumer insight, scenario planning studies and methodologies and demographics studies (FR)
Concept House methodology and 'post-Kyoto' vision[10] *(FR)*
Future criteria for buildings[11]*, and consumer needs analysis*[12] *(FR)*
Brand strategy process (Stephen McKernon)
FRST BE bidding information and research methodologies (FR and BRANZ)
HEEP (BRANZ)
Annual Loss Factor (ALF)(BRANZ)
Monitoring knowledge (BRANZ and FR)
Water monitoring knowledge and methodology (Richard Taylor, EcoWater, WCC)
Solar Heat Storage project (Mike Collins, FR)
Zero and Low Energy House (ZALEH) knowledge (BRANZ)
Original 'hedgehog' diagram[13] *of a 'post-Kyoto' house (Russell Burton and Bryan Walford, FR)*
Regional New Lynn demographics[14]*, and regional knowledge (WCC)*
Environmental models (BRANZ and Barbara Joubert[15]*)*
Waitakere planting guide (WCC)
Virtual NOW House Demo CD (FR)

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[9] In the case of Bayne et al. 2003 : "Demonstrating New Zealand's Future Residential Houses", note that copyright has been assigned to Blackwell Publishing, UK. This paper is to be published in Part 2 of a book entitled "Smart and Sustainable Built Environments", in press, and due for release early 2005. The work can be reproduced and copied, in whole or in part, provided that: 1) due acknowledgements are made to the book, editor and publishers; 2) The publishers reserve the right to charge a fee for the reproduction of typography from the book; and 3) the paper will not be published in any form prior to publication of the book.
[10] Including terminology 'NOW', 'THEN', 'FUTURE'
[11] As outlined in the report Bayne et al 2002. " Building needs for future decades"
[12] As given by Susan Bates at 29th January workshop
[13] Refer to Figure 3 of The NOW House Project, Part 1.
[14] As tabled by Katja Lietz. Refer pg 92 of hardcopy notes
[15] Which some NOW Home design elements were tested against, etc

Materials information previously gathered (for input into Materials database) (individual team members)

Individual knowledge, expertise and experience of the team members, as at 28th January 2003.

Potential Commercialisable ideas

From an evaluation of the Ideas Log, the following table has been drafted, outlining suggestions of potential systems/ ideas arising during the NOW house project that Beacon may like to take further in creating commercialisable IP. Note that this is an evaluation by the authors, and the spreadsheet itself may show further ideas deemed more suitable by Beacon Pathway Ltd. The authors in no way guarantee that these ideas have not been developed further, and as a courtesy to the initiators, Beacon Pathway Ltd should advise these individuals of any intentions to take the idea/ suggestion further, as to our knowledge IP currently rests with these initiators. Indeed they may be able to offer further refinements, and can establish if the IP has been developed further or taken up by another party.

Topic	Subtopic	Statement	Idea	Initiator	Media	When
Relocatability	Deconstruction	Corner interior (and exterior) linings should be easily dismantled at junction points.	GIB linings and others requiring stopping and sealing/gluing do not lend themselves to this process. Especially important for removable second living wall, bathroom and internal garage wall linings. Should we look into a novel fixing arrangement so we don't need to destroy the linings during relocation?	Karen Bayne	email	31/10/2003
Relocatability	Design		Use double frames and bolt frames and trusses	Louw van Wyk	email	23/07/2003
Relocatability	Design		Concrete slab needs to be self-supporting if we are to move it - ribraft with jacking points. Otherwise use bolted bottom plates and design jacking points and bracing points.	Louw van Wyk	email	23/07/2003
Relocatability	Design		Use small frames of 450mm width between each full frame with coach screws for Gib board. Disconnect cables and pipes at the panels	Louw van Wyk	email	27/11/2003
Relocatability	Relocation		Use bolted wooden platforms, as removing 30 sq metres of paving is labour intensive	Dave Moore	email with attached filenote containing ideas from FR staff	22/07/2003
Appliances	Fridge		Replace with well-insulated safe food storage cupboard cooled by circulating cooled water from the cold storage tank in Mike's solarheating/cooling system. Requires small fridge to act as heat pump.	Mike Collins	email	26/05/2003
Benefits templates	Acoustics		Sound insulating ventilation bricks for mounting in walls (intended for brick walls, but could be adapted). Noise mitigating section boundary walls. Mounting water pipes on resilient mounts. Quieter appliances.	Team D	Features and Benefits templates	14/03/2003
Benefits templates	Protection		Volcano – ash fallout – if using rainwater off roof need a pH sensor valve to stop going into watertank. Sensor could also measure bacteria and potability levels. Earthquake – fix fasten forget – shatter-proof glass. Heaving soils?? –Louw had an idea for driven piles, screw-cut to readjust house level	Team B	Features and Benefits templates	14/03/2003
Benefits templates	Security		A wired circuit (or series of circuits) linked around the home via a hollow dado picture rail or architrave. Eg. Protection, Entertainment, Monitoring, Security etc links	Team B	Features and Benefits templates	14/03/2003
Benefits templates	Security		Theft: A microchip linked to telephone network/power meter which allows appliances to only work at that ph number/ GPS location; Uniquely marked house/contents; Wired houses which Link to nearest security firm alarms -sets off alarm either at house or police station when appliance is unplugged	Team B	Features and Benefits templates	14/03/2003
Floor	System		Heating and cooling pipes can be incorporated in a light weight concrete floor topping	Mike Collins	email	26/05/2003
House Manual	Record		A record of construction as well as explaining operational aspects. Seasonal maintenance schedule included. Greg stated he would take on responsibility for creating such a handbook at end of design process.	Greg Burn	email	22/05/2003
Linings	Fastening		Use Doz-Lock clip to reduce plasterboard waste.	Mike Collins	Filenote	07/04/2003
Virtual Architect	Format		4 layer setup - level 1 as a simple tour explaining features of now house; level 2 explaining why we chose those features; level 3 enabling you to change the features and see the resultant performance specs; level 4 allowing you to change the house en masse, move it around on site, or give a different site	Chris Kane & Bryan Walford	Email	24/06/2003
Water heating	Solar		Include integrated heating and cooling system developed by Mike Collins*	Mike Collins	Filenote	07/04/2003

* This concept was given as Background IP from Forest Research, to be used in the project – the IP continues to reside with FR, and FR has undertaken further work on this idea. It is included for completeness.

OWNER OBLIGATIONS

The following matters have been raised throughout the NOW house project, and are collated here and presented to Beacon Pathway Ltd as:

- Existing understandings, intentions, decisions or areas where contractual arrangements are in place
- Actions that are still required to be completed in order to meet requirements of the NOW house project
- Unresolved issues requiring a decision by Beacon Pathway Ltd
- Old 'leads' or suggestions that could be followed up again by the new owner
- Things that never occurred that may need to be chased up

For clarification, these have been outlined into five categories:

Actual – referring to those which are contracted, or minuted decisions
Implied – referring to those which are expected or verbally promised only
Unclear – referring to those where any agreement is not formally stated – i.e. Beacon needs to establish the situation before making any commitment that could effect the person/ company
Unresolved – opportunities or contentious issues requiring a resolution
Recommendations – immediate actions the new owner should undertake to progress the NOW house project, and leads recommended that Beacon follow up on.

Actual

1. Robert Vale and John Sutherland are to be peer reviewers of the NOW house project[16]. Robert Vale has an outstanding contract with Forest Research to complete a review of the design brief, and the final working drawings, to outline what might be done differently on another site or budget. This contract was to be completed by September 2003, however, delays in getting final working drawings to Robert have seen this contract lapse. Forest Research has an ethical responsibility to honour the contractual arrangement, and requests Beacon Pathway Ltd. to honour this contract with Robert Vale as the new owner of the project. Karen Bayne has a copy of this contract, and will send to Beacon on request.
2. The design team membership consists of: Greg Burn, Robyn Alison and Dave Moore (core members); Roman Jaques, Mike Collins and Karen Bayne were added to the team throughout the project.
3. A decision was made to not have monitoring in real-time via a webcam or other, as this is too 'Big-Brotherish'[17].
4. The house needs to be designed to be relocatable[18].
5. The design of the house does not need to be capable of being a show home, but once a week for half a day there is the expectation by Ecomatters of public 'walkthroughs'[19].

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[16] At Owner's team meeting, decided on a peer review process. Minutes of 16 July phone conversation with Owners Team reps state Karen and Greg were charged with obtaining peer reviews from these two by the Core team, by 23rd July 2003.

[17] Email between Chris Kane and Karen Bayne 08/05/03

[18] During late May 2003, indications were made to Forest research from Waitakere City Council, that Ecomatters trust might not be able to underwrite the purchase of the house. Relocatability was therefore written into the design brief to protect the owners in the event that this occurred (though unlikely). Bryce Heard reiterated Forest Research's position in a memo dated 20/06/03 in stating : "Forest Research……is contemplating underwriting the cost of building the Now Home in the interim, and it will be placed upon land owned by Waitakere City Council. The objective here is to have a removable house and land under separate ownership."

[19] From the following minuted meeting discussions:

"NOW Home is not a "showhome" per se, but an encapsulation of what we know today" *Minutes 29 January 2003*

"One clarification already - we do NOT need to design the house to be capable of being a show home! People will not be traipsing through the house on a regular basis" *Email update from Kimball to team on 6th*

6. The up-front Beacon establishment costs are to be tabled with a view to reimbursement by Beacon once operational. Beacon is to take over the contract between FR and WWB to manage the construction stage of the house[20].
7. Each company (Beacon partner) agreed to chip in with some funds for the marketing and communication strategy for the NOW house[21].
8. Relocatability, Solar heating, and double glazing are design constraints in the design brief, 2 as givens (double glazing isn't a given, but might be needed to achieve the passive thermal performance target)
9. The wall between the second living area and northern bedroom is to be framed to be removable, and no services are to pass through this area[22].

Implied

1. BRANZ Ltd. were invited to be a part of the NOW house project partly on the understanding they would have a significant part to play in monitoring methodology and undertaking the monitoring of the construction and operational phases with Forest Research.
2. Following a visit to the Research House in Queensland, a research relationship developed with the Queensland Department of Works, and sharing of goals, findings and philosophies ensued. It is expected that this relationship and sharing of findings between the two projects be continued. This was established originally between BRANZ and QLD Dept of Works, and was formally handed to Paul Minett. The subsequently agreed form of the continuing relationship is unclear at the time of writing.
3. Forest Research, as a member of the Australian Smart Housing Network, has agreed to update and share information with the network relating to projects that promulgate 'Smart' thinking in housing research and design. The NOW house is one such project.
4. The NOW house project has been presented at the SASBE conference in 2003, which is a regional conference of the CIB/iiSBE (International Initiative for a Sustainable Built Environment) International Sustainable Building conference. This generated much interest in the project, the paper was accepted in a published book of the conference, and an 'expectation' (by the organising committee) is that the project would be aired in some form at the SB05 conference in Tokyo next year.
5. Waste generated from construction, that is useful for other building projects, shall be offered to Habitat for Humanity
6. Katja Leitz and Russell Burton to liase on landscape plan, and make sure Robin is included in decision making.
7. Once working drawings are completed, Forest Research is to work with Mitek to arrange double stud detailing for relocatability.

June, following 4 June meeting. Annika responded same day with following comment "It looks like we need to clarify the parameters for public accessbility. My understanding is that it will be accessed by the public to "kick the tyres" (using Russell's vernacular). That's certainly what EcoMatters are expecting - we just have to agree on how much and when. EcoMatters are thinking once a week for half a day, I'm thinking once a month. We need to have that discussion.

"The built demonstration house will not be a show home, but is rather an attempt to physically represent best practice, in order to assess gaps in meeting the needs and therefore set research priorities for future housing projects". *Olympic Place NOW house design brief. May 2003.*

[20] From 20/06/03 memo by Bryce Heard, CEO of Forest Research, to Beacon Establishment Board "Forest Research has also employed Winstone Wallboards to project manage the development of the designs (Stage 1) and it is expected that this will continue through Stage 2 the actual delivery of the house (excl actual construction costs). It is appropriate that the IP, and benefits that accrue belong to the partnership and therefore it is appropriate that ultimately the partnership takes on the associated costs"

[21] As discussed at Beacon partner's CEO meeting on 20th June 2003.

[22]Minutes of 16 July phone conference " No services part of wall (bedroom 3) – to allow for flexibility eg later movement; yes, and under control"

Unclear

1. Alan Duxfield was approached as a potential occupier of the NOW home in Olympic Place. In identifying a tenant, Beacon would need to approach Alan to see if he is still interested.
2. At what stage is the kitchen design? It remains unclear as to whether Scotts are still undertaking the bathroom and kitchen design stages or not.
3. The design brief has as a design constraint that "passive design of heating of internal environment…. ambient temperature of between 18-25 degrees, for all but 10 days of the year". The issue of whether the house as designed would meet the Brief targets was discussed during the 16th July 2003 phone conference with Owner's senior reps. There was a statement made then that some modelling had been done, but with further work from Victoria University students being undertaken as well, these would be the true results. Albrecht and Roman are, however, still unsure of whether the current design will achieve this target (as of July 2004) – it is suggested that before construction begins, the final plans be submitted to them for thermal modelling. Who will pay for this?
4. The landscaping design (final) should ensure there is decking or child-friendly surface available along the north-side of the house. (Currently, gravel and shell is shown off the Northern bi-fold doors below the pergola in the landscape design.)
5. Background IP belonging to Forest Research in the form of a concept and methodology for a virtual web-based house 'tour' of potential housing improvement concepts (the original ultimate end-point of the FR Concept House project), have been previously outlined to the collaborative NOW house team, developed into a demo CD by 3D Graphics Limited, and presented at the Waitakere City Development Board meeting in December 2003. Discussions to date around what might be required for further development and commercialisation of this idea have been between Forest Research and Virtual World Ltd. Such a virtual model was intended for development of either the 'post-Kyoto' FUTURE house, or generic NOW house. However, it is unclear if development of this virtual model is still being considered by Beacon. If so, Beacon will need to negotiate terms with Forest Research if intending to use this IP in such a development for Beacon Pathway Ltd.
6. The designer was asked in May 2003 to indicate how long it took to reach each design decision, and how each specification was addressed. To allow this to happen, a designer log was incorporated into the brief. The design decision log requires interrogation to ensure we understand design decisions and can justify these in terms of brief, as the log has not been updated since July 2003. Although a requirement of the design team, there has been no further logged briefs tabled at meetings since the 15th of July 2003 (refer to CDROM file *Logged Brief 15 July.doc)*, however, further design updates have been given, some with comments. It is essential to the process that the design decisions have been recorded by the design team to establish gaps. It is unclear to the wider team whether Greg and the design team have continued this process or not, in whatever form the design process notes may take.

Unresolved

1. The final design has not yet been checked against the design brief, to ensure it meets at least the design constraints of the project. Beacon Pathway Ltd need to ensure that when the design team presents the final design and working drawings for signoff it has been vetted by a number of experts, and perhaps audited externally by an independent reviewer (e.g. Vale or Sutherland). It would be useful at this stage to assess the extent to which the design meets the project aims, also, however, these aims are somewhat subjective. Perhaps at the proposed NOW House team debriefing forum, this could be discussed.
2. Following the team meeting on 24th of July, Kimball put out a sheet of decisions and requested that participants put in the full references and rationale for the material decisions made at the NOW house meeting of 24/07, to ensure the decision-making process is fulfilled in terms of integrity of the process. We recommend Beacon Pathway Ltd ensure this has been undertaken to their satisfaction, as these were the material choice decisions, and will require explained validation by stakeholders and policymakers. This was not done extensively at the time of decision-making during July, as participants were often working unfunded, or within severe budgetary constraints.

3. Decisions for abandoning collated ideas from Ideas Log should be assessed for justification.
4. Material sponsorship deals – Winstone Wallboards and other companies have expressed interest in donating materials or sponsoring construction of the NOW house. Beacon Pathway Ltd will need to decide whether to allow sponsorship deals now the material types are specified, and how to ensure transparency and fairness for manufacturers.

Recommendations

Four key recommendations (in order of priority) to aid in meeting of the project requirements

The following are priority requirements in order for Beacon to take firm ownership of the Olympic Place project, and ensure the end result reflects both the needs of the new owner, and a quality result:

1. Establish the way to relocate the house, and the design implications of this, if any
2. Ensure that the design meets the brief. This will mean
   - Ensuring that all the design constraints are met
   - Ensuring that the design decisions for other specifications are explained, and the areas where tradeoffs were made are clear and reasoned
   - Undertaking an external review or audit of how well the design meets the brief
3. Beacon Pathway Ltd. to initiate a one-day forum with the NOW house team, as a project debrief, to discuss this report, in order to gain feedback on the findings and the implications for future projects.
4. Appoint appropriate personnel in the roles of project site manager, and monitoring research co-ordinator.

Old 'leads' or suggestions that could be followed up again by a new owner

- Claire Benge (at the time at the Building Industry Authority) stated there are some reasons why BIA might like to be involved in the 'Post Kyoto project'
- A suggestion to enhance skills-base training in the sector, and show Maori responsiveness would be to allow Maori carpentry students from the Whakatane Wananga to undertake some of the work in construction of the NOW house. (or Auckland-based equivalent)
- Design brief (generic) is needed for public dissemination – the original aim was to work with HNZC on this. There was also an idea of developing a functionality brief for future Beacon homes.
- A research programme is needed to undertake a study on rural vs. urban water quality from roof-top collections - most rural households use rooftop collection systems, but many city by-laws will not allow this as 'potable' water in urban dwellings. Is the city rooftop water actually of worse quality than rural water? If not, why can city folk not drink it? This would save much on the processing of potable town-supply for residents.
- Suggestion for a project to assess NOW house on the least cost standardised design versus NOW house final design – i.e. what is the actual cost of getting NOW house benefits through designing in of social, economic, and environmental benefits?

Things that never occurred that may need to be chased up

- The 'construction process and maintenance' section could only be completed once the construction format and materials are finalised and brief is signed off – Greg is to do this
- Each design iteration was supposed to be circulated to the group with a revised budget and an up-to date copy of the designer's log, but never occurred. Instead each iteration and designer comments, and a revision of footprint.
- Albrecht flags that with current design, a heating system may be required to meet brief specification, due to standard walls and skillion roof and lack of thermal break in windows. Albrecht was reminded last month that he was to run some calculations – funding permitting.

- No sprinkler placements yet seen in the design, although a household sprinkler system (as developed by NZFS and BRANZ) were seen as necessary.
- Greg was waiting for Craig Walker to get back with some more detailed information regarding relocating the building, and how to relocate the building using the current design has not yet been resolved – it appears that a panellised system may be required, and this could have an impact on current material decisions.

Appendix A: Vision linkage documents

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Thursday 27th February 2003

Review & Implications of Consumer Housing Language

Introduction

This brief paper looks at consumer language in relation to housing & provides some frameworks for applying our learning to NOW Home branding/ marketing.

Review & Implications

1. The Project Context

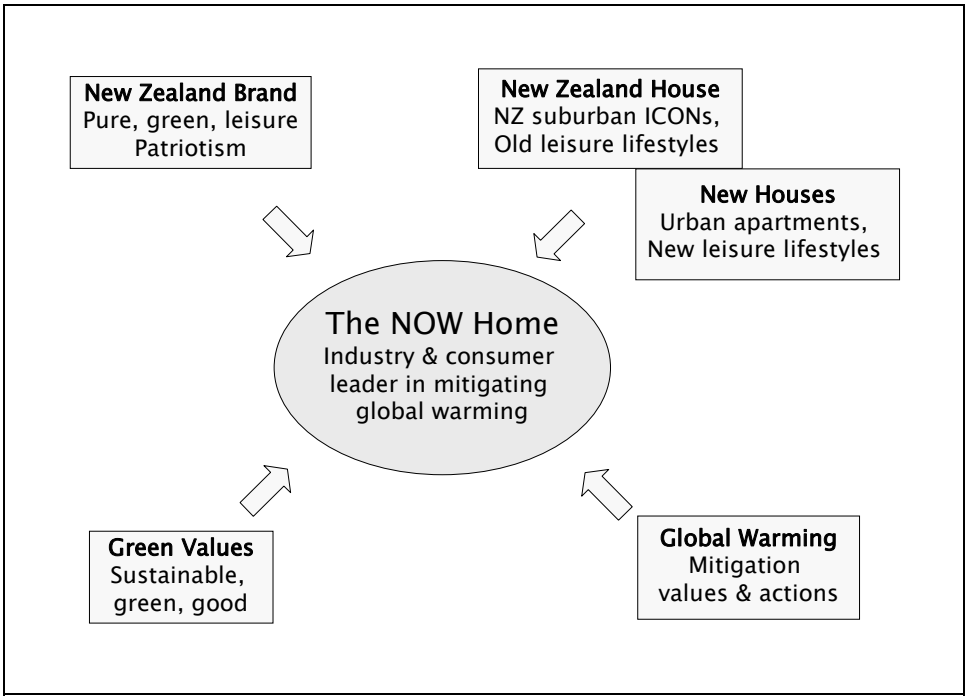
We have a draft vision encompassing Education, Sustainability, Fit for Purpose (Quality) and Appeal. These are linked by Brand, Index, Values & Meaning to the key features of the house – to be finalised this Wednesday 5th March.

2. The Market Context

Climate change & green markets are relatively young & emerging into our culture & consuming in fragmented ways.

We can however, identify some key patterns by looking at existing consumer-oriented communications. By linking common language themes, we can identify common values.

The diagram at right summarises key links.



The diagram suggests that there are lots of 'language resources' available within consumer markets, but we will have two critical tasks:

- Making these powerful for the building industry – to justify contributing to mitigation
- Linking these to the NOW house specifically – to justify purchase of a NOW house

3. The Brand Framework

The brand framework is the template we use to organise the brand's meaning, strategy & relationships.

There are many possible brand frameworks to choose from, but we should favour those that lead us to account for the brand as an agent of social change, & as a generator of behavioural change more specifically.

A specific issue is making sure house features & benefits are strongly communicated by the brand – people may simply not understand the need for a mitigating house per se.

The diagram below suggests a framework with initial, evolving brand meanings.

NOW House Brand Framework			
	House	Brand	Consumer
Summary Position	o Character NZ House	o Great NZ Home	o Mitigating heroes
Gains & Motivators	o Fits with lifestyle o Enjoyable in itself	o Flexible o Protecting o High value (ecology, resale)	o More enjoyment o More balanced life o Joy of NZ living/ lifestyle
Losses & Barriers	o Higher cost	o New, different brand o Involves risky decision	o Uncertainty about benefits o Ignorant about global warming o Loss of face & money
Personality	o Solid, reliable, flexible, easy	o Friendly, fun, outgoing o Strong, secure, solid	o Outgoing, energetic, enquiring, risk-taking, principled, patriotic
Values	o Educational, purposeful, appealing, proven (index)	o Authority, leadership in idea o Innovation in design o Feel of NZ Icon o Protection from elements	o Contemporary NZ lifestyles o Nature/ ecology/ green values
Context	o Large proportion of NZ building stock unhealthy o Leaky buildings o Growth/ demand for housing o Increasing impact of climate on house	o Social marketing still evolving o Potential 'positive dissatisfaction' limited by ignorance about global warming & impact on residences o Ability to brand/ market successfully in brief timeframe at issue!	o Cynicism about brands & marketing o Limited understanding of green consuming, especially in residential building o Increasing impacts of climate change on household

4. The Brand Narrative

The narrative is the story we tell consumers – it dramatises global warming issues while also connecting it with housing, & ultimately, justifies purchase of the NOW house.

The diagram below suggests two different narratives – perhaps best understood as different ways in & then pathways that might be taken to reach the same end. These narratives are the basis for our consumer communications.

NOW House Brand Narratives			
Problems	Consumer Strategies	Solutions	Marketing Strategies
Business practices & people's lifestyles have impacted on global weather patterns Global warming means/ will mean: o Avg temperatures increase, extremes of weather increase o Pests, illnesses & stresses from weather increase o NZ leisure lifestyles will have to change o NZ houses will have to change	With global warming, people will: o Struggle with changes in health & lifestyle arising from difficult climate o Spend more time indoors o Seek ways of preserving NZ values o See vulnerable groups grow more vulnerable – the young, elderly, poor & unwell	***What people will want is:*** o A house that **protects** – higher performance info & building techs o A home that **assures** enjoyment of NZ icons - leisure time & nature o A lifestyle that **optimises** enjoyment of NZ home & nature o A social identity that **rewards** mitigators	What we can do is market: o **Protection** o Houses, people , lifestyles from climate change o Climate from NZers o **Enjoyment** o Home, Leisure o Lifestyle o **Identities & values** o Cool/ mitigating o Cool greenies/ Mitigators
New Zealand will: o Loose some of its pure, clean, green appeal o NZ lifestyles will have to change o NZ tourism & exports will suffer o Nzers will have to evolve the ways they express their identity & values	NZers will: o Fear & have climate-related problems with their incomes & lifestyles o Struggle with changes from the more difficult climate o Seek ways of preserving or evolving NZ lifestyles & business opportunities	***What NZers will want is:*** o Technologies that **protect** – higher performance info & techs for business & home life o Ways to **assure** enjoyment of NZ icons - leisure time & nature o Lifestyles that **optimises** enjoyment of NZ home & nature o A global identity that **recognises** NZers as mitigators	What we can do is market: o **Protection** o Economy, houses, people, lifestyles from climate change o Climate from NZers o **Enjoyment** o Business gains o Home, Leisure o Lifestyle o **Identities & values** o Cool/ mitigating o NZers as cool greenies/ Mitigators

Values

Values are those qualities that an individual or a society considers important as principles for conduct and that are intrinsically worthwhile. They are generalised, abstract ideas held by humans about what is desirable, proper, good or bad. Societal values, which serve as expectations for everyone, are the values that are generally accepted by a society and that form the basis of its cultural traditions, structures, practices, and laws. The most important societal values include freedom, fairness, honesty, respect, compassion, and justice. Personal values are acquired and held, consciously or unconsciously, by each individual (although personal values are strongly influenced by society in general).

We suspect that there is a considerable amount of pragmatism — particularly in terms of trade-offs with costs — involved in how these values are reflected in the housing choices of many New Zealanders. This raises the question of how idealistic we can afford to be in developing a design brief for the Now House.

We see the following potential links between values and the vision elements:

1. Appeal. Community/family values. Ecological and social sustainability.
2. Fit for purpose.
3. Sustainability. Obviously this would depend on an individual's particular value set — it could be either very important or almost irrelevant. This is a potential area for change that should be considered for the Future House.
4. Education. In practice it doesn't seem to be very important. In an ideal world it would be.

Only the sustainability-related features and benefits appear to be relevant. We have more work to do in identifying values-related features and benefits. For example, we have not yet considered community- and/or family-related features

The NOW Home

INDEX/RATING SUBTASK

1. DEFINITION AND CHARACTERISTICS

A "rating/index" is a procedure for determining the overall benefit of a particular object/product being assessed, based on one or several characteristics, so that it may be compared to a standard/benchmark or to another object/product having the same (or very similar) application. Ratings and indexes are, where-ever possible, based on scientific (that is rational and objective) methods of assessment. For characteristics which are difficult to examine in this objective manner (for example, the subjective characteristic of "aesthetics" or "fashion"), other procedural methods, such as a Delphi system (i.e. expert based group consensus) are required. However, it is unlikely that these types of issues need to be rated – as people will judge these issues for themselves. In some instances, ratings may contain both subjective and objective aspects.

Although it is recognised that environmental rating is a very new science, it is one which can (even at this early stage) provide a useful decision support tools and guidance for much of the decision-making process concerning the design of a complex product such as a house. However, its limits must be recognised. This is especially important when dealing with single factor rating systems, which may give misleading results because of their very limited appraisal of the overall picture.

2. HOW DOES RATING RELATE TO THE 'VISION ELEMENTS'?

In terms of the "Vision Elements", "Ratings/Index Systems" achieve a connection to them as they:

- **Educate people.** They instruct on what is being assessed and on what the rating has been based on. Thus, the user can make informed decisions, based on where their priorities lie. If information on the criteria for assessment is given, the user will be able to gain an understanding on which features are important and perhaps even the reasoning behind them. Users may also be alerted to possible problems, which are not obvious in a cursory inspection – for example a poor acoustical rating between adjoining units. Currently, there are no-known ranking systems (apart from the BRANZ Green Home Scheme) which examine anything but the basic house buying criteria (such as cost, neighbourhood, outlook, resale and size), and even this is focused almost entirely on sustainability (rather than social etc) issues.
- **Connect 'Fit for Purpose' to 'Appeal'.** That is, they bring together normally hidden features – such as thermal, structural and acoustical performance) which all contribute to and make more transparent the quality of 'Fitness for Purpose', in effect, becoming part of the 'Appeal' to the consumer, along with other factors, such as style, fashion, location etc.

Note that, in terms of "Ratings", the Visions Element "Sustainability" is really just another "Feature", being an amalgamation of other features currently listed, such as waste management, air quality, acoustic, light, security, carbon footprint etc.

3. HOW DOES THE INDEX/RATING HELP TO IDENTIFY AND DEFINE THE CHARACTERISTICS OF THE 'FEATURES AND BENEFITS' OF THE NOW HOME?

Index/rating systems provide the useful decision support tools for the designer/consumer/specifier. Their credibility is increased if backed by an independent, third party. Already, there are tools specifically designed for new-New Zealand houses which could be applied directly, or used as part of a larger (more holistic) assessment process.

For some issues, such as 'energy', 'air quality', 'light', 'waste management', 'cost', 'accessibility', 'thermal', 'acoustic', and 'green/carbon', ratings can provide clear and simple guidance for the user. This can be achieved through either a benchmarking system or 'star/credit' rating system which amalgamates background calculations and is underpinned by scientific data. For other, more subjective issues, such as 'amenity' and 'quality', simpler (descriptive-based) indicators could be applied, based on expert knowledge. Quality (here defined as the overall build and finish) for example, can very effectively be rated on a 5-point descriptive scale, ranging from "Serious" through to "Excellent".

The type of features/benefits used in a descriptor of properties is often based on what appeals to the target market. Often real estate advertisements or RV evaluations have set features that they list as a checklist for buyers (e.g. number of bedrooms and bathrooms, car storage, nearby amenities, fenced section, gardens established, level of maintenance and chattels. etc). This may not be an important consideration for sustainability, but these things score highly on a 'resale' rating, and therefore should be considered in the NOW Home. What features and benefits are on the checklist are depend on the rating system(s) used, and therefore what is assessed as part of it (e.g. resale value, demographic target group, green buyer, regulator, etc..).

For many (and possibly all) features a rating system should consider the end effect on the consumer. For example, as far as the consumer is concerned 'Thermal' means how thermally comfortable the house is for them. To achieve the 'Thermal' feature rating we consider thermal insulation, heating, the orientation of the house etc all together. The same would be true for good 'acoustics': the consumer wants a quiet house, so we consider noise insulation of outer house envelope, exterior noise levels, appliance noise, and plumbing noise all together.

MEANING OF HOUSE AND HOME

The NOW House aims to provide a concept house which best meets *emerging* health and environmental requirements using *existing* materials and services. Four values were identified:

1. Fit for Purpose
2. Appealing
3. Environmental Message
4. Educational

Features and benefits required to attain these values include: function; structure; quality assurance; moisture control; light; energy; thermal; acoustics; indoor air quality; waste management; recyclable; Green; mobility; accessibility; security; fire management; landscaping; amenity and furnishings; fashion; cost and resale value.

Four areas for further investigation were identified to help link features and benefits with the values desired. These areas were:

1. The Meaning of House and Home (and communication)
2. Values (What is important to people?)
3. Indicator Index
4. Branding

Shaun Killerby, Louw van Wyk and Mike Collins discussed the Meaning of House and Home. We came up with the following ideas, all of which contribute to design for fitness to purpose:

1) A NEST

A house/home is essentially a nest, designed for the raising of families. Family is a major part of every culture, though with greater size and emphasis perhaps in Maori and Pacific Island cultures - Europeans tend to be more individualistic. It is from this idea that we get the expression 'Empty Nesters', those who are deliberately reducing the size of their home once their children have left so that they can't return (a very European idea).

2) RETREAT

A house/home is often a retreat, a place away from work. This idea proliferated with the industrial revolution; before then work was often at home. Because of the division of work and home, houses often reflect the idea of a holiday hideaway: hence the Californian bungalow, the Tuscany townhouse, etc.

3) WORKPLACE

Technologies are now allowing various professionals, students and some others to work back at home and, in so doing, spend more time with family [see point 1]. In order to ensure a clear distinction between work and home (in order to work in peace and then retreat from work) areas within the houses need to be designated as office space. Given that computers are also used for study, book-keeping and recreation at home even when occupiers study or work elsewhere, most homes need at least a small, quiet workplace.

4) ENTERTAINMENT AREA

A house/home is an entertainment area, where one is able to play and have guests around. One of the big parts of the New Zealand culture is the ability to entertain outside with a deck, barbeque and/or pool. In the inner city, space constraints and the immediate availability of services means that there is some division of home and entertainment occurring – parks being the garden, cafes being the kitchen, etc. – such that the apartment is sometimes little more than a place to sleep.

(Some modern inner-city apartments don't even have kitchens.) However, this is a very location specific trend.

5) WORKSHOP
A house/home is also a workshop, where one has personal space available for various hobbies and interests, such as mechanics, gardening or crafts.

6) STORAGE AND ACCUMULATION
A house/home is a place to store and accumulate wealth. This is both in terms of capital gain and storage of personal possessions for family, entertainment, hobbies/interests, holidays or holiday ambience, work or expression of our unique personalities.

7) SECURITY
A house/home is a castle, a place to protect family and personal possessions. Security encompasses both external threats (protection from home invasions, theft, natural hazards, etc.) and internal threats (protection against fire, moisture damage, etc.).

8) PERSONALITY AND CULTURE
A house/home is also a means of expressing personality and culture, showing to the world who we are as individuals. If we have the finance we can do this in the building itself. If not, then we take what building we can afford and add our own personal affects through renovations, furnishings and possessions.

Constraining Factors

The actual expression of each of these meanings will be modified and constrained by various factors, such as disposable income, size of family and culture. Mike and Louw investigated these constraining factors and identified:

- Education
- Social Standing
- Income/Wealth
- Potential Earning Power
- Ability to borrow
- Ethnic background

The above drivers can be influenced by values, education, promotion, demonstration, peer pressure, fear, changing circumstances and similar factors.

Individual or family values translate into the selection of house type and the add-ons that can make it a home. The selection includes the following:

- Basic Shelter (SECURITY)
- Lifestyle
    - Animals (NEST)
    - Children areas (NEST)
    - Care areas (elderly, handicapped etc) (NEST)
    - Lodgers (overseas students in vogue) (NEST)
    - Home gym (ENTERTAINMENT)
    - Home theatre (ENTERTAINMENT)
    - Entertainment areas (ENTERTAINMENT)
    - Home office (WORKPLACE)
    - Workshop (WORKSHOP)
- Status (must look expensive, trendy etc.) (PERSONALITY)
- Investment (don't care as long as it will appreciate in value) (ACCUMULATION)

Who Then Do We Design For?

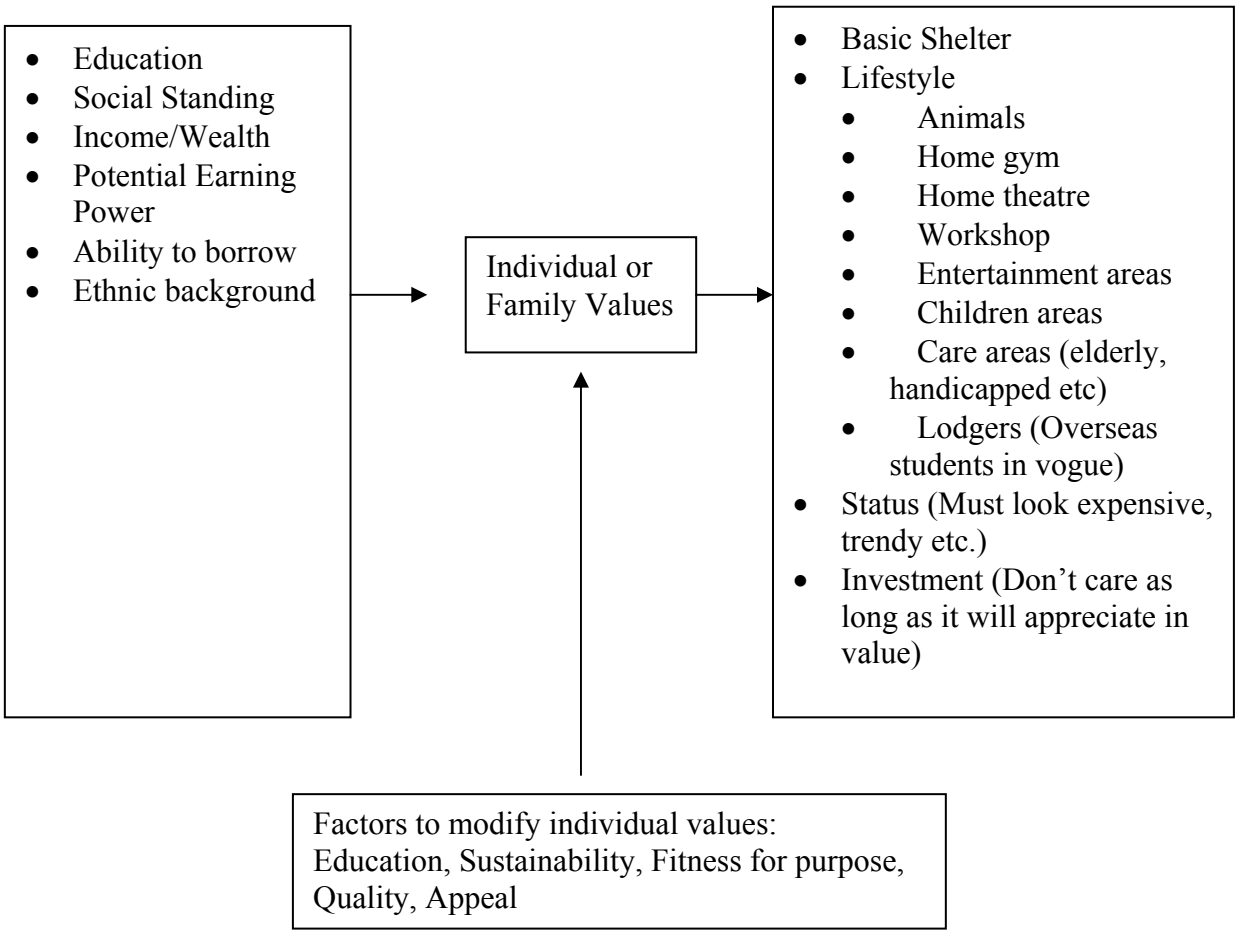
Given the wide range of modifying and constraining factors that contribute to house design, we will have to define the individual or family values for the NOW House and select a house type to match. It will be impossible to produce something for everyone. It is worth considering that there are basically four *main* groups within the market to consider:

Level 1. Those who cannot afford to buy or build a new home
Level 2. Young families wanting a healthy home to raise a family
Level 3. Professionals wanting a healthy home to raise a family
Level 4. Established individuals with higher disposable incomes

Those people in Level 1 are outside the market for the NOW House, as they cannot afford to build or buy a new home. The decision as to whom we design for thus comes down to Levels 2 to 4. Those in Level 4 would hypothetically be able to pay more for a house that meets emerging health and environmental using existing materials and services. However, for maximising public good we consider that Level 2 is more the market segment that we should be designing a house for – those with greater constraints on disposable income and consequently a higher propensity for settling for houses which don't meet best health and environmental considerations.

We suggest looking at designing a house for a hypothetical young family with, say, one to one and a half incomes, the husband working as a tradesman, three to five children in the house and maybe even one elderly person. There would be high water consumption, people frequently coming and going, doors being left open, constant cooking going on. At least one member of the household would be a smoker. If we design with such a family in mind we may be able to produce a house which has fitness for purpose (addressing all of the meanings of house and home), is practicable and appealing, and at the same time has greater health and environmental performance. Design features for fire management, waste management, reduction of water consumption and suchlike would be both practical and educational.

Meaning of House and Home



Appendix B: Features and benefits template

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***Accessibility***
Team	***C***
Short Description	Design home for easy access and living conditions for disabled and elderly occupants and visitors
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	Inform people of the needs of others who are not as physically able as the average person. Point out that we are all getting older but may sustain disabling injuries at any age, that parents often come and live with their children in the last years of their lives, and that designing layout and facilities to meet everyone's needs benefits both able and disabled people.
➔ Sustainability	Starting with a building that has some thought given to accessibility to both the building and its facilities, saves expensive retrofit later if the need arises.
➔ Fit for purpose (quality)	Providing for everyone's needs expands the fitness for purpose often for little extra cost.
➔ Appeal	Greater flexibility of future use of home will appeal. Often the features that make a home suitable for the disabled, also render the home easier and safer to live in for the able. E.g. walk in showers with no threshold lip and plenty of room. (My last 2 houses have featured this sort of shower and they are great.)
Vision linkages: ➔ Brand	A home for everyone
➔ Index/Rating	Assessed by experts in the field.
➔ Meaning of "house" and "home"	House meets expectations of a wider range of occupants. A comfortable convenient house is more a home than simply a place to sleep.
➔ Values	Caters for a range of people's needs.
What do we already know (or not know) about these possible impacts? Think as broadly as possible eg environmental and health "footprint", build issues, marketing the NOW Home (eg communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	
➔ Research already available	Data is available from a number of sources on the needs of the disabled and elderly.
➔ Known research gaps	
➔ Solutions or systems already available	A number of aids for the disabled are available from specialist suppliers. Many of these relate to house fittings.

➔ Products (or companies) that may help deal with the impacts	A brief search on Google reveals many firms such as disability products.com which supply equipment for the disabled. Also articles on designing houses for handicapped and elderly. See "LARES: An Intelligent Sweet Home for Assisting the Elderly and the Handicapped"
What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	Will increase first cost, but reduce costs of subsequent modification to suit handicapped people.
➔ Location?	NA
➔ Timing?	NA
➔ Materials to be used?	NA
➔ Trade-offs required when there are multiple possible solutions?	First cost versus subsequent costs. Nevertheless, we should be concerned about long term benefits in this project and not just short term costs. We have already discussed this and agreed that in NZ we too often overlook the sacrifices that are made by short term, first cost driven, thinking.
➔ Construction method?	NA
➔ Measurement of effects?	Assessment by experts on accessibility for handicapped people.
➔ *(Other)*	Accessibility, in the broadest sense, should be a feature of the design from the word go. An accessible house is also easy, safe, and comfortable to live in for able people as well.

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***Replace this text with the relevant feature or benefit***
Team	***B***
Short Description	**Occupancy**
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	An occupant, or potential occupant, needs a handbook of the basics of housing and house maintenance. This book would be based on data such as that found in the "Maintaining Your Home" manual published by BRANZ, also an environmental assessment tool to apply to the building materials such as the "Environmental Comparison of Building Elements" available from the NZIA. The handbook would cover the fundamental requirements for a secure, weatherproof, comfortable and healthy home. This handbook combined with a pre-construction and purchase protocol to establish the cost of (annual ?) maintenance. Also heating/cooling costs established by using ALF, or similar, before proceeding will indicate the best choice of style to have the minimum energy cost impact. This, combined with better information about insulation elements e.g. glazing, sound, heat/cold etc will assist house purchasers how to get the best out of a house by explaining the effect of positioning plantings, driveways/paths, windshelters and positioning to optimise solar gain/reduction.
➔ Sustainability	This is inseparable from education. There is a risk in suggesting that current building practices/building materials are unsustainable and will probably be unavailable in the future i.e. it may result in the current practices becoming more attractive as an "investment" due to their possible future scarcity. Sustainable products, whatever they may be, need to be seen as readily available, cost effective (cheap?) and durable in the long term. Sustainablity may be conflicted with "wants" and "needs" i.e. where a person may want something that is not in the best interest of society as a whole. A sustainable housing system has to be a structure that has uniform input for high quality and finish, with attention to low total life cycle costs.

➔ Fit for purpose (quality)	Fitness-for-purpose and quality may not necessarily be synonymous. Construction towns such as Mangakino, Twizel or Turangi, which were built to house their workforces were not initially seen as becoming permanent townships. In the case of Mangakino the ceiling stud heights are lower than are permissible in most if not all other districts in NZ. In these cases the houses were designed to a grade sufficient to meet the immediate to short term needs. It could be argued that the quality for the designed need was good/high but the long term view may be that the life cycle costs are higher than for a "permanent" dwelling. How then is "Quality" to be defined?
➔ Appeal	Whether a house has appeal may ultimately be characterised by the person/s who has/have the most to do with it e.g. Mother with young children, is it safe, secure & healthy. Retired couple, low maintenance house & garden. Does it appeal to the local town planner, has it a low impact on the available reticulation services and roading.
Vision linkages: ➔ Brand	
➔ Index/Rating	
➔ Meaning of "house" and "home"	
➔ Values	
What do we already know (or not know) about these possible impacts? Think as broadly as possible eg environmental and health "footprint", build issues, marketing the NOW Home (eg communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	
➔ Research already available	
➔ Known research gaps	
➔ Solutions or systems already available	
➔ Products (or companies) that may help deal with the impacts	
What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	
➔ Location?	
➔ Timing?	
➔ Materials to be used?	
➔ Trade-offs required when there are multiple possible solutions?	
➔ Construction method?	
➔ Measurement of effects?	

➔ *(Other)*	

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***Waste Management***
Team	***B***
Short Description	Four stages to examine during the buildings life – the design, the construction, the habitation and the demolition/deconstruction stage. Waste includes building materials for all stages, surface runoff control of liquid pollution at the construction stage and user waste ("rubbish") produced by the dwellers during habitation. May also include the waste generated as part of refurbishment/extension – so has close association with the flexibility of the dwelling spaces.
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	Inform people of that certain decisions made (especially at the design stage) have long term implications in terms of their waste generation. Focus on the essentials (i.e. basics which have the most significant impact) for each of the stages, but also alert to those less well known. Quantify things in units that people can relate to (i.e. swimming pool size etc).
➔ Sustainability	Waste disposal has implications for climate change, resource (material) use, land area use, health, pollution (both liquid and gaseous), transport, and use of non-renewables.
➔ Fit for purpose (quality)	In terms of waste generation, issues such as function, use-ability and flexibility are all critical. These factors all have implications as to how long and to what degree the building will be fit/comfortable to live in, so ideally should be maximised from the beginning.
➔ Appeal	Ensuring that on-site recycling during the buildings life. Employing the 'loose fit – long life' axiom will increase a buildings appeal (while reducing waste) to the educated consumer.
Vision linkages: ➔ Brand	Smart and responsive design, reflecting owners needs both now and in the future.
➔ Index/Rating	*REBRI* have checklists rather than formalised rating schemes which could be applied for the construction-related aspects only. The *Sustainable Households* scheme has an auditing procedure for weekly checking of amount of waste disposed of to curb side.
➔ Meaning of "house" and "home"	
➔ Values	Effective household waste management has been more of a focus since the advent of curb side recycling schemes and NZ has a history of decomposing organic wastes. However, we still landfill about 18kg waste per week per household nationally – so we need to be made more responsible for the role we play.
What do we already know (or not know) about these possible impacts? Think as broadly as possible eg environmental and health "footprint", build issues, marketing the NOW Home (eg communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	

➔ Research already available	Auckland Regional Council, BRANZ, Christchurch City Council, WASTEMINZ conference papers, RONZ, Hamilton City Council, Victoria University, Sustainable Households programme all look at different aspects of waste generation. Overseas research also.
➔ Known research gaps	Designing for deconstruction, design for assisting recyclables use.
➔ Solutions or systems already available	REBRI web site, WASTEMINZ web site and links to recycling industry.
➔ Products (or companies) that may help deal with the impacts	WasteMinz and RONZ
What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	Minimal extra, mostly to do with design decisions
➔ Location?	Location for easy use for kitchen recyclables.
➔ Timing?	Procedures have to be in place at the start of the design process to gain maximum benefits
➔ Materials to be used?	Shift towards non-composites and grouping materials of similar durability together for ease in replacement.
➔ Trade-offs required when there are multiple possible solutions?	Mainly to do with extra cost of having a more flexible floor layout. Also durability verses cost of materials and the less flexibility of room sizes.
➔ Construction method?	Not very different from standard techniques.
➔ Measurement of effects?	Amounts of construction site waste being landfilled/cleanfilled/recycled or reused. Amounts of occupant-generated waste going to cleanfill weekly. Accounted for preferably in weight rather than volumetric terms.
➔ *(Other)*	

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***SECURITY***
Team	***B***
Short Description	**Security = keeping things you value safe from harm, in terms of human threats (cf. Protection which is natural threats)** **General thoughts:** **Alarm systems and locks give a lack of freedom which is a part of reality these days, but not wanted** **Time taken to lock up and unlock using keys and PINs is a hassle and timewaster. Also uncertainty in 'did you lock the house?' -unneeded** **Car alarms and burglar alarms go unnoticed –tune out. Annoying also for neighbours.** **Criminal elements associated with certain suburbs, so you choose where to live based on percieved security risks.** **Visibility cf. Privacy – need to be visible so neighbours can keep an eye out. Siting and access up drives/paths are important for this.** **Pet access – shouldn't be near handles, or large enough for children to enter.** **Deadlocks don't work – burglars can get mad and trash house if no easy escape, and there is a 'panic risk' if you need a key to unlock the door to get out in emergencies - fire risk also.**
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	
➔ Sustainability	
➔ Fit for purpose (quality)	
➔ Appeal	
Vision linkages: ➔ Brand	
➔ Index/Rating	
➔ Meaning of "house" and "home"	
➔ Values	

What do we already know (or not know) about these possible impacts? Think as broadly as possible eg environmental and health "footprint", build issues, marketing the NOW Home (eg communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	
➔ Research already available	A whole industry devoted to security – bound to be heaps.
➔ Known research gaps	Information is readily available, and police no doubt could aid in this. How do you measure peace of mind? The only way is to use a ratings scale (subjective) of area/home over time to record security perceptions of residents.

➔ Solutions or systems already available	Possible solutions:
	• Theft: A microchip linked to telephone network/power meter which allows appliances to only work at that ph number/ GPS location.
	• Uniquely marked house/contents.
	• Wired houses which
	  • Link to nearest security firm alarms
	  • Sets off alarm either at house or police station when appliance is unplugged

➔ Products (or companies) that may help deal with the impacts	Burglar alarms, safety locks and safety windows, security screens, securi-vents,…..a myriad of off-the-shelf solutions Security firms and police
What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	There are 2 main levels of cost – financial and mental Cost decisions are Value-Based – need to protect your most precious things =family and assets (ie. different values placed on these two aspects depending on whether you have children, elderly people, expensive items, items of sentimental value, etc. in home) Perceptions are very important in resale, etc. If you don't have a good impression of an area, the value reduces. Need to break up the close associations of criminal elements (eg. Ford Block, Mangere, does Wellington have an 'undesirable' suburb..???) with areas. Insurance premiums.
➔ Location?	NA
➔ Timing?	NA
➔ Materials to be used?	Tough or smart/intelligent materials /systems–but need to recognise security is at best a deterrent – criminal element will get in if they really want to! The aim is to make it more difficult for intruders to do harm.

➔ Trade-offs required when there are multiple possible solutions?	This is linked to cost and is a matter of horses for courses to give adequate peace of mind in your personal situation. Visibility/privacy trade-of – and links to access to property – lit street lamps and open spaces near paths not large bushes. The many solutions available give a range of possibilities (objective view)Need to match these to your situation and personal peace of mind for optimal solution (subjective risk assessment) No-one wants to live in a fortress, but we want to feel safe. There is a certain trade-off between adequate peace of mind, and maintaining neighbourhood congeniality – you need to trust and rely on your neighbours for security when you go on holiday/out for the evening. Also builds social networks and street -friendly citizens. If someone moves in next door, puts up a fence with a big padlock and installs lots of security measures, do you get the feeling they may not trust you and your neighbourhood (which you may feel at home in and proud of!)?
➔ Construction method?	See possible solutions. Some of these need to be designed in and accounted for during construction phase. It appears a lot could be done with Doug's idea of a wired circuit (or series of circuits) linked around the home via a hollow dado picture rail or architrave. Eg. Protection, Entertainment, Monitoring, Security etc links
➔ Measurement of effects?	Crime rate Peace of mind Neighbourhood perception of security in area.
➔ *(Other)*	

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***PRIVACY***
Team	***B***
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	
➔ Sustainability	
➔ Fit for purpose (quality)	
➔ Appeal	
Vision linkages: ➔ Brand	
➔ Index/Rating	
➔ Meaning of "house" and "home"	
➔ Values	

Short Description	**Privacy = Balancing exposure vs. seclusion**
	
	General thoughts:
	
	There are two parts to privacy in a house:
	
	Inter-house privacy (between your house and others)
	Intra-house privacy (between various dwellers)
	
	Visibility cf. Privacy – need to be visible enough so neighbours can keep an eye out, but not an eye on, you. Siting and access up drives/paths are important for this. Needs to enable occupants to view people arriving for security reasons, also.
	
	Needs to look welcoming but not a drop-in centre! Private places should be a place to retreat to without outside intrusions, but not a place to breed hermits – a healthy household has good fellowship both with other family members and the neighbourhood. NOW House needs to provide retreat, but encourage interaction (envigorating vs. cocooning trends)
	
	Also, need clear indication of public and private areas of the house – front vs. back door –which to call at?, clear doorbell/knocker, interior layout etc.
	
	Inter-house:
	• **Windows and curtains –siting – trees etc, take into account views of neighbours and how neighbours will view you when designing siting and layout.**
	• **Some people want to cut themselves of from community, others need to see what is going on and be a part of the neighbourhood.**
	• **The familial aspect to streets has been removed and increased mobility has changed community attitudes to what is 'intrusive'.**
	
	Intra-house:
	• **Ablutions –separate toilets and bathrooms (loo needs a basin, too), so not intruding on privacy to wash hands, etc. if other householder in bathroom**
	• **Especially need to get from bed to toilet/bathroom or kitchen areas without needing to go through lounge. Don't want to 'dress' just to do business.**
	• **People staying over:**
	  • **More aware of restricted privacy**
	  • **Doors to bedrooms/bathrooms kept shut**
	  • **Invasion/ intrusion on household running**
	• **Soundproofing**
	• **Separate retreat areas for different household members to go to at same time – especially if of different age.**

What do we already know (or not know) about these possible impacts? Think as broadly as possible eg environmental and health "footprint", build issues, marketing the NOW Home (eg communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	
➔ Research already available	Use info gathered during FR scenario visualisation sessions (similar process to this one used for lifestyle needs) Rotorua Public library has lots of good books on house design, etc. Thorns/ Perkins work –ask about issues relating to privacy
➔ Known research gaps	NZ situation means we aren't at same stage as other nations – haven't got same issue due to space and backyards/gardens Check with sociology contacts as to research needs (Crothers, Thorns, Perkins, etc)
➔ Solutions or systems already available	Ensuites; trees/shrubs; walls, fences; siting; Branz publications..??; Nooks and crannies in awkwards spaces or designed in (eg. Bay windows, kids playarea under stairs etc); acoustic floors; courtyards/glades; rumpus room; den; guestroom/spareroom; partitioning dividers
➔ Products (or companies) that may help deal with the impacts	Curtains/shutters blinds Doors Fence matrials Sound insulation Screens Trellis Low-noise flush toliets Low-noise appliances GiB Noiseline and Tuffwall
What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	This is a design feature, and cost minimised by designing-in privacy so mass products are not required Cost of trees and shrubs, fences, curtains, screens, etc. Mental health issue can be a huge social cost if privacy/retreat areas are not done well – frustrations with neighbours lead to arguments and court of law, while frustrations with family/household lead to arguments and divorces.
➔ Location?	Design feature, and largely related to siting and room layout. Also, privacy occurs all through the house in terms of furniture placement and screens etc.
➔ Timing?	At design and construction stages Throughout lifestages – different privacy requirements of occupants
➔ Materials to be used?	Sound proof Sustainable solutions by designing in (passive privacy) and using trees and shrubs not big concrete walls or processed materials.

➔ Trade-offs required when there are multiple possible solutions?	Cost vs space allocation – ie nice to have 8 room house, which would give lots of privacy, but not very affordable Passive solar siting for sun vs. siting house for privacy/views/out of sight of neighbours
➔ Construction method?	Screens need to be easy to pick up and place, and easy to pack away. Need to create different size and shape rooms for different functions – and use small 'unusable' spaces as retreat nooks and crannies (eg put in a windowbox or small seat…links to function and layout in the design stage. "The space left over is as important as the space you create" –Ian Athfield. Lowered ceilings in these nooks give more homely feeling (eg. Traditional bungalows.)
➔ Measurement of effects?	Satisfaction and peace of mind – monitor residents mental health and happiness with house
➔ *(Other)*	

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***PROTECTION***
Team	***B***
Short Description	**PROTECTION = optimised house to look after occupants** **2 angles: Preventing loss of value in the physical asset, and protecting people who live in it from natural elements** **Value loss – depreciation, deterioration** **Natural elements – wind, water, fire, UV, earthquake**
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	Need past history on a house –structural designs etc. to prevent cutting through live wire or puncturing pipes etc. Need a user manual that stays with the house –(or a CD/interactive website on property) that gets updates with maintainance and natural-hazard impacts.
➔ Sustainability	Durability – need preservative treated or naturally durable and long lasting materials
➔ Fit for purpose (quality)	Need access panels to check condition of structure – keypad on sensor circuits to check they are all working correctly Sensorised house- ie. snsors and automatd microdots to feed information about load stresses from storms, etc..filters on water supplies
➔ Appeal	Resale value link, links to design also.
Vision linkages: ➔ Brand	
➔ Index/Rating	WOF for house – ratings system link
➔ Meaning of "house" and "home"	
➔ Values	
What do we already know (or not know) about these possible impacts? Think as broadly as possible eg environmental and health "footprint", build issues, marketing the NOW Home (eg communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	
➔ Research already available	EQC and other design code information Sensors –how to monitor environments and peoples responses (COHFE) HEEP sensoring equipment Wired homes
➔ Known research gaps	How to incorporate all these sensing techniques into one (or a small number) of systems, and how to get them talking to each other…PLC??

➔ Solutions or systems already available	Bound to be some of-the shelf solutions, but need something that is simplified and affordable for a house…and can accommodate a bit of tweaking/modification.
➔ Products (or companies) that may help deal with the impacts	Volcano – ash fallout – if using rainwater off roof need apH sensor valve to stop going into watertank. Sensor could also measure bacteria and potability levels. Earthqauke – fix fasten forget – shatter-proof glass Heaving soils?? –Louw had an idea for driven piles Wind – plantings –shelter belts, walls, siting other buildings as wind protectors UV – higher UV proof materials ratings - UVtech –ph 0800488832 - Dean's (Jo's partner in PSP) paint on solution -Shading – window awnings and eaves, can be moveable so summer only. Water – too little is more a rural problem. Could use grey water on plants to reduce town supply usage - water reticulation schemes round home. Separate toilet wastewater from kitchen, bathroom and laundry (cultural issue or bacterial issue if use this in garden?) - showers not baths Too much water (floods & downpours) – siting – watch this on flood plains. Use pole houses or piles to reduce force of torrent around house,and protect/raise furnishings from ground level.

What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	Balanced with site
➔ Location?	Siting and design due to natural hazards -localised
➔ Timing?	At design and construction stages Ongoing maintenace
➔ Materials to be used?	Floods ruin furniture and fittings. Need easy to upgrade fittings so easy to restyle home and onsell. Carpet not easy to dry if caught in overflow interior 'flood' – drill hole and incorporate a hose fitting into basins/tubs to connect to downpipe, and use mats or brushed concrete.
➔ Trade-offs required when there are multiple possible solutions?	Local conditions for natural element protection priortised, and resaleability of home – will any design appreciate, or will certain designs be a better longterm resale value
➔ Construction method?	Sensors and microdots in construction stage, wiring systems circuit diagrams in design stage
➔ Measurement of effects?	Sensor data, and ability to withstand elements Resale value Maintenacne costs per annum.
➔ *(Other)*	

Feature or Benefit	*FIRE Management*
Team	***B***
Short Description	**Preventing Fire deterioration to house and lost lives** **Smoke kills, fire doesn't. Contents fuel the housefire, and usually start it, not house structural materials.** **Aiming to protect people not posessions – get out quick…design is key to escape routes, etc.** **Fire can threaten from outside as well as inside house.**
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	Smoke alarms and battery removal. –cooking sets these off – too sensitive. Home drying of clothes – most clothes now have synthetic elements – dryer friction sparks – drying in front of fire, etc. CANDLES! –esp poorer areas.
➔ Sustainability	
➔ Fit for purpose (quality)	
➔ Appeal	
Vision linkages: ➔ Brand	
➔ Index/Rating	
➔ Meaning of "house" and "home"	
➔ Values	
➔ Research already available	See Uni of Canty and Colleen Wade
➔ Known research gaps	Ditto
➔ Solutions or systems already available	Smoke alarms, sprinklers, building paper with retardants
➔ Products (or companies) that may help deal with the impacts	Fire Service
What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	Standard materials prices, and smoke alarms, but sprinkler systems too expensive for homes for most…why? Can connect to rainwater tank or pool.

➔ Location?	Bushfires –houses moving into bush surrounds, people not cleaning gutters and sections of dry matter, climate changes
➔ Timing?	
➔ Materials to be used?	Sprinkler. Why have both retardant and non retardent building paper? Furnishings and fittings need to befrom natural not synthtic materials, if afforable, and scothgaurded to prevent fire spread.
➔ Trade-offs required when there are multiple possible solutions?	Can't trade off fire protection!
➔ Construction method?	Fit in sprinkler and fire management systems at designa ann construct stage
➔ Measurement of effects?	Fire reductions Less loss of life.
➔ *(Other)*	

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***Light***
Team	***B***
Short Description	**Provision of suitable (effective and efficient) light appropriate for the specific task and area, whether provided for naturally or artificially.**
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	Focus on the selection and correct position of luminaries and windows to achieve the desired outcome, in terms of luminous intensity, efficiency, glare control, colour spectrum balance etc.
➔ Sustainability	Use daylighting and compact fluorescents where possible.
➔ Fit for purpose (quality)	
➔ Appeal	Natural light provides full colour spectrum, orientation, sense of time and weather, views, etc. Both natural lighting and high efficient lamp technology provide reduced energy consumption (everything being equal).
Vision linkages: ➔ Brand	
➔ Index/Rating	NZS provides little support/direct here.
➔ Meaning of "house" and "home"	Well designed lighting has links with privacy, security, energy, function, cost, fashion and amenity. It also is associated with the ""Workplace", "Entertainment" , "Nest", "Workshop" and "Security" aspects.
➔ Values	
What do we already know (or not know) about these possible impacts? Think as broadly as possible eg environmental and health "footprint", build issues, marketing the NOW Home (eg communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	
➔ Research already available	Some through the Schools of Architecture. Plenty of overseas information available, including on issues such as lighting colour and health.
➔ Known research gaps	Unknown.
➔ Solutions or systems already available	Few NZ-specific off-the-shelf systems available.
➔ Products (or companies) that may help deal with the impacts	Lighting companies.
What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	May be extra for 3D ray tracing modelling (through CADD programmes), but should be minimal.
➔ Location?	
➔ Timing?	Must incorporate at concept design.

➔ Materials to be used?	
➔ Trade-offs required when there are multiple possible solutions?	For natural lighting, heat losses from larger windows must be factored in. For artificial lighting, aspects such as higher up-front costs, limited luminaire designs etc, must be accounted for.
➔ Construction method?	Not radically different from standard.
➔ Measurement of effects?	Post occupancy modelling rather than with lux metering.
➔ *(Other)*	

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***Health***
Team	***B***
Short Description	**Creating a healthy home to work, entertain, play, and nest in. That is one which provides positive conditions in which the occupants can life and thrive.**
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	Educate people on the differences between, and implications of, toxins, allergens and irritants. Also, how a healthy house is defined in terms of the comfort and control of the immediate environment.
➔ Sustainability	A healthy home is more sustainable, as it will have (intrinsically) a higher perceived value as a result of it being more comfortable and controllable, assisting the owner to flourish.
➔ Fit for purpose (quality)	Close linkage with most other benefits, such as air quality, light, resale, moisture control, function, energy, thermal, green/carbon and acoustic.
➔ Appeal	Appeal is for the longer term dweller – as health impacts are usually not realised immediately.
Vision linkages: ➔ Brand	This brand has already been taken (to some degree) by Winstone Wallboards, through the Gib Living Solutions series (Gib Dry and Gib Quiet Zones).
➔ Index/Rating	The upcoming Code of Good Practice for the Energy Efficiency of Houses can be applied. Also the Gib Living Solutions 'Noise Control Systems" guideline (July 2000).
➔ Meaning of "house" and "home"	Health appeals to the "Nest", "Retreat" and "Workplace" aspects, by providing positive conditions in which to carry out their activities.
➔ Values	
What do we already know (or not know) about these possible impacts? Think as broadly as possible eg environmental and health "footprint", build issues, marketing the NOW Home (eg communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	
➔ Research already available	Energy aspects: - BRANZ HEEP surveys, ALF and Lincoln University on thermal mass and Victoria University. IAQ aspects: BRANZ studies on humidity levels, and dust mites. Air leakage of homes, and the effect of insulation.
➔ Known research gaps	Very little on the concentrations of many pollutants or possible synergies between different pollutants and their effect on people.
➔ Solutions or systems already available	Mainly moisture and energy related, available through BRANZ (HEEP, ALF and Green Home Scheme), EECA, Winstone Wallboards, daylight programmes available off the internet.
➔ Products (or companies) that may help deal with the impacts	Natural (low VOC) paints, varnishes and glues from suppliers such as BioPaints, Central vacuum cleaners, EECA, BRANZ, Victoria University.

What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	Increase of about 10-15%.
➔ Location?	Well orientated, in terms of natural light, shelter from the prevailing winds and
➔ Timing?	
➔ Materials to be used?	Some think that the interior should be kept free of plastics and adhesives and use only solid timber, with low toxicity finishes on the surfaces, with no particle board or plywood. High levels of insulation, untreated timber where-ever possible, with a detached garage to keep car fumes from entering the house. Vents for kitchen, bathroom and laundry.
➔ Trade-offs required when there are multiple possible solutions?	
➔ Construction method?	Not radically different from standard.
➔ Measurement of effects?	Energy consumption, health of occupants (specifically related to respiratory illness), perceived comfort (many post-occupancy measures here).
➔ *(Other)*	

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***Structure***
Team	***C***
Short Description	Use of wide stud spacing, 900 mm or 1200 mm, in external walls in conjunction with 140 mm wide studs and other materials and components to suit.
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	Suggest to people that there are other ways of achieving the same or better end results.
➔ Sustainability	A reduction in material use and improvement in thermal and acoustic performance of external walls can result.
➔ Fit for purpose (quality)	Designed to meet structural requirements. Improvements in acoustic and thermal performance may be identified.
➔ Appeal	Appeal on basis of improved thermal and acoustic performance and economy of material use.
Vision linkages: ➔ Brand	Something different that performs better.
➔ Index/Rating	Assess thermal performance and ecological footprint.
➔ Meaning of "house" and "home"	Performance aspects only are relevant.
➔ Values	Sustainability.
What do we already know (or not know) about these possible impacts? Think as broadly as possible e.g. environmental and health "footprint", build issues, marketing the NOW Home (e.g. communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	
➔ Research already available	Work has been done on new stud and plate tables in NZS 3604 format to identify framing sizes required at different stud spacings.
➔ Known research gaps	Implications for selection and performance of linings, claddings, thermal and acoustic insulation systems, needs studying. Building process, fixings etc, need researching.
➔ Solutions or systems already available	Thicker linings which can span wider stud spacings are available. Similarly, cladding systems can be made to work with wider stud spacings. E.g. vertical board and batten depends on dwang spacings, not stud spacings.
➔ Products (or companies) that may help deal with the impacts	No special requirements.

What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	Should provide savings as less material and fewer components and fixings required so lower labour costs. Thicker walls mean smaller useable floor area for same over-frame plan area. Higher thermal insulation with thicker batts will cost more.
➔ Location?	NA
➔ Timing?	NA
➔ Materials to be used?	Look at all materials and components used. In particular, thermal insulation and double glazing to fully capture benefits of better insulated walls.
➔ Trade-offs required when there are multiple possible solutions?	None identified.
➔ Construction method?	Some changes may be necessary due to wider stud sizes. Will need to be identified during design process.
➔ Measurement of effects?	Multiple effects on building economy and performance will need to be identified.
➔ *(Examine other components, e.g. joinery.)*	Wider studs at wider spacings may have implications for modular design and exterior joinery for the thicker walls. Also thermal insulation products and lining and cladding systems.

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***Acoustics***
Team	***D***
Short Description	**The ability to control the noise levels in your home, and to not have to constrain your activities because others might hear. (Noise control of internal and external sound sources and acoustic privacy)**
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	Raising this issue before people buy a house makes them aware that it can be a problem, and that things can be done to mitigate the problem.
➔ Sustainability	Noise control solutions are much cheaper when installed at the construction stage, and result in a house better able to withstand increases in noise in the environment and changing noise demands of a growing/changing family. This results in less need for renovation and moving to a different house.
➔ Fit for purpose (quality)	Better noise control measures allow occupants to control the noise in their environment. Some of these same noise control measures allow people more freedom in their house by allowing them to engage in noisy activities with less concern about what people outside may think.
➔ Appeal	Being able to control noise more and knowing you have more acoustic privacy brings a better sense of sanctuary to a house, making it more appealing as a home.
Vision linkages: ➔ Brand	Caring about the customer.
➔ Index/Rating	There are ratings which look at noise levels inside a house and can relate this to customer satisfaction.
➔ Meaning of "house" and "home"	Better noise control and acoustic privacy makes the house more of a shelter or sanctuary. Also, improved noise control within the house makes it more useful as a workplace and home.
➔ Values	
What do we already know (or not know) about these possible impacts? Think as broadly as possible eg environmental and health "footprint", build issues, marketing the NOW Home (eg communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	
➔ Research already available	• Scandinavian research links noise levels within the home to customer satisfaction (percentage of customers satisfied). • Sound insulation performance of interior walls and some exterior walls.

➔ Known research gaps	• Impact sound insulation of LTF floors is a problem for low-frequency footstep sound (multi-storey building). • Low-frequency insulation of walls is not well known for LTF construction. • Providing effective, cheap, sound insulating high-flow ventilation. • Sound insulation performance of exterior walls is usually not thought of. • Amount of acoustic privacy people need (how much the building envelope needs to reduce emissions from the inside).
➔ Solutions or systems already available	• Interior walls with improved sound insulation. • Doors with improved sound insulation due to greater mass and presence of edge sealing. • Sound insulating ventilation strips for window frames. • Double glazing and laminated-glass windows. • Sound insulating ventilation bricks for mounting in walls (intended for brick walls, but could be adapted). • Noise mitigating section boundary walls. • Mounting water pipes on resilient mounts. • Quieter appliances.
➔ Products (or companies) that may help deal with the impacts	• Winstones Wallboards for interior walls and for timber flooring solutions with better impact insulation performance. • James Hardie for exterior walls. • Pilkingtons for laminated glass and double glazing. • Interlock Industries for window frames with ventilation strips. • Fergus Fricke from Sydney University for sound insulating ventilation bricks. • NZ Acoustic consultants for more ideas (Keith Ballagh from MDA, Ken McGunnigle from Prendos).
What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	Depends on the environment, but approximately 4% of total building cost for significant improvement in acoustic performance in a generally accepted figure.
➔ Location?	Obviously, the external noise at the site determines the sound insulation required.
➔ Timing?	Maybe requires slightly longer construction times.
➔ Materials to be used?	Standard materials, except for ventilation bricks
➔ Trade-offs required when there are multiple possible solutions?	Go for the simpler, more easily constructed solution.
➔ Construction method?	Implementation of acoustic solutions usually requires more careful, skilled construction.
➔ Measurement of effects?	Measure sound levels inside house at night (sleeping time), and in quiet spaces (study room). Sound levels should be less than 25dB(A) to satisfy more than 80% of people.

➔ *(Other)*	

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***Thermal efficiency & design***
Team	***D***
Short Description	**By thermally designing the house to take best advantage of free energy sources (solar, wind) and maximising the energy retention thereafter, the burden on the grid can be substantially reduced.**
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	People are already fairly aware of the need for energy efficiency, although most don't realise this is a design issue rather than a retrofit one.
➔ Sustainability	Less energy usage = less CO2 = more time available for the planet's inhabitants
➔ Fit for purpose (quality)	High-performing thermal designs encompass a lot of non-tangible benefits, although the most obvious one to give great satisfaction is the small power bill
➔ Appeal	Peace of mind, helping the planet, reducing the power bill.
Vision linkages: ➔ Brand	Innovative, in a way that compliments the "nurturing" aspect of the brand rather than "technology" – its all about hidden attributes that are subtly manifested
➔ Index/Rating	There are many means of measuring the thermal efficiency of a home, most well-proven
➔ Meaning of "house" and "home"	Warm, comfortable, economic.
➔ Values	
What do we already know (or not know) about these possible impacts? Think as broadly as possible eg environmental and health "footprint", build issues, marketing the NOW Home (eg communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	
➔ Research already available	Vast tracts on thermal design of many different housing styles, for many different communities
➔ Known research gaps	Some of the newer materials are less well-understood (phase change waxes, for instance)
➔ Solutions or systems already available	Many – super insulation, heat recovery ventilation systems, high-mass and phase change systems, double/triple glazing with insulated frames, high efficiency heat exchangers etc etc
➔ Products (or companies) that may help deal with the impacts	Many. In NZ, insulation and glazing suppliers
What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	

➔ Cost?	Going to a more efficient thermal design (as an afterthought) adds a premium for high-grade materials, but this is not always required when the primary structural design is thermally sound to begin with.
➔ Location?	For demonstration purposes, somewhere cold in winter and hot in summer. Rotorua would be better
➔ Timing?	Will probably require longer construction times, but a lot of the effort is taken up in the design phase.
➔ Materials to be used?	Standard, but used in new ways, apart from superinsulation and high-efficiency windows. Thermal mass is usually good (concrete, brick, glass block).
➔ Trade-offs required when there are multiple possible solutions?	Yes, but usually these will be cost-driven – the most economic examples will be those which are very carefully designed to eke out the best advantage from the site and surroundings
➔ Construction method?	Will probably not be standard
➔ Measurement of effects?	Must be – temperature & RH logging, and measure of the degree of extra energy required for heating or cooling.
➔ *(Other)*	

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***Moisture Control***
Team	***D***
Short Description	**Provision of a home that excludes external moisture, and manages internal moisture to provide a healthy indoor environment. Both will benefit the durability and hence sustainability of the construction.**
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	None is currently needed, as this is very high in people's consciousness due to the weathertightness crisis.
➔ Sustainability	The more durable a building is, and the less retrofit work is carried out upon it, the more sustainable the building becomes, especially if part of the external moisture management is the provision of a catchment for freshwater.
➔ Fit for purpose (quality)	This will receive huge scrutiny, and MUST be perceived to be very high quality – see "Weathertightness" above.
➔ Appeal	Again, public opinion will see to it that this is one of the most important short-term features
Vision linkages: ➔ Brand	Providing for the customer's health, and if properly implemented, wealth.
➔ Index/Rating	Currently there are very useful tools for moisture management in indoor areas, but a bombproof external moisture management solution is some way off.
➔ Meaning of "house" and "home"	This addresses on of the primary needs for a shelter – to keep the rain off, and the DVDs dry.
➔ Values	Hmmm.
What do we already know (or not know) about these possible impacts? Think as broadly as possible eg environmental and health "footprint", build issues, marketing the NOW Home (eg communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	
➔ Research already available	Not as much as would be expected, for external moisture – not directly applicable here due to low standards of industry skills and finishing, and first-cost mentality. Indoor moisture is tied up with IAQ design, and is a much more understood area.
➔ Known research gaps	Centered around moisture entry, tolerance, and disposal pathways. Also need a way to prove success.
➔ Solutions or systems already available	None – some manufacturers will claim they have the answers, but we won't know for a few years yet if they do. Traditional cladding types are less risky (weatherboards, brick, block) especially if high-risk detailing is limited (decks over rooms, parapets)
➔ Products (or companies) that may help deal with the impacts	Currently, many. Successfully deal with the problems – not sure.

What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	Cavity solutions have been estimated to add up to $1000 to the build cost of a new house
➔ Location?	Anywhere – Auckland has the biggest body of opportunity
➔ Timing?	No significant difference to status quo
➔ Materials to be used?	More durable materials in cavity systems (H3 CCA battens, stainless steel nails) and possible passive vent system for house
➔ Trade-offs required when there are multiple possible solutions?	Could be – claddings have different attributes, and if (say) masonry is chosen for thermal mass, then moisture management follows different rules than if weatherboards or fibre cement are used.
➔ Construction method?	Depends on cladding – a fibre cement cavity system is still fairly new, so some care will be needed. Otherwise nothing new.
➔ Measurement of effects?	Monitoring of ToW in walls, cavities, and temp/RH in the living spaces.
➔ *(Other)*	This could be an important issue if the weathertightness issue blows up again at launch time – the best solutions currently available look good, but are unsubstantiated for fibre cement. A strategic decision in favour of something such as brick or masonry may be needed to avoid the risk.

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***Fastenings***
Team	***C***
Short Description	Easily demountable fastening systems. Enable structural and non-structural elements to be removed and rearranged.
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	Inform people of the opportunities and advantages in building in a way that allows for future modification.
➔ Sustainability	Helps in the recycling, modification, adaptation and reuse of buildings. In the end will facilitate deconstruction.
➔ Fit for purpose (quality)	Demountable fastenings must still perform structurally. Also their appearance and cost must be acceptable.
➔ Appeal	Greater flexibility of future use of home will appeal.
Vision linkages: ➔ Brand	An adaptable and flexible house
➔ Index/Rating	?
➔ Meaning of "house" and "home"	Enables house to meet expectations of owner throughout its life by allowing easier adaptation to different requirements.
➔ Values	Adaptability
What do we already know (or not know) about these possible impacts? Think as broadly as possible eg environmental and health "footprint", build issues, marketing the NOW Home (eg communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	
➔ Research already available	Most fasteners have strength figures associated with them. There is data available on the amount of modification and repair of houses. We know that costs of modification and extension are high.
➔ Known research gaps	Some knowledge exists about removal of fasteners. E.g. withdrawal resistance of nails. Little info is available on the ability to remove fasteners throughout their life after surface finishing of the component and after corrosion has taken place during use. What adhesive fixing systems are there that are easy to deconstruct? Can heat be used to remove otherwise sound adhesives? How much modification of houses would go on if people were not deterred by costs? How much would people value the opportunity presented by a readily modified or extended house? What cost premium would they pay?

➔ Solutions or systems already available	Screws of various types and materials are available. E.g. stainless steel screws would be easier to remove because of lack of corrosion. Some screw head recesses are easier to remove than others. Duplex nails with double heads are designed for easier removal.
➔ Products (or companies) that may help deal with the impacts	Many fastening manufacture and supply companies exist. A range of adhesives is manufactured and some companies would design an adhesive to suit a particular application.
What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	May increase first cost, but reduce costs of modification, repair, deconstruction etc. Screws are being used more often and costs of both screws and power driving equipment have reduced.
➔ Location?	NA
➔ Timing?	NA
➔ Materials to be used?	Look at appropriate materials to resist corrosion in various situations. E.g. stainless for exterior, plain steel for interior. Evaluate available adhesives for their ability to be demounted.
➔ Trade-offs required when there are multiple possible solutions?	First cost versus subsequent costs. Level of finish may be affected by fastening system.
➔ Construction method?	Power driven fastening systems already available.
➔ Measurement of effects?	Ease of removal of components can be evaluated at various intervals after construction both for mechanical fasteners and glues.
➔ *(Other)*	We may choose to design NOW home for deliberate extension or modification of both internal and external layouts later in its life. We could start with a small house but it would be designed to allow for easy extension to accommodate a growing family. This could be a feature of the design.

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***Energy***
Team	***C***
Short Description	**Energy efficient design and construction elements, including thermal mass improvement for timber buildings. Use of renewable and advanced energy technologies such as solar water heaters, heat pumps, and in-ground water reservoirs for storing hot and cold energy.**
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	Focus on extending the energy benefits beyond bill savings. Educate people on "living quality" improvements in energy efficient homes. Maybe some basic education in terms of energy usage most effective savings potential, i.e. space heat: 33%, water heat 33%, other appliances: 33%. Therefore tackle space heat and water heating first. Avoid technical jargon (R-values, kWh, etc.) Informing people of the advantages of controlled thermal mass.
➔ Sustainability	Use of energy efficiency and renewable energy sources reduces the need for fossil fuel usage and thus reduces CO2 emissions, preserves natural resources and removes the main reason for going to war with Iraq. Improvement in effective thermal mass improves comfort levels and reduces heating costs.
➔ Fit for purpose (quality)	Linkage with many other benefits, namely comfort and health, but also convenience, prestige, etc. Installation workmanship is important for building envelope insulation. If future houses are disconnected from the grid, energy demand matching becomes important, i.e. what are people's tolerance levels of having cold showers if there was no sunshine for the last week ???. Thermal Mass improvements can be incorporated into most houses.
➔ Appeal	Lower power bills, but also many non-energy benefits, such as comfort and total economy improvements.
Vision linkages: ➔ Brand	I suggest to remove the focus away from the energy bill savings towards more intangible benefits, i.e. self sufficiency, ecological responsibility, health, comfort, etc.

➔ Index/Rating	There are several rating schemes around (ALF, Energy Assist, NZS4218 calculations, the new EECA rating scheme, etc.) Fundamental questions are always whether to rate o only the building o building and appliances (heating system and hot water heating o occupant behaviour o how to compare different fuel types Energy savings should be able to be measured.
➔ Meaning of "house" and "home"	Energy appeals mainly to the "NEST" aspect of houses, through providing a comfortable, affordable and healthy environment to bring up the family. Some technologies also have a PERSONALITY/CULTURE component, i.e. photovoltaic, fuel cells, etc. Comfort and economy definitely helps to develop a sense of home.
➔ Values	Responsibility for the global environment Securing a valuable living environment for our future generations, health and comfort are personal values that people would expect from their quality homes
What do we already know (or not know) about these possible impacts? Think as broadly as possible eg environmental and health "footprint", build issues, marketing the NOW Home (eg communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	
➔ Research already available	➔ HEEP results on "average" NZ houses energy use ➔ Thermal simulations and calculation software such as ALF ➔ Research results on thermal mass in buildings, basic engineering allows sums to be done. Concept may be original but implementation uses known technology.
➔ Known research gaps	➔ Field performance of newer technologies and energy generation technologies (Solar water heaters, PV, wind) ➔ Distributed generation and linkages with grid connection (although some work has been done by IRL) ➔ Main gap seems to be the understanding of non-technical barriers (financial, legal, knowledge, expertise, availability, etc.) and ways how to overcome them, i.e. marketing ➔ Performance of heat and coolth reservoirs needs to be checked out in practice. Control systems may need to be developed. Energy systems engineering analysis required.
➔ Solutions or systems already available	➔ ZALEH database has about 50 case studies, but they are not yet scientifically evaluated ➔ Overseas marketing schemes for low energy housing, in particular Europe (IAE Task 28 Sustainable Solar Housing" is developing marketing tools and will have case studies of marketing success stories.) ➔ All the systems comprising water reservoirs, plumbing, pumps, controllers, heat exchanges, solar panels, heat pumps, etc. are available off the shelf.

➔ Products (or companies) that may help deal with the impacts	➔ EECA ➔ Associations (solar industry, biomass, wind, PV, Sustainable Energy Forum, Energy Management Association) ➔ Components of the system are available from many sources.
What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	Increase of about 10% of initial capital expenditure, but long term energy savings (although I estimate that cost benefits are not commercially viable using common criteria - <3 year payback, low energy cost, no carbon charge, etc) Costs should not be high as conventional systems can be used.
➔ Location?	Some considerations regarding the micro climate will apply. In Auckland cooling and shading will be an issue. Building orientation will be affected by the location and there may be conflicting aims (nice views versus street access versus solar orientation) A flat site has been viewed as preferable.
➔ Timing?	No issues, except that energy costs may rise, so cost-benefits calculations might change in the future. Energy is in the public's mind at the moment through the Maui gas field crisis and the Iraq war.
➔ Materials to be used?	Super insulation, maybe sustainable resources (macerated paper, wool, rock-wool, wood fibre insulation). Roman could do some life cycle analysis for different materials Thermal mass for solar heat storage (Concrete!!! Oups!! No fear, it would be sufficient to have a concrete slab floor. We can still use timber walls. But the floor should be uncarpeted, i.e. tiled in some exposed places.) Solar water heating (low tech or high tech options)
➔ Trade-offs required when there are multiple possible solutions?	➔ Wall thickness for super insulation may have to be 300-400mm -> view restrictions and reduction n usable floor space ➔ maybe structural issues for solar water heater on the roof ➔ design decisions, i.e. orientation of the building, optimum window sizes, footprint of the house, thermal mass ➔ First costs with saving in energy and reaping other benefits.
➔ Construction method?	More or less standard. There is lots of reference material and guidelines, particularly from overseas. Earthmoving and plumbing. No rocket science. Careful design of building is required to maximise advantages. Heat recovery from waste hot water and air changes needs to considered in initial plan layout. Passive cooling systems (e.g. night sky radiators and evaporative coolers) for storage of coolth in cool reservoir and use during the day, need to be designed into the building.
➔ Measurement of effects?	➔ Monitoring Energy Consumption - Power (incl. wood, gas and LPG) ➔ Indoor temperature and internal climate records should reveal pros and cons of system. ➔ Occupants perceptions of value of problems and benefits

➔ *(Other)*	In-ground reservoirs may or may not be transportable depending on construction. This is a simple assembly of conventional components which should lead to a significant improvement in comfort and economy.

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***Recyclability, reuse, and waste reduction***
Team	***C***
Short Description	Selection of materials, components and fastenings for ease of recycling, reuse and reduction of waste.
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	Raise people's awareness of impact on environment of throw away society and the environmental and economic benefits accruing from careful design and use of materials.
➔ Sustainability	Reduces waste and size of environmental footprint.
➔ Fit for purpose (quality)	A feature of an eco house.
➔ Appeal	Helps to meet obligations under Agenda 21.
Vision linkages: ➔ Brand	An eco house with a small environmental footprint.
➔ Index/Rating	Assess footprint.
➔ Meaning of "house" and "home"	A low impact house could reflect lifestyle of some people but not others.
➔ Values	Sustainability.
What do we already know (or not know) about these possible impacts? Think as broadly as possible e.g. environmental and health "footprint", build issues, marketing the NOW Home (e.g. communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	
➔ Research already available	Desirability of economical use, reuse and recycling of materials and components is well known.
➔ Known research gaps	Recyclability and reuse of some components and materials will be less well known than others. Research may be required. Links to demountable fastening systems.
➔ Solutions or systems already available	Some systems for waste reduction and reuse are available but not widely used.
➔ Products (or companies) that may help deal with the impacts	Can list companies involved in waste reduction, reuse and recycling of building components and materials.
What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	May exhibit savings or increase first cost depending on system and material. Overall benefits to environment in short and long term.
➔ Location?	NA
➔ Timing?	NA

➔ Materials to be used?	Look at all materials and components used.
➔ Trade-offs required when there are multiple possible solutions?	Costs v environmental benefits may be trade-offs in some situations.
➔ Construction method?	Demountable fastenings used where possible.
➔ Measurement of effects?	Some assessment of waste reduction, reuse and recyclability may be possible.
➔ *(Use of recycled materials?)*	Perhaps we should make efforts to use recycled materials and components in the NOW House ourselves. Put our money where our mouths are. Practise what we preach etc.

NOW Home Project: Features and Benefits Analysis

Feature or Benefit	***Air quality***
Team	***C***
Short Description	Controlled ventilation via air to air heat exchangers with filters and humidity control. Combines air quality requirements with energy savings.
How does this Feature or Benefit interact with our vision elements and linkages?	
Vision elements: ➔ Education	Inform people of the benefits of climate controlled ventilation and energy savings.
➔ Sustainability	Reduces energy consumption and improves health.
➔ Fit for purpose (quality)	A quality interior climate.
➔ Appeal	Health and energy savings appeal to all.
Vision linkages: ➔ Brand	A healthy eco house.
➔ Index/Rating	Measure energy savings and air quality.
➔ Meaning of "house" and "home"	A home should be healthy and energy efficient.
➔ Values	Health, economy and CO2 reduction.
What do we already know (or not know) about these possible impacts? Think as broadly as possible eg environmental and health "footprint", build issues, marketing the NOW Home (eg communicating the benefits), lifecycle costs, existing NZ & overseas experiences, measuring benefits	
➔ Research already available	Desirable air change rate for health is known. Filtration of outside air may be necessary in some situations. E.g. pollen, dust. Energy is lost in expelling warmed or cooled air. This energy can be recovered with heat exchangers. Humidity control an additional feature.
➔ Known research gaps	Can this be done with a passive or very low energy system?
➔ Solutions or systems already available	Systems are available commercially but may require energy input for filtration and humidity control.
➔ Products (or companies) that may help deal with the impacts	HVAC companies can supply. Perhaps not made in NZ, but overseas products could be adapted to NZ conditions.
What is your best guess as to how this Feature or Benefit might ultimately be reflected in our decisions for building the NOW Home?	
➔ Cost?	Will increase first cost. Savings of energy are quantifiable. Health savings more difficult to assess. Less condensation an additional benefit. Humidifying dry air another benefit.

➔ Location?	NA
➔ Timing?	NA
➔ Materials to be used?	NA
➔ Trade-offs required when there are multiple possible solutions?	Lower cost ventilation systems such as fixed vents, will not confer advantages of energy savings nor precise control of air quality including humidity and purity.
➔ Construction method?	NA
➔ Measurement of effects?	Air quality and energy savings can be monitored.
➔ *(Other)*	

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Appendix C: Design Brief

DETAILED BRIEF FOR OLYMPIC PLACE NOW HOME

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DETAILED BRIEF FOR OLYMPIC PLACE NOW HOME

Overview

The NOW House research project is about **building houses for the post-Kyoto environment** (2012-2015), but constrained in that it can **only utilise NOW materials/ technologies** (those currently available or able to be achieved today).

The work is being conducted by Forest Research in collaboration with BRANZ, EECA, WCC, and WWB. Forest Research holds ownership of the project, which is being funded through the Foundation of Research Science and Technology under 2 contracts [contract number CO4X0215 being Research for Industry funding, Objective 2: Concept House; and FR Contract 'Value through Design' being NSOF funding].

It forms part of a larger piece of work on Sustainable Cities and the Built Environment being proposed by the Beacon Consortia over the following six years.

Project Aims

1. The NOW House project aims to research and encapsulate what we know today about best practice in meeting the needs of the next decade – the 'post-Kyoto'[23] society. Identified should be: preferred design processes, design ideas and also identifiable gaps in the knowledge.
2. The project aims also to demonstrate this via one possible built solution on a given site.
3. The built demonstration house will not be a show home, but is rather an attempt to physically represent best practice, in order to assess gaps in meeting the needs and therefore set research priorities for future housing projects.
4. While recognising the limitations of studying a single house in isolation, the project will also install adequate provision for energy, thermal, water and moisture metering (wired-house) for evaluative purposes; and study waste streams and labour processes during the construction process.
5. All system decisions will be the most appropriate for the situation with regard to the following filter elements (as described in Appendix A: Filter Elements):

[23] 'post-Kyoto' refers to the time period after the 2012 reporting period under the terms of the ratified Kyoto protocol. It indicates a time period 10-15 years hence, whereby certain societal changes have been anticipated due to both lifestyle and demographic trends and indicators, as well as the Government regulatory environment which will affect both consumers and industry players.

- ♦ Affordability (capital and running costs)
- ♦ Resource use (labour, land, transportation, sustainable and renewable materials)
- ♦ Energy efficiency (operating and embodied)
- ♦ Desirability (heritage, fashion, comfort and aspiration)
- ♦ Performance (durability, seismic, fire, wind-loading) also Future-proof (functional needs, flexible design, maintenance needs)
- ♦ Water and Waste management (minimised city-supply water usage, reuseability and/or recyclability)
- ♦ Personal Health (physiological, safety and security, peace/relaxing(mental))
- ♦ Community Health – (social cohesion, neighbourhood etc)

6. None of the above filter elements is to be regarded as any more, or any less important than any other filter element.
7. The project will reflect the Vision throughout: be inspiring & affordable (appeal), healthy and resource efficient (sustainable), smart, innovative and marketable (education) and fit for purpose for the needs of future 'post-Kyoto' society (performance).
8. House design will need to provide a 'meaningful' house to reflect NZ character and values.
9. The house is being designed with the average New Zealand family in mind. The costing is therefore something which is within reach for most (with a 10-20% deposit), but for which they will still need to save and work quite hard towards obtaining.
10. The completed construction will be finished with interior chattels such as that of a vacant possession sale, with modest exterior landscaping. Appliances to be included in chattels include an oven, a dishwasher.
11. The Now House is about building a home requiring whole house considerations in terms of Function, Light, Indoor Air Quality, Safety and Security, Cost, Warmth, Acoustics, Aesthetics, Energy Use, and Environmental friendliness. The benefits of this house will be a home that is: of higher quality, more comfortable, safer, quieter, requiring less maintenance and is more durable incurring lower monthly operating costs to support a state of complete physical mental and social well-being for its occupants.
12. Aim to use the least environmentally-damaging and resource-intensive materials.

Values:

- Setting a benchmark for best practice.
- The performance requirements are better than Code minimum.
- Make the best decisions possible given appropriate and reasonable analysis. (Remember the 80:20 rule).
- Describe your goal, how will you measure success and how will you confirm success.
- Behind every decision is a story – ensure your story is in the log.
- Making a mistake is forgivable, not trying is not forgivable.
- The best personal ethics – we do not accept personal gifts – any gifts to the project are officially notified and recorded, and included in the budget.
- All material and system decisions to be run through the decision filter.

- Unless there are strong reasons why not we use New Zealand-based biologically-derived sustainable and renewable resources.
- It is difficult that's why we have the best team.
- You CAN be SMART and INNOVATIVE within a NOW framework.

Success is?

Success	Performance indicators.
A HOUSE that sets a new "benchmark" for understanding sustainability in the framework of affordable and desirable.	▪ Detailed performance criteria with at least 90% of these criteria met. ▪ We break the mould – eco and sustainable are affordable and desirable ▪ National interest in the house is very high ▪ We achieve innovation within a NOW Framework.
A HOUSE that requires significantly less water, energy, resource to operate than a "typical" house.	▪ We achieve 60% of "typical" resource demands.
We will have created a decision framework that we can build into a powerful future tool.	▪ We have developed a baseline decision filter system. ▪ We will have developed a sustainable framework of real and meaningful value.
We will have exposed knowledge gaps.	▪ Created a log of key issues relating to buildings that are otherwise not dealt with.
Created opportunities for the future.	▪ A list of great ideas ready to be tested in retrofit or new build solutions.
We know why we have made ALL decisions.	▪ Every decision and issues affecting those decisions are documented.
We have created a platform that will set precedents for House design.	▪ Developed a system for House design ▪ Set protocols for design focussed on sustainability.
We have captured the attention of the Nation.	▪ Media exposure ▪ Web hits ▪ Demand for information.
We will achieve significant and sustained change in the thoughts, behaviour and uptake of ideas of all people effected throughout the residential value chain.	▪ Code changes and bylaws reflect project aims and outcomes ▪ People come to us as the source of best practice in residential building

SUMMARY SHEET OF PERFORMANCE SPECIFICATIONS, TARGETS AND MEASURES OF SUCCESS

NB: WE <u>MUST</u> INDICATE TARGET VALUES – (Recognising that many may be highly estimated)

Home Value	Component	Success determined by achievement of following 'A' grade performance specs:	Measurement method	Target	Justification for target (references)	Score*
Affordability	Capital cost	1.1; 1.2; 1.4; 2.1; 3.6	Total cost of construction.	$150,000	Based on market demographics	
	Operating (energy and general maintenance) costs	1.3; 3.12; 4.4; 6.2; 6.6; 7.2; 11.1; 13.7	Energy: sum monthly energy bills Maintenance: sum maintenance diary expenses for year.	Energy bills: ≤ $550/yr Maintenance: ≤ $600/yr for first 15 yr.	EECA national average figures (halved); Ian Page.	
Desirability	Ergonomics	2.3; 2.4; 2.5; 2.6; 10.1	Adherence to Standards	'Good' rating, POE review	Arbitrary	
	Aesthetics	1.3; 9.1; 13.5; 14.1; 14.2; 14.3	Post Occupancy review of occupier	'Good' rating, POE review	Arbitrary	
	Saleability (Resale)	2.6; 9.1; 13.5; 14.1; 14.2	Resale value/ Valuation	N/A	Not likely to be on-sold.	
	Useability (Functionality)	2.3; 2.6; 2.10; 3.12; 3.13; 8.1; 13.3	Post Occupancy review of occupier	'Good' rating, POE review	Arbitrary	

Home Value	Component	Success determined by achievement of following 'A' grade performance specs:	Measurement method	Target	Justification for target (references)	Score*
Performance	Structural *Earthquake, wind, loads*	3.1; 3.6	N/A	N/A	NZBC compliance	
	Fire	10.1; 10.3; 10.4	N/A	N/A	NZBC compliance	
	Thermal	6.2; 6.6; 6.8	Calculated performance using ALF to find BPI and monitoring of thermocouples (with meter-board loggers).	Indoor temp. between 18 and 25°C for all but 10 days/year.	Various (inter)national sources[24]	
	Indoor Air Quality	1.10; 5.2; 5.3; 11.1; 11.4; 11.7; 13.2	None- pollutants levels cannot be compared to normal houses, as too user/situation dependant.	No sensible targets could be established.	Various (inter)national sources[25]	
	Noise (Internal)	9.2; 9.3; 9.4	Sensor in lounge and bedroom	Quiet areas ≤ 27 dB(A). No plumbing noise.	Various international sources[2]	
	Noise (External)	9.1	Acoustic sound testing results	N/A	Uncontrollable.	
	Future proof - *Flexibility and services provision.*	2.3; 2.6; 2.10; 3,12; 3.13	(Needs to be assessed well after NOW House built)	'Good' rating at POE review	Arbitrary	

[24] See associated Multi-Criteria Decision Matrix for details
[25] See associated Multi-Criteria Decision Matrix for details

	Light	7.7; 8.1; 8.2	Post Occupancy review of occupier	'Good' rating at POE review	Occupant-dependent.	
	Durability	5.1; 5.2; 6.8; 8.4;	Maintenance and bio-deterioration - POE	'Good' rating at POE review	Arbitrary	
	Moisture	5.1; 5.2; 5.3;11.4	In-wall RH monitoring results. No targets for room ambient air RH, as too dependant on occupier.	mc in wet-area framing to be similar to general framing mc.	BRANZ studies[2].	

Home Value	Component	Success determined by achievement of following 'A' grade performance specs:	Measurement method	Target	Justification for target (references)	Score*
Personal and Community Health	Health & Safety	2.4; 5.3; 8.1; 9.1; 10.1; 10.3; 10.4; 11.4; 11.6; 11.7; 13.3	N/A	N/A	Impossible to measure.	
	Privacy	1.6; 9.1; 1.10	Post-occupancy review	'Good' rating at POE review	Arbitrary	
	Security	1.10;	Post- occupancy review	'Good' rating at POE review	Arbitrary	
	Comfort	1.3; 1.10; 6.2; 6.6; 6.8; 8.4; 9.1; 9.3; 11.1; 11.4; 11.6; 13.2; 14.3;	Post- occupancy review	'Good' rating at POE review	Arbitrary	
Resource use	Water consumption	4.6; 4.8; 4.9; 7.6; 13.8; 4.10	Monitoring of public supplied (i.e. reticulated) and toilet only	Total: $\leq$ 90 l/person daily.	WCC (Katja Lietz)	
	Energy consumption	7.2; 7.7; 8.1; 11.1; 13.3	Monitoring of meter box.	Less than 5070kWh/yr	BRANZ HEEP data, halved.	
	Embodied energy	3.12;	Calculated/estimated from final design	890 MJ/m^2 for floor/walls/roof only (for light construction)	N. Mithraratne (2001) and Andrew Alcorn (2003).	
	Land use (impact)	1.3; 13.2; 13.5; 13.7; 13.8; 13.9;	Area disturbed by development, and volume of land resources used in construction and landscaping	N/A	Targets very site-specific.	

	Water production (*grey and storm)*	4.8; 13.6	None – as too difficult to measure accurately.	N/A		
	CO_2 emissions		Derived (converted) from bought power	≤ 2650 kg CO_2/yr gas/electric mix; or ≤ 3250 kg CO_2/yr all elect. system)	Based on predicted energy use and marginal electricity CO_2 emission of 0.64kg/kWh.	
	Materials *(sustainable, renewable, non-toxic, healthy*)	3.6; 3.12;	TBA	TBA.	TBA.	
	Waste	4.4; 4.6; 13.1	Monitoring during construction phase; Volumes produced during occupancy recorded	≤ 4 m^3 in total; ≤ 5 kg/ HH/wk	REBRI, BRANZ and WasteMINZ studies[2].	

* Note that in assessment of success measures, we will endeavour to score the **completed** NOW house using internationally recognised scoring systems such as (Barbara's system) and/or the Green Home Scheme, to enable suitable comparisons to be made.

This Brief

This document provides the link between the extensive research and consultative process feeding information into the design, and the final solutions developed for the specific site in Olympic Place. A generic brief for the NOW House concept will be produced separately.

- The Performance Specification column sets out what the designer should aim to achieve, it does not state how. The bullet points indicate how success will be measured, by whom, and when.
- These individual Performance Specification are prioritised to assist the designer in making the best overall trade-offs as the design is knocked into shape.
- ***The next column provides the reasoning behind the Performance Specification and possibly links to further information to assist design.***
- The Designers Log column within the brief is included to ensure that we capture the processes behind the design decisions made. This project is unique in its team composition and approach, and so the design process including: expert input, specific resources used and rationales for final decisions, will be of great interest to the architectural and related professions. The Log is also intended to provide a mechanism for internal communication amongst the team which being large and widely spread may otherwise have inadequate understanding of the thinking behind the finished building

Notes: It has also been discussed that a check column or columns should be added to make it faster to identify at what stage the item will be checked in the design, and by whom.

For example: WCC.
Check 1 Developed design.
Check 2. POE [Post Occupancy Evaluation].

This version of the brief may be in spreadsheet form as part of a larger database.

DESIGN CONSTRAINTS

These are uncompromiseable 'Givens' that the design must adhere to:

CONSTRAINT	**REASON** *(these should all be referenced if at all possible!)*	**DESIGNER SIGN-OFF WHEN CRITERIA MET.**
Site to be that offered by WCC at Olympic Place, New Lynn. • Site specified in design and resource/building consents	Site chosen	_____ Date _____
House design must enable relocation after 2 years • Ability to relocate	Site and ownership restriction	_____ Date _____
5 m max height • Design compliance to this height restriction	Site requirement	_____ Date _____
To be designed to meet local body requirements. • WCC resource and building consent gained	The house should not get 'special treatment' from WCC.	_____ Date _____
House to be built to an NZ$150,000 budget, excluding: GST, land purchase, professional fees. • Budget estimates to be generated at concept, developed and contract document stages • Quantity Surveyors report on completion [hand over].	Reflects the local demographic data and market (from StatsNZ 2001 Census figures, collated by Strategic Group, WCC). Gives potential occupants in the area a realistic idea of what is attainable.	_____ Date _____

Adequate provision for operational monitoring as per Project Aim 4 •	Project requirement	_____ Date _____
Comply to all legal requirements and implement at least minimum standards as outlined in NZBC • Code of compliance certificate	Legal requirement	_____ Date _____
Wired house – ability to connect to services later, even if not yet provided.(Internet and Sky a must, things like security, Jetstream, other 'new and emerging' technologies need to have provision for hooking in later). • Ability to upgrade house with technology change.	Project Requirement. Need for technology enabled homes, and future provision of services. Minimise installation costs for the future. MOVE TO SITE/LOCATION?	_____ Date _____
CONSTRAINT	**REASON** *(these should all be referenced if at all possible!)*	**DESIGNER SIGN-OFF WHEN CRITERIA MET.**
Install smoke detectors in 2 areas of house, and install fire extinguisher and/or fire blanket in kitchen and garage • POE check	Fire Service recommendation	_____ Date _____
Install low-flow showerheads and taps (9 l/min or less) • POE check	Water conservation. (SAA MP 64-1995)	_____ Date _____
Incorporate ventilation methodology into design • Check final design	Innovation requirement	_____ Date _____
No use of deadlocks • Audit item at completion stage	Deadlocks are seen as an irritant and safety risk. [ref?]	

		_____ Date _____
The design should NOT incorporate an in-sink waste disposal unit • Check with final plans	Sink disposal units use much water, discourage composting and overload the sewerage system (Ref?).	_____ Date _____
Provide space in kitchen for organic collection • Provide a space of 5 litres	Reduce green houses gases, reduces waste disposal to landfill and increase the amount of nutrients on-site (Ref?).	_____ Date _____
Provide space for non-organic recycling bins (at least 2) located near (or in) the kitchen • Bin to be a combined volume of 20 litres or more.	Reduce waste to landfill; Council likely to introduce organic collection;	_____ Date _____
Provide for rainwater collection and reuse for toilets and garden use. • Detailed design to be checked, ensuring rainwater tank is pumped.	Lowers town supply water use while using natural on-site resources. Pumping rather than gravity fed so that rainwater use can be monitored.	_____ Date _____
Energy Efficiency measures to be prioritised according to HEEP findings (eg. Hot water heating high priority)	Energy efficiency measures taken need to be shown to be in most effective areas	_____ Date _____
Weathertight (as far as practicable) but breathable envelope. • monitor moisture content of frames • incidence of leaks • incidence of mould growth	4D's document (Hazleden et al.) spells out the need for various aspects for weathertightness. Need to ensure if water gets in, it can get out again –hence breathable	_____ Date _____

CONSTRAINT	**REASON** *(these should all be referenced if at all possible!)*	**DESIGNER SIGN-OFF WHEN CRITERIA MET.**
Utilise solar water heating circulation system and thermal mass storage for under-floor or preliminary water-heating.	Innovation requirement	_____ Date _____
Passive solar-panel for pre-heating of hot water • Check building consent provision	Hot water accounts for major power use in homes (ref = HEEP..?)	_____ Date _____
Passive design for heating of internal environment. allowing an ambient temperature of between 18 and 25 degrees C, for all but 10 days of the year • Number of days below 18 or above 25 degrees C from temperature measurements • Number of days where occupant took active measures to control temperature to maintain thermal comfort	Energy efficiency and comfort (Ref = WHO)	_____ Date _____
Emphasise natural lighting where possible • Ensure every room has access to natural light • Room does not require artificial lighting during 9am-4pm year-round	Natural lighting better for health, energy efficiency and productivity(ref)	_____ Date _____
Emphasis on efficient lighting where practical • Monitor energy required to run lighting	Efficient lighting reduces energy used and excess heat generated. (ref=HEEP)	_____ Date _____
Appropriate shading and protection from wind, UV and water to reduce maintenance and deterioration of assets.	Future-proof requirement, given high likelihood of intensified climatic conditions (ref).	

• Maintenance required from maintenance log • overheating		_____ Date _____
Use of only naturally sustainable and renewable (bio-based) materials in core systems and products unless it is inappropriate to do so (ie. does not meet core design brief criteria, or no bio-based products/systems currently available that meet performance needs). Use of materials with lowest toxicity and health impacts practicable, if known. • Volume of non-renewable materials used	From a range of comparative studies, biomaterials (especially wood) are recognised and well understood to be the materials of choice for sustainable buildings (esp. given they are New Zealand's only available sustainable and renewable building resource apart from wool) due to higher performance cf. other materials across a wide range of filter criteria, including: cost; seismic (Rainer, H.J. and E. Karacabeyli. 1999) and fire performance (Sultan, M.A., V.R. Kodur, L.R., Richardson and R.A. McPhee 1997), structural loadings (Tiemann, H.D. 1951.), recreational facilities, labour (simplicity of tools and recognition of system), local material availability, ability to change and upgrade systems later, ability to access services, affective qualities of natural wood finishes (Ridoutt et al.2001; Broman 1995; and Sadalla & Sheets 1993) as well as the following environmental qualities (as outlined from ASMI comparative tests by Trusty and	_____ Date _____

	Meil 1999)which included ground disturbance, embodied energy, water and air toxicity, global warming potential, resource use and waste generation.	
Use plant species compliant with WCC guidelines for area • Check with WCC Parks Dept for landscaping plant choices	WCC Parks and Ecomatters Trust requirement	_____ Date _____
Minimise impermeable areas. • % of impermeable area	Impermeable surfaces increase the amount and speed of stormwater runoff. They contribute to flooding and water contamination.	_____ Date _____
Product and material choices will be made in consultation with the appropriate expert(s) as highlighted in each section of the brief, through use of Filter in Appendix a. • Signoff of design choices relevant to each section by an appropriate named expert.	Process requirement.	_____ Date _____

Ranked Performance Specifications – A's

PS	*Rank*	**Benefit Components**	**Sustainability factors**	**Designer's Log**
1.1	***A 10+***	Capital Cost	Affordability	
3.1	***A 10+***	Structural	Performance	
6.6	***A 10+***	Thermal Operating Cost Comfort	Performance Affordability Personal & Community Health	
6.2	***A 10+***	Thermal Operating Cost Comfort	Performance Affordability Personal & Community health	
2.1	***A 10+***	Capital Cost	Affordability	
1.2	***A 10+***	Capital Cost	Affordability	
11.1	A 10	Air Quality Operating Cost Comfort Energy Consumption	Performance Affordability Personal & Community health Resource Use	
6.8	A 10	Comfort Durability Thermal Light	Personal & Community Health Performance Performance Performance	
13.3	A 10	Energy Consumption Health & Safety	Resource Use Personal & Community health	
13.9	A 10	Land use	Resource use	
13.8	A 9	Land use Water Consumption	Resource use	
4.8	A 9	Water Consumption Water Production	Resource Use Resource Use	
1.3	A 9	Land Use Ambience Comfort Operating Cost	Resource Use Desirability Personal & Community Health Affordability	
5.1	A 9	Moisture	Performance	

		Health and Safety Durability	Personal & Community Health Performance	
13.5	A 9	Land Use Ambience Saleability	Resource Use Desirability Desirability	
13.2	A 9	Land Use Comfort Air	Resource Use Desirability Performance	
5.2	A 9	Moisture Durability Air	Performance Performance Performance	
4.9	A 9	Water consumption	Resource Use	
1.4	A 9	Capital Cost	Affordability	
7.2	A 9	Energy Consumption Operating Cost	Resource Use Affordability	
13.7	A 8	Land use Operating Cost	Resource Use Affordability	
7.6	A 8	Water Consumption	Resource Use	
13.1	A 8	Waste	Resource Use	
9.1	A 8	Noise Comfort Health & Safety Privacy Ambience Saleability	Performance Personal & Community Health Personal & Community Health Personal & Community Health Desirability Desirability	
8.1	A 8	Light Health & Safety Useability Energy Consumption	Performance Personal & Community Health Desirability Resource Use	
10.1	A 8	Ergonomics Health & Safety Fire	Desirability Personal & Community Health Performance	
7.7	A 8	Light Energy Consumption	Performance Resource Use	
11.7	***A 8***	***Health and Safety***	***Personal & Community Health***	

		Air	***Performance***	
1.10	A 7	Privacy Air Comfort Security	Personal & Community Health Performance Personal & Community Health Personal & Community Health	
8.4	A 7	Comfort Light Durability	Personal & Community Health Performance Performance	
4.6	A 7	Water Consumption Waste	Resource Use Resource Use	
2.6	A 7	Saleability Useability Ergonomics Future proof	Desirability Desirability Desirability Performance	
13.6	A 6	Water Production	Resource Use	
9.3	A 6	Noise Comfort	Performance Desirability	
2.10	A 6	Future Proof Useability	Performance Desirability	
3.12	A 6	Useability Operating cost Future proof Materials Embodied Energy	Desirability Affordability Performance Resource use Resource use	
10.4	A 6	Fire Health & Safety	Performance Personal & Community Health	
11.6	***A 6***	***Health and Safety*** ***Comfort***	***Personal & Community Health*** ***Personal & Community Health***	
1.6	A 6	Privacy	***Personal & Community Health***	
14.3	A 5	Ambience Comfort	Desirability Personal & Community Health	
11.4	A 5	Air Moisture Health & Safety Comfort	Performance Performance Personal & Community Health Personal & Community Health	

3.6	A 5	Capital Cost Materials Structure	Affordability Resource Use Performance	
5.3	A 5	Health and Safety Moisture Air	Personal and Community Health Performance Performance	
4.4	A 5	Operating Cost Waste	Affordability Resource Use	
2.4	A 5	***Ergonomics*** ***Health & Safety***	***Desirability*** ***Personal & Community Health***	
14.2	A 4	Ambience Saleability	Desirability Desirability	
3.13	A 4	Useability Future proof	Desirability Performance	
4.5	A 3	Waste	Resource use	
10.3	A 3	Fire Health & Safety	Performance Personal & Community Health	
2.3	A 3	***Ergonomics*** ***Useability*** ***Future proof***	***Desirability*** ***Desirability*** ***Performance***	
14.1	A 2	***Ambience*** ***Saleability***	***Desirability*** ***Desirability***	
2.5	A 2	Ergonomics	Desirability	

TRADE-OFFS:

*(NB – In deciding trade-offs, the ranking system is to be used in conjunction with the Summary of Performance Specifications sheet on pages 8&9. The goal of the design team is to incorporate **all** benefit components, in major or minor ways. Some of the above specifications have multiple benefits, which means a tradeoff can be made with another performance spec with just the one benefit, as it will still achieve the benefit in some way, so long as the relative ranking is also taken into account. - KMB)*

1. SITE INCLUDING SECURITY AND PRIVACY - KATJA

Goals – *Provide a safe and secure area, with residential 'peace of mind', to keep safe most precious things – family and assets*
– *Balancing exposure and seclusion to give both inter- and intra- house privacy.*

	Performance Specifications and • **measures**	**Priority**	**Reasoning behind performance specifications** See Katja Lietz, WCC; Charles McIntosh and Karen Bayne, FR	**Designers Log**
1.1	Site to be that offered by WCC at Olympic Place, New Lynn.	***A 10+***		
1.2	To be designed to meet local body requirements.	***A 10+***	The house should not get 'special treatment' from WCC.	
1.3	Ensure optimal siting and design, through determining regional climate, site micro-climate, solar access, views, average temperatures, daily variations and seasonal wind directions, velocity and frequencies, for both today and likely future increases. • Site environmental presentation sheet for public display produced explaining how the above site characteristics influence design.	A 9	Siting determines wind, water, UV etc. loadings, and the required claddings/ eaves, protective coatings. Designing for local climate conditions maximises thermal performance.	
1.4	5m height max	A 9	Waitakere City Council have a 5 metre height restriction on the site. [This would incline us towards specifying a single storey house, or a single storey + basement -contingent on ground-site suitability]	
1.5	Section obtained to be sized similarly to similarly priced houses in that area	B	Must have face validity with local visitors. Should not have an unrealistic amount of space to spread out it.	
1.6	Ensure house is sited and designed so as not to compromise resident or neighbour privacy. • Balance between public, open areas and private, intimate areas • A well defined main entrance, this should be clearly visible from the road, but should not be in direct siughtline with the living area.	A 6	For personal and surrounding privacy	

	• Access to toilet and kitchen is possible without passing through public areas.			
1.7	Provide a variety of spatial experiences • User trials using visualisation via 3D modelling	B	Using odd shaped areas and different ceiling heights can create different moods – intimate or public.	
	Security			
1.8	Emphasis on passive security through design Occupants feel safe • Street facing side of house is open and visible, without impinging on privacy • No solid fences	B	Good design can result in increased security without the need for active security systems.	
1.9	No use of deadlocks • Audit item at completion stage	B		
1.10	Use security vents, screens, passive ventilation for windows. • Audit item at completion stage	A 7		
1.11	Outdoor security lighting with motion sensors or solar garden lights should be utilised • Audit item at completion stage	B	Outside lighting when dark, simple security feature	

2. ACCOMMODATION - DAVE

Goals - Meet needs, and key wants and expectations of target population.

- House should be designed from the outset with approachibility, accessibility and useability in mind.

	Performance Specifications and • **measures**	**Priority**	**Reasoning behind performance specifications** See Susan Bates, FR and Annika Lane WCC - demographics, usage trends and needs Dave Moore, FR - safety and layout for good function	**Designers Log**
2.1	House to be built to an NZ$165,000 budget*, excluding: GST, land purchase, professional fees. • Budget estimates to be generated at concept, developed and contract document stages • Quantity Surveyors report on completion [hand over].	A 10+	Reflects the local demographic data and market. Gives potential occupants in the area a realistic idea of what is attainable.	
2.2	Total running costs including cleaning materials to be significantly better than the local average for affordability. • Provide occupants with a log for recording detailed costs and check annually against a control group within WCC.	B	An intrinsic part of a sustainable approach. Any comparable studies of this type already in progress or planned?……anyone know ?	
2.3	The following guidelines and Standards to be adhered to: 1. BRANZ. (2001) Homes without Barriers. 2. Royal New Zealand Foundation for the Blind. Design guide information @ http://www.rnzfb.org.nz/Environmental/domestic_design.html Independent checks to be made by a Barrier Free Trust accredited auditor or ergonomist: • At concept, developed design, working drawings and practical completion stages and • when relevant changes are made to the design	A 3	***House should be designed from the word go with approachibility, accessibility and useability in mind. It should permeate our thinking with regard to all the design features, not simply be add ons or afterthoughts. The design should draw upon available researched understanding to extend the useful life of the design for given occupants as their circumstances change. For example the arrival of children or age-related degeneration.***	

	during the construction process .			
2.4	The following Standard to be adhered to: Standard NZS 4102: (1996) Safer house design (guidelines to reduce injury at home). Independent checks to be made by an injury prevention specialist (IPS) at: • concept, developed design, working drawings and practical completion stages. • when relevant changes are made to the design during the construction process .	A 5	***To incorporate knowledge about aetiology of domestic injuries, in particular slips/trips/falls into the design process.***	
2.5	***Public space and building surroundings to be designed in accordance with:*** 1. Standard NZS 4121(2001) Design for access and mobility: buildings and associated facilities. 3. Barrier Free (NZ) Trust (2002). Resource handbook for barrier-free environments. In order that human and goods accessibility is optimised. Independent checks to be made by a Barrier Free Trust accredited auditor or ergonomist: • At concept, developed design, working drawings and practical completion stages and • when relevant changes are made to the design during the construction process .	A 2	These documents cover non-domestic buildings and the spaces between. Design to at least NZS 4121 standard ensures compliance with Code. The BFT Resource handbook includes a useful checklist and bacjground information. The guidelines also assist with ensuring that	
2.6	Target market to be people looking for a 3 bedroom house in the New Lynn area. Design to reflect local population of mixed ethnic and familial circumstances through provision of: a variety of possible sleeping arrangements as numbers expand and contract, and food preparation facilities that expand by utilising covered outdoor areas to cater for extended families and larger groupings if required. The house to demonstrate means of extending the useful life of the design for given occupants as their circumstances	A 7	The place is likely to be occupied by a WCC parks department employee and family for the first two years. Design flexibility is viewed as a core criteria for future housing. For a house built to a tight budget, the maximisation of the use of extensive outdoor space [decks are one-tenth the cost of internal space] is essential. In Auckland a well placed deck is probably the most intensively used room in the house	

	change, providing different uses of spaces over time with minimal retrofitting. To be checked against the following scenarios: • Family with active three children under five • Household with a member needing bedrest for several months • Christmas - with a trebling of people staying for three days • Blended family at a weekend with two adults and five children from three different relationships under the same roof • WCCs and ergonomist to check design at each iteration.		by children. WCC Demographics data see: Household Composition and Family Type.xls	
2.7	House to be suitable to fit in with the longer term WCC and Ecomatters Trust cluster plans for the area. Specifically, main living space to have capacity for expansion into covered, less covered and open areas. Decks, courtyards, drive etc. To provide facility for up to 35 people to be addressed from the house in good weather. • WCC to check and sign off at each iteration • (Dependent on Marketing Plan)	B	The building is likely to be hub of the educational function of the cluster. As a cluster of buildings and other project facilities with a common focus, there will be an increasing need for a gathering and focal point for visitors. This need not be entirely indoors, but would ideally have the facility for at least small groups to be catered for in poor weather. Contact Iris at WCC via Annika for more detail as cluster, and New Lynn redesign plans evolve.	
2.8	Personal security to be optimised in accordance with guidelines from WCC publication Crime Prevention through Environmental Design • Check by WCC at developed design completion.	C	Cheap deterrent ideas such as scrunchy gravel around path nearest house to track movement of visitors/intruders better than reliance solely on expensive active systems. Contact Annika Lane at WCC and Rachel Hargreaves at BRANZ.	
2.10	Wired house – ability to connect to services later, even if not yet provided.(internet and Sky a must, things like security, Jetstream, other 'new and emerging'	A 6	Need for technology enabled homes, and future provision of services. Minimise installation costs for the future.	

	technologies need to have provision for hooking in later). • Ability to upgrade house with technology change.			
2.11	Adequate corridor and door space available for moving furniture in/out and around the home. • POE check when tenant takes possesion	B	Future-proofing requirement. Anecdotal evidences that older homes do not have adequate room for installing newer, larger items of furniture (esp. entertainment centres, queensize beds and lounge suites) with ease. Expectations that people will continue to have shorter term tenancies.	

*** WITHIN THE $165,000 IS A $15,000 MARGIN FOR CAPITAL ITEMS AND SYSTEMS WHICH GIVE LONG-TERM OPERATIONAL BENEFITS**

STRUCTURE AND MATERIALS - *LOUW*

Goals – *Preventing loss of value in the physical asset, and protecting people who live in it from natural elements.*
- Best structural integrity for LCA of manufactured components, time to construct and use of resources.

	Performance Specifications and • **measures**	**Priority**	**Reasoning behind performance specifications** See Mike Collins or Bryan Walford, FR	**Designers Log**
3.1	Structural performance specifications are spelt out in NZBC. • Adherence to letter and spirit of NZBC • Building consent and compliance certificate	A 10 +	NZBC compliance required	
3.2	Prefabrication and modular design of core elements and fixing systems is preferential to reduce construction time. • Ease of construction, construction time and tools required	B	Short construction time, ease of modification to system, and	
3.4	Explore the merits of alternative stud spacing/lining material combinations. Incorporate a redesigned timber framed wall of lower grade timber material. • 150x40mm studs, with 900mm centres will improve thermal efficiency. • Check Building Consent compliance	B	Ability to increase thermal and acoustic properties, and use lower grades of timber for similar structural performance. Ability to utilise New Zealand's largest biological building product to greater advantage. Thinner studs reduces thermal bridging	
3.5	Roof needs to be supported in such a way as to maximise open plan living space, and also allow all internal walls to be non-loadbearing. • No. of load-bearing walls	B	Design flexibility for future layout.	
3.6	Design Roof truss support system to make best use of timber grades available from the forest resource. • Design incorporates optimised grade mix for loading requirements	A 5	Ability to use existing wood resource more effectively, and reduce building costs.	
3.7	Use of large solid beams or columns in the architectural design, which may be used as structural elements.	B	People want open plan space requiring beams or columns.	

	• Open plan space incorporated			
3.10	Flooring if sheet material used to be screwed to joist, and to incorporate I-Beams and double-sided tape to reduce squeaking.	B	Although gluing to joists eliminates squeaking, deconstruction in future means this makes it difficult to reuse floor elements. I-Beams have more consistent dimensions, and are stiffer, thus reducing deflection.	
3.11	Floors in sensitive acoustic zones to have shorter span joists to reduce deflections.	B	Short spans reduce sagging.	
3.12	Use lowest maintenance materials and systems; and future-proof for easy maintenance • Core maintenance time spent on house cf. average in area over time	A 6	People have less time available (and spend less money) to undertake maintenance and subsequently much maintenance is not being undertaken adequately.	
3.13	Provide easy access for piping and electrical services piping for upgrading / maintaining etc. through structural but non-permanent fixtures.	A 4	Need to keep design flexibility and future wiring upgrades in mind.	

4. WASTE MANAGEMENT - ROMAN

Goal - ***minimise liquid and material wastes from construction, habitation and demolition stages as much as possible.***

	Performance Specifications and • **measures**	**Priority**	**Reasoning behind performance specifications** See Katja Lietz, WCC and Roman Jaques, BRANZ	**Designers Log**
4.1	Ease reuse/recycling of the house by increasing the de-constructional potential. Preference for demountable, non-composite, screwed-in, high quality materials and components • Assess at detailed design stage	C	Making a building easier to deconstruct increases the chance of it being recycled.	
4.2	Reduce construction off cuts and allow for ease of reuse and recycling, by having rooms based on standard sheet sizes, separating construction wastes for collection and should be 4 cubic metres or less uncompacted. • measure construction waste going to recycled (overall volume or weight)	B	Reduce environmental stress on planet by being more resource efficient. WCC in association with REBRI and BRANZ can do this.	
4.3	Use recycled materials where possible, provided performance and other factors are not compromised • Volume of recycled materials used catalogued,	B	Reducing construction waste destined to landfill.	
4.4	Provide space in kitchen for organic collection • Provide a space of 5 litres	A 5	Reduce green houses gases and increase the amount of nutrients on-site.	
4.5	Provide space for non-organic recycling bins (at least 2) located near (or in) the kitchen • Bin to be a combined volume of 20 litres or more.	A 3	Reduce waste to landfill; Council likely to introduce organic collection;	
4.6	The design should NOT incorporate an in-sink waste disposal unit • Check with final plans	A 7	Sink disposal units use much water, discourage composting and overload the sewerage system.	
4.7	The design should provide for grey water reuse for garden and flush-toilet uses. • Volumes re-used	C	Lower water usage from council supply, reduces waste water generation. However, this is practically difficult to do.	

4.8	Provide for rainwater collection and reuse for toilets and garden use • Detailed design to be checked ensuring that tank water as well as total town supply water is monitored.	A 9	Lowers town supply water use while using natural on-site resources	
4.9	Incorporate dual flush toilets with low water consumption	A 9	Water use reduction, and less treatment and pollution of water ways.	

5. MOISTURE CONTROL –CHRIS

Goal - *The provision of a home that excludes external moisture, and manages internal moisture to provide a healthy indoor environment.*

	Performance Specifications and • **measures**	**Priority**	**Reasoning behind performance specifications** See Chris Kane, BRANZ	**Designers Log**
5.1	Examining the building envelope: • monitor moisture content of frames • monitor incidence of leaks • ***monitor incidence of mould growth***	A 9	Moisture ingress has implications for health and well-being of the occupants as well as the durability and structural integrity of the building materials.	
5.2	To control indoor moisture, give attention to: heating, ventilation, insulation and moisture release rate. Design must achieve this as passively and as energy efficiently as possible. • See Thermal section	A 9	Require minimal condensation to prevent mould growth and material degradation. See NZBC E3.	
5.3	Layout vents so that moisture-generating appliances addressed through passive ventilation.	A 5	To avoid condensation.	

6. THERMAL – ALBRECHT

Goal - *Achieve comfortable ambient living conditions throughout the changing seasons through minimal non-passive means.*

	Performance Specifications and measures	**Priority**	**Reasoning behind performance specifications** See Albrecht, BRANZ and Mike Collins, FR	**Designers Log**
6.1	Sustainable solar design is based on three principles ranked in order of importance: - Insulation (incl. advanced glazing) - Solar gains through optimum window sizes and orientations - Thermal mass for heat storage and overheating protection Maximise use of passive solar heating and cooling. Layout of rooms and windows in context of living patterns throughout the day. Incorporate shading through fixed overhangs, movable awnings and vegetation to prevent overheating		Reduction of GHG emissions (Post Kyoto House!!!) and reduced dependency on depletable fuels.	
6.2	Passive design for heating of internal environment, allowing an ambient temperature of between 18 and 25^{o}C for all but 10 days of the year. This is to be achieved through the use of thermal mass, insulation and glazing. • Number of days below 18 or above 25^{o}C from temperature measurements • Number of days where occupant took active measures to control temperature to maintain thermal comfort Insulation (Recommended R-values are generic and may vary slightly with product choice):	A 10+	Energy efficiency. Improve comfort and health of occupants. Reduce energy bills.	

	Recommended R-Values: Walls: total installed R-value R3.4 Roof: total installed R-value R5.2 Floor: total installed R-value R4.4 (or equivalent BPI using ALF) **Thermal Mass:** Insulate slab on ground floor, which in solar exposed areas is tiled or polished i.e. NOT covered in carpet. Use thermal simulation to optimise design and ALF to confirm BPI for reference purposes.			
6.6	*Means of Heating:* ***In warm climate zones (i.e. Auckland), the home does not require in-built heating.*** ***In cool climate zones options include:*** ***- heat-pumps: COP of 2-3 but expensive and uses high-grade energy (electricity)*** ***- solid fuel heating: no net CO_2 emissions, potential wetback combination, renewable local fuel source*** ***- This sections refers to the type of heater used and is measured in CO_2 output generated by the heater.***	A 10+ A 10+	Reduction of GHG emissions Comfort improvements	
6.7	**Heater capacity:** Minimise heater capacity required to maintain comfort levels. - This section refers to the SIZE of heater required and is measured by the CAPACITY of the heater	B	The objective is achieved by the same means as the heating energy reduction (insulation, solar gains and thermal mass), because good solar design results in smaller equipment requirements.	
6.8	**Shading:** Use appropriate shading of façade to avoid overheating during summer while still allowing winter sun to heat house. Avoid excessive East and West facing windows, apply overhangs for North facing windows. - This section refers to the COMFORT of the occupant and can be measured using comfort graphs	A 8	Achieve a naturally comfortable home, i.e. no equipment is necessary to provide a comfortable living environment. Part of general rules of passive design	

7. ENERGY – ALBRECHT

Goal - *Energy efficiency is a major Post-Kyoto aim - reduce overall non-renewable energy consumption, while increasing the benefits from energy use for same units generated*

	Performance Specifications and • **measures**	**Priority**	**Reasoning behind performance specifications** See Albrecht Stoecklein, BRANZ and Mike Collins, FR	**Designers Log**
7.1	Preamble: Energy consumption in New Zealand houses is generally allocated to equal parts to • Space heating (climate dependent) • Hot water heating (of these on average 40% are standing losses) • Other (appliances, lighting, etc.)		*Albrecht's document spells out the main justifiable reasons for the energy requirements in this brief.*	
7.2	Specify solar hot water heating • This section refers to the AMOUNT of ENERGY used for heating hot water and is measured in kWh • The Solar Industries Assn. is currently developing a tender document template, which can be used in specifying the individual product.	A 9	Free energy for hot water heating	
7.3	Install HW cylinder close to uses to minimise pipe runs and inside the house to utilise heat losses for space heat. •	B	Hot water is one of main energy drain on households.	
7.4	Insulate vent pipe and frequently used hot water pipes •	B	Hot water is one of main energy drain on households.	
7.5	Consider hot water heat recovery systems such as GFX. The benefits will however have to be balanced with the increased building/plumbing complexity. • This section refers to the AMOUNT of heat recovered and is measured in Joules(?)	B	If heat is recovered from space or water heating, then less energy is required to get spaces and water to higher temperature	
7.6	Install low flow shower heads. • POE	A 8	To reduce water consumption	

7.7	Specify use of compact fluorescent with energy efficient ballasts for all artificial lighting. • This section is concerned with the NUMBER of LUMINAIRES in a lighting design scheme with uses high efficiency lighting options and can be measured by the % of artificial lighting which uses these options	A 8	Energy efficient, longer-lasting	Scale: 10 = 100% CF with HE ballasts 4 = 50% CF with HE ballasts
7.8	Appliances should be chosen based on their energy label ratings as well as on their appropriateness. Choose only appliances with 4 ★ or more •	B	Using less energy to run for similar task	
7.9	Embodied energy of house designs to be calculated and life cycle costs of materials including 50 year energy use to be outlined. • This section refers to the AMOUNT of ENERY required to produce the materials that make up the building as well as the energy required to operate the house and can be measured in MJ.	C	The embodied energy of materials has a direct impact on the environment	

8. LIGHT – ROMAN

Goal – *providing effective and efficient lighting to enable functions in specified areas*

	Performance Specifications and measures	**Priority**	**Reasoning behind performance specifications** See Roman Jaques, BRANZ	**Designers Log**
8.1	Emphasise natural lighting where possible • Ensure every room has access to natural light • Room should not require artificial lighting during 9am-4pm year-round • Measure number of days where artificial lighting used outside daylight hours.	A 8	Natural lighting better for health, energy efficiency and productivity, however, overcast days in winter may require additional light sources.	
8.3	Differentiate between task and general lighting and generally provide good visual performance (e.g. contrast, luminance, and colour rendering). • Plan checked at detailed design stage, examining all the critical living areas	B	Different activities need different lighting conditions. Soft/passive lighting suits most areas, however some tasks require more concentrated (usually artificial) lighting.	
8.4	Provide suitable shading controls for westerly windows (especially for kitchen/living and study areas) to control for glare/overheating • Plan checked at developed design stage as well as at POE. See *Thermal* and *Energy* sections.	A 7	Demanding visual work and living areas needs to be glare-controlled. Preventing overheating and fittings and furniture damage from UV in summer.	
8.5	Any compact fluorescent lamps (CFL's) provided need to be well colour rendered with electronic ballasts ♦ Check specs on lamp	B	Need to ensure that the desired colouring is achieved in a particular space.	
8.6	***Few or no recessed light cans in insulated ceilings unless they are insulation contact rated.*** • ***Check plan***	B	Need to ensure that thermal bridges are minimised.	

9. ACOUSTICS – JO

Goal - *Control noise levels in the home so that internal and external sounds do not impinge on activities*

	Performance Specifications and measures	Priority	Reasoning behind performance specifications See Grant Emms, FR	Designers Log
9.1	**External Noise** • Control intrusion of external noise into house by selection of appropriate external envelope systems including walls, windows, doors, and roof. (warning can be expensive i.e. double glazing/laminated glass) • Site house and use landscaping to reduce external noise penetration into living areas of house even when windows/doors open to outside living areas. (Bedrooms should still have level of quiet) • Provide landscaping (fences, vegetation, barriers) to reduce noise to outside living areas. • Provide ventilation systems which allow adequate ventilation without severe acoustic compromises Measure **Living Areas** – $L_{A,eq}$ over 24 hours should be less than 30dB(A) **Bedrooms/Study's -** $L_{A,eq}$ over 24 hours should be less than 27dB (A) **Wet Area's** (Bathrooms/ensuites/laundries) $L_{A,eq}$ over 24 hours should be less than 40dB(A) for both intermittent and continuous noises. **Outdoor Living/Living with Doors or Windows open-** should be less than 40 dB(A) at times they are likely to be used. **Ventilation** -A fully open bedroom ventilation system should not increase the noise levels in the room by more than 1dB. (Strip vents in windows should achieve this).	A 8	We can't control the noise being made outside the home in the same way we can control internal noise sources if needed. The external envelope is critical to achieving an acceptable level of peace and quiet that is beneficial to the health of the homes occupants. There should also be a liveable area of the house, which can have it's windows open without undue noise intrusion A passive venting system should not allow significant external noise penetration, but should be present so that occupants don't have to open windows to get enough air (especially when sleeping)	

	Building Elements - Use $R'_w+C_{tr,50-2500}$ ratings for building envelope elements (Walls, windows, doors). Monitoring – Plan for measuring Daytime Background noise levels prior to construction (Marshall Day??) Monitoring with sensors Daytime background noise level in living area once occupied(price to come). Hard to measure background levels once occupied, may be better to measure them unoccupied.			
9.2	**Internal Noise** • Arrange rooms so that quiet areas are separated from noisy areas. • Provide Internal Walls Systems to reduce noise transmission from living areas into Bedrooms and other quiet areas such as a study • Identify noise sources and the most noise sensitive living areas. Strategic layout of the plan to optimise acoustic separation and minimise impact of road noise. Measure Bedroom and quiet areas should remain at less than 27 dB(A) even when other activities are taking place in the home, wall structures to these rooms should have an acoustic rating of at least $R'_w = 45$ Monitoring Sensor measuring dB level in at least one bedroom adjoining/closest to living areas. (Can be incorporated with Plumbing Noise)	B	With large families especially with young children to allow for quiet areas and all times even when various other activities are taking place throughout the home. Many health problems are being associated with disruption of sleep Juxtaposition of noisy and noise sensitive areas on plan will increase building costs to achieve required levels - if levels are achievable at all.	
9.3	**Plumbing** No Audible plumbing Noise. Monitoring – Sensor Measure dB(A) level in adjoining	A 6	Plumbing Noise can be distracting and disturbing particularly at night and is easily solved.	

	room from source i.e. level in Master Bedroom from Ensuite/Toilet ($$ to come)			
9.4	**Internal Impact Noise – 2 Level Homes** Provide a mid-floor system in the home so that noise levels are kept at required levels at times of impact. Measure Floor structure should have an acoustic rating of $L'_{n,w} + C_I < 50$ dB for both vertical and horizontal transmission into quiet areas.	B	Footfall noise is often a source of annoyance in any home. Reduce impact sound transmitted from trafficked areas into quiet habitable spaces.	
9.5	**Appliances.** Select low-noise level appliances in the home so as not to affect required levels stated previously. Locate appliances away from walls backing ono quiet zones.	B	Reduces the overall house noise levels	

10. FIRE - *CHRIS*

Goal – *Prevent, minimise risk and contain fires where possible*

	Performance Specifications and measures	**Priority**	**Reasoning behind performance specifications** See Colleen Wade, or Chris Kane, BRANZ	**Designers Log**
10.1	Design the layout to provide two exit routes in case of fire from each space. Escape route plan in place, and drill confirms do-ability. Check at developed design	A 8	Need to get family including elderly members to safety.	
10.2	Use materials which limit fire spread where possible Volume (or %) of non-flammable materials used. Check at working drawing and completion audit stages.	B	Flammability risk, and preventing flamespread.	
10.3	A built-in sprinkler system be plumbed in as well as hard wired (and linked) smoke detector system which is properly positioned Working smoke alarms positioned in key areas checked at completion audit. Sprinkler system fitted checked at completion audit. • Explore payback period	A 3	Fire Service advocate of smoke alarms in every house. Sprinkler system cost now a safer and viable option for residential	
10.4	Install a fire blanket and/or fire extinguisher in the kitchen or garage Checked at completion audit	A 6	High risk of fire from cooking Kitchen and Garage recognised as two prime fire-start areas	
10.5	Provision for an emergency supplies/protection of important records cupboard or safe. Check at completion audit.	B	Civil Defence emergency risk, and protection of valuable/ irreplaceable items	

11. AIR QUALITY – ROMAN

Goals - Achieve desirable air change rates with minimal energy and pollutant in ambient air, in recognition that air quality is a vital aspect of good living conditions.

	Performance Specifications and • **measures**	**Priority**	**Reasoning behind performance specifications** See Roman Jaques -BRANZ	**Designers Log**
11.1	***No high-tech HVAC or ventilation heat recovery solutions. Simple, low-tech solutions i.e. passive vents, etc.*** • ***Percentage passive control of air circulation cf. active control*** • ***Use BRANZ Vent checksheet to determine best methodology for passive venting (see 11.4).***	A 10	High-tech HVAC is not traditional in NZ houses, and also often energy intensive and intrusive. HVAC systems are occasionally unreliable and require occupant education, maintenance etc.	
11.2	Products used in the house should be chosen for low toxicity including VOC's, particularly from flooring material, wood based furniture, paints, glues and sealants, carpets and also products used for cleaning need to be addressed under occupant behaviour. • Reduce VOC emissions	B	VOC's are known to cause negative health effects. See Paragon quote re monitoring.	
11.3	Limiting potential harm from EMF's. • Monitor EMF emissions levels on site prior to construction (as transmission towers nearby) • Ensure that switchboard is not within a 4 metre direct line of where people are for prolonged periods (e.g. bed)	C	EMF's are perceived/believed to cause negative health impacts, from mild headaches to cancer, with no scientific consensus view on their risk.	
11.4	Air should be kept at an appropriate RH level through passive means for comfort and to prevent bio-contaminant problems • Control RH and temperature of ambient air (see Thermal and Moisture sections). For living areas a comfortable range is between 40-60% RH, for bedrooms range is 40-70% RH. • Minimise mould growth/ spore presence	A 5	***An important air quality problem in residential buildings is generally bio contaminants (mould, mildew, dust mites, bacteria).*** ***BRANZ are in the final stages of developing BRANZ Vent (it is undergoing a technical audit), this helps in identifying air change rates etc in conjunction with the changes to E3.***	
11.6	Minimise irritants such as dust and pollen	A 6		

11.7	Any garage detached from house or cross-vented	A 8		

12. HEALTH – JO

Goal –*enhancing general wellbeing, by providing positive conditions in which occupants thrive.*

	Performance Specifications and • **measures**	**Priority**	**Reasoning behind performance specifications** See Jo Duggan, WWB, - general. Roman Jaques, materials toxicity and air quality. Charles McIntosh, Composite boards and paint/glue VOCs.	**Designers Log**
11	**Indoor Air Quality** Performance covered under Air Quality and Moisture Control Sections		Indoor Air Quality is important to Human Health because we spend as much as 80% of our time indoors. The cost to the country in terms of Asthma alone are estimated to be at least $825 million a year and Asthma has a significant impact on sufferers quality if life. The causes of asthma has been linked to House dust Mites and the indoor living environment. The EPA states that 50% of illness is either caused or aggravated by indoor air pollution.	
6	**Thermal** Performance covered under Thermal Section		New Zealand Houses are frequently below 14 degrees Celsius and occasionally below 10 degrees which is well below the WHO recommendation of 16 ^{o}C . New Zealand has a higher winter mortality rate than other western nations with much harsher winters such as Sweden.	
11 & 5	**Moisture Control & Ventilation** Performance covered under Air Quality and Moisture Control Sections		There are a number of articles showing the toxicity and unhealthy levels of current homes due to the presence of moulds, use of cleaners, and lack of	

			appropriate layout for safety, and moisture control and ventilation. Require adequate fresh air changes. HVAC systems suspected (known?) to increase risk of airborne viral colds/ flus.	
9	**Acoustics** Performance covered under Acoustics section		Noise can affect people physically, psychologically and socially. Noise affects everyone and has an impact on the environment equal to other forms of pollution.	
1 & 2	Safety and Security Performance covered under Site and Accommodation sections		Reduce accidents in the home	

13. LANDSCAPING – KATJA

Goal – *Provide aesthetic and functional qualities to house design, which improve the value and living ability of the outdoor environment*

	Performance Specifications and • **measures**	**Priority**	**Reasoning behind performance specifications** See Katja Lietz, WCC	**Designers Log**
13.1	Provide space in garden of at least 1 m^3 for composting of organics	A 8	Encourages and allows composting, as tenants are collecting organics wastes	
13.2	Planting to complement the climate control of the house	A 9	Wind and sun protection, shading and beautification	
13.3	Provision for laundry to be dried outside in a sheltered (and private) area. Provision of indoor drying rack or line for wet days • Ceiling hoist or under-verandah lines • Outdoor clothesline in private position	A 10	Reduced energy from dryer appliance Bacteria killed from UV light–healthy option (+ Kiwi Culture to have a Hills in the backyard!)	
13.4	Use materials that will not damage the environment, are durable and low maintancance.. • Maintenance spend over time	B	Durability and maintenance	
13.5	Minimise site works needed and work within bounds of site – incorporate and utilise existing trees and streams etc. as well as existing buildings as site features within the overall design.	A 9	Ground disturbance upsets natural ecology Mature amenities can be an economic feature also, in increased value, and provide shade/beautification etc.	
13.6	Minimise impermeable areas. • % of impermeable area	A 6	Impermeable surfaces increase the amount and speed of stormwater runoff. The cotribute to flooding and water contamination.	
13.7	Plants native to the area should be utilised, but an edible landscape, and vegetable garden should also be provided. • check species selection with WCC parks	A 8	Acknowledging natural heritage of the area, providing habitats for native species. Provide food for occupants.	
13.8	Minimise out door water requirements no in built irrigation system	A 9	Reduce water use	
13.9	No plants should be used that could become weeds. • check species list against WCC list.	A 10	Minimise risk of introducing new pests and disease	

13.10	Limit lawn area to outdoor living area • % of lawn • lawn can be easily mowed with hand mower.	B	Increased permeability through intensive planting Less energy use, air and stormwater pollution through law mowing	

14. AESTHETICS AND DECOR – KAREN/SUSAN

	Performance Specifications and • **measures**	**Priority**	**Reasoning behind performance specifications** **See Karen Bayne, FR**	**Designers Log**
14.1	Shows modern style as per architectural and interior design trends of present times • Would not look out of place in an architecture or House and Garden type magazine.	A 2	Needs to be desirable and appealing to present populace for interest and marketing purposes	
14.2	Invocative of Kiwi character and meaning – reflects NZ culture and heritage • Shows housing elements that are immediately recognisable to NZ public	A 4	Must be implicitly understood by market to brand and promote easily.	
14.3	Invokes feeling of warmth and homeliness to occupant through appropriate use of materials to connote desirable and positive meanings from décor. • Post-occupancy interview	A 5	Materials are known to convey certain affective qualities. e.g. Natural woodgrain is known to be viewed positively for warmth, friendliness, caring and trustworthy connotations, while glass and steel can be used effectively to offset this due to cool, modern and industrial connotations.	

15. CONSTRUCTION PROCESS AND MAINTENANCE – GREG

	Performance Specifications and • **measures**	**Priority**	**Reasoning behind performance specifications**	**Designers Log**
15.1	Allow provision of a maintenance record log book • Check log book in place. Audit at completion • Accuracy of log book assessed at POE		For records and to ensure maintenance undertake on a regular basis, and for future owners/ dwellers reference	

Design Brief Addendum: Additional requirements to enable performance monitoring of the NOW House

	Performance Specifications	Priority	Reasoning behind performance specifications	Designers Log
	General			
	Allow space for master units and PC close to meter board, but internally.		Burglar and weather proof.	
	Telephone access for PC modem with separate telephone no.		Remote communication and data download. This option is cheaper than cell-phone.	
	House should have a ceiling with a roof space above i.e. NOT a skillion roof		Allows un-intrusive sensor cable runs	
	Install 50mm diameter conduits into the roof space from ➢ Meter board ➢ Fuse board ➢ Water cylinder cupboard ➢ Solar water heater pipes or panel (depends on panel location and layout) ➢ PC/logger master unit location		Eases sensor cable connections after the house is complete	
	Electricity			
	Dedicated wiring circuits for: ➢ One lighting circuit per room ➢ One power circuit per room ➢ Dedicated circuits for fridge/freezer ➢ Dedicated circuit for dryer (if installed)		Electricity monitoring systems are simpler if most info is collected at one point rather than individual power outlets.	
	Sufficiently large outside meter-board and inside fuse board to allow placement of loggers. Placement of meter-board to be more than 4m of areas where people spend extended periods (for EMF's).		Electricity monitoring systems are simpler if most info is collected at one point rather than individual power outlets.	

	Gas			
	If reticulated gas is used one BRANZ gas meter has to be installed in each end-use line (i.e. cooking, water heating if present, space heating if present) and wired back to meter board. Place gas meter and electricity meter in close proximity.			
	LPG cooking is the preferred cooking option, but may be difficult to monitor.		Low gas pressure will be even further reduced by flow-through gas meters. Andrew Pollard is currently investigating other options.	
	Temperature			
	Installation of four thermocouples in wall cavities to measure internal wall surface temperatures and wired back to the master unit. Internal surface locations to be monitored: ➢ External bathroom wall ➢ External kitchen wall ➢ External master bedroom wall ➢ External living room wall All walls as far as applicable should be facing South, alternatively West or East.		Measure condensation risks	
	Thermocouple wires should not be cut and joined		Risk of signal noise	
	Solar Radiation			
	no special requirements			
	Noise			
	No special requirements			
	Solar Water Heater			
	Solar water heater must be pumped (rather than thermosiphon)		In order to measure water flow from solar water heater.	
	Occupancy Sensors			
	Possibly as part of the security system. Security system should be selected with this capability.			

	Air Quality			
	Can be done by a small number (10?) one-off air sample draws, possibly 5 after building completion and 5 after one year occupancy. No construction implications.		(Roman has contact details).	

	Humidity			
	Install stainless steel nails spaced 10mm apart into window timbers, with leads out into room areas. Must be calibrated before being enclosed.		Measure moisture content of framework in high-risk areas.	
	Water consumption			
	Use electric water pump rather than gravity feed for rainwater collection tank for toilet feed.		Difficult to monitor if only gravity fed.	
	Use mains pressure system		Low pressure systems might be influenced by in-line flow meters	
	Install water meters for ➢ Whole house (from mains) ➢ Rainwater collection tank			

What to Measure

Computer - Server	On-site computer (server) for remote components, DAQ card - wired sensors. Programmed with a LABview program. Computer to have modem for; uploading data. No data is to be broadcast.
DAQ	Suitable DAQ card with a number of counter inputs, and analog inputs (with most for use with thermocouples)
Remote Receiver	Remote Data Receiver (for temperature sensors)
Temperature	Remote - 1 per room + 2 living room + external, - 5 join T/H measurement per sensor
Surface Temps	Wired - for condensation risk (4 locations in house)(reference junction at master unit)
Surface Humidity	not measured
Humidity	Wired for moisture content in framing. Measure RH (in ambient air) in 2 living areas and 2 bedrooms and 2 wet areas.
Circuits (Electricity)	Total, Lights, Range, Hot Water, Heat Pump per pulsed input (i.e. Electricity meters)
Appliances (Electricity)	Exclusive wiring to Fridge-Freezer - Clothes Dryer, etc. per appliance
Noise	Sensors with loggers located in the master bedroom and the lounge.
Gas	Gas meters with pulsed output per meter or gas flow meter for low pressure situations (~$1500)
Water Use	Pulsed output water meters - total water, total hot water, individual end-uses ie shower, taps?? per meter
Solid Fuel (?)	wire thermocouple to DAQ card sensor for throttle or loader control??
EMF's	Monitor prior to building erection
VOC's, CO and formaldehyde	Indoor - post completion, over a predefined period – see Paragon quote.
Construction waste generation	Measured volumetrically by visual assessment – engineering student to do? Segmented into landfilled and recyclables/re-usables.
Water usage	Water metre measured monthly by occupant, recording number of dwellers for that period in log-book for both town and tank supply..
Solar	remote with pyranometer
Solar Water Heating	measure temperatures (thermocouples), flow, irradiance (previous item)
	flow meter
	Thermocouples
Water leaks	Catalogue in home maintenance manual
Mould growth	Catalogue in home maintenance manual
Occupancy Sensors	not instrumented
Weather Data	retrieve from weather stations

Appendix A : Filtering Elements Framework

Personal Health

- **Definition**

This rating describes the effect the component or system has on the personal health of the occupants of the residence in which it is used. It does not consider the effect of the manufacture, installation or disposal of the item(s) on the health of those involved in those processes.

- **Scoring Scale**

-3 Has very serious negative effects on the health of the occupants. This may reflect high levels of gaseous or fibrous irritant emission, an ability to support biological irritants such as mould or dustmites, or the capacity to cause cold and damp conditions within the residence.
0 No effect on personal health compared with an NZBC Code-minimum dwelling
+3 Has very beneficial effects on the health of the occupants. This may include the ability to stifle biological activity, absorb irritant gases or fibres, or to actively contribute to stable temperature and moisture levels within the dwelling.

- **Further Considerations**

These issues, by their very nature, consider the dose/response curve for each individual in the house, and as such can not represent absolutes. For each issue identified for each material, the WHO TLVs for each health scenario should be considered. Eg, for healthy indoor temperatures, the range is 16˚C – 25˚C.
In the case of items which may change in service, a composite rating is suggested reflecting the mathematical ratio of the likelihood of altered performance to standard performance.

Community Health

- **Definition**

This rating describes the effect the component or system has on the health (more collectively defined as "wellbeing") of the occupants of the community in which the residence is sited. It does not consider the effect of the manufacture, installation or disposal of the item(s) on the wellbeing of those communities involved in those processes.

- **Scoring Scale**

-3 Has very serious negative effects on the wellbeing of the community. This may reflect disproportionately high levels of noise or energy use, unsympathetic design aesthetics, or fortress mentality construction, for example.

0 No effect on community wellbeing compared with an NZBC Code-minimum dwelling

+3 Has very beneficial effects on the wellbeing of the community. This may include a welcoming approach, whilst still maintaining security, good meeting areas along the borders of the property, sympathetic design low energy and water usage, and excellent waste management.

- **Further Considerations**

The interaction of a single dwelling with the local community is many-faceted, revolving mostly around the surrounding residents appreciation of the dwelling, although the energy and resource management features of the house, if well integrated, naturally reduce the burden on community systems.

Performance

- **Definition**

This rating describes the performance of the component or system in the residence in which it is used, in terms firstly of its primary function, then secondary benefits or drawbacks which may result from its use.

- **Scoring Scale**

-3 This product or system, when installed in accordance with the manufacturer's instructions, fails to achieve its stated design function, either by direct failure or by failure to provide support to other items which have complementary or other functions

0 No discernible functional difference compared to an NZBC Code-minimum dwelling

+3 Provides exemplary performance when installed in accordance with the manufacturer's instructions and in some cases will exceed the claimed performance, either in direct functionality or in support of complementary or other functions

- **Further Considerations**

In cases where secondary, tertiary (or beyond) sub-functions exist for some systems or products, a secondary rating should be undertaken. This should be weighted according to the identified top-level priorities – i.e. for the Olympic Place NOW Home, evenly weighted priorities; for a low-cost NOW Home, with the Affordability weighting increased, and so on for each particular blend of priorities.

Desirability

- **Definition**

This rating describes the element/building/overall house design in terms of its appeal. In this case, "desirability" will be assessed almost exclusively in terms of its looks, as the other characteristics usually associated with it (such as function, comfort, sustainability etc) are all addressed within other filters.

- **Scoring Scale**

-3 This product/element/house design/landscape design, when installed fails to be aesthetically pleasing in any way, in terms of its form/colour/scale/contrast etc, to the majority of viewers

0 This product/element/house design/landscape design, is neither attractive or unattractive to the majority of viewers

+3 This product/element/house design/landscape design, when installed is very aesthetically pleasing, to the majority of viewers.

- **Further Considerations**

This issue is, by its very nature, highly subjective – a unanimous agreement on any particular product/element etc is highly unlikely. However, if a good majority (say over 70% agreement) for a particular product/element/design etc assessment is reached, this is all that is necessary. Its importance (along with Affordability) cannot be underestimated and therefore should be highly weighted, as it is a make or break issue.

Affordability

- **Definition**

This rating describes whether the product/element/whole house with any landscaping is within the means of the intended purchaser of the house. The initial (i.e. upfront) monetary cost as well the ongoing (i.e. any maintenance or replacement) cost should be taken into consideration. It is proposed that the total cost (i.e. initial plus maintenance and replacement) of the major elements should be calculated over at least 100 years.

- **Scoring Scale**

-3 This product/systems total cost over 100 years is very high, when compared to a similar product/system which has the same function.
0 This product/systems total cost over 100 years is average.
+3 This product/systems total cost over 100 years is very modest.

- **Further Considerations**

This issue is partially dictated by the demographics of the suburb – i.e. what can the prospective owner afford given the defined budget of around $170k, which requires the fewest tradeoffs in terms of the other sustainability tenants. This is one of the few sustainability tenants which is able to be easily quantified.

Energy Resource Management

- **Definition**

This rating describes the effect the component or system has on the use of primary fossil energy. It covers both construction and embodied energy as well as operational energy use (LCA). Benchmarks will be defined in terms of normalised kWh energy use (all fossil fuel types and possibly also bio-fuels) and CO_2 emissions. The kWh target will be normalised by floor area and climate and mainly addresses the energy demand efficiency (insulation, solar design, efficient appliances, etc.). The CO_2 target allows to address any energy generation and sustainable fuel types as well (PV, fire wood, etc.)

- **Scoring Scale**

-3 Extremely fossil fuel intensive – uses non-renewable energy resources in areas where others will suffice
0 On par with fossil primary fuel consumption with an NZBC Code-minimum dwelling
+3 Has very low fossil fuel consumption during construction and occupancy phases.

- **Further Considerations**

This category constitutes one part of Resource Management aspects. Linkages inherently exist to health and comfort targets. Some uncertainty exists regarding national electricity generation and gas forecasts, i.e. marginal and average CO_2 loadings of electricity will change dramatically within the lifetime of the building.

Achievements should be monitored through energy data logging.

Water Resource Management

- **Definition**

This rating describes the effect the component or system has on the availability of clean reticulated sustainable water resources. The implementation approach is twofold: conservations and efficiency measures such as low flow showers, water tap aerators, dual flush toilets, etc. and use of rain water for grey water applications (gardening, toilet flush, etc.). Targets can be defined via l/day use of reticulated water, possibly normalised by occupant numbers.

- **Scoring Scale**

-3 Extremely water intensive – uses town supply water resources to a higher degree than an average equivalent household
0 Town supply water usage equivalent to an NZBC Code-minimum dwelling
+3 Uses significantly less town supply water than an average equivalent household.

- **Further Considerations**

To verify achievements that amount of town-supply water consumption should be measured.

Waste Resource Management

- **Definition**

This rating describes the liquid and wastes resulting from the construction of the building, during its construction, operation and disposal. Liquid resource wastes included are: storm-water runoff and town potable water demand. Material waste resources included are: material wastes generated during construction and demolition as well as those collected weekly by the Council as part of rubbish-day collections.

- **Scoring Scale**

-3 Extremely material/water resource intensive (high stormwater run-off, large construction wastes and high rubbish collections weights), with no provision for deconstructability or having an alternative water harvesting method.

0 Standard house, in terms of requiring 1 x 9m^3 skip of materials waste generated during construction, x litres (Katja to fill in) of stormwater run-off, and 19 kg per week of household wastes collected.

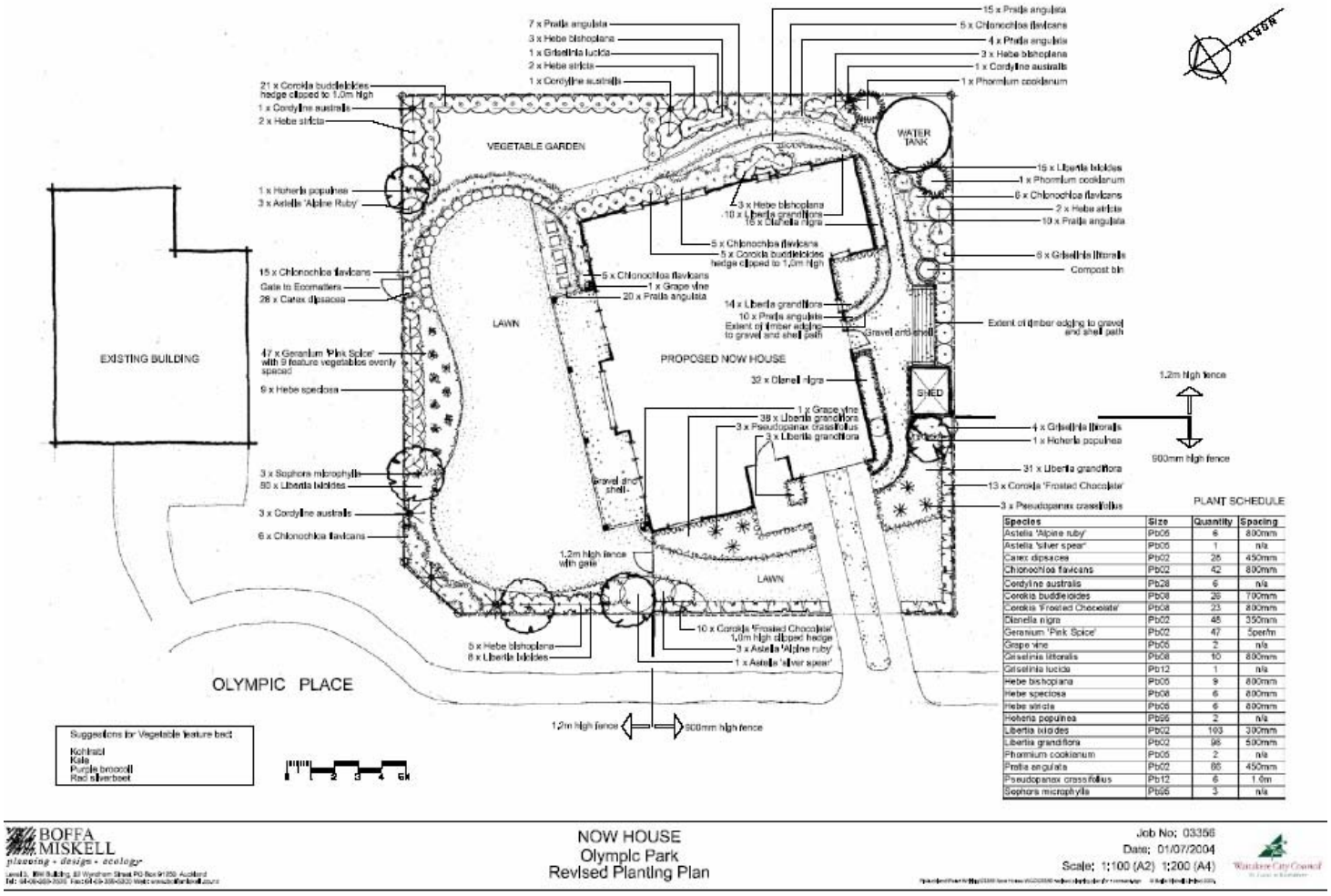
+3 Very material/water resource efficient (very little stormwater runoff, little construction wastes, on-site water harvesting and very little weekly household rubbish destined to landfill).

- **Further Considerations**

This category requires some monitoring, by both the homeowner as well as the third parties, for at least the first year of occupation, to get reasonable results (although to some degree, the results will be dependent on the occupant(s)). The occupant will have to weigh their weekly garbage, as well as read the installed water monitor to record town supply usage.

Appendix D: Final Design - layout and landscaping

(Refer to Hardcopy notes page 19-22, for final detailed house design.)



PLANT SCHEDULE

Species	Size	Quantity	Spacing
Astelia 'Alpine ruby'	Pb05	6	800mm
Astelia 'Silver spear'	Pb05	1	n/a
Carex dipsacea	Pb02	28	450mm
Chionochloa flavicans	Pb02	42	800mm
Cordyline australis	Pb28	6	n/a
Corokia buddleioides	Pb08	26	700mm
Corokia 'Frosted Chocolate'	Pb08	23	800mm
Clianella nigra	Pb02	45	350mm
Geranium 'Pink Spice'	Pb02	47	5per/m
Grape vine	Pb05	2	n/a
Griselinia littoralis	Pb08	10	800mm
Griselinia lucida	Pb12	1	n/a
Hebe bishopiana	Pb05	9	800mm
Hebe speciosa	Pb08	6	800mm
Hebe stricta	Pb05	6	800mm
Hoheria populnea	Pb95	2	n/a
Liberta bloides	Pb02	193	300mm
Liberta grandiflora	Pb02	98	500mm
Phormium cookianum	Pb05	2	n/a
Pratia angulata	Pb02	85	450mm
Pseudopanax crassifolius	Pb12	6	1.0m
Sophora microphylla	Pb95	3	n/a

BOFFA MISKELL
planning + design + ecology

NOW HOUSE
Olympic Park
Revised Planting Plan

Job No: 03356
Date: 01/07/2004
Scale: 1:100 (A2) 1:200 (A4)

Waitakere City Council

Appendix E: Materials database (refer to CDROM)

Appendix F: Ideas log (refer to CDROM)