

Natural Play:  
Making a difference to children's  
learning and wellbeing

*A longitudinal study of the Forestry  
Commission- Merrylee Primary  
School– Glasgow City Council  
partnership 2008-2011*

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# Executive Summary

## Overview

*Natural Play: Making a difference to children's learning and wellbeing* presents the findings of a longitudinal study of the pioneering partnership between Forestry Commission Scotland, Glasgow City Council and Merrylee primary school in Glasgow. It provides evidence to show that children's engagement with a natural play space within school grounds has a multitude of positive impacts on their learning and physical and emotional wellbeing. The study also provides a value for money assessment, concluding that the cost of developing natural play spaces is comparable with those of building traditional tarmac playgrounds. In view of the benefits outlined in the report, it is argued that the provision of a natural playspace within school grounds represents excellent value for money.

## Background

The natural play in school grounds project was the first of its kind in the United Kingdom. It was therefore important to capture data to evidence whether or not the organisations' efforts to create a natural play space has made a difference to the children's learning and wellbeing. The study answers important questions such as:

- Can a natural play space lead to enhanced emotional and physical wellbeing for children, compared with a traditional playground space?
- Can a natural play space lead to enhanced classroom-based and outdoor-based learning for children, compared with a traditional playground space?
- Do natural play spaces in school settings offer good value for money?

## Method

The study took a participatory and inclusive approach. It included children, teachers, parents, playground support and Forestry Commission staff. Evidence was collected through three principal means: a literature review; a baseline study in 2008 exploring how children used the traditional 'tarmac and turf' play space to which they had access; a follow-up study in 2011 exploring how children were using the new natural play space, which incorporates topography such as hills, valleys, steps, meadow area, hollows, shrubs and trees, willow tunnels, dead wood, a rope bridge and seating.

In terms of attribution of results, it must be noted that in 2011 the children also had access to a full size, all-weather, astro turf football pitch. As far as possible, the study attempts to isolate impacts that can be directly attributable to the natural play space, although it is inevitably impossible to completely separate the influence of each play space.

Similar methods were used in both 2008 and 2011 in order to ensure comparability of findings. These consisted of:

- participant observation across the different playareas in morning and lunchtime breaks over a three day period
- one hour focus group discussions with 30 children, broken up into 4 groups of P2, P3, P5 and P6
- physical activity measurement through the use of pedometers fitted to children
- participatory photography
- focus group discussions with separate groups of teachers, playground staff and parents
- weekly reporting forms by teachers
- daily reporting forms used by playground staff to monitor a set of given indicators

## Results

Conducting a 'before and after' study was a helpful way of evidencing the impact of introducing a natural play space into the school environment. The research highlights some key results: some of which stand for themselves and some which require further study and analysis.

- ❖ **Indicators of emotional wellbeing improved. There has been:**
  - A reduction in the reporting of bullying.
  - A dramatic reduction in physical injuries.
  - Increased opportunities for free, imaginative and creative play.
  - Enhanced social interaction between different groups of children, including between boys and girls and different age groups.
  - Enhanced options for solitude, where needed, and for children who may not be interested in football/ tarmac based activities to thrive and flourish at best and, at least, not be singled out.
  - Enhanced opportunities for interacting with nature at playtime.
  
- ❖ **Physical activity levels increased.** The natural play space encourages children to use different muscle groups. In addition, compared with the baseline study, there was evidence of an increase in both the number of steps and in the minutes of physical activity that both boys and girls and across all of the year groups accumulate over a day. The increase is equivalent to 10% of their daily recommended minutes and steps. This cannot be solely attributed to the natural play space as the astro turf space has also had an important role to play. However, observation alone clearly demonstrates that physical activity is a key activity on the natural play space.
  
- ❖ **Positive impact on children's indoor learning.** It is not possible to assess the impact of the natural play space in isolation from the development of the new school buildings and changes in the curriculum. However, teachers felt that the natural play space has contributed to increased punctuality when returning to class after play, improvement in the time needed to settle back into class, improvement in mood after play, increased concentration and attainment levels after play, increase in the quality of social interaction with other pupils and teachers, and a decrease in incidents of difficult behaviour.
  
- ❖ **Outdoor learning increased**, indicating that natural play spaces are complementary to the 2010 Curriculum for Excellence for Outdoor Learning.
  
- ❖ **The research also indicates that natural play may be beneficial for teachers and in enhancing children's access to and enjoyment of nature and outdoor play.**
  
- ❖ Experience of natural play has led to a change in **the attitudes and behaviours of playground supervisors and staff towards risk and increased scope for children to risk assess and take decisions for themselves. Children's exposure to risk and responsibility for assessing risk has led to a demonstrable increase in resilience.**
  
- ❖ A cost-benefit analysis shows that developing a natural play space in school grounds comes at a comparable cost to developing a traditional tarmac playground. The detailed build cost for a traditional tarmac playground to be built on the same space was £63,784. The cost of upgrading to a gold standard natural play space was £65,512, which represents an additional £1,728. In view of the benefits outlined in the report, **the provision of a natural playspace within school grounds represents excellent value for money.**

## Conclusion

The research shows that the natural play space offers a multi-choice space for play to suit different play styles, moods and personalities. This has had an impact on both physical and emotional wellbeing. It is thus clear that there are significant benefits to engaging children in natural play within school settings, which come with a comparable price tag to a traditional tarmac playground.

# 1. Background

## 1.1 Natural Play

Over the last 30 years there has been increasing evidence that play in 'natural environments' has a multitude of benefits. These include the development of social skills, language and comprehension, physical activity, improved physical and mental health and environmental learning<sup>1</sup>. Research shows that limiting children's outdoor play experience risks damaging their physical, mental and emotional development, leaving them less well prepared for the adult world and also less interested in the environment<sup>2</sup>. Linkages have been made between the lack of nature in children's lives and the rise in obesity, attention disorders and depression giving rise to the concept of nature deficit disorder<sup>3</sup>. Opportunities for children to engage directly with nature have been reduced, leading to what has been called the 'extinction of experience', a cycle of disconnection, apathy towards environmental concerns and progressive environmental depletion<sup>4</sup>. The evidence suggests that the earlier that children are introduced to the natural environment, the more likely they are to return and access this space in later life<sup>5</sup>. On the basis of this evidence, Forestry Commission Scotland piloted the development of a natural play space within a primary school in Glasgow.

## 1.2 Background to the Development of Natural Play at Merrylee Primary School

Natural play within school grounds was piloted by Forestry Commission Scotland (FCS) at Merrylee Primary school in partnership with Glasgow City Council (GCC) as part of its efforts to allow children to play and interact with trees and the natural environment on a daily basis.

Merrylee primary school was identified as the preferred site for natural play development as it offered the chance to incorporate a natural place space within a new build school in an urban area. Details of the initiative are provided in the box on this page.

The partnership was established and driven by Forestry Commission Scotland. However, the initial support and enthusiasm for natural play from the Headteacher was critical in establishing a successful partnership. From this starting point Glasgow City Council Development and Regeneration Services were brought on board along with key colleagues from the Education Services. A tour of natural play sites developed by Stirling City Council helped bring the concept of natural play to life. This tour also helped to address some of the initial perceived health and safety issues, for example limiting of grass mounds to 300mm. The health and safety team within Glasgow City Council education services were fully involved and took on board the risk versus benefit approach presented by Forestry Commission Scotland.

<sup>1</sup> See Muñoz 2009 for a detailed literature review of the impacts of outdoor play on physical, mental and emotional wellbeing and learning. See also Pretty et al 2009.

<sup>2</sup> See Louv 2008.

<sup>3</sup> This term was coined by Louv 2005, updated in 2008.

<sup>4</sup> Pyle 2003.

<sup>5</sup> See Louv 2008, Lester and Russell 2010 and Wells and Lekies 2006 for the links between child play outdoors and ongoing appreciation of and use of nature as an adult.

## The Project

Forestry Commission Scotland, Merrylee primary school and Glasgow City Council have worked together over a three year period to develop a natural play space- 'the Urban Jungle'- on the school's new premises. The play site build cost was £65, 512 and covers 1700m<sup>2</sup>.



The site was developed in a participatory manner with the school's pupil council, parent council, Glasgow City Council, school staff and Forestry Commission Scotland. Pupils were actively involved in decision making, including design and budgetary decision making.



The space incorporates topography such as hills, valleys, steps, meadow area, hollows, shrubs and trees, willow tunnels, dead wood, a rope bridge and seating.



The project is the first of its kind in the United Kingdom. The aim of this study is to inform future natural play developments in school grounds.



Within the school, the parent council was informed of the proposed plans and members from this were nominated to be part of the natural play steering group. In addition a pupil design team was formed to ensure that the pupils were at the centre of the development. This ensured that the whole school community was involved from conception to delivery.

The play space in the new school grounds is 0.9 hectares and the natural play space takes up 1700m<sup>2</sup>. The play space in the old school grounds was 0.6 hectares in total. Aerial photos of both sites are provided in Annex 4.

### 1.3 The Study

This report presents the findings of a longitudinal study of the pioneering partnership between Forestry Commission Scotland, Merrylee primary school which has around 300 pupils on the school roll, and Glasgow City Council.

The study was commissioned by Forestry Commission Scotland in 2008 as part of its commitment to capturing data to evidence whether or not the creation of a natural play space has made a difference to children's learning and wellbeing. The study attempts to provide some answers to important questions such as:

- can a natural play space lead to enhanced emotional and physical wellbeing for children, compared with a traditional playground space?
- can a natural play space lead to enhanced classroom-based and outdoor-based learning for children, compared with a traditional playground space?
- Do natural play spaces in school settings offer good value for money?

The study took a participatory and inclusive approach<sup>6</sup>. It included children, teachers, parents, playground support and Forestry Commission staff. Evidence was collected through three principal means:

- **A desk review was undertaken** of documentation directly relevant to the Merrylee experience as well as external papers written on the theme of natural play.
- **A baseline study** was conducted in 2008. This study explored how children used the traditional 'tarmac and turf' play space to which they had access. The space consisted of:
  - a small concrete playground for the P1s and P2s (children aged five and six, the first two years of primary school in Scotland)
  - a larger play area for P3 – P7 children. The larger play area consisted of: a large concrete playground, including a 'friendship area' with benches and lined at one end by trees and; a grass play area which was often waterlogged and un-useable and; a red blaze football pitch.
  - a small wildlife garden, which was locked and used only with staff supervision.

**The baseline study is available online<sup>7</sup>.** The methods used were:

- participant observation across the different playareas in morning and lunchtime breaks over a three day period
  - one hour focus group discussions with 30 children, broken up into 4 groups of P2, P3, P5 and P6
  - physical activity measurement through the use of pedometers
  - participatory photography
  - focus group discussions with separate groups of teachers, playground staff and parents
  - weekly reporting forms by teachers and
  - daily reporting forms used by playground staff to monitor a set of given indicators
- **A follow-up study in 2011 of how children were using the new natural play space**, as detailed in the text box on page 1 of this report. The methodology used was identical to that used in the

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<sup>6</sup> Any quotes used are non-attributable to individual children. Permission was obtained from parents to take photographs of the children and to use these in the report.

<sup>7</sup> See Groves with McNish. 2008.

baseline to allow for comparability. Although there are some differences in which children and staff participated at the two time points, there is an overlap. Full details of the methods used can be found in Annex 2 of this report. The natural play space is one of three spaces available to the children in the new site. The other two consist of a tarmac playground and an astro turf football pitch.

In terms of attribution, it is important to note that two elements will have had an additional impact on the findings seen in 2011:

- The development of a full size, all-weather, astro turf football pitch in Merrylee school's play area in parallel with the addition of the natural play space. The pitch is well used and has, in its own right, played an important role in enhancing children and staff's use of the outdoors space.
- The 2010 Government 'Curriculum for Excellence through Outdoor Learning' document which encourages schools to 'provide creative, sustainable and progressive opportunities for all children and young people to participate in a range of outdoor learning experiences'. This has also motivated staff and children to engage more with natural spaces outdoors.

As far as possible, the researcher has been careful to attempt to isolate impacts that can be directly attributable to the natural play space, although it is inevitably impossible to completely disentangle these different influences.

### **Timing**

Weather is an important factor defining the type of play that children engage in. The research team were keen to ensure that the weather conditions were similar in both years. In 2008 the data were gathered over 26th -28th November and in 2011 the collection period was 2nd to 4th March. The follow up study had been due to take place in November 2010 in order to have a comparable weather situation. However, extreme snowfall occurred, which meant that children were sledging and snowball fighting- not comparable to the play activities in November 2008. The study was postponed again in January 2011 due to further snow. The follow up study was therefore conducted in March 2011. Annex 3 provides weather data for each of the collection periods showing minimum and maximum temperatures along with barometric pressure. From this data and observations made on the days the weather conditions were similar during each collection period. The research team therefore feel confident that the play conditions weather wise are comparable.

## **2. Natural play and children's emotional wellbeing**

'Well-being' as a concept is a "a complex, multi-faceted construct that has continued to elude researchers' attempts to define and measure it" (Pollard and Lee 2003). For the purposes of this study, we have divided wellbeing into emotional wellbeing (this section) and physical wellbeing (Section 3). We use a loose definition of emotional wellbeing at playtime as being a state whereby children are not subject to bullying or undesired physical injury, where there is scope for free play and for imaginative play, where children express a positive moodstate and whereby different groups of children feel that they are able to have their needs met.

In this Section, we explore the following indicators in turn as being potentially relevant to children's levels of happiness and contentment in the context of their play time:

- Levels of accidents, injuries, bullying and other incidents that may occur at playtime (this overlaps with physical wellbeing)
- Scope for imaginative, creative and free play at playtime
- Children's happiness, mood and self esteem at playtime
- Interaction of different children with each other and with the space
- Interaction with nature at playtime

## 2.1 Reduction in playtime accidents, injuries, bullying and other incidents

Playground staff were given daily reporting forms to monitor incidents occurring at playtime<sup>8</sup>. The categories were accidents, injuries, bullying and other. Staff were asked to report on the number of incidents, their degree of severity (slight, moderate, severe)<sup>9</sup>. They were also given the option to comment on mood or incidents.

The results revealed that there was a significant decrease in the number of incidents reported on the new play space compared with the old space:

- **Baseline: 130 incidents were reported** over a 14 day period in November and December 2008 (76 accidents, 1 incident of bullying and 53 'other' incidents, which included pushing, hitting and slipping) in the baseline study. In terms of severity, 92 were considered moderate, 37 slight and 1 severe.
- **Follow-up: 8 incidents were reported** over a 14 day period during the same months in 2011. There were 6 accidents and 2 cases of bullying, all considered 'slight' on the severity scale. Both cases of bullying occurred when the natural play space was closed.

Observations conducted during the baseline and the 2011 study supported this data. It was observed that fewer incidents were reported by children to staff than in 2008. This could be due to the simple fact that there were actually fewer incidents on the new play space. Falling on grass is less likely to require attention than falling on tarmac.

'There are almost zero incidents when the children are on the natural play space. When it is out of use, there are arguments, pushing and other nonsense' Playground staff

**It has thus been seen that fewer incidents were being reported. Did this mean, however, that there were actually fewer incidents in practice?**

In 2008, children appeared to be less stimulated and were seen frequently asking for attention from playground staff. Children's complaints and reporting of injuries appeared to be triggered principally by boredom, particularly on the day that the weather was bad. In the new space, children appeared to be too busy with their play to require attention for discomfort or minor injury when they slipped or fell. This was confirmed through discussions with children and with playground staff, one of whom told us that: 'If they fall on the Urban Jungle<sup>10</sup> they don't want to come in, so they just get up and get on'. Another factor could be the fact that the play space is now physically bigger, which could reduce bullying caused by two groups trying to use the same smaller space for different games.

The reduction in physical injuries was one of the most common points raised by children when asked to compare the different sites:

'In the old school, it was hard to run around. When you fell over, you would scrape your knees and injure yourself' (P5 Boy)

'I really love it [the Urban Jungle] a lot. It is quite a bit better than the last one. If you fell over on the concrete it hurt but here it is soft grass.' (P4 girl)

Parents also volunteered how much they welcomed the fact that their children 'don't have all the graze injuries that they used to get from playing on the old tarmac playground'.

<sup>8</sup> Data were collected at various points in 2008, 2009 and 2010 due to the various postponements in the study. It was therefore possible to provide comparative data for a two week period in November to December in both 2008 and 2010. In 2008, there were two wet play days in this period. In 2010, there was one.

<sup>9</sup> Staff were asked to assess children generally, the research team was not following specific children or specific groups of children.

<sup>10</sup> 'Urban Jungle' is the name chosen by the pupils for the natural play space.

The new astro turf pitch also has a role to play in the reduction of injuries. However, the following quote from a P2 boy is revealing of the role that the Urban Jungle has played in reducing injuries:

‘I have had five accidents on the pitch- I had a bleeding knee and on the tarmac [on the new site] I got a bleeding nose, but never on the Urban Jungle’.

Evidence collected through focus group discussions also suggests that there has been an actual reduction in incidents such as bullying and fights and not just a decrease in the reporting of such incidents. Playground staff attribute this to the Urban Jungle in particular, arguing that:

‘Children get on better when the Urban Jungle is open. There are less arguments and they complain to us less. There is less bickering and they play with each other better.’

We also saw above that the only two incidents of bullying during the reporting period occurred when the natural play space was closed.

## 2.2 Participation in Free, Creative and Imaginative Play

Previous research shows the value of allowing children to engage in free play, whereby they choose when, where and how to play. Such play has been seen to allow children to: express their emotions and inner feelings; come to terms with traumatic experiences; maintain emotional balance, physical

‘They are able to use their imagination more [in the Urban Jungle]. They use it as a den, a prison, a shop. Sometimes the girls just sit and have a wee chat. The tarmac isn’t used if the Urban Jungle is open’. (Playground staff).

and mental health and well-being; develop a sense of who they are, their value and that of others; develop their creative skills; learn social skills; learn to deal with conflict and negotiate; solve problems; develop communication and language skills (Santer and Griffiths 2010). Yet, despite this evidence, time for free play has been markedly reduced for some children over the last few decades (Muñoz 2008; Burdette and Whitaker 2005). Complementary research has also shown that natural play fosters and rewards creative play (Louv 2008). The Scottish Executive’s Curriculum for Excellence also promotes ‘active play’, which includes imaginative and creative play, as a way for children ‘to develop vital skills and knowledge and a positive attitude

to learning (Scottish Executive 2007: 5). It is therefore useful to explore whether access to natural play space has had an impact on children’s engagement in free and imaginative play. We also wanted to explore whether the natural play space facilitated creative play whereby children can create their own play (beit through pretend play or not).

In 2011, children had access to three play spaces, each with quite a distinct reason for being. The first area is the tarmac playground. This is used for eating snacks, playing hopscotch and basketball. This was reported to be the least used space; a transition area on the way to the astro turf or to the natural play space. One explanation given was ‘the tarmac isn’t that good. If you fall you skin your knees so we don’t use it.’ (P5, girl). This demonstrates children’ ability to risk assess for themselves, discussed further in Section 5 of this report.

On the second space, the astro turf, play is more formal and informed by rules: the space is segregated into four zones, each zone for a different age group, football with its accompanying rules is one of the primary activities, other activities are directed and supervised by adult staff. These may include skipping, tennis or other activities. Equipment and therefore permission needs to be sought in order to play these games.

‘Sometimes we play disease on the Urban Jungle, but sometimes gymnastics is good on the pitch. We see how we feel. To sit and chat, we can sit on the benches, in the housey things on the Urban Jungle’ Girl.

The natural play space aims to allow for free, informal, un-directed play where all age groups and interests can come together and children can play at will. The topography and features were

designed to be varied: the children can run down the hill, jump over the tree, roll down the grass embankment, play on the logs, dance in the amphitheatre space, explore the meadow, weave through the willow tunnels and cross and climb over the wooden bridge.

### Three observations are worth pulling out in relation to free and creative play.

The first point to make is that the **three spaces combined facilitate free play as they enable children to make choices** about what space they would like to play in and therefore what kinds of games they would like to play (and the kind of social norms that they want to abide by at a given time). This was welcomed by children, who repeatedly affirmed that they liked to choose where to play, as shown in the quote boxes. It is also important to note that not all children chose to play on the natural play space. Some children clearly preferred to stay on the football pitch and not play on the Urban Jungle. These appeared to be a minority, however, consisting principally of older boys playing football. Most children enjoyed the opportunity to vary which space to play in and did so, changing between the natural play space and the astro turf.

### Secondly, the natural play space itself provides an enhanced space for free and creative play.

In the baseline study, it was seen that children were using the play time available to engage in free play. They described a rich range of play activities. They described 20 'favourite' activities, from complex team games to simply playing alone or walking and talking. However, it was also observed that there were circles of children around the support staff at break time, with some children telling the staff that they were bored and cold. This pattern was not evident during the 2011 research on the natural play space. As one playground staff confirmed 'There was more boredom in the old site'. It would therefore appear that the new space has provided additional stimulation for children who were perhaps lacking stimulation in the old play space.

The 2011 study revealed that the children's desire to play freely and delve into their imaginations had in no way been impeded by the new space, as the quotes and photos in this section show. Interestingly, the games referred to in the 2008 study were still being played in 2011. However, they appeared to have been enhanced by the new terrain. For example, 'Hidey Tig', is a game that has benefited from the additional hiding places afforded by the natural play space: 'the best place to hide is the Urban Jungle, there are more places to hide than on the pitch'. New games have also been invented to reflect the new surroundings. For example, 'King of the Hill', which uses the hill provided by the new topography, or 'Jungle City' (a take on 'Urban Jungle').

The theme of **variety of options available** to children was also frequently cited when referring to the natural play space: planting trees, jumping from the wooden logs, sitting and relaxing alone on the benches, playing in the stone circle under the bridge, pretending that the willow dome is an igloo, pretending that the log is a ship, pretending the wooden houses are secret dens, relaxing on the grass, running up and down the bumpy bits. These were in addition to the formalised games that children engaged in regularly, such as those mentioned above.

Of course, imaginary play also occurred during the baseline study. However, one staff member expressed that 'Children will always have imagination but this space helps'. Parents also expressed their view that their children's imaginations were flourishing in the new space 'They play on the

#### Examples of imaginative games

'I like to play Round the World in 80 minutes. You explore and go to different places. One time we went to China and there was an earthquake. I play it all over the place. My best place is the Urban Jungle because you can explore. It is like the actual setting of the game. It is like the Amazon forest.' (Boy)

'We are disguised as other people. I am disguised as a racoon. I am disguised as [Jane]. And we are spying. And we are trying to disguise our voices. And we are spying on the grownups. We are trying to recover the queen's stolen jewels.' (Girl)

'We are trying to make a fire under water as we're in an air bubble but it turns out we were rubbing a giant squid's tentacle and the giant squid was in a bad mood anyway.' (Girl)

bridge and imagine that there are trolls and pirates. Any film that is in the popular culture is brought into the space’.



Children have also used their imaginations to claim the natural play space, adapting it for their own purposes. For example, the wooden blocks were originally designed to be for seating but the children use them for jumping, as can be seen in the photo.

The natural play space thus appears to have enhanced the options available for free, informal, undirected and creative play. Arguably, however, the results of this study would have been quite different if



'The Urban Jungle gives you more of a choice to play. It's good fun. We could sledge down hills in winter. Grass is good as you don't hurt yourself. When you do handstands. It's soft. You can be on the grass to relax, its better, it smells fresh. Concrete smells all concrety basically' (Girl, P4).

'The Urban Jungle is fun. I play hide and seek or on the log, I like running up and down the steps. Sometimes I like to play on the pitch and play line tig or tig. We like both.'

the natural play space consisted of flat grass. As one child explained: 'Playing Harry Potter is much better here. On flat ground you can't imagine things. The trees, the steps are great'. Staff felt that the different contours of the natural space and the use of

willow tunnels and bushes meant that children feel that they are out of view and could have some privacy, from each other and also from staff. The 'bumpy' bits were regularly mentioned by children:

'The Urban Jungle is a great place. It is the best. It is a great bumpy little place'. (P2)

'I like the Urban Jungle because there are lots of bumpy bits and hiding places. You can run up and down the bumpy bits' (P3)

**The third observation is therefore that a varied topography is a critical element of the benefits observed from this particular natural play space.**

### 2.3 Children's happiness, mood and self-esteem

Recent research shows that natural settings can lead to restorative outcomes in terms of mental wellbeing in young people (Forestry Commission 2009a). The researchers were thus interested to explore whether there had been any differences in children's happiness, mood and self-esteem. Focus group discussions, transect walks<sup>11</sup> and informal conversations were used to ask children

<sup>11</sup> A participatory method whereby the children took the researcher for a walk around their play spaces,

about their feelings before and after playtime. The study did not attempt to put children into groups (for example, children suffering from ADHD or depression) and the observations are therefore general observations from a mixed group of children, who were willing to share their feelings.

In the baseline study, it was seen that there **was a mix of feelings at playtime**. Around half the 30 children interviewed said that they felt 'happy' as they could play with their friends, mix with children from other classes, play games, have freedom from work, fresh air, eat snacks and run around. Others said that they felt 'frustrated that there is not enough to do' or 'annoyed as it is always the same games and people fall out when choosing games which is frustrating'.

In 2011, the vast majority of feelings reported were related to positive emotional wellbeing:

'I feel happy when it's sunny. There are lots of fun things to do on the Urban Jungle. If the skipping is out I will do that. You get fresh air, not in a stuffy classroom, there are so many of us squashed up in a class'. (P3)

'I would like a maze so that I could stay there and never find my way out' (P2)

'We are closer to nature, it is nice fresh air, in the classroom it gets sweaty.'

'It is good to get a break from work. Sometimes it is really hard and you need time to think about it.

Sometimes you are stressed and you need to exercise and relax' (P5/4)

'I feel excited. I think 'no work for 15 minutes'. I feel happy.'

'You are not just playing but learning, bringing computer games to life, doing drama.' (P2)

'I like it when it is cold and I can smell the air'.

'I want to eat my snack quickly so I can go and play.'

'I think 'freedom''

'I feel happy and hungry' (P6)

'It makes me happy, excited... hungry' (P2)

'It is nice to share a playground with the smaller ones so we can play together'. (P5)

In terms of negative emotional wellbeing, one P6 expressed anxiety at playtime: 'I feel anxious, like, what are we going to play today. Sometimes people are unhappy with what others want to play'. This was not specifically related to the natural play space but to playtime in general.

Another child expressed upset with playing in the cold: 'I like it when it is sunny but not when it is too cold and hurts my knees.'

Feelings of upset and sadness were expressed on days when the Urban Jungle was closed<sup>12</sup>:

'The Urban Jungle is closed if it is muddy and wet. I am upset when it's closed as I like to go on it.'

'When it's muddy and we're not allowed on it, I feel upset and sad as I can't go on the bumpy bits. I like going through the willow.'

In the baseline study, **feelings after playtime were mixed**. An important source of frustration was the cloakroom space which was too small. Some children expressed sadness about having to do more work but for most this depended on the subject that they were going into and whether or not they enjoyed it.

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describing what came into view and providing an opportunity for informal discussion based on observation.

<sup>12</sup> No data was available on the exact number of days in the year that the Urban Jungle was closed. Over a 46 day period from November 2010 to March 2011 during which teachers monitored play for the purposes of this study, the Urban Jungle was closed for an additional 11 days compared with the other play spaces.

In 2011, sentiments were less mixed. The majority of children expressed dissatisfaction at the end of playtime:

‘At lunchtime I feel annoyed as you think of a good game and the bell rings and then you forget about it the next day. When things just getting really good, the bell rings’.

‘I feel like screaming’.

‘Boo (signs of pulling out hair and pulling faces)’

‘I feel sad, I feel ‘unfreedom’’

Again, it is not possible to generalise as one child stated:

‘I feel brilliant. I like to work, more than to play. I don’t like playing outside’.

It is worth noting that when children were asked about their old play space, their most positive memories were focused on the natural elements: ‘I miss walking up the trees in the forest’ and ‘I remember the old puddle that got icy’. The latter comment opened up a period of group reminiscence about The Puddle.

Within the scope of this study it was impossible to assess how children’s mood during playtimes affected their mood throughout the remainder of the day, or in the longer term. However, playtime did appear to be a time of positive mood for the vast majority of children. There is some evidence to suggest that there is enhanced wellbeing as a result of having the new natural play space and it would be worth investigating the link further.

## 2.4 Interaction of different children with each other and with the space

In the baseline study, there was a good mixing of age groups but there was clear gender segregation, as is often the case in children of this age group and examples of children who were keen to avoid playtime. On the basis that play is not just about exercise and that play time is not just about play, the research team were also keen to explore whether the natural play space had affected the social interaction of different groups of children and whether different groups of children were getting their needs better met.

**Age:** One of the benefits of the natural play space most often cited by children was the interaction of older and younger children. In the baseline study, there was already good interaction, where possible. However, the play spaces were age segregated by staff, with one space for the younger children and one for the older children. In the new school, this model has been replicated on the astro turf area, which is zoned into four areas according to age group. The natural play space is thus the space for different age groups to play together. And they were visibly playing together. Older children have modified the terrain to make it more accessible to the younger children, carving foot holes into the grass steps so that the little ones can also climb up, as the photo shows. Due to the lack of non age-segregated playspaces in the Baseline study, it is difficult to state confidently that the enhanced age group interaction is solely due to the space being a natural play space specifically<sup>13</sup>.



<sup>13</sup> It was seen that the tarmac playground, while also non segregated, is not a popular choice of play space.

What is also evident is that the natural play space offers opportunities for different behaviours, a space where social norms existing elsewhere are waived: 'The older ones run about in a way that they wouldn't on the pitch, they are more likely to let their hair down a bit, to dance around up there. But they wouldn't do it on the pitch' (playground staff member)<sup>14</sup>.

**Addressing Diversity of Needs:** Staff reported that the natural play space also provided an alternative space for children who may not feel comfortable in the busier, more organised astro-turf space or where children can 'escape from people they don't want to be with'. This was confirmed by children who talked about how they could go and 'sit on top of the hill on benches or go into the wicker dome and chat'. Children and staff were aware that the natural play space offered opportunities to children who may not want to engage in the more common forms of play, as the below quotes reveal:

'He's an expert at maths. He doesn't like football and he used to sit in a corner, now he can join in the activities in the Urban Jungle where it is quiet' (Boy)

'People who aren't that good at sport or tig or chasing might not feel great. They might go into the rock space in the Urban Jungle as you can relax there. If you don't have much friends or you could join in the activities there. It's quiet.' (Girl)

'Sometimes they want to be on their own. In the Urban Jungle they can be alone without sticking out'. (Playground Staff)

'Before they used to just hang out at the benches. There were the ones who used to just wander alone. Now they are running around so when they are alone, they are having fun alone, running around the Urban Jungle'. (Playground Staff)

This is not to say that the natural play area has removed all forms of peer pressure. One boy explained that 'I am mostly on the pitch, most of my friends are there. I would choose the Urban Jungle if my friends were there. We always do the same games on the pitch.' (P5/4 boy)

It does, however, confirm studies showing that varied green play spaces suit a wider array of students and promote social inclusion, when compared with conventional turf and tarmac school groups (Louv 2008: 220). Louv discusses findings that show that when children play in an environment dominated by play structures, rather than natural elements, they establish their social hierarchy through physical competence. In the study cited, access to natural play space led to the emergence of more creative children as leaders, children using more fantasy play and their social standing becoming based less on physical abilities and more on language skills, creativity and inventiveness (Louv 2008: 88).

In terms of addressing diversity of needs, it could be suggested that the natural play space does not accommodate children with physical mobility difficulties as well as a flat space would, although it would be possible for a wheelchair to be used on the natural playspace. One other concern could be that the fact that there are more places to 'hide' in the natural play space might mean that staff are less aware of loners or of bullying incidents and may therefore not be able to offer necessary support. However, staff are able to monitor the space as no spaces are in fact out of sight of the patrolling staff.

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<sup>14</sup> In a study of Forest Schools (Lovell 2009), it was noted that both girls and boys and different groups of children got involved and were active.

**Gender:** In view of studies showing a trend towards boys having greater opportunities than girls to play outside<sup>15</sup>, it was also critical to explore the gender component of children's use of the natural play space. The baseline revealed a strong gender based distinction in terms of play activities and friendship groups. To what extent has this been replicated in the new space? One might assume that the football friendly astro turf would be the primary domain of the boys, with the natural play space the primary domain of girls. This was not the case, however. In fact, as seen above, the natural play space provided a 'safe' space for boys who do not want to play football to run around, have fun and be less obviously 'not playing football'. In turn, it was apparent that there were more girls playing football in 2011 than 2008. One girl explained why: 'Before we didn't like football, now we do. There are bigger goals, the boys encourage us to join in. They want bigger games. If we miss a shot, they encourage us, they say better luck next time' (P6 girl). The participatory photography also revealed a mixing of girls and boys in activities, unlike the participatory photography during the the baseline line study which showed clear gender segregation in activities. This could be as the natural play space allowed for a more diverse range of play, which enabled girls and boys to find common play interests but again further study would be needed to assess this conclusively.

## 2.5 Participation in 'natural' play

It has been seen that the natural play space has increased opportunities for free, creative and imaginative play. Is it more than just an adventure playground though? Has it increased children's experience of nature? Is the school using the space to encourage children to engage with nature or just for increasing physical space and exercise?

The baseline study revealed that children sought to and managed to engage with nature, despite the lack of a natural environment in which to play. This type of play, was, however deemed to be too dangerous or too dirty, principally by adults but also by some children. The natural spaces that might have been available to the children were locked off (the wildlife garden) or considered to be too muddy (the waterlogged grass space), as the quotes below reveal:

### 2008

'Playtime is boring. There is not much to see and we never use the wildlife garden as we can only go in with an adult' 2008

'We have to keep telling them not to do things that come naturally to them because of the concrete and there is no mesh over the pond in the wildlife garden.' 2008

'They love climbing up the pole in the shed or the railing behind the tree. They are not allowed because of the concrete which is hard and dangerous if they fall.' 2008

### 2011

'The Urban Jungle is amazing, there is not one bit of concrete. We were looking for that. There are more places to hide now. In the old one we made up a route to get into the wildlife part. (P6, girl).

Dirt was a strong part of the discourse for the children, parents and staff in both the baseline and the 2011 study, despite not being a pre-defined interview topic. 'Dirt' came out strongly in 2008 as being 'a bad thing' for staff and parents. Children gave a mixed message, stating that getting dirty was not good but naturally veering to muddy puddles and damp leaves for their play.

The discourse was radically different in 2011. Staff stated how children are now expected to come to school 'kitted out for being outdoors and for getting muddy'. Parents joked about how 'it certainly

<sup>15</sup> Studies reviewed by Lester and Russell (2010) show that girls tend to have restrictions placed on their opportunities to play outside through parental prohibition, for reasons associated with cultural expectations and safety concerns and, more indirectly, through girls' greater responsibility to perform domestic tasks.

makes them muddy', that 'even my P1 girl who is a girly girl gets muddy' and 'it is evident from their footwear and clothing that they are not just sitting around'. One parent said that 'dirt isn't an issue. It can be a problem if you are constantly washing clothes but we come to expect it. The fact is that my child loves coming home with mud on him and loves coming to school'.

Children interviewed in 2011 appeared to be enjoying the mud: 'I would like more mud, mud's amazing' and 'My trousers are all muddy but I don't care. I don't mind. They can go in the washing machine'. None of the children mentioned their experience of mud negatively, as one staff member said 'there is no fuss now about mud'.



In addition to mud, the natural play space has also allowed the children to interact with plants and insects. Staff told how in the summer children go to the meadow area and watch for insects and make paths through the long grass. The children also told of how they enjoyed weaving the willow and watching the buds grow. A parent stated that her daughter now comes home asking about nature: 'She is quite interested in nature now. Where does willow come from? She is interested in creepy crawlies'.

As in the baseline study, in 2011 children were still drawn to the trees. One group of children were observed spending all their available time playing around one tree:

'This tree is called Wally. We are playing the Wally game. We decorate it with pine cones. We play Indians. Sometimes we sit and pray [demonstrates a meditation pose], sometimes we sing'.



One teacher remarked on how the ripe, juicy apples on the apple tree remained on the tree. She remarked that the children were 'respecting the tree as they have planted so many themselves'.

The data collected thus shows that the natural play space has had some positive impacts on factors which may influence children's emotional wellbeing. This includes a reduction in the level of reported accidents and bullying at playtime, enhanced opportunities for imaginative and free play at playtime, enhanced opportunities for children that may not want to engage in conventional playground activities and enhanced opportunities for interacting with nature at playtime. As seen in Section 1.1 of this study, there is evidence that children's interaction with nature leads to ongoing appreciation of and use of nature as an adult. This is seen to essential to the individual's own personal wellbeing but also to environmental conservation (Pyle 2003).

The next section will explore whether there has been a benefit on children's physical wellbeing.

### 3. Natural play and children's physical wellbeing

In this report, we refer to physical wellbeing in the sense of physical health. We wanted to know whether the natural play space had any impact on children's exercise levels: both in terms of quantity and quality of exercise. We also wanted to know whether impacts were gendered.

The design of the natural play space encourages children to use different muscle groups: steps up, climbing, balancing, bending, jumping, leaping, running up, running down. The various photos and quotes in this report demonstrate that children have taken up this diversity of options for different forms of physical exercise.



“We get much more exercise here. We have loads more space for running about. It makes your heart pump. You can imagine a giant lives on top’. P4, girl.

In order to provide a quantitative measure of any changes in physical activity, the research team asked children to wear pedometers<sup>16</sup> at play time. They did so over the three day research period, in both 2008 and 2011. A selection of pupils from four year groups, P2, P3, P5 and P6 were tracked. These were the same children that participated in the focus group discussions, although not all children wanted to participate in the pedometer exercise. Each child was allocated a specific pedometer that they had fitted prior to each of the play times. During each of the data gathering periods there was a novelty aspect of wearing the pedometer that seemed to affect some pupils, leading them to potentially be more active than they normally would. This appeared to be consistent in both 2008 and 2011, however.

25 full sets of data were gathered in 2008 on 10 boys and 15 girls. 23 full sets were collected in 2011 on 14 boys and 9 girls. Five children were involved in both years' exercises. The age group of the children selected was the same in both years.

The graphs below show visually the differences in the mean number of steps and minutes of physical activity recorded at the 2008 baseline and 2011 follow up.

<sup>16</sup> The pedometers were 'New Lifestyle' (NL1000). The physical activity minutes recorded by the NL 1000 are the number of minutes above 2.9METs. For example 1 Met is equivalent to sitting quietly at rest and 8 METs is equivalent to jogging.

**Chart 1. Mean total number of steps recorded over both morning and lunch time intervals**

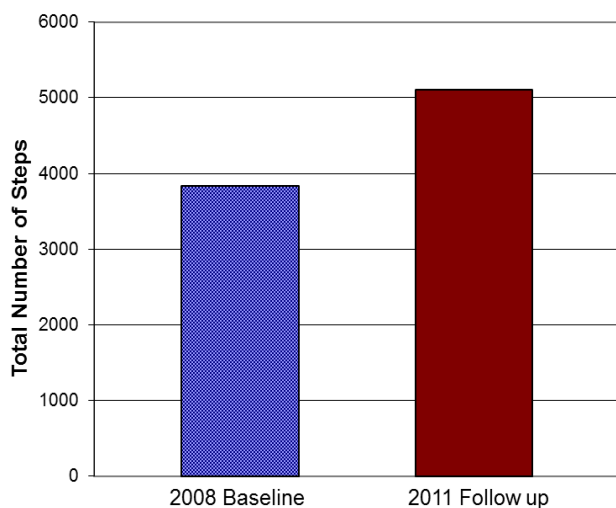


Chart 1 shows the mean number of steps accumulated across both the 15min morning playtime and the 45min lunch playtime. In 2008 the number of mean steps was 3836 and in 2011 this increased to 5104 steps. An 'unpaired t-test'<sup>17</sup> showed a significant difference in the number of steps between baseline and follow up. This means that it is unlikely that the difference between baseline and follow up is due to chance. In other words there is something about the new school playground that is causing the children to take more steps and take part in more physical activity. It is not possible to say, however, that this is solely due to the natural play site as others factors have also been contributory, as discussed in Section 1 of this report.

**Chart 2. Mean total number of minutes of physical activity recorded over both morning and lunch time intervals**

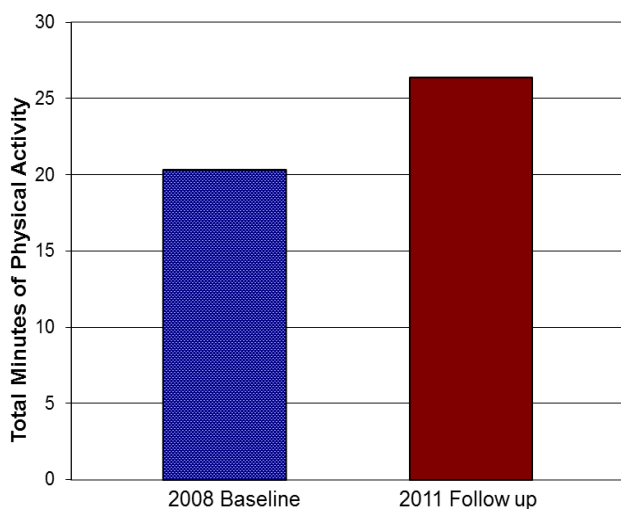


Chart 2 shows the mean number of minutes of physical activity, above 2.9 METS, accumulated across both playtimes for the baseline and follow up. In 2008, the mean accumulated minutes of physical activity was 20 minutes and 33 seconds. This **increased in 2011** to 26 minutes and 39 seconds<sup>18</sup>.

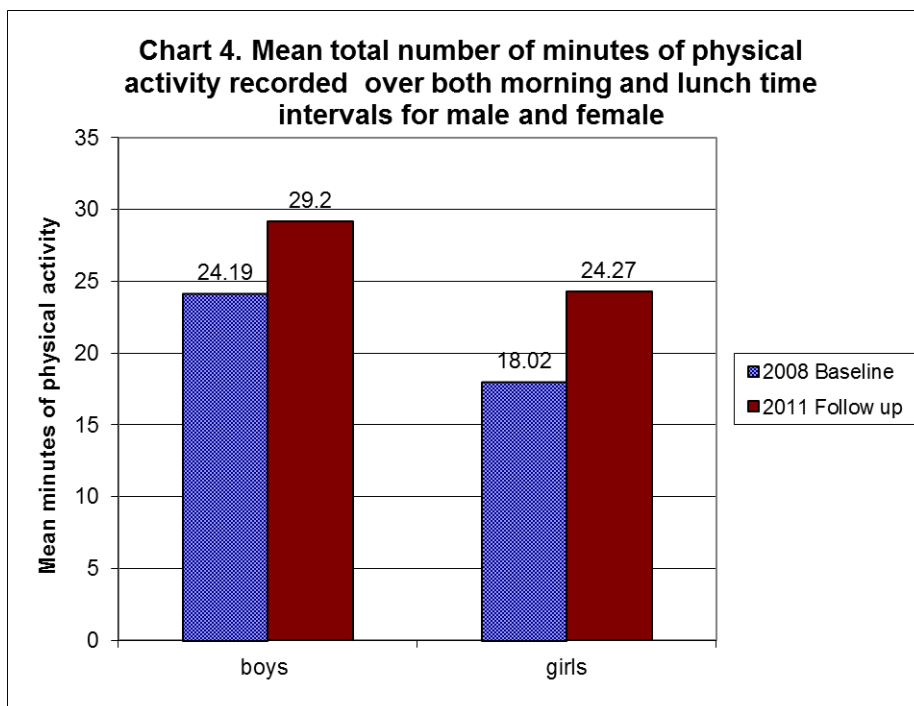
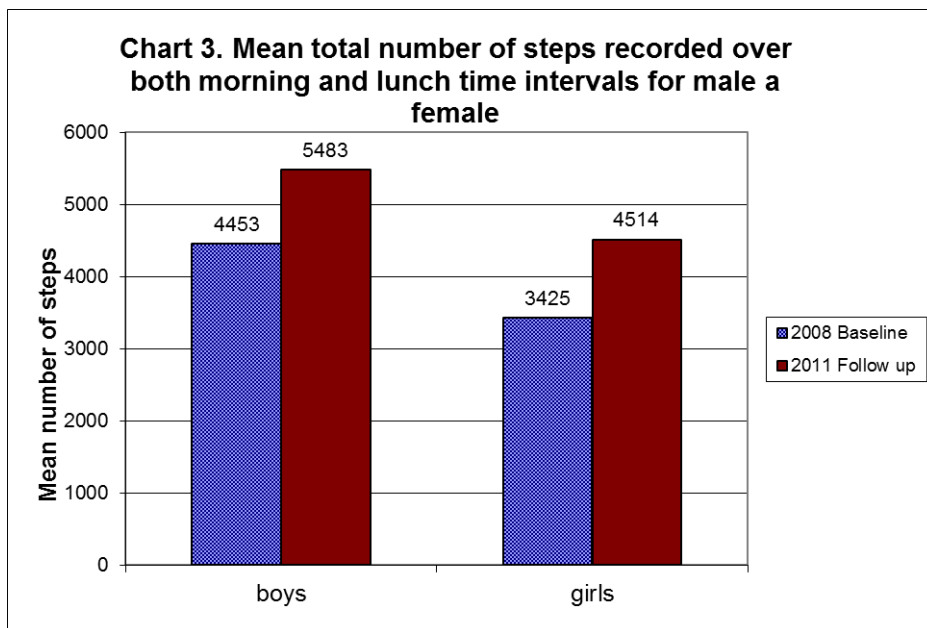
**Baseline pedometer data gathered showed a significant difference between boys and girls in the number of steps and minutes of physical activity accumulated.** This pattern was consistent with previous studies from both Britain (Stratton, 2000) and the United States (Sarkin et al., 1997) that have shown that boys are more active than girls during playtime. It is possible that the significant differences in physical activity between baseline and follow-up seen in Charts 1 and 2 could be a result of there being proportionally more boys in the follow-up than the baseline sample. It was therefore important to analyse the 'boys' and girls' results separately, to rule this out as a possible explanation. The research team were also interested to see whether activity levels in the new play space still varied according to gender, as they had at baseline.

Chart 3 shows the mean steps accumulated and Chart 4 shows the mean minutes of physical activity accumulated for both boys and girls at baseline and follow up. **Both boys and girls increased their steps and minutes of physical activity from baseline to follow up.** At follow up, there was **still a significant difference in the minutes of physical activity and number of steps between boys and**

<sup>17</sup> 'Unpaired' means that the data were collected from two different groups of children and not from the same individuals.

<sup>18</sup> Again an unpaired t-test showed a significant difference in minutes of physical activity above 2.9 METS,  $p < .05$ , between baseline and follow up.

girls. These continued differences are not entirely unexpected, given the many factors which influence children’s activity levels, discussion of which is outside the scope of this study.



Thus, there is evidence of an **increase in both the number of steps and in the minutes of physical activity that both boys and girls and across all of the year groups accumulate over a day**. It seems very likely that this increase is, at least in part, attributable to the move to the new school grounds. The significant increases shown in the graphs above are encouraging and will further contribute to the pupils attaining the recommended 60 minutes of moderate physical activity a day and the recommended number of steps<sup>19</sup>. The increase in mean number of steps per day from baseline to follow up was 1268 along with 6 minutes more moderate level physical activity per day. This increase is equivalent to 10% of their daily recommended minutes and steps. These significant increases can be attributed in part to the natural play space that was incorporated into the school

<sup>19</sup> It has been recommended that girls should accumulate 12,000 steps per day and the boys should accumulate 15,000 steps (Tudor-Locke et al 2004).

playground. How much of this increase was due to the natural play space will require further investigation.

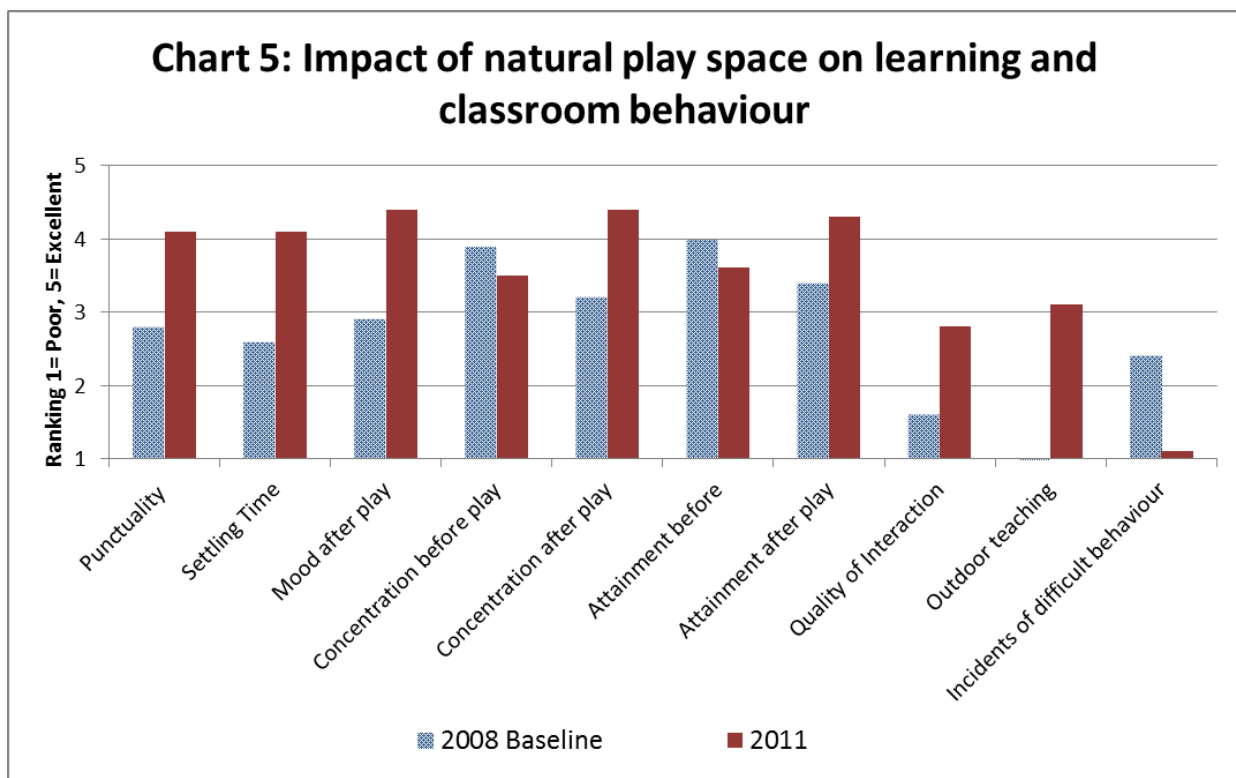
Annex 5 provides more detailed data in tabulated form.

#### 4. Natural play and learning

There is research to indicate that not only is playtime important in providing children opportunities to develop their social skills, but that it is also important in helping children to concentrate on learning activities in the classroom<sup>20</sup>. There is rather less evidence, however, on how playtime specifically in natural spaces influences learning. One of the key elements of this research was therefore to see whether natural play had an **impact on children’s learning**, when compared with children’s play on a traditional tarmac and turf playground. This was explored in terms of children’s classroom-based learning, their learning about the outdoors and their learning in the outdoors, as well as in terms of factors which might influence children’s learning, such as concentration levels.

Teachers were asked to complete weekly reporting forms for their class in order to assess the impact of play on punctuality, settling time, mood, concentration in class, attainment levels, quality of social interaction with other pupils and the teacher, outdoor learning and incidents of difficult behaviour. Teachers were asked to rank each of these on a five point scale, with 1 representing ‘poor/low’ and five ‘excellent’. The teachers were also asked to keep track of incidents of difficult behaviour and how often they used outdoor space for teaching.

Chart 5 below compares the data collected in 2011 with the 2008 baseline. The data was collected from the same forms each year (P2, P3, P5 and P6).



The data shows a reported:

- **increase in punctuality when returning to class after play.** This is an interesting finding as one might expect that the fact that children appear to be less bored and having more fun, as shown

<sup>20</sup> Pellegrini and Holmes (2006) .

in Section 2, would mean that they would be slower in returning to class than in 2008. This gives rise to the hypothesis that children are more satiated by their natural play and ready to come back to class. However, this would require further study. It should also be noted that the new school building also allows for better access to the indoor space as well as to pegs for hanging coats. This will also have an effect on punctuality when returning to class.

- **improvement in the time needed to settle** back into class.
- **improvement in mood after play**
- **decrease in concentration levels and attainment levels before play. This could be due to higher levels of excitement before going out to play but further study would be needed to clarify this finding.**
- **increase in concentration levels and attainment levels after play.** Focus group discussions with teachers provided a qualitative assessment of why there has been an improvement in concentration and attainment levels after play. According to two teachers: 'children are calmer after the break. More than before. They are running off steam, enjoying their play and making up a lot of their own games.' 'There is more engagement in the classroom. Children are more relaxed, healthier. There is less trauma from playtime coming into the classroom.' This finding is supported by Louv, who cites various studies showing how being close to nature helps boost attention span (2010: 105).
- **increase in the quality of children's social interactions,** with each other and with the teacher. This is discussed further in Section 5.
- **decrease in incidents of difficult behaviour.** The direct impact of the natural play space itself on this indicator is measurable. Survey data from the playground staff confirmed that when the Urban Jungle is out of bounds there are more incidents of children arguing (see Section 2.1). Again, this supports Louv's argument (2008) that workers who have views of trees and lawns are more enthusiastic in their work and experience less frustration.
- **significant increase in outdoor teaching time.**

In the old play space, teachers rarely taught outdoors. The data shows that in November 2008, teachers reported outdoor teaching time as being 0.5 times a week on average. In March 2011, this had gone up to 3 times a week. A number of reasons for this were given and it is evident from the following quotes from teachers that the natural play space has played an important role:

'We use the outdoors space all the time now. We spent an afternoon outside doing snow maths, weighing and measuring the snow. We did snow putts'.

'When it is a nice day the school is empty, we are all finding spaces outside. For example, the P1s need to run outside and find words. For technology, we build dens. Children do their own drama on the section of the Urban Jungle that looks like an amphitheatre. We have done planting, bird watching'.

'The Curriculum for Excellence is making us go outside anyway but now we have the space to do it. Now we have a better facility. Before it didn't stimulate us or them. We were worried about the children falling on the concrete as that would mean you couldn't do the lesson and you would have to worry about the parents.'

'Anything that you do outdoors is seen to be leisure, an activity that the children enjoy. They can make more noise out there when we do drama. It would be disruptive in a classroom. There is a whole different aspect to being outdoors'.

'It is good in the afternoon when the children are tired and restless. 3-4 classes can go out at the same time. You don't have to timetable or plan it. Before you could only go out one class at a time'.

One teacher reported how she could not get the children to settle down and read. She took them outside and they immediately calmed down and settled down to read. The meadow area was reported as being a stimulating area for learning, for photography and drawing. One lesson on the topic of Romans was taken outside and P5 children made swords and re-enacted the war between

the Scottish and the Romans on the Urban Jungle. The natural play space is thus also enabling teachers to implement Curriculum for Excellence requirements.

Staff also expressed how children themselves are taking their learning outdoors. A lesson on fairy dens was taken into the children's playtime games. Participant observation confirmed this, with one group of boys spending each break time building their own fairy den in the Urban Jungle. See photo and quote below.

'This is the fairy den. This is the wee door, we blocked the other doors so the coldness didn't come in. We put grass there to make it nice and warm inside. We need some sprinkles to make the fairy house nice and warm [sprinkling grass as talking]' P1, boy.



In the focus group discussions, children expressed that taking part in the design committee has taught them how to budget and to prioritise needs in line with an available budget. While this is not strictly a learning result caused by access to natural play it has been a learning outcome of the wider process of developing a natural play space.

## 5. Other Impacts

### 5.1 Ability of pupils to risk assess

In recent years, there has been a backlash against 'uninspiring play spaces that do not enable children to experience risk' and a call for a shift away from a system of risk assessment to a system of risk-benefit assessment, where potential positive impacts are weighed against potential risk (Young 2010: 37). The Scottish Government has also endorsed a risk benefit approach to risk assessment and has highlighted the long-term benefits of play and exposure to moderate risk as instrumental to physical health and the development of resilience and mental wellbeing (see Play Scotland 2010<sup>21</sup>).

In the baseline study, risk was a common theme in adults' discourse: the risk of getting dirty, the risk of falling off a tree, the risk of going into the wildlife garden. As a result, climbing trees and going into the wildlife garden unsupervised was not permitted and getting dirty was frowned upon by all.

The experience of the natural play space has led to a dramatic shift in discourse by all concerned. In 2008, any potential risk meant that play was stopped. In 2011, a playground staff member suggested that 'a zip wire would also be good', which indicates the extent to which perceptions of risk have changed as a result of the experience.

Children playing on the natural play space are now being asked to risk assess for themselves. They are in fact being given the responsibility to make risk assessments and the older children are being asked to risk assess for younger children. Staff have noted that this sense of 'I am in charge of deciding if it is safe' has given children increased confidence and a sense of responsibility.

This is quite different to 2008 when it was seen that adults felt that children were not able to risk assess for themselves and that it was for the adults to remove potential risks. The baseline data showed, however, that children were able to risk assess for themselves. Children were actively

<sup>21</sup> See also, Gill 2010.

selecting which games to drop when they appeared to be too dangerous. They also demonstrated an awareness of which games adults assessed to be too dangerous but which they felt that they could carry on playing.

The experience of natural play has thus led to a **change in discourse around risk assessment**. In addition, it has led to a **change in behaviour**. Staff reported that children's exposure to risk and responsibility for assessing risk has led to increased resilience. This was seen in Section 2.2 where we saw a reduction in the reporting of accidents.

Staff behaviours have also changed through exposure to natural play, as the quote boxes shows. The staff are now more confident about children taking risks. Staff have received training and encouragement and their experience is showing that children are able to risk assess for themselves. Instead of saying 'don't go on that path' they are allowing the children to risk assess for themselves. Parents interviewed highlighted that their children were enjoying their new found freedom. As one parent said 'They love it, They love the fact that they can do things without being told off, discovering things while playing'.

'With the right of having the natural space, comes the responsibility of taking reasonable risks. They just dust themselves down and get on. We tell the parents at the start of the year that it is their responsibility to dress children appropriately. Not one parent has complained and the demand for the school has increased.' (Headteacher).

'We want them to be on it, they want to be on it so sobeit. We have changed. You get confident about letting them get on and get muddy. We are seeing less accidents, they are better at judging what they can and cannot do. (Playground staff)

The photos below and the following conversation are illustrative of how the natural play space is encouraging children to explore risk:

'I play in the Urban Jungle. Me and my friends like to put our hands on the bridge and put both legs between the ropes and hang upside down and then do a backflip down'.

'I bang my head when I do that'

'Well you need to go higher. I taught her that and today she managed it' (Conversation between two P2 girls)

Perhaps reassuringly the conversation continued with a discussion of how soft the landing was under the bridge:

'It is really fun on the bridge, you can do acrobatics, it cushions your landing. When you play tig or disease and someone blocks you on the bridge you can jump off'.



## 5.2 Adult -Child Interaction

Louv (2008: 106) argues that improved access of children to natural play spaces also leads to **improvements in adult-child interactions**. The teacher questionnaires revealed that there had been

a significant improvement in the quality of children's interaction after play time, as opposed to before playtime, with each other but also with the teacher (see Section 4). On a scale where 1 signifies poor quality of interaction and 5 represents excellent interaction, teachers ranked interaction as being 1.6 in 2008 and 2.8 in 2011. Again, it is important to note that this may be a result of a combination of the natural play space and the astro turf. It was also seen above that children were enjoying being able to play without 'being told off', due to playground staff allowing children to risk assess more for themselves.

### 5.3 Teachers' wellbeing

The question of **teacher's wellbeing** was not a topic of the research. However, it came up in two different ways. The first example related to the long period of snow that Scotland experienced in winter 2010-2011. In most schools, children were not allowed out in the snow due the dangers of icy tarmac playgrounds. However, the natural play space remained open as the snow did not pose the same risk on grass. One teacher explained the impact of this on teachers:

'Other schools were not letting their children out into the snow. Teachers were tearing their hair out. It is therefore great for us too.'

The second example of impact came from a child, who volunteered that she felt that her teachers are happier:

'More of the teachers are happier. They are encouraged to use the outdoors. On In Service days a man called Alan did an outdoor learning day with them and they dug dens'.

The impact of natural play on teachers would therefore be worth exploring further. As Louv (2008: 220) argues 'In an era of increased burnout, the impact of green school and outdoor education on teachers should not be underestimated. Teachers too deserve exposure to the restorative qualities of nature.'

### 5.4 Children's engagement with the outdoors out of school time

"...children's ability to experience the natural environment is under threat. Fear and risk, lack of investment, overcrowding and poverty are all restricting their opportunities to spend time outside" (Thomas and Thompson 2004).

In view of reports that children have less time outdoors out of school time, the researchers were interested in seeing whether increased access to natural play at school was having any impact on their access to the outdoors out of school time.

Parents interviewed welcomed the opportunity for their children to have as much outdoor time as possible in view of the fact that their children are mostly inside out of school time:

'Most children do play in the house. That's why it is so great here [at the school]. They encourage them to go outside. At home it is an easy option to keep them inside. They don't want to go out if it is raining but at school they just do it. It's a peer thing. If they see other children on the pitch they have to get on it. They want to go to breakfast club so they can get on the space and the pitch. We know they're safe here if we let them out.' (Parent)

Safety is clearly a concern for parents: 'We have a communal garden. I don't feel safe letting them out alone.'

In one focus group discussion, children were asked whether they would choose to play indoors or outdoors at home. Four chose outside, three chose inside. In the other groups, there was also a rough split:

'I don't play outside at the weekends. I stay inside. I have virtual things to do'. (P2, girl)

'I usually play inside on my Nintendo Wii all day'. (P3, boy)

'I don't get a chance. I have piano, gymnastics, ballet. Friday I'm free'. (P2, girl)

'I play outside every day. I play in my back garden. Sometimes with my Dad, sometimes on my own'. (P2, boy)

'I play football and Frisbee with my Dad in my garden' (P3, boy)

'In my garden, I play hopscotch with my brother or tig'. (P3, girl)

This is similar to the findings in the baseline study. As in the baseline, the choice to be outside was related to the seasons: 'in summer, I ride my bike every minute of the day but not in Autumn or Winter.'

One parent reported in 2011 that her son is now wanting to spend more time outside:

'They do want to be out more now. My son was a home boy, now he has more friends, there are more out of school outdoor clubs. It used to be chess, now it is golf as they have the facilities.'

This would indicate that it is not only the natural play space that is encouraging children to have more time outdoors. It is also a result of having better facilities, school encouragement and peer pressure.

Thus, while there is some data showing that some children are wanting to be outdoors more, it is not possible to conclude that this is a direct result of the natural play space in and of itself. Furthermore, safety concerns outwith school continue to limit the possibilities of children having independent outdoors play time.

## 6. Is it possible to make a value for money case for natural play spaces in school settings?

The build cost of the natural play space cost was £65,512. The two major funders were Forestry Commission Scotland and Glasgow City Council. Additional funding was secured from the local area committee school fundraising and a private company, Renewable Energy Systems.

Having assessed the positive impact of the natural play space on children learning and well-being, the research team was interested to explore this extent to which these impacts represented good value for money. How did the build cost of a natural play space compare with the cost of building a traditional tarmac playground?

In order to provide a cost comparison, Glasgow City Council Development and Regeneration Services assigned a quantity surveyor to provide detailed build costs for a traditional tarmac playground to be built on the same space. The costing for this build was calculated at £63,784. Therefore the cost of upgrading to a gold standard natural play space was only £1,728, which, in line with the benefits outlined in this report, represents excellent value for money.

Another way of assessing value for money was to assess the development cost of the natural play per pupil per school year. The calculation showed that the development cost was equivalent to approximately £31 per child per school year over a seven year period, at which time the build costs will have been paid up<sup>22</sup>. In view of the benefits cited above, this would also appear to be good value for money.

## Conclusion

Conducting a 'before and after' study has been a helpful way of evidencing the impact of introducing a natural play space into the school environment. The research highlights some key findings, worthy of further study and analysis.

The research has shown that the natural play space offers a multi-choice space for play to suit different play styles and personalities. Indicators of emotional wellbeing appear to have improved and opportunities for enhanced social interaction as well as solitude, where needed, have been provided. Natural play appears to provide an important alternative to football/ tarmac based activities on flat ground. It allows children, who may not appreciate such activities, to thrive and flourish at best and, at least, not be singled out. Varied topography was seen to be a critical component of these outcomes.

Physical activity levels have also increased. This cannot be solely attributed to the natural play space as the astro turf space has had an important role to play. However, observation alone clearly demonstrates that physical activity is a key activity on the natural play space. Incidents of accidents, injuries and bullying have gone down dramatically, despite (and perhaps because of) the encouragement of children to risk assess for themselves. Outdoor learning has increased, indicating that natural play spaces are complementary to the 2010 Curriculum for Excellence for Outdoor Learning. The research also indicates that natural play may also be beneficial for teachers and in enhancing children's access to and enjoyment of nature and outdoor play. The natural play space has offered a rich and stimulating environment where children are able to learn to engage with nature. The participatory nature of the design process has resulted in a space which has been chosen by children and parents and is therefore wanted, needed, used, maintained and fit for purpose.

The study demonstrates that environments surrounding school buildings can be improved by working in partnership to design and build high quality outdoor spaces that support healthy behaviour- including physical activity and exercise, stimulation of the senses, increased interaction between different year groups, interest groups and between boys and girls and an increase in the aesthetic experience of contact with nature.

It is thus clear that there are significant benefits to engaging children in natural play within school settings, benefits that appear to come with a similar price tag to the traditional tarmac playground. Natural play is an important initiative that Local Authorities and Education departments can take to create, transform and revitalise school grounds with respect of the human experience, encouraging greater use of the outdoors by staff and pupils. Natural play spaces provide a positive distraction from hard engineered spaces consisting of tarmac and concrete and incorporate quiet reflective areas for children to flourish and develop their imagination while learning to engage with nature.

## Next Steps

Forestry Commission Scotland will use the natural play development at Merrylee Primary School and the associated report as a best practice example. It will showcase what can be delivered within school grounds and the benefits thereof in order to encourage similar developments. Specific actions will be required to this effect. These include:

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<sup>22</sup> There are 300 children in the school, each staying in theory for seven years. If £65,512 is divided by 300 and then by 7 the total cost per child per year comes to £31 for the period 2010 to 2017. At which point the construction costs have been paid up.

- Encouraging education departments to consider natural play for any new build or school redevelopment.
- Highlighting the gap in planning between built and natural environments surroundings schools.
- Producing a design guidance booklet which includes case studies.
- Facilitating visits to natural play sites for headteachers and planners.

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## Annex 2: The Research Process

### Methods

The study took a participatory and inclusive approach<sup>23</sup>. It included children, teachers, parents and playground support staff. The methods used were identical to that used in the baseline in order to allow for comparability. A wide selection of quantitative and qualitative methods were employed to enable triangulation of findings and to explore as many research questions as possible.

- **Participant observation** was conducted at morning break and at lunchtime over a period of three days. The researcher observed play in all play areas, aiming to engage in informal discussions with as many children as time and opportunity would allow for. The researcher observed the full range of activities described by children in the focus group discussions as well as in the informal discussions. These included pretend play, football, hopscotch, skipping, basketball and playing on the various options available in the Urban Jungle. Photographs were also taken to capture the rapid changes in activity.
- **Children:**
  - **One hour focus group discussions** with 30 children from P2, P3, P5 and P6 (an average of eight per group) in 2008. In 2011, 29 children also from P2, P3, P5 and P6 participated, five of whom were also involved in the baseline study. Participatory methods such as drawing, ranking and ice breakers were used. In order to ensure random selection of participants, children were asked by teachers to volunteer their names if they wanted to be included in the research. In 2008, names were then drawn randomly out of a hat. In 2011, children were randomly selected by the headteacher and asked if they wished to participate.
  - **Physical activity measurement:** Each of the focus group participants were given pedometers (New Lifestyles NL-1000) to measure their physical activity levels. The pedometers measured not only the number of steps taken but also the minutes of physical activity above 2.9METs (Metabolic equivalent, METs, is the unit commonly used to gauge the intensity level of physical activity. For example 1 MET is equivalent to sitting quietly at rest while 8 METs is jogging). They were fitted with these at the beginning of each play time and returned them at the end. Each pupil was given the same pedometer over the 3 days.
  - **Participatory photography:** children in the focus group discussions were given disposable cameras and asked to take pictures of what they liked and did not like about their current play space. The photography took place while the children were also wearing the pedometers. Three or so children shared a camera and were asked to take around eight photos each.
  - **Transect walks:** Children that the researcher met during the participant observation sessions at playtime were asked to take the researcher on a walk around their different play spaces. This provided the opportunity to see spaces that the researcher may not have known were there and also to talk in a relaxed way with children about what was being shown.
- **Teachers:** A focus group discussion was held with nine teachers in 2008 and in 2011. The majority of the teachers that took part in the discussions were the same in both years.
- **Playground support staff:** A focus group discussion was held with four playground support staff in 2008 and five in 2011. Three playground staff were involved in both years.
- **Parents:** seven parents of children selected to participate in the baseline research participated in a focus group discussion. Seven parents also took part in the follow up study. Only one parent participated in both years' discussions.

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<sup>23</sup> Any quotes used are non-attributable to individual children. Permission was obtained from parents to take photographs of the children.

In addition, **teachers completed weekly reporting forms** for their whole form to monitor indicators such as concentration levels, attainment levels, quality of interaction with each other and staff, use of outdoor space and incidents of difficult behaviour. They were asked to complete these for one month. **Playground staff completed daily reporting forms** to monitor accidents, injuries, bullying and other incidents as well as children's mood at play time. They were also asked to complete these over a one month period. These reporting forms provide triangulation and quantitative data to substantiate the qualitative data obtained by the focus group discussions.

Data collection centred on the following:

- Current play space:
  - Activities children currently engage in
  - Benefits and Challenges of current play space: Children's physical activity levels, self confidence and self esteem, resilience and ability to risk assess
  - Interaction of different children and different abilities/approaches to using the space
  - Accidents, injuries, bullying and other incidents that may occur at playtime.
  - Impact of playtime on formal classroom time
  
- Children's engagement with the outdoors out of school time
  - Frequency and type

In 2011, additional data were collected aimed at drawing comparisons with the old play space. This centred on:

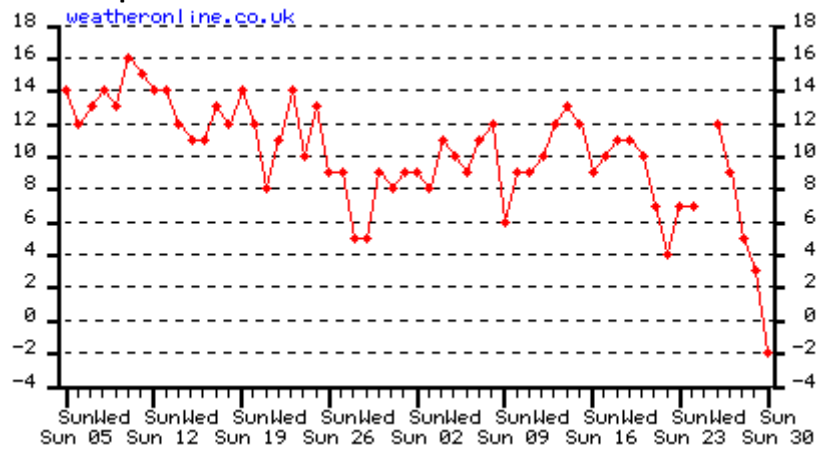
- Reflections on differences between the old and new play space. This included observations on any differences in play, in incidents observed, in formal teaching time and on children's development.

## Annex 3: Weather Data

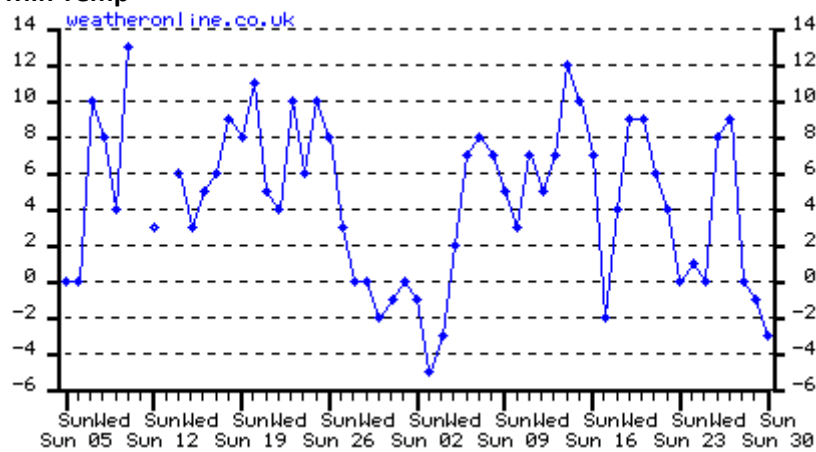
Weather data – supplied from [www.weatheronline.co.uk](http://www.weatheronline.co.uk)

26-28<sup>th</sup> Nov 2008

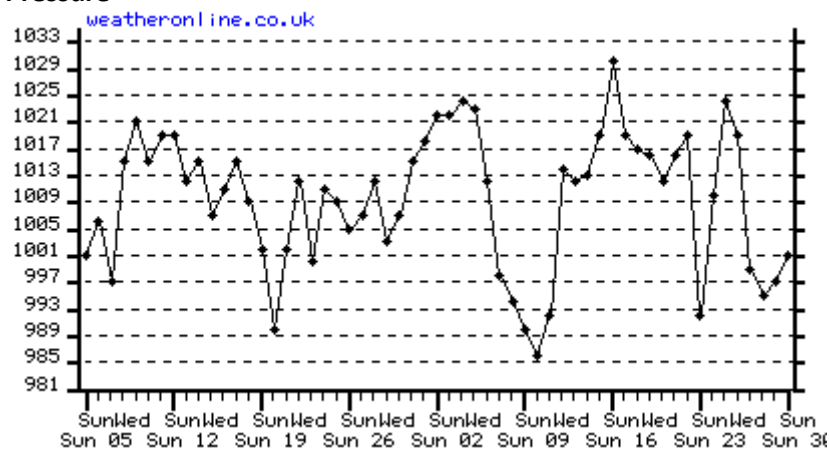
### Max Temp



### Min Temp

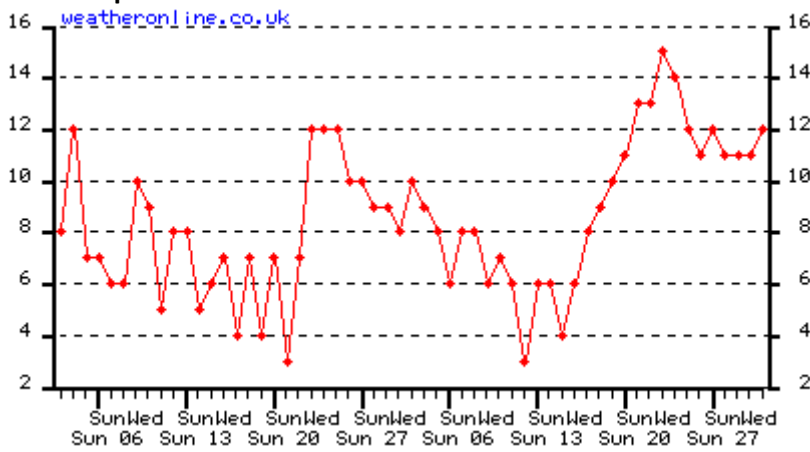


### Pressure

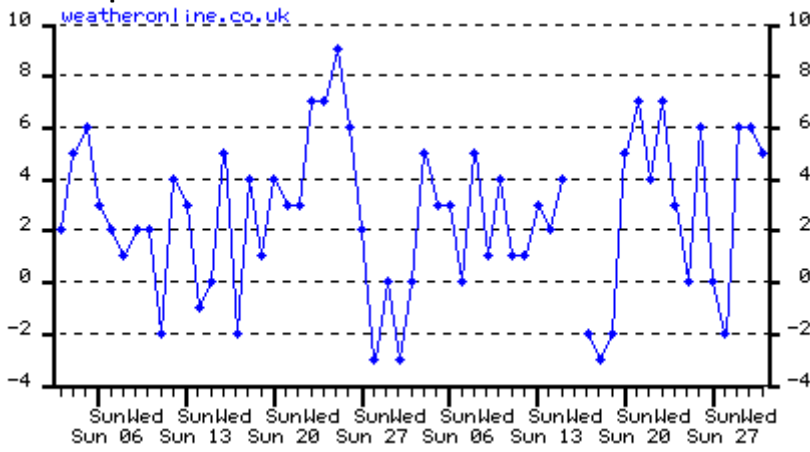


2<sup>nd</sup> -4<sup>th</sup> March 2011

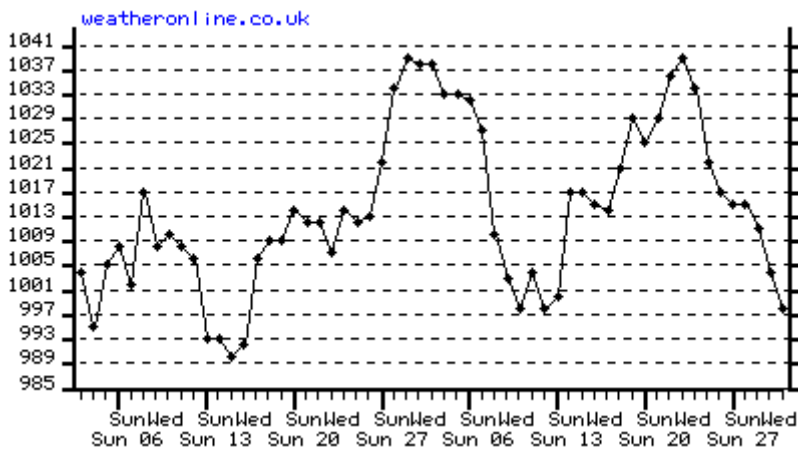
### Max Temp



### Min Temp



### Pressure



## Annex 4: Photos of Merrylee 2008 and 2011

### Merrylee Primary School 2008



### The Playground



### The playground for the younger children



### Merrylee Primary School grounds 2011- natural play space hatched in zigzag lines.



## Annex 5: Pedometer Findings

Below are 3 tables that summarise the data gathered from the pedometers.

### 2011 Summary Data

**Table 1: Mean data gathered over the 3 days.**

	summary of the 3 days	
	Mean (Stdev)	steps per minute (Stdev)
mean steps morning break	1977.22 (807.57)	131.81(53.84)
mean steps afternoon break	3126.96 (1079.50)	69.47 (23.99)
<b>TOTAL</b>	<b>5104.18 (1111.31)</b>	
Mean time (minutes), morning	10.38 (4.57)	
Mean time (minutes), afternoon	16.01 (6.53)	
<b>TOTAL</b>	<b>26.39 (6.43)</b>	

**Table 2: Data break down for male and female**

	Female		Male	
	Mean (Stdev)	steps per minute (Stdev)	Mean (Stdev)	steps per minute (Stdev)
mean steps morning break	1833.22 (859.00)	122.21(51.27)	2069.79 (768.96)	137.97(51.26)
mean steps afternoon break	2680.78 (1203.65)	59.55(26.75)	3413.77 (893.65)	75.84(19.86)
<b>TOTAL</b>	<b>4514 (1120.57)</b>		<b>5483.56 (1069.39)</b>	
Mean time (minutes), morning	9.59 (5.16)		11.03 (4.46)	
Mean time (minutes), afternoon	14.28 (7.39)		18.17 (5.58)	
<b>TOTAL</b>	<b>24.27 (6.53)</b>		<b>29.20 (6.29)</b>	

**Table 3:  
Data  
break  
down for  
each  
class  
group**

	P2		P3		P5		P6	
	Mean (Stdev)	steps per minute (Stdev)	Mean (Stdev)	steps per minute (Stdev)	Mean (Stdev)	steps per minute (Stdev)	Mean (Stdev)	steps per minute (Stdev)
mean steps morning break	1844.39 (675.53)	122.99 (45.03)	2185.47 (650.63)	145.70 (43.38)	2177.11 (1012.60)	145.14 (67.51)	1721.76 (794.20)	114.78 (52.95)
mean steps afternoon break	2993.17(1132.41)	66.51 (25.16)	3281.80 (1191.44)	72.93 (26.48)	3607.28 (946.25)	240.49 (63.09)	2507 (937.21)	167.13 (62.48)
<b>Total</b>	<b>4837.56 (1088.05)</b>		<b>5466 (1095)</b>		<b>5784.39 (1207.84)</b>		<b>4228.76 (945.55)</b>	
Mean time (minutes), morning	9.46 (3.59)		11.26(3.52)		11.58 (6.24)		9.18 (4.54)	
Mean time (minutes), afternoon	15.40(7.18)		17.45 (7.22)		20.27 (5.34)		12.35 (5.50)	
<b>Total</b>	<b>25.26 (6.31)</b>		<b>29.11(7.22)</b>		<b>32.25 (7.18)</b>		<b>21.53 (5.34)</b>	

## 2008 Summary Data

Table 1: Mean data gathered over the 3 days.

	summary of the 3 days	
	Mean (Stdev)	steps per minute (Stdev)
mean steps morning break	1269.87 (513.22)	84.66 (34.21)
mean steps afternoon break	2566.65 (879.07)	57.03 (19.53)
<b>TOTAL</b>	<b>3836.517(968.421)</b>	
Mean time (minutes), morning	6.39 (3.26)	
Mean time (minutes), afternoon	13.53 (5.31)	
<b>TOTAL</b>	<b>20.33 (5.58)</b>	

Table 2: Data break down for male and female

	Female		Male	
	Mean (Stdev)	steps per minute (Stdev)	Mean (Stdev)	steps per minute (Stdev)
mean steps morning break	1162.73 (468.96)	77.51 (31.26)	1430.57 (542.12)	95.37 (36.14)
mean steps afternoon break	2262.75 (867.16)	50.28 (19.27)	3022.5 (687.52)	67.16 (15.28)
<b>TOTAL</b>	<b>3425.484 (886.793)</b>		<b>4453.067 (1010.494)</b>	
Mean time (minutes), morning	5.53 (3)		7.48 (3.46)	
Mean time (minutes), afternoon	12.08 (5.22)		16.30 (4.42)	
<b>TOTAL</b>	<b>18.02 (5.20)</b>		<b>24.19 (6.05)</b>	

**Table 3: Data break down for each class group**

	P2		P3		P5		P6	
	Mean (Stdev)	steps per minute (Stdev)	Mean (Stdev)	steps per minute (Stdev)	Mean (Stdev)	steps per minute (Stdev)	Mean (Stdev)	steps per minute (Stdev)
mean steps morning break	1295.07 (550.69)	86.34 (36.71)	1345.48 (632.79)	89.70 (42.19)	1286 (400.55)	85.75 (26.70)	1120.83 (513.64)	74.72(34.24)
mean steps afternoon break	2794.33 (766.78)	62.10 (17.04)	2869.76 (758.00)	63.77 (16.84)	2211 (846.35)	49.14(18.81)	2301.62 (914.57)	51.15(20.32)
<b>Total</b>	<b>40489 (1005.768)</b>		<b>4215.238 (1034.715)</b>		<b>3497.333 (802.816)</b>		<b>3422.45 (945.728)</b>	
Mean time (minutes), morning	6.33 (3.32)		7.27 (4.16)		6.12 (3.08)		5.56 (3.18)	
Mean time (minutes), afternoon	15.05 (6.02)		15.40 (4.51)		11.43 (4.59)		12.24 (5.20)	
<b>Total</b>	<b>21.38 (6.31)</b>		<b>23.08 (6.08)</b>		<b>17.46 (4.57)</b>		<b>18.21 (5.28)</b>	