

# **Psychological Research Methods**

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## Introduction

Environmental Stewardship is a new initiative introduced by DEFRA to encourage landowners and farmers to manage their land in an effective way. The aim is to create and maintain habitats for a wide range of birds and animals.

This involves developing previously farmed or unused land in order to create these habitats. In return, DEFRA will pay the landowner a certain amount depending on the way in which the land is managed e.g. organically, and the amount of land being managed.

There are 3 types of Environmental Stewardship scheme which increase in complexity but also in the benefits they provide to the owner:

- Entry Level Stewardship (ELS) -
  - Open to all farmers and landowners.
  - Simple and effective land management.
  
- Organic Entry Level Stewardship (OELS) -
  - Organic strand of ELS.
  - Pays more per hectare than ELS.
  
- Higher Level Stewardship (HLS) -
  - Targeted environmental management.
  - Capital work plans.

Areas of land which can be managed are split into entitlements. These can be bought/sold or leased, and provide the owner of the entitlement with the same responsibilities and benefits of Environmental Stewardship as if they had originally owned the land.

Thus allows the original landowner to make an income from the land without requiring any development from them. Owning an entitlement allows a person to purchase a small piece of land – which would not normally be available for purchase – develop it and make money from it. This means you do not have to be a major landowner to take part in the Environmental Stewardship scheme.

## Focus for Project

The site may potentially be used by a wide variety of users as there are not really any constraints on who may be interested in Environmental Stewardship. However, it would be fair to assume that a large proportion of users will be farmers and therefore of an older age. This could mean they have limited computer experience, but is not necessarily the case.

However, it is not just farmers who may apply for the Environmental Stewardship schemes - any organisation or individual with enough land can apply. As such, the site may be visited by users from schools or village associations.

There may also be users who do not own their own land, and are looking to buy/lease an entitlement from Forrest Hills and as such, their ages and abilities may differ.

In conclusion, it is impossible to predict the types of users that will visit the site. Therefore, the site will need to be simple enough for novice users, but should provide extra functionality for those users who can take advantage of it.

## **Website**

The idea of the “Environmental Stewardship @ Forrest Hills” website is:

- to firstly provide general information on Environmental Stewardship.
- to allow potential buyers to search and purchase the entitlements available at Forrest Hills.
- to provide an administrative back-end to the system, to allow easy updating of products.

There are currently only a small number of sites selling entitlements as the scheme is relatively new, and the main purpose of these sites is the buying/selling of milk quotas from dairy farms. Of these, only one site<sup>1</sup> seems to offer a search facility, while the others simply provide a static list of entitlements available with contact details, and some do not provide a list of entitlements but just request that you contact them.

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1 George F White - <http://www.georgefwhite.co.uk/>

# Needs/Task Analysis

In order to obtain the requirements of the Environmental Stewardship website, it is first helpful to get an idea of the kind of tasks that will be completed by users. To do this, Hierarchical Task Analysis can be used to determine the goals and objectives of a user, the tasks and subtasks they will be required to perform, and to give the tasks a sequence to follow.

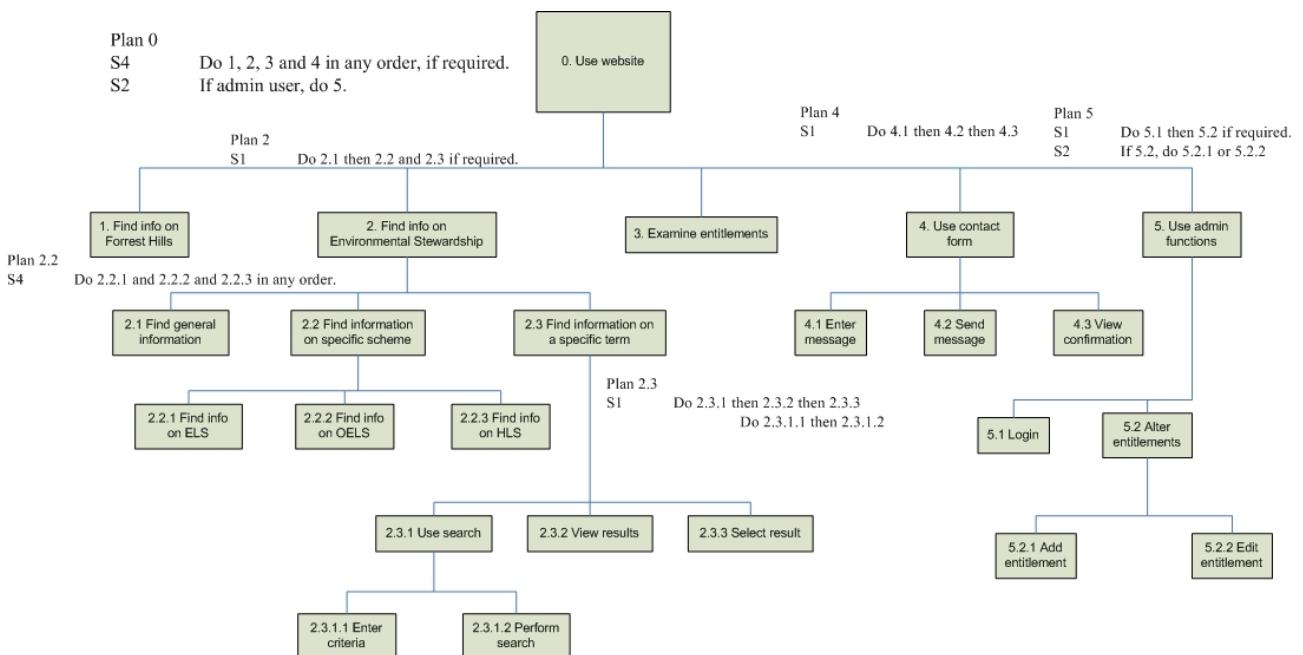
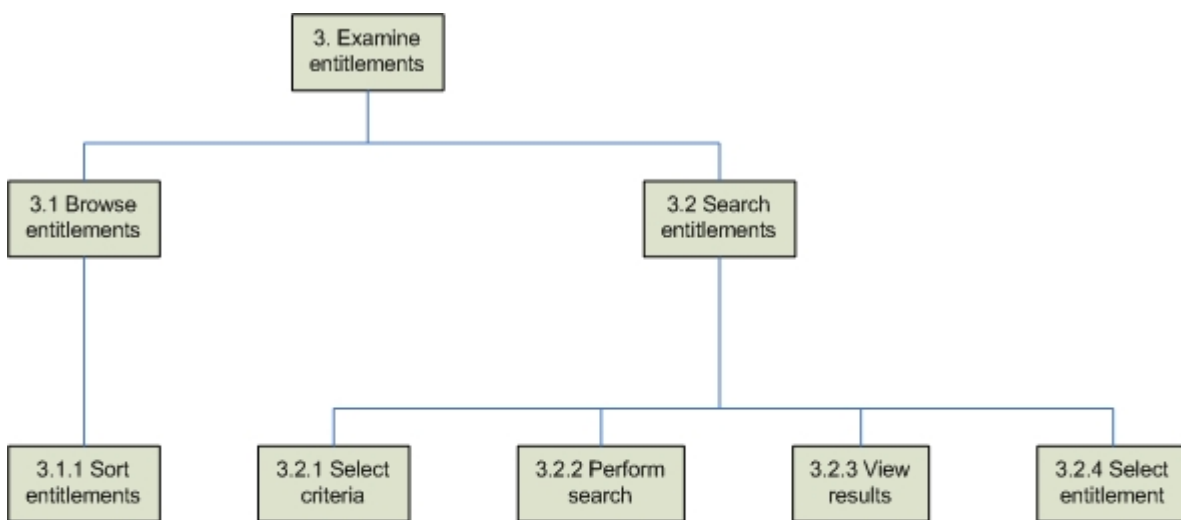
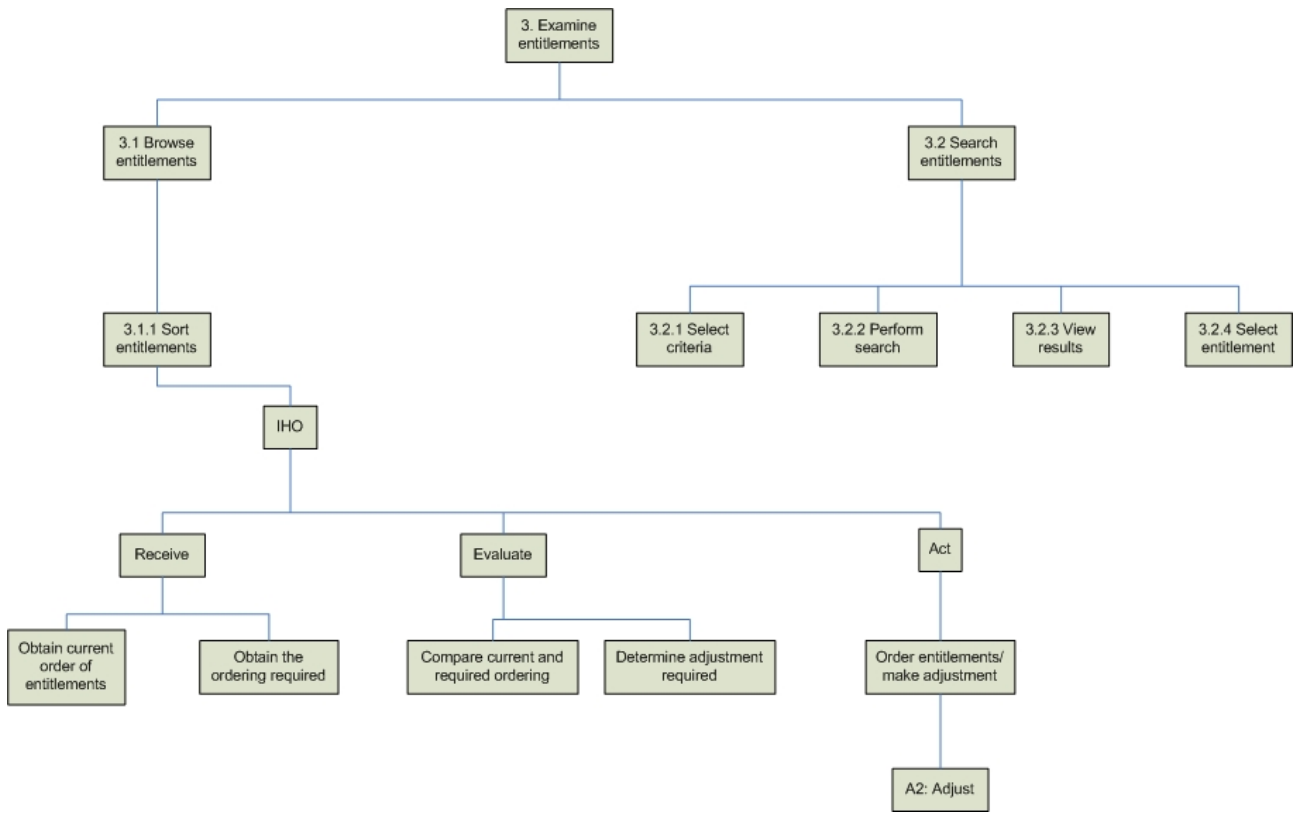


Illustration 1: HTA of the Forrest Hills systems (excluding task 3)



Plan 3  
S4 Do 3.1 or 3.2 in any order.  
S2 If 3.1, do 3.1.1  
S1 If 3.2, do 3.2.1 then 3.2.2 then 3.2.3 then do 3.2.4

Illustration 2: Task 3 of using the Forrest Hills system



*Illustration 3: Task 3 displayed in SGT form*

# Requirements

A requirement is a property that a system must exhibit in order for it to satisfy the user. Requirements should be ranked to help determine which are more important than others.

In this case, a binary mandatory/desirable system based on the use of modal verbs is used:

- Mandatory - a requirement **shall** be implemented.
- Desirable - a requirement **should** be implemented.

## Functional Requirements

Specify the intended behaviour of the system and functions and tasks it is required to perform.

ID	Requirement	Derived Requirements
1	The system shall allow people to find out about Forrest Hills. Although not a primary goal of the site, potential purchasers are likely to want to know about the seller.	
2	The system shall allow users to find information on Environmental Stewardship. A primary goal of the site is to provide general information about Environmental Stewardship, and also more specific information. Therefore, this requirement can be broken down into 2 sub-requirements.	2.1, 2.2
2.1	The system shall provide information about general Environmental Stewardship topics.	
2.2	The system shall provide information on the 3 different Environmental Stewardship schemes.	
3	The system shall allow people to buy entitlements. The other primary goal of the site is to allow people to purchase entitlements.	3.1, 3.2
3.1	The system shall allow users to browse entitlements.	3.1.1, 3.1.2
3.1.1	The system should allow sorting of entitlements.	
3.1.2	The system should allow paging of entitlements, so that not too many are displayed at once.	
3.2	The system shall allow users to search entitlements.	3.2.1
3.2.1	The system should provide a flexible search facility.	3.2.1.1
3.2.1.1	Allow searching by keyword or criteria.	
4	The system shall allow users to contact Forrest Hills.	4.1
4.1	The site should contain a contact form.	
5	The system shall allow the administrator of the site to add or edit the entitlements for sale.	5.1
5.1	The system should provide a CMS for adding and editing entitlements.	

## Non-Functional Requirements

Non-functional requirements constraints on the system and ensure that it reaches a certain level of quality.

ID	Requirement	Derived Requirements
1	The site should have a reasonable load time - recent research suggests it should be less than 4 seconds (Jupiter Research, 2006).	1.1
1.1	The site should use compressed and optimised images.	
2	The site shall be secure.	2.1, 2.2
2.1	The system shall provide information about general Environmental Stewardship topics. The process of buying entitlements shall be secure.	
2.2	Access to the administration area shall be secure and restricted.	
3	The site should be usable on a variety of Operating Systems and browsers.	
4	The site shall be accessible to disabled users.	
5	The site should be easy to navigate.	

## Design

Here I will take the requirements of the system and will develop them into a design to be implemented.

### Colour Scheme

The colours selected for the site intend to give it a 'natural' feel that reflects the subject matter – namely Forrest Hills and the environment. As such, a series of browns were used for page backgrounds and greens were used for menus. Black text on the light brown background gives the best contrast, while white was used on the dark green menus.

Once the site is implemented, it will be evaluated for compatibility with colour blind users, by testing it with an online tool.

### Website Layout and Structure

Recalling that the site may experience a wide variety of users with potentially differing skills; it is important to ensure that the site is easy to navigate.

The pages feature a vertical menu down the left hand side of the page and the same menu is in a horizontal format at the bottom of each page. On his website<sup>2</sup>, Neilson looks at the topic 'When Bad Design Becomes the Standard' in which he examines several website design elements, which while actually bad design, have become de-facto standards on websites. The element most applicable for the forrest Hills website is the “Left-Justified Navigation Rail” which was first introduced by CNET in 1996.

Neilson states that there are 2 usability reasons why a right justified navigation rail would be better:

- “Fitts' Law dictates that shorter mouse movements are better...”

Therefore it would save time by placing the navigation rail next to the scroll bar, as these are both frequently used items.

- “Users always look at the content first when they encounter a new webpage.”

If the content was placed at the left of the window, users could read this before naturally progressing to the navigation on the right.

However, Neilson concludes that although a navigation rail on the right might improve a site's usability by 1%, it would cause problems for users because the rail would not be where they expected.

The menus feature rollover effects which highlight as the mouse moves over them, giving feedback on where the cursor is. Also, when a page is visited, its link in the menu is kept highlighted; both of these features give the user important feedback, a principle based on Neilson's Heuristics.

The menu is constructed using a sitemap of the website, so although there is no specific 'sitemap' page, the functionality of such a page is already integrated into the navigation system.

As a further aid to navigation, a 'breadcrumbs' trail is available at the top of the page. These will be useful for users who may arrive deep down the navigation structure. They also inform a user of where in the site they currently are.

## Forms

The Forrest Hills website contains two main forms: one for searching the entitlements, the other a contact form. It also contains a small form to enable the users to search the site.

Neilson suggests a number of guidelines which were taken into account in the design of these forms:

- Don't use the reset button.

Neilson's Heuristics suggest that it is important to allow users an 'emergency exit' out of a situation. The 'reset' button on a form is a websites' way of providing this function. However, users prefer to use the 'back' button to perform this action.

Not only is the 'reset' button defunct, it can also be dangerous:

- clicking the 'reset' button by accident will erase all the users' work.
- it creates unnecessary clutter on the form and requires the user to decide which button to click next.

So the reset button should be removed, but the user still requires the ability to undo or edit their actions. In the case of text boxes, the text can simply be edited. Radio buttons and drop down menus should have a default or "Select" state.

- Neilson also suggests that the first field in a form should receive keyboard focus when the page loads. This allows the user to start typing immediately and saves a click.

## Implementation

The Forrest Hills website was implemented using ASP.NET and displays and functions correctly in the 3 browsers it was tested in (Internet Explorer, Firefox and Safari). The site is located at <http://duncanhalley.co.uk/forresthills>

Any content or functionality that is not yet complete can be seen at <http://duncanhalley.co.uk/forresthills/incomplete.aspx> or by trying to use an incomplete function on the site.

# Evaluation

Evaluation of a system is an important part of the systems lifecycle, as it allows designers and implementers to compare the system to the original requirements and therefore ensure the system is what the user wants.

In terms of interfaces, evaluation will ensure that they meet the requirements of being usable, that is they are “learnable, retainable, efficient and satisfactory to use” (Constantine and Lockwood, 1999). The intention of evaluation is to reveal any problems that may exist in an interface or any difficulty that the users experience.

## Evaluating the Forrest Hills site

Evaluation of the Forrest Hills website was done using heuristic evaluation (Nielson and Molich, 1990; Nielson, 1994), a technique for finding usability problems by having a set of evaluators examine an interface and check its compliance with certain usability factors or “heuristics”.

Generally, heuristic evaluation with one person will not find all the problems, but by using more evaluators, a larger number and wider variety of problems will be discovered. A group of about 4 people is said by Nielson to provide the best cost:benefit ratio, but the type of evaluators used will also affect the results.

A group of 5 usability experts could be expected to find about 84% of problems, while an individual evaluator will find only 31% of problems. Because of this, I used a number of people to evaluate the Forrest Hills site, and these consisted of Graduates who had previously performed a heuristic evaluation and a farmer who would be a likely user of the system.

Both groups were given tasks to perform during which they could note any problems and give feedback on the site. The Graduates noted problems in the form of violated heuristics while the farmer simply wrote down what he liked/disliked and any problems he faced.

## Tasks

The evaluators were given a number of tasks to complete during which they would note down any problems or violated heuristics. The full tasks can be seen in the appendix, but summarised they are:

1. Browsing the site.
2. Adding entitlements using the Admin back-end.
3. Browsing entitlements.

These tasks enabled the evaluator to experience the system from the perspective of a standard user, and also of an administrative user. The task-based approach also provides another benefit, mostly to the non-expert evaluators. Instead of having a non-expert trying to evaluate usability, layout and heuristics; they were given a task to complete and in the process could note down any problems. The action of doing this would reveal any usability problems.

## Findings

The evaluation carried out on the site has brought to light the following points:

- The bottom navigation bar extends to far to the right of the page. This is caused by the addition of the 'admin' links to the bar. As such, it would only be seen by an administrative user who was logged into the site, and not to standard users – the admin link only becomes available when logged in as an administrative user.

However, the problem could still be fixed for admin users. The best way to do this would probably be to reduce the size of the menu text and reduce the padding between the menu items. Alternatively, the bottom menu could be removed altogether, although this may cause more usability problems than benefits.

- The content area of the pages can seem quite narrow, especially on higher resolution screens. However, a major issue when designing websites is ensuring they will fit on a variety of monitors and resolutions. So while the page may seem narrow at high resolution, it will fit perfectly at lower resolutions. The way the page is designed ensures that at lower resolutions, users are not required to scroll horizontally, which would have a large impact on usability.
- One user stated the following: *“Menu bar is at the bottom of the page (in fact, I didn't notice it for about the first 5 minutes of using the site). Menus normally appear at the top of a page or screen which would feel more natural.”*

This is an interesting point, as the bottom menu bar was only added as a convenience for users when they reach the bottom of a page. It seems that this particular user managed to miss the main navigation menu on the left of the page, which is strange as this is one of the main locations for such a menu. The point about menus appearing at the top of a page is valid, but this point should also include menus appearing on the left of the page.

## Future Work

In its current state, the Forrest Hills website is missing a few elements which would need to be implemented before it could be used as a live e-commerce site. Features such as the search function and contact form would be relatively simple to implement, while the e-commerce function is much more complex. The original idea was that the site could be developed to allow the purchasing of entitlements online, but due to the legal complexity of selling/leasing land and the large sums of money involved, it would be better to just allow buyers to either place a deposit or register their interest in an entitlement.

If it was decided that deposits would be taken, then an entirely new system would have to be implemented to handle secure payments. This was obviously not within the scope of this project, but would be required for a live website. This would then lead to the requirement of displaying much more detailed information about an entitlement, including multiple pictures. The user would then be able to select an entitlement and 'drill down' to view more information about it.

Also, the Content Management System could be developed further. Currently, it allows the administrator of the site to add/edit/delete the entitlements displayed on the site, but this could be extended to allow the editing of the other pages. A CMS would allow the admin user to easily update the site by entering data and information into text boxes. This would then be stored in a database and displayed on the site. It could be easily updated by the admin user by logging into the admin area and altering the text in the appropriate text box.

## References

DEFRA, Environmental Stewardship. <http://www.defra.gov.uk/erdp/schemes/es/default.htm>

Dix, A., Finlay, J., Abowd, G.D. & Beale, R. (2004). "Human-Computer Interaction". Prentice Hall: Harlow.

Jeffries, R., Miller, J., Wharton, C. & Uyeda, K. (1991). "User Interface Evaluation in the Real World: A Comparison of Four Techniques". Proceedings of CHI'91, New Orleans, April 28 - May 3, 1991.

Jupiter Research (2006). "Retail Web Site Performance - Consumer Reaction to a Poor Online Shopping Experience" Retrieved from [http://www.akamai.com/html/about/press/releases/2006/press\\_110606.html](http://www.akamai.com/html/about/press/releases/2006/press_110606.html)

Molich, R., & Nielsen, J. (1990). "Improving a human-computer dialogue". Communications of the ACM, 33, 338-348. In Lansdale, M.W., & Ormerod, T.C. (1994) Understanding interfaces: a handbook of human-computer dialogue. Academic Press, UK.

Nielsen, J. (1994). "Heuristic evaluation". In Nielsen, J., and Mack, R.L. (Eds.), Usability Inspection Methods, John Wiley & Sons, New York, NY.

Nielson, J. (1999). "When Bad Design Becomes the Standard". Retrieved from <http://www.useit.com/alertbox/991114.html>

Nielson, J. "How to Conduct a Heuristic Evaluation". Retrieved from [http://www.useit.com/papers/heuristic/heuristic\\_evaluation.html](http://www.useit.com/papers/heuristic/heuristic_evaluation.html)

Schaffer, E. & Sorflaten, J. "Web Usability Illustrated: Breathing Easier With Your Usable e-Commerce Site". Published in The Journal of Electronic Commerce, Volume 11, Number 4.

Vischeck colour blindness simulator. <http://www.vischeck.com/>

# Appendix

## Evaluation tasks given to evaluators

Dear Evaluator,  
Thank You for agreeing to complete a Heuristic Analysis of the 'Environmental Stewardship @ Forrest Hills' website.

You will be asked to complete a number of tasks which are likely to be common operations conducted by users of the system.

### Tasks

<http://duncanhalley.co.uk/forresthills/>

#### 1. *Browsing the site*

First take the opportunity to explore the website to gain an understanding of Environmental Stewardship.

To find out if the website is effective at providing information about Forrest Hills an Environmental Stewardship, please attempt the following questions and note any difficulties you had finding the answers, using the form:

What is the annual payment per hectare for Entry Level Stewardship?

Which is the cheapest entitlement available?

Where is Forrest Hills roughly located?

#### 2. *Adding entitlements using the Admin back-end*

Visit the administration login page at: <http://duncanhalley.co.uk/forresthills/Admin/>

(It's not secured due to the database required for logging in costing more on my hosting, but obviously the real site would have a login system.)

Once logged in you will see a list of the entitlements already available.

Using the navigation menu on the left, select 'Admin Home' then 'Manage Products'

On the page that follows, click 'new' to add a new entitlement.

Fill in the appropriate details and click insert.

Your new entitlement will be added to the database – you can confirm this by clicking on the page numbers at the bottom of the page. You should select the last page.

Click the 'Logout' link in the navigation bar when you've finished.

### *3. Browsing Entitlements*

You are now going to view the entitlements that are available at Forrest Hills, by viewing the 'Browse Entitlements' page.

On this page, the entitlements are displayed 5 to a page. The pages can be navigated through by clicking the page numbers at the bottom of the page.

Try sorting the entitlements according to different criteria – the page itself explains how to do this.

## Example completed evaluation (Graduate experienced in heuristic evaluation)

### Heuristic Evaluation Form

Severity Scale:

0 - don't agree that this is a usability problem

1 - cosmetic problem

2 - minor usability problem

3 - major usability problem; important to fix

4 - usability catastrophe; imperative to fix

	How found?	Heuristic violated	Problem description and how heuristic is violated	Severity	Solutions
1	browsing	4	Bottom page navigation bar extends to far right rather than flush with main content.	1	Centre the bar, or shrink to fit
2	browsing	8 / n/a	@ symbol and forrest hills text looks sans serif when rest of site isn't. I don't like it, looks like a CMS addon to a v.pretty site	1	Make icon / change to serif font / sex it up
3	browsing	8	Search button on navbar is very dark, visually distracting, may result in unwanted saccading (wait till oculomotor ;-)	1	Lighten it up / tone it down
4	3	3	When sorting, a nice addition could be up / down arrows to immediately toggle between high / low. Also, could be helpful to indicate what description sorts as - alphabetical is assumed, but prob redundant	2	Up / down arrows, maybe? Could be overload, perhaps trial
5	browsing	8	Main content window is fine for most cases, but a bit small when it comes to text heavy pages. Harder to navigate / browse text heavy pages	2	Scrolling nav bar? Wider page? Tighter padding?