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Introduction

There are four primary objectives to the University’s current ten-year development plan:

- Internationalisation
- Inclusivity
- Excellence
- Sustainability

The management of the campus landscape has strong associations with both excellence and sustainability. One of the key points of the excellence objective is to enhance the quality of the campus and its facilities. This is important because, among other things, an attractive campus will help to attract both high quality staff and students to work and study at York, which in turn will benefit the University’s standing and reputation.

In terms of sustainability and the environment the University is committed to minimising and recycling waste, increasing biodiversity, promoting energy efficient transport, and managing carbon output effectively. The management of the landscape contributes in some way to all of these objectives.

The University campus is a public open space, but this is not its primary function. First and foremost it is home to nearly 16,000 students, added to which it is a place of work for several thousand more staff. In this way the campus is almost like a small town, with residents who require facilities and services to be able to fulfil their roles, whether this is learning, teaching or research. These demands bring a different set of pressures to bear on the campus and its landscape than those associated with a public open space in the truest sense of the phrase. In other words, the University campus may well be a public open space, but it is not a public park.

The University of York celebrates its 50th Anniversary in 2013. In relative terms the University is therefore still young. More importantly it is still growing; it is still expanding. It is dynamic. The recent expansion to Heslington East is the most obvious manifestation of this.

The growth of the University inevitably puts pressure on the landscape, which is often compromised as a result. This in itself presents the challenge of managing the landscape to mitigate the impact of these pressures and to ensure the campus remains an attractive environment for the students and staff to live and work in and for the local community to be able to enjoy.

The Heslington West end of the campus offers a variety of different landscaping possibilities, from the very formal surroundings of Heslington Hall and the Yew Gardens through to the woodland and naturalistic margins, inbetween which is contained a classic parkland landscape with a serpentine lake running the full length of the campus at its centre. Due in no small part to its careful planning and design during the early history of the University, the landscape is highly regarded by many and makes the campus as a whole an attractive and pleasant place both to live and work.

In 2008 the University embarked on the development of a major new extension to its campus. Although close to the existing campus, the new development is big enough to have generated its own identity as distinct from that of the existing campus. Heslington East, as the new development is now termed, has quite clearly defined guiding principles and philosophies which are driving the on-going establishment of the landscape, including management, habit creation and biodiversity action plans. In this context it is important that the existing ‘Heslington West’ campus is not overlooked. This document seeks to address this and encourage a uniformity of approach to the principles and practices employed across the whole University estate.
History and development

While petitions were drawn up as early as 1617, permission to establish a university in York was not granted until 1960. The development of the University and its vision was headed by Baron James of Rusholme, the University’s first Vice-Chancellor. With Heslington Hall and the King’s Manor as the primary venues, the University opened its doors in October 1963 to 230 students and 28 staff.

In 1964, work began to expand the University campus to the marshy land around Heslington Hall. The development included landscaped parkland with a central man-made lake, innovative covered walkways, and the many CLASP buildings seen around campus.

By the end of the decade (and on schedule), the University of York’s campus included five colleges, three laboratories, Central Hall, the JB Morrell Library, the sports hall and the Sir Jack Lyons Concert Hall. Undergraduate enrolment had increased to 2,500 students.

“Without doubt the landscape of York University has proved to be imaginative and highly successful. This quality is largely due to the University’s demand for high standards, incorporating a well-designed landscape. The care shown by Robert Matthew Johnson-Marshall and Partners in the design is reflected in the finished scheme, which is maintained in a positive way by a dedicated Grounds Maintenance Staff” *(Country Life, September 1971)*

The University is renowned for its skilfully designed contemporary landscape. Designed and built in the early 1960s, the landscape has matured and is now accepted as a classic piece of design. Robert Matthew Johnson-Marshall and Partners (RMJM & Partners) initiated the design of the grounds, the concept for the landscape being developed and followed through by Maurice Lee, Landscape Partner, RMJM.

**Tree planting**

“Intensive tree planting and the creation of a varied and interesting landscape which should form a valuable addition to the city’s public open space”

Originally three scales of trees were to be used:

- small ornamental trees in close proximity to the buildings
- medium-sized trees linking groups of buildings to the site and each other
- large trees which were primarily planted in shelter belts and also intended to relate the University to the surrounding landscape.
Lake

“To improve the poor site drainage... a new land drain system extending across the site was constructed. A surface reservoir was recommended to regulate the water flow from the site and this developed into a large lake which became the ‘show piece’ of the site”

After the mid-1980s the input of RMJM & Partners was reduced to provide a fresh outlook upon the management and ten years ago Hal Moggridge (Colvin & Moggridge) was engaged to carry out a review of the University landscape, which assessed both the strategic and practical measures required to conserve and improve the landscape, several of which are listed below:

- define the lakeside landscape, keeping it free from vehicles and utilities
- reinforce the framework tree planting, creating avenues into the central campus
- open and conserve views across the lake
- have open space swept back across grass away from the water’s edge
- plant a second generation of long-lived broad leaved deciduous trees
- undertake extensive grassland bulb planting.

To maintain its position as one of the top universities in the world, the University needed to upgrade and expand its campus. In addition to improvements to existing facilities, the University expanded on to Heslington East. The site consists of 117 hectares of land close to the current campus on the outskirts of York. The development of the site includes academic buildings, college accommodation, sporting facilities and community facilities.
Activities and facilities

Leisure provision

The University campus serves as a place of passive recreation for many campus users. During the Summer Term particularly, students use the external environment for informal games, sunbathing, studying outside and general relaxation. Many members of staff enjoy lunchtime walks around campus and taking their lunch outdoors in benign weather conditions. The local public use the peripheral areas of campus as a dog walking facility and many people from the local community like to come on to campus with children and grandchildren to feed the wildfowl on the lake.

A new outdoor gym and trim trail is planned with a potential for 12 exercise locations. The route has already been outlined and will be around 10 kilometres long, circumnavigating both the Heslington West and East ends of the campus.

Sport

Sport is an important aspect of life at the University. The original Sports Centre on the Heslington West end of the campus caters for a range of indoor sporting activities including five-a-side football, badminton and squash. It also houses a comprehensive fitness and weights suite. Outdoor facilities include:

- a floodlit artificial hockey and football pitch
- a floodlit tennis and netball courts
- a 400m running track
- a basketball court
- 40 acres of grass sports pitches used for football, rugby, cricket and lacrosse.

In August 2012 the University opened the new York Sport Village at Heslington East, offering a state-of-the-art sporting and leisure venue conveniently located and easily accessible by cycle, car or public transport. Facilities include:

- an eight lane 25 metre swimming pool
- an 18 metre learner pool
- a floodlit competition-standard outdoor 3G football pitch
- three five-a-side 3G football pitches
- a 120-station fitness suite
- three air conditioned studios for classes such as spinning and yoga
- spa facilities including sauna and steam rooms
- a café.

The local community is actively encouraged to make use of the facilities on offer, with attractive membership rates being offered.
Angling

There is a University Angling Club which is open to all students, members of staff and their families. Membership is available through York Sport Centre provided you also hold an Environment Agency rod licence. The lake on the Heslington West campus was stocked with coarse fish several decades ago. Angling however is not permitted on the new Heslington East lake and it is not intended to stock this water with fish.

Play areas

There is one children’s play area on campus, which is located at Halifax College and caters for the children living in the family housing complex on this site. The play area is inspected annually by ROSPA to ensure compliance with current safety standards.

Events

The campus is used throughout the year for outdoor student events ranging from pop concerts to bicycle repair workshops. The University has a formal process for approving and managing outdoor events and encourages the use of the external environment in this respect within the parameters of making sure outdoor events do not cause a nuisance to the local community.

Arts provision and community learning

Concerts regularly take place at the Sir Jack Lyons Concert Hall. Members of the community are invited to attend the dozens of concerts, lectures and learning events held on and off campus. Our public lectures have attracted over 10,680 attendees and attendance for York Concerts numbered 14,639 for 2010/2011. A full programme of events taking place can be viewed at www.york.ac.uk/news-and-events/events.

The Centre for Lifelong Learning (CLL) offers a range of part-time, open access learning opportunities to the local community, as well as a number of distance learning courses. An online brochure detailing courses offered is available at www.york.ac.uk/lifelonglearning.

Sculpture

There are a number of sculptures located mainly around the Heslington West campus, including a Barbara Hepworth and work by Austin Wright, Dr Thomas Taylor and Joanna Mowbray. A statue of the Bhudda is also located along the side of Spring Lane, close to the Berrick Saul building. Flowers and other offerings are regularly left in the cupped hands of the statue. A comprehensive guide to art on campus can be viewed at www.york.ac.uk/about/campus/art.

Car parking

The University campus contains a number of car parking facilities, designed to cater for all who use the University. Depending on your needs, you may be able to obtain a permit to park. Otherwise, for the majority of the time, you will be required to use one of the pay and display locations around campus.
Across campus there are a small number of free short-stay parking bays, varying in time between 10-45 minutes. Around 30 of these short-term spaces can be found in the car park in front of the Information Centre at Market Square. These spaces operate a no return within one hour policy.

In addition, between the hours of 18:00 and 24:00 Monday to Friday, and 18:00 Friday to 24:00 Sunday, parking is free in the pay and display car parks. The requirement to pay and display will be waived during these times. Note that permit-only car parks are still reserved for permit holders during these times.

Toilet facilities

There are no public toilets on campus; however, all the college nucleus buildings and catering outlets have associated toilet facilities and these are all accessible to the public.

Refreshments

There are a number of catering outlets situated across both the Heslington West and East parts of the campus, providing a range of food styles and types. Many of these facilities are available to all campus users and not just students and staff. There are also now several Costa Coffee franchises operating across campus, from the Roger Kirk Centre at Heslington West to the York Sport Village café at Heslington East.
Health and safety at the University

As with all other similar institutions, health and safety is a primary consideration at the University of York. The University has a Director of Health and Safety and within the health and safety department there is a Health and Safety Officer who has special responsibility for the Directorate of Estates and Campus Services, of which the Grounds Section is part.

The details of the University’s Health and Safety Policy are set out in the Policy Statement and Arrangements Document, which can be viewed at www.york.ac.uk/admin/hsas/Severe%20Weather%20Plan%20.pdf

Ultimately everyone within the organisation is responsible for health and safety, but day-to-day responsibility of health and safety within the Grounds Section rests with the Grounds Maintenance Manager. Safety of work is governed by generic risk assessments and safe systems of work. All work carried out should be in accordance with the appropriate risk assessment and safe system of work. Where a body of work needs to be carried out which is not covered by a generic risk assessment, a specific risk assessment will be produced for the work prior to its execution.

Working in accordance with risk assessments and safe working systems will sometimes require further control measures to be met:

1. Wearing personal protective equipment (PPE) – wherever practical all staff should have their own dedicated PPE which they maintain in good condition, reviewed regularly and replaced as necessary.

2. Acquiring safety data sheets from which to produce Control of substances hazardous to health (COSHH) assessments.

3. Servicing, maintenance and inspection of machinery and keeping up-to-date service logs.

4. Testing equipment for hand arm vibration levels and determining maximum exposure limits.

5. Providing regular staff health surveillance in respect of hand arm vibration and hearing capacity.

6. Provide, where necessary, operator training including aspects of health and safety training.

7. Measuring the angle of slopes and making staff aware of those which cannot be driven across.

8. The maintenance of records and inventories pertaining to the use of equipment and pesticides.

9. Having in place suitable disposal systems according to waste streams generated.

10. Maintaining satisfactory stocks of important materials, for example spill kits.

11. Providing satisfactory and legislation-compliant storage facilities for materials such as fuels, pesticides, fertilisers etc.

12. Providing a measure of job rotation for staff to limit the effects of carrying out a specific task.

13. To have documented procedures in place to deal with emergency situations which threaten people, buildings or the environment.

14. To provide adequate and comfortable welfare facilities for staff to enable them to perform their duties safely and comfortably.

The University is very aware that the campus is an important public open space to local residents and in response to this the University has a specific risk assessment to cover the public and other campus users. The risk assessment is available on request and covers the following topics.

Security

The Security Centre is manned 24 hours a day, 365 days a year. The Security Department provides 24 hour a day patrols both on foot and in vehicles. There is campus-wide CCTV coverage which is constantly monitored from the Security Centre. The crime rate on campus is low compared to the national average; however, the Security Department’s aim is to reduce crime on campus by five per cent year on year. The Department uses a ‘traffic light’ system to track performance, where green indicates a decrease, amber a static figure and red an increase. This enables the Department to target their resource to reduce ‘red’ areas. Statistics on campus crime are available on the Security Department website and can be viewed at www.york.ac.uk/admin/security/statistics.
From a grounds perspective, the section co-operates with Security in helping to improve security of the external environment by pruning trees where they compromise the effectiveness of external lighting or CCTV cameras. Shrubs and hedges are also pruned to improve visibility splays and in specific areas which are particularly vulnerable to opportunist theft, the Grounds Section has planted shrub types such as Roses, Berberis and Pyracantha in an attempt to deter theft.

**Tree safety**

Since 2002 the tree stock on the University campus has been regularly surveyed by an arboricultural consultant. Surveys form the basis of the on-going management of the tree stock, particularly with regard to maintaining it in a safe and healthy condition. Initial rationale was to survey all trees on a five yearly cycle. This however has recently been refined and a ‘traffic light’ system has now been adopted, whereby trees are divided into red, amber or green categories depending on the level of risk which they pose. In essence, a large fairly old tree in close vicinity is better off being removed than risk an incident, which could feasibly have occurred.
proximity to buildings or areas of high people usage would be categorised as red, whereas a small tree standing in an open space well away from buildings or people would be categorised as green.

Red trees are surveyed on an annual basis, amber trees on a two to three year cycle and green trees on a five year cycle. When carrying out surveys it is good practice to rotate the time of year when they are done. This will give the consultant an opportunity to inspect trees in different seasons, which gives the broadest possible opportunity to spot problems that may otherwise not manifest themselves at other times of the year. When surveys are carried out it also gives an opportunity for the consultant to re-classify individual trees if they feel their size, condition or age warrants it.

A proportion of the Heslington West part of the campus lies within the Heslington Conservation Area. Any work required to trees that fall within its boundary needs to have approval from City of York Council before it can be undertaken. Most tree work carried out on campus results from recommendations made within the tree survey. A copy of every tree survey undertaken is routinely sent to the Landscape Architect at City of York Council and approval for all works is sought, whether it lies within the conservation area boundary or not. This informs the City Council about what is happening in terms of tree management and helps to maintain good planning relations. There are currently no individual tree preservation orders in force on either Heslington West or Heslington East.

**Lakes**

There is no overt signage on campus that relates to lake safety or prohibitions regarding its use. Apart from angling, recreational activities are not permitted on the lakes. Even the feeding of wildfowl is discouraged because of associated problems with pigeons/vermin and water quality issues.

Water quality is monitored in respect of algal blooms, with water samples going to the Environment Agency between April and October on a monthly basis. If algal blooms are found to be present, notices advising campus users not to have contact with the water are placed in locations around the lake periphery, within the water to deter their removal.

In November and April every year signage is placed in the lake to warn campus users of thin ice and not to venture onto the surface.

**Snow clearing and gritting**

Over the winter period between the months of November to March inclusive, the Grounds Section operates a snow clearing and gritting service for the University. The operation consists of an early planned attendance system whereby weather forecasts are checked on a daily basis and a decision is made the previous day as to whether staff need to be at work early to clear and treat roads and paths.
A problem specific to the University is the problem of wildfowl droppings, which is a result of having a large body of water on campus. The Section operates a Nilfisk R5500 sweeper to try to keep on top of this problem and the Section has recently invested in a Glutton external vacuum, which has proved very effective at dealing with all kinds of external litter from cigarette ends to discarded fly posters, including the up-lifting of goose droppings. Grounds staff are also now responsible for the cleaning of external bin bays, cycle stores and bus stops.

All University buildings are non-smoking and smoking is now only allowed outdoors. To service this, cigarette bins are located ubiquitously across campus in areas popular with smokers and are emptied on a frequent basis by the Grounds staff.

Dog fouling

Many local dog walkers use the University campus but dog fouling itself is not a serious issue. Most dog walkers stay on the periphery of campus, walking through predominantly woodland areas. University signage asks that dogs be kept on leads while on campus and most people comply with this request. Signage to this effect is not yet in place on Heslington East, but a programme of signage is planned which will provide this within a wider framework of campus rules. Dog waste bins are not provided on campus. There are several signs on Heslington East which specifically ask dog walkers to clean up after their dogs, but they are expected to take the waste off site with them. Putting dog waste in litter bins is discouraged, as it would contaminate waste that currently goes into the recycling stream with offensive waste. Estates Services have formulated a policy regarding dogs on campus, which can be viewed at the Grounds Section’s web page.

Vandalism and graffiti

Both of these are low level problems on campus. Some episodes of vandalism are a consequence of student ‘high jinx’ and where these can be traced back to the culprit, fines are levied to cover the cost of repair or replacement. Most of these episodes are inevitably related to the consumption of alcohol.

Graffiti is a minor issue, no doubt because there are few places on campus which lend themselves to being used as a canvas for urban art. An external cleaning contractor is normally engaged to clean up instances of graffiti.

Litter and cleanliness

External litter collection has recently become the responsibility of the Grounds Section, with six members of staff being employed on a part-time basis to patrol for litter and empty external litter bins. Dealing with external waste is part of the overall waste management strategy and now all litter from external bins is fed into the waste recycling stream, rather than simply going into the general waste stream and subsequently to landfill. This demonstrates that the University is both committed to a clean and safe campus and pursuing its ultimate aspiration of zero waste to landfill.
Grounds staff

The work of the Grounds Section now has three main strands:

- grounds, gardens and landscaping
- grass and synthetic sports fields maintenance
- external cleansing and recycling.

The current establishment of staff within the section is ten gardeners, three sports fields staff and 15 external and recycling staff. Most of the external staff are part-time and so in full-time equivalent terms, there are 8.4. Given that the University estate is now 200 hectares in extent, as well as the King’s Manor in the city centre, the number of staff is fairly modest!

The vast majority of grounds maintenance and sports fields work is carried out by in-house staff. The exceptions to this are specialist activities such as tree work which involves climbing and cutting steep grass banks. Most paving repairs are carried out by contractor, but the Section is looking to take on more of this type of work by trying to recruit staff with these skill sets. A grounds maintenance specification covers the work of the grounds and the sports fields. The University also currently uses the Planon system for managing and allocating work across the different trade groups. This system also generates pre-planned maintenance (PPM) job tickets for specific tasks at appropriate times in the year, for example trimming the yew bushes and planting seasonal bedding.

As with grounds and sports maintenance, much of the new landscaping which takes place on campus (including that associated with development and new build) is undertaken by in-house staff. There is also a model landscape specification, which covers sort landscaping aspects and this is also intended for issue to any landscape contractors that do work on campus associated with development projects.

Training is an important feature of staff development within the section. There are mandatory training requirements in terms of Health and Safety such as lifting and handling and fire safety. The other primary aspect of training is related to day-to-day work and all staff are required to undertake competence training and assessment in a range of disciplines:

- handling and application of pesticides
- tractor driving including reversing with trailers and operating a front-end loader
- driving utility vehicles
- using ride on mowers
- operating hand-held machinery, such as hedge trimmers, brushcutters and pedestrian mowers.

There are several other areas of work, where only a proportion of staff are trained and assessed and these include chainsaw operation, use of hydraulic platforms and applying pesticides through tractor mounted sprayers.

Currently the Directorate of Estates and Campus Services is working towards achieving Investors in People recognition.

Equipment and machinery

The Grounds Section owns and operates an extensive range of equipment and machinery from four-wheel drive tractors with front-end loaders to hand-held battery powered hedge trimmers. A high degree of mechanisation is necessary due to the nature of grounds and sports fields maintenance and the low staff complement in relation to the size of the estate.

All equipment is regularly inspected, maintained and serviced as required, with records being kept for all vehicles. The Grounds Section does not employ its own mechanic and so all major servicing is carried out by local horticultural and agricultural engineers. Vibration testing of all hand-held equipment is also carried out on an annual basis. Operator maximum exposure limits (MEls) are derived from vibration testing, but it can also give early
indications of whether a piece of equipment is in need of adjustment, repair or possibly replacement.

Many of the larger items of machinery are extremely expensive and a rolling programme of replacement for large, important equipment helps to budget for this. For a large equipment purchase a business case is usually produced to justify expenditure. It is however becoming increasingly necessary to look at alternative ways of funding equipment replacement that can be accommodated within annual budgets.

Outdoor furniture

Heslington West has been under development since the early 1960s and some of the artefacts such as low level lighting and benches are still evident on campus. Over decades the quantity of outdoor furniture has increased in response to the steady increase in the number of campus users and the pressures that increased usage has brought. As a consequence there is now a broad variety of different styles of outdoor furniture around campus.

The approach to outdoor furniture in the future will be to progressively try to standardise around adopted styles and materials, particularly in respect of bollards, litter bins and obstacles such as cycle chicanes, with a preference for natural materials, including timber for bollards and natural stone where obstacles are required to control vehicle access or cycle speed.

In terms of maintenance, all external benches are now on a PPM cycle to make sure that they are primarily in a safe condition and also maintained appropriately, whether this be by oiling, staining or painting.

Path network

As with outdoor furniture, the path network around campus is made up of various different surface treatments such as loose gravel, tarmac and paving slabs. Currently surveys are carried out twice yearly on the paths made of paving slabs to identify and deal with any potential trip hazards. There are issues with maintenance and delivery vehicles driving over paved surfaces, which can cause damage. Measures are being taken to improve this situation through the contractor induction process, through which it is stressed that contractors are not allowed to drive over paved areas unless they first put down protection. There are also several key access points for maintenance vehicles on campus which mean having to drive across paved covered ways. These have been identified for strengthening.

Elsewhere on campus there has been a recent programme of path improvement which has involved the replacement of old Breedon gravel surfaces on many of the lakeside paths with tarmac surfaces dressed with buff coloured gravel. The aspiration now however is to progressively move towards laying the buff coloured resin bound gravel that has been used extensively on the new Heslington East part of the campus.

Apart from vehicle damage, there is also an issue with damage to path surfaces from tree roots growing under paths and making the surface heave. This is difficult to remedy in the long term, and certain instances may demand the removal of tree roots to prevent future re-occurrence, in turn affecting the health and stability of the tree. In instances like this the action taken will be decided in view of the individual set of circumstances prevailing.
As part of overall Estates Strategy, the campus path network is being considered in the context of future usage patterns. It is intended that paths will be categorised as:

- pedestrian only
- shared paths for pedestrians/cyclists and University utility vehicles
- shared paths that contractors will also be allowed to access for maintenance purposes.

Sports fields

The current standard of the grass pitch playing surfaces is very good and has been for some considerable time. The objective in managing the sports fields is to maximise the playing capacity for all grass surfaces, but at the same time make sure that the standard of the pitches produced does not deteriorate through over-use. This is an issue because currently the demand for student sport (most notably football) is not fully satisfied, as many of the colleges would like to field 1st, 2nd and 3rd teams.

The maintenance of the pitches is largely governed by the maintenance specification, although the exact timings of maintenance operations is very often governed by the weather. A primary objective of maintaining the sports fields is to produce grass surfaces that are safe to play on. As such, intensive maintenance is often required to produce a true playing surface which is not going to present an obvious hazard to the pitch user.

Going forward, the maintenance of the sports pitches will concentrate on maintaining or improving where possible the current standard. This will be achieved through a combination of keeping up to date with the latest products and techniques through training and recruitment of staff and investment in the right equipment necessary to do the job. By its nature, the maintenance of grass sports pitches probably involves the most intensive use of pesticides and chemicals of any of the work carried out by the Section. As with other areas of maintenance the intention will be to limit this where possible by substituting cultural for chemical controls and the greater use of organic fertilisers.

Although the grass sports pitches are maintained primarily for student and staff use, there is an element of external use of the pitches from outside clubs and the community generally. For example, there are many summer schools offered by the University to local children during the summer holidays and the sports pitches are often used in conjunction with these. Community relations and involvement will continue to be encouraged through making the pitches available when possible to outside user groups.
The key overall objectives of the long-term management of the University environment are to ensure that:

- the long-term interest of nature conservation and the Landscape Structure is safeguarded
- existing wildlife habitats as well as new habitats are conserved
- a sustainable and environmentally friendly approach is adopted where possible for all operational and maintenance activities
- vegetation is controlled to maintain a safe environment for campus users
- there is integration with Biodiversity Action Plans (BAP), both local and national as appropriate
- there is the reuse and recycling of materials and waste products wherever practical
- the use of energy conservation, pollution reduction and resource conservation measures are maintained
- there is the minimisation of pesticide use
- high horticultural, arboricultural and ecological standards are maintained.

Recycling

The ultimate aspiration of the University is zero to landfill. The journey towards this starts with a look at what happens to our current waste in terms of collection and disposal. Our aims are to improve the levels of recycling and to move the remaining waste higher up the Waste Management Hierarchy.

2011 recycling levels were calculated to be around 29 per cent. We are taking steps to increase this figure. This year (2013) we will be changing the way in which we collect and dispose of the waste we generate on campus. We are moving away from asking people to sort their recycling waste before throwing it into the correct bins. From May 2012 we have provided recycling bins which take mixed recycling waste (with the exception of glass which may be included at a later date).

Studies have shown that this mixed method increases the amount of recycling typically by around 25 per cent. Mixed bins make it simpler and easier for the user to recycle and easier for the waste company to collect and transport the materials.

By taking out food waste and waste to be recycled, the levels of residual waste should drop dramatically but will still remain a large percentage of total campus waste. This will go to our contractor to be sorted. Any materials that can be recycled will be removed and any remaining waste shredded and sorted into fine aggregate materials or refuse-derived fuel. This will move our residual waste higher up the Waste Management Hierarchy.

Composting

For many years now the Grounds Section has been shredding and composting the green waste generated from grounds maintenance activities. Green waste is stockpiled for several months until there is a sufficient quantity for a large shredder to be hired in for a day. Once shredded, the material is turned on a regular basis to aid the composting process. After a year to eighteen months the shredded material is then screened in a large rotating drum, with any remaining coarse material being filtered...
out for re-shedding. The remaining material forms a soil improver for use around the University campus.

At present there is a contamination issue with Himalayan Balsam, but the Section is working to systematically eradicate the problem, with the help of student volunteering groups.

**Pesticide and chemical usage**

It would be incredibly difficult to maintain an estate the size of the University without the use of herbicides. However, where practical, it is the policy of the Section to substitute the use of a chemical control with that of a cultural control. Where herbicides are used it is also policy to limit use to those chemicals which have a low or no hazard rating at all.

As well as operator and campus user considerations, it is important from an environmental viewpoint that herbicides are used sensibly. For example a lot of surface run off from the campus may ultimately find its way into the lake and so the use of residual herbicides, which might enter the lake and begin to concentrate there, would be inappropriate.

Fertilisers are still used on the grass sports pitches to a degree, but the availability of the Section’s own composted green waste has the potential to limit the need to use compound fertilisers. In the landscape context, the use of fertilisers other than proprietary organics such as pelleted poultry manure has ceased.

**Water conservation**

The Vale of York is not an area of high rainfall, being in rain shadow from the Pennines. Nonetheless, the amount of watering carried out as part of grounds maintenance is superficial. There isn’t a great deal of summer bedding planted out and although much of it is in tubs, irrigation water is obtained from the lake and water retention granules are incorporated into the planting medium. There are no hanging baskets at all around campus.

When planting trees, it is standard practice to incorporate water retention granules into the backfill and a watering tube into the tree pit. Mulches are routinely used on new and existing shrub planting to help conserve moisture as well as suppressing weed growth.

**Trees and woodlands**

In addition to health and safety considerations, the intention of carrying out tree surveys is to manage the tree resource to perpetuate it. A broad age and species range is required to make sure the tree stock does not reach

The Grounds Section no longer buys or uses peat-based products for horticultural purposes. Peat-free tree planting compost is frequently used, but the emphasis is increasingly on substituting this with soil improvers derived from our own green waste recycling operation. Planting borders are mulched with processed bark or wood chip which has been generated from campus through tree work operations.

It continues to be difficult to avoid the use of peat when ordering in plant material from nursery stock producers. Over time however it is hoped that peat usage in this regard can be reduced through consultation with preferred suppliers.
over maturity and start to decline all at the same time. The surveys also provide information in this regard and thus help in structuring re-planting policies.

Many trees have been planted in various sizes ranging from whips to semi-mature trees, as part of landscaping around new buildings, woodland management and general improvement to the landscape. The objectives underpinning current and future tree planting programmes are as follows:

1. To provide a second generation of long-lived native broad leaves within the wider landscape to provide a long-term framework tree canopy. This was a recommendation made in Hal Moggridge’s Strategic Review in 1992 and is still pertinent to the management of the tree stock. However, the planting of large-growing, dense-canopied trees needs to be avoided close to buildings, especially species which develop structural weaknesses as they mature and are therefore prone to bough breakage and fork failure, for example Silver and Norway Maples, Horse Chestnuts and London Planes. There are significant populations of these species which have been planted close to buildings, paths, roads and car parks and which now present problems in monitoring and management.

2. To increase species diversity – different species have differing life spans which serves to even out peaks and troughs in the overall life cycle of the tree population, ie not all trees decline at the same time leaving a void until the next generation matures. Coupled with this, a broader species range mirrors the University’s function as an institution for learning, which contains a high quality and successful Department of Biology.

3. To introduce more evergreens into the landscape.

4. To move away from species such as Willows and Poplars which decline as rapidly as they mature. Again Willows and Poplars dominate areas of the campus. These species are prone to wind damage resulting in splitting and bough breakage and like the species listed above now represent problems in monitoring and management.

5. To plant more smaller ornamental/exotic subjects in and around buildings and paths for campus users to appreciate characteristics such as flower, fruit, scent, bark patterns etc. Small ornamentals also pose a much reduced risk to buildings and people.

6. To reinforce the stock of native species to attract a diversity of wildlife.

7. To compensate for the loss of trees through the continued development of campus and those highlighted for removal by the survey itself.

Together, the above will also serve to improve the ‘livability’ of the campus by reducing pollution, dampering noise, softening architecturally impoverished buildings and generally introducing a ‘feel good’ factor. Sensible and appropriate management is needed to achieve this in the long term.

Prior to development the Heslington East site was primarily agricultural land comprising many large open fields. Apart from around the periphery of the site there were few mature trees, which has in turn meant there are virtually no large mature trees close to buildings, paths or car parks. Having very few trees in high risk locations simplifies the management of the trees considerably. In summer 2007, the University commissioned a survey of existing trees and hedgerows on the Heslington East development site. Trees were categorised by an Arboricultural Consultant using the British Standard 5837: 2005 ‘Trees in Relation to Construction – Recommendations’ which identifies the quality and value of existing tree stock to inform decisions on tree removal or retention during development.

Future management of the mature tree stock will involve periodic surveys to monitor the health and vigour of the trees. Maintenance work will arise from the recommendations made within these surveys, with approval for all recommended works being sought from the planning authority and subsequently carried out to suggested timescales.

Currently all woodlands on campus are surveyed on a three-yearly cycle. Several of the woodland areas on Heslington West are covered by blanket tree preservation orders and as such it is essential that any work carried out on the trees within these woods has the consent of the local planning authority (City of York Council).

Woodland management is driven by usage. The woodlands on the periphery of the campus are first and foremost amenity areas used mostly by local residents. As such the primary management objective is to ensure the trees therein do not present a hazard to users. Both the woods along Windmill Lane and around the Chemistry car park have had extensive work carried out in this respect and
further woodland areas have been assessed as part of the recent survey.

Although health and safety is the first consideration, one of the most important aspects of the woodland management strategy should be to manage the woods in such a way as to promote and attract a variety of wildlife. To this end it is policy that following tree work as much wood as possible is left within the woodland, either as standing or felled trunks, log stacks and any brash chippings generated used to reinforce woodland paths.

Replanting considerations centre on maintaining the character of the woodland by reinforcing the species already present and helping to perpetuate the woodland by supplementing natural regeneration. Also, by introducing a broader range of species, woodlands can be improved in characteristics such as broadening habitat range, introducing flower and evergreens and generally strengthening the woodland understorey.

Within the landscape buffer zone on Heslington East there are many areas of woodland block planting of various sizes. The primary species are Oak and Ash, but each block contains a broad mix of native species. Planting comprises species of tree, shrub and field heights offering a multi-layered environment into which deadwood piles, roosting and breeding boxes can be introduced.

The plants within the woodland blocks have initially been protected from grazing animals with plastic shelters, with bio-degradable mulch mats placed around the base to exercise some degree of weed control around each plant.

Over the first five or so years of development, maintenance will involve periodic inspection of the planting blocks, whereby guards and shelters will be adjusted where necessary, together with the spraying of a non-selective systemic herbicide around the base of plants to keep them weed free. Herbicide spot treatment will also take place to prevent the encroachment of non-desirable species such as Sycamore.

Plant losses will also be monitored and if necessary replacements planted to ensure the species mix is maintained as originally planted.

Once the canopy begins to close, it will probably be necessary to carry out selective thinning to improve the woodland structure. Once more typical woodland conditions begin to develop the ground flora will be assessed to determine the rate of colonisation of woodland herbs. If this has been poor, introduction of native species through seed and pot plants will be conducted.

**Diamond Wood**

The Woodland Trust chose the 60 acre site of Kimberlow Hill on the Heslington East development as one of 60 Diamond Woods in the UK to celebrate the Diamond Jubilee of Her Majesty Queen Elizabeth II. It forms part of an initiative by the Woodland Trust to plant six million native trees across the UK under its Jubilee Woods project to provide a living legacy to celebrate Queen Elizabeth’s reign. As Patron of the project, Princess Anne planted a ceremonial tree at the wood in September 2012 to officially declare it open.

So far on the Heslington East site the University has planted 55,000 native trees, of which over 30,000 will form the Diamond Wood. Together they will form a mixed deciduous woodland, which will attract a broad range of insect and bird life and develop an interesting woodland ground flora. It is the only Diamond Wood in North Yorkshire and as well as supporting a wide range of wildlife it will provide an attractive amenity for the local community to enjoy.
On a 500 acre campus, where only just over 20 per cent of its footprint is occupied by building/hard standing, a large proportion of the remaining area is made up of grass. As such, grass is an important component of the campus landscape and offers a range of possibilities in its management and treatment.

In specific areas it is appropriate to manage the grass sward intensively, for example around Heslington Hall and within the Vice-Chancellor’s Lodge garden. The aspiration in these areas is to improve the condition of the sward and it is anticipated that operations including fertiliser application, scarification and top dressing will be increased in frequency. The maintenance of both high and general amenity grassed areas is documented in the grounds maintenance specification.

There are several large areas on the periphery of the campus, or under extensive areas of trees that are left uncut for the duration of the growing season. The primary objective here is to encourage biodiversity, but it also has the benefit of saving time on maintenance.

There has for some years been an on-going programme of grassland bulb planting and this will remain an integral part of future grassland management, as it gives a high visual impact for minimal outlay. Many of the grassland areas chosen for this treatment will be under trees and on slopes and represent an attempt to save time on cutting these areas, which are by nature more difficult. Further mixtures of bulb and wild flower planting will also be made in areas which abut the lake. These will typically have a water side association, for example Snakes Head Fritillary, Cowslip and Lady’s Smock.

In the short to medium term the species-poor meadows will be managed by cutting twice yearly: once in March and then again in June. The grass meadows are cut by a local farmer as a hay crop, thus removing the vegetation and, as a consequence, hopefully reducing nutrient availability within the soil. In the long term it is expected that by managing these grassland areas on this basis, nutrient levels will fall to a point where wild flower species can be introduced.

Species-poor hay meadow

As part of the earth works on the new Heslington East campus extension there has been a great deal of mixing between sub soil and top soil in an attempt to reduce the high nutrient levels (particularly Phosphorous). This has taken place because before development the land was in agricultural use and thus highly fertilised. The problem with nutrient-rich soil is that firstly it does not favour the development of species-rich meadows and secondly nutrients leaching out of the soil in ground water will end up in the lake which would adversely affect the water ecology. As part of the nutrient management programme, species-poor hay meadows are being sown down within the buffer zone landscape, with a seed mix intended to take nutrient from the soil year on year until eventually conditions should become more favourable for species-rich meadows. It is impossible to say over what timescale this will prevail.
Species-rich hay meadow

One of the main aims of the landscape development on Heslington East has been to create species-rich hay meadows similar to those described in the National Vegetation Classification. These grasslands normally occur on nutrient poor clay-loam soils and are usually grazed after being harvested. The existing top soil on site was nutrient-rich and therefore unsuitable for the creation of species-rich hay meadows. However, nutrient levels are substantially lower in the sub soil and as large amounts of sub soil were available from the earthworks, this was subsequently applied to the top soil in the Western Buffer zone.

Once established, the species-rich meadows will be cut twice yearly in March and then again at the end of July once the annual species have set seed. As with species-poor hay meadow, a local farmer will cut these areas and take off a hay crop.

Perennial weeds such as Ragwort will be controlled by herbicide spot treatment during late spring.

Excessive grass development will be controlled by sowing Hay Rattle (a parasite on grasses helping favour conditions for wild flowers) in autumn which will locally inhibit grass growth giving less aggressive species a chance to colonise.

Periodic monitoring of the vegetation sward will take place to ensure its compatibility with the national vegetation classification. If species do need to be re-introduced, this will probably be done by plug planting.
Cornfield annuals

Within the buffer zone landscape in high profile locations, areas of cornfield annuals (Poppies, Corn Marigolds and Cornflowers) will be sown. As these plants need cultivated ground to grow, the initial establishment regime will be an annual iterative process as follows:

- Apply non-selective herbicide to the area to kill perennial weeds.
- Prepare the ground by harrowing to create a seed bed into which seed mix is sown. Roll the soil to ensure good contact between seed and soil.
- Cut down vegetation in September after seed is set to make sure ripe seed is dispersed widely.
- The following spring, plough or rotovate the area and sow an additional amount of seed to supplement the natural seed bank.

Shrub beds

As with grassed areas the management of shrub beds is outlined by the maintenance specification, which details the various maintenance operations to be carried out throughout the year. Additional to the maintenance, there are several strands to the ongoing management of shrubbed areas on campus. Wherever possible it is intended that weed control within shrub beds is of a cultural nature and extensive use of wood chip as mulch will be employed along with ground cover shrubs. It is envisaged that most of the wood chip used on shrub beds will have been generated on campus, but occasionally it will be necessary to buy in wood chip from local tree surgeons.

Shrub beds have a finite shelf life and part of their management aims to renew or regenerate ageing or moribund shrub beds. In the process of doing this there is scope for the introduction of more botanical interest into new plantings. This sits well with the notion of an international university with a cosmopolitan population of staff, students and visitors, which is to some degree reflected in the plants used from around the globe. However the reverse side of this ethos is encouraging biodiversity through the selection of shrubs and plants used and native species fauna are obviously encouraged by native flora. As such there is a balance to be struck with plant selection.

With biodiversity in mind, the aspiration to plant a shrub/flower bed that is designed for bees and butterflies by using those species that are known to attract them has now been fulfilled. It is intended this border will have some form of interpretation associated with it and thus complement the learning ethos of the University. A further planting bed is planned close to the National Science Learning Centre, which will complement the Centre’s core business of updating teachers’ knowledge and skills base.

Seasonal bedding

The maintenance of seasonal bedding is detailed in the maintenance specification. Due to the labour intensity associated with it, seasonal bedding will be limited on campus to those areas where it will have highest impact. Also, because of the potential water requirement to establish summer bedding, these areas should where possible be close to the lake, so that water can be drawn...
directly to irrigate bedding if needed. Although carefully designed seasonal bedding displays can be extremely attractive, in some senses there is little point having a great deal of it during the summer when the campus is generally quieter and not as many people are around to appreciate it.

**Hedges**

The maintenance of hedges around campus to a large degree is driven by health and safety considerations, such as making sure they do not provide a hiding place for undesirables and maintaining sight lines around roads and car parks. The management of hedges is set out in the maintenance specification, but where possible hedges will be managed to encourage wildlife and to act as corridors connecting habitats.

As far as possible, hedges will only be cut outside of the bird nesting season. Where health and safety considerations dictate otherwise, the hedge will be checked along its length before trimming for signs of nesting activity and where any is found, that section of hedge will be left undisturbed.

Where it is possible, the intensity of management will be relaxed, which should allow the hedge to afford more shelter and provide a greater food source.

Where new hedges are planted, a variety of native shrubs will be used to make the hedge as attractive as possible with flowers, winter berries and good autumn colour, but also provide as rich and diverse a habitat as possible.

On the Heslington East campus extension work will be undertaken to restore and establish good-quality hedgerows which are rich in native woody species. Existing hedgerows will be retained where possible and protected from construction activities where necessary. Gaps in existing hedgerows will be planted with a diversity of native woody species. New hedges will first be cut six years after planting and then on a yearly basis thereafter.

Problem vegetation

There are on-campus problems with some non-native invasive weed species, particularly Himalayan Balsam and Ragwort. The management of Himalayan Balsam is intended to try to systematically eradicate it altogether from campus over the course of the next several years. This will be achieved through an integrated programme of cultural and chemical control and will involve additional help from volunteers and conservation groups from both inside and outside the University.

Although Ragwort is a noxious and notifiable weed species, the ethos will be to control rather than completely eradicate it from campus. Control will be achieved mainly through mowing and hand pulling, and this will be supplemented by the use of citronella oil. Ragwort needs to be controlled to prevent it spreading into neighbouring grazing land, although it is quite a useful plant from a biodiversity point of view since it is a food source for many insects. It is the host species for the Cinnabar moth caterpillar, which controls the plant in any case as it feeds on it.
Lakes and associated water features

Water is a unifying theme across both the Heslington West and East parts of the campus. It could be said that water is the dominant feature of the landscape. It is very important to the feel and character of the external environment.

Both lakes form an integral part of surface water management, acting as large balancing ponds and providing flood attenuation. However, the lakes differ in several respects:

- The new lake on Heslington East is twice as big in surface area as the Heslington West lake and to a large extent is twice as deep, which makes it a much larger body of water.
- The lakes occupy differing geographical locations within the landscape. The lake on Heslington West is very much at the centre of the landscape, whereas on Heslington East the lake sits along the southern margin.
- Heslington West lake is half a century old, while Heslington East is freshly dug.

The differences above translate into lakes with individual characters and eco-systems, which in turn demands a differing management regime for each.

Mute swans on Heslington East lake
Heslington West lake

The Heslington West lake was constructed in the 1960s as an extension to the top lake which originally formed part of the grounds of Heslington Hall. It has an area of 53,461sq/m or 13.2 acres and a capacity of 68,663 cu/m or c. 14 million gallons. The theoretical average water residence time is 78 days. The lake was constructed to act as a balancing reservoir for surface water drainage. The following is a quotation from the original development plan: “Improvements of the land drainage will produce a considerably increased speed and quantity of run-off of rain water from the site. This, together with the increase in paved areas and roofs which the University development will produce, could be such as to overload the existing drainage system... if the lands drainage is improved... the present storage capacity of the permeable ground will have to be replaced by some form of balancing reservoir.... We recommend that this reservoir should in fact be a surface reservoir and that virtue should be made of this necessity by designing it as a lake and integrating it with the landscape design as a whole.” The development plan went on to state, “Although it appears that the rate of change of the water will be low, we do not anticipate that this in itself will cause its condition to become objectionable in any way. Water stored in a lake even if not changed improves in quality bacteriologically, providing it is not subject to pollution.”

In hindsight, the optimism of the development plan does seem a little short-sighted. Water quality depended on a balanced ecosystem being maintained and pollution being avoided, but no account is taken of factors such as inputs of leaf litter, waterfowl excreta, detritus from storm water drains, or the fact that most of the surface water drainage system is not protected by oil interceptors. Consequently, 40 years on, we have a lake with water quality which is severely degraded and as such does not fulfill its potential as the focus of the campus landscape. The key issues for the future management of the lake are therefore the problems of nutrient enrichment, a stressed or unbalanced ecosystem and aeration.

Nutrient enrichment

The primary sources of nutrient enrichment are waterfowl excreta, leaf litter, ground water and to a lesser extent unconsumed food fed to wildfowl by campus users. For several years now the Grounds Section has been trying to establish reed beds in specific areas of the lake to act as bio-filters. Beds of Norfolk reed (*Phragmites australis*) have been proven to significantly reduce nitrate loadings on a long-term basis, but establishing them in the lake has proved very difficult due to the damage caused to the plants by grazing waterfowl. Despite this difficulty, continued efforts will be made to establish reed beds and other species of marginal and emergent aquatics, as all vegetation of this nature will help to pull nutrients from the water and will also add to the aesthetics of the largely sterile appearance of the water.

Since the excavation of the lake, approximately 300mm (one foot) of silt/detritus has accumulated on the lake bed; this represents approximately 25 per cent of the water depth! Over time all bodies of water have a natural tendency to silt up and return to land and given long enough this would certainly happen to the University lake. To partially mitigate this it is proposed that the lake is seeded in sections with hydrated lime which will help to de-acidify the bottom sediment. By raising the pH of the sediment, bacterial action should be stimulated which should help to breakdown the organic content of the silt, thus reducing its depth. Although the mineral content of the sediment will remain, it should mean there is less available nutrients to be constantly stirred up and recycled within the lake’s ecosystem.

Unbalanced/stressed ecosystem

The Heslington West lake is impoverished in three elements of this balanced system:

- predatory fish
- higher plants (macrophytes)
- zooplankton.

Each are affected by the other.
Too few predatory fish leads to too many small fish, particularly Bream which are heavy grazers of zooplankton. This in turn means that zooplankton levels are severely depleted. Zooplankton feed on phytoplankton but, as zooplankton are largely absent, phytoplankton flourishes making the lake water turbid. This means that sunlight cannot penetrate very far down the water column, so any emergent aquatic vegetation will not have enough light to establish and photosynthesise.

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Higher plants are extremely important to the ecology of a water body. They act as a buffer against phytoplankton by using up available nutrients and they also provide important habitats for zooplankton and young predatory fish, as they provide cover from other predators.

In short, restoring the balance of the Heslington West lake’s ecosystem should help to improve at least the water quality in the lake. One way of doing this would be to introduce an effective predatory species into the lake, namely Pike. This would eventually bring down the small fish population, but numbers of Pike may eventually proliferate to unacceptable levels.

Control of both species by netting and removal would certainly be both beneficial to the Heslington West lake and provide a saleable product at the same time!

Health checks have been carried out on the fish population by the Environment Agency and they have been found to be clear of all parasites and disease, which means they can be sent to any other body of water. It is suggested that the Environment Agency are engaged to net and remove fish from the lake and offer them for sale to other angling associations. The services of the Environment Agency are free, but they would take 10 per cent of the fish caught for their own use in establishing or supplementing other fisheries which they manage.

Additionally, removing some of the larger fish, particularly Carp and Bream, would reduce competition for food within the remaining fish population. Smaller fish may then increase in size and in turn become saleable. The finances generated by managing the lake in this way could provide money towards future management objectives.

Manipulating the fish population of the lake in this way should help to re-balance the ecosystem of the lake. Fewer small fish will allow zooplankton to re-establish which in turn should feed on and reduce algal growth. Together with this bio-manipulation, the continued introduction of higher plants should be carried on, as this will benefit the lake’s ecology in the ways previously outlined.

Aeration
Available oxygen can fluctuate widely over a 24-hour period, as well as seasonally. Oxygen depletion will lead to fish kill and bad odours, which manifest particularly during hot weather. Introducing aeration therefore has several marked beneficial effects. It can help to condition the sediment on the bottom of the lake by helping to change its state from anaerobic to aerobic so the lower water column is no longer stripped of oxygen. This will help in the oxidation of the organic element of the sediment, helping to reduce its depth and getting rid of nutrients contained therein.

Progress in this direction has already been made with the installation five years ago of an internal water circulation system, which utilises both Derwent College and Spring Lane Weirs.

Although not achievable from operational maintenance, there may be the long-term possibility of obtaining water from a borehole. If it were initially possible to use water from such a source for cooling purposes, say within the
Department of Chemistry before discharge to the lake, then it may make the suggestion more feasible. A constant or frequent throughput of water would certainly help increase oxygenation within the main water body.

Again the establishment of emergent and marginal aquatic plants will also help to oxygenate the water, as oxygen is a bi-product of photosynthesis.

The oxygenating capabilities of the fountain are only localised. It is also possible that, during the summer at least, its effect may be counterproductive. This is linked to the scientific law of the solubility of oxygen in water being inversely proportional to the water temperature: as the temperature of the water rises, the solubility of oxygen decreases and vice versa.

Other lake management issues
Bankside maintenance is urgently needed in several areas of the lake. The shore line has eroded considerably over the last 40 years. In some places erosion has been stabilised by lakeside tree roots and this can give a perfectly acceptable natural appearance. There are other areas however where the lake margin requires reconstruction together with a suitable method of reforming the lake edge. Interwoven Willow pegs could be used in this situation, or a system of timber pegs, brushwood faggots and pre-planted coir fibre rolls.

Unfortunately it is the case that Heslington West lake currently has very little protection from potential pollution sources entering the storm water drainage system and there have been significant pollution instances in the past. From even general observation it is evident that on a regular basis films of oil (whether vegetable or mineral) can be seen floating on the surface of the water somewhere on the lake. The installation of oil interceptors to protect surface water discharges into the lake must be a high priority. Presumably all recent capital project work will have incorporated this measure.

Recovery plan
Having identified the problems which exist with the Heslington West lake as it currently is, the next step is to determine the actions necessary to bring about an improvement in its current state. The information above relates mostly to how the lake may need to be managed on an on-going basis, which should hopefully over time bring about some improvement. There are however some fundamental problems which cannot be managed out in this way and demand a more ambitious course of action.

To begin with, the main lake body is far too shallow and this is one of the root causes of its current condition. Furthermore, the lake is progressively getting shallower as sediment and detritus build up on its bed. It has already been suggested that one way to mitigate this is to seed the lake bed with hydrated lime. However, this will not reduce the build-up of mineral deposits on the bed and in time (possibly now) serious consideration needs to be given to dredging the bed of the lake completely.

Before this is carried out, it must first be established where the arisings (which will be considerable in quantity) can be disposed of. A possibility may be to spread it on the agricultural land of the Heslington East site before it is developed. As a precaution however, it may be wise to have the sediments tested to make sure they do not contain any contaminants that would adversely affect the land on which the silt was spread or which would leach out into the groundwater.

In order to dredge the lake, it is recommended that it is first drained down completely, which would necessitate the relocation of the University’s waterfowl. This would have to be done in consultation with the Wildfowl and Wetlands Trust. It would also necessitate the removal of current fish stocks, which could be health checked and sold to neighbouring angling clubs.

Draining the lake would also allow for the old defunct butyl liner to be removed and would provide for the additional opportunity of re-excavating the central channel of the lake bed to make it much deeper than it currently is. This would provide considerable benefits to the long-term ecology of the lake and would offset the need to re-dredge the lake for a long time to come.

It is possible that, following this, the lake may need re-sealing with puddled clay before being allowed to refill. The shallow areas left around the lake edges should then be replanted with marginal and emergent aquatics, which will require protection in the short term until they are well established and can withstand disturbance from the re-introduced waterfowl population.

It is suggested that fish are not introduced back into the lake straightaway, but are allowed to re-colonise naturally, with eggs brought in on the feet of transient waterfowl.

Top section of Heslington West lake
From an ecological point of view, the top section of Heslington West lake appears to be in a much better
state than the main part of the lake, possibly because it is much older and its ecology is more balanced. There are well established beds of marginals within the lake and an increasing volume of emergent aquatics, with the continuing establishment of the lily pads, which has been going on over the last five to ten years.

Although the timber piling around the lake edge and smaller island has been renewed recently, the timber piling around the main island has for some time been in a poor state, but the established vegetation on the island is doing a very good job of keeping the island stable. Indeed it may not be a good idea to disturb this island too much, as it is solid with Japanese Knotweed and it would be unwise to do anything which might encourage this very invasive plant to spread elsewhere on campus.

The top lake dates from around the mid 19th century and was excavated deeper than the newer main lake. It has however silted up considerably over its lifetime and would in turn benefit from at least certain sections being dredged and deepened. In comparison to the main lake, however, this is nothing like as urgent a problem.

In recent years there have been problems in the lake with blue-green algae manifestations. When this occurs there is very little that can be done to counteract it. Not all species of filamentus algae are dangerous to health, but as part of the

Preparing to put barley straw into the Heslington West lake to suppress blue-green algae

lake’s overall management, water sampling will be carried out at monthly intervals between April and September to determine if blue-green algae is present in the water.

**Heslington East lake**

The experience of the Heslington West lake has informed the construction and subsequent development of the new lake on Heslington East, in that the problems that have manifested themselves with the Heslington West lake are well understood and thus have been factored out at Heslington East. This does not mean, however, that similar problems to those experienced within the Heslington West lake will not occur in time because there are some common denominators. It does mean, however, that, in the short term at least, we are not trying to manage a eutrophic lake with a stressed eco-system and as such the management interventions will be based on prevention rather than cure.

The management operations associated with the lake are likely to be as follows:

The control and management of nutrient levels will be a core objective for lake water quality. A SuDS ‘management train’ approach will be applied to treat surface water runoff from developed and landscaped areas before discharging to the lake (e.g. swales, filter drains and wetlands). Zones of aquatic planting will also be cultivated within the lake to assist in the prevention of algal blooms.
A re-circulation facility will be included to enable further treatment of lake discharges and safeguard the downstream water environment. Abstracted groundwater will help to maintain flow conditions through the lake and will also supplement water levels during periods of lower rainfall.

In order to compensate for variable ground conditions, the lake may require a partial or complete liner. This may comprise a geo-membrane with a ‘bentonite’ clay core. This lining technique requires an overburden of low nutrient subsoil to be placed over the liner to provide weighting and protection. This overburden will also allow aquatic plants to be introduced directly into the substrate.

**Aquatic planting**

The establishment and maintenance of a wide diversity of higher aquatic plant species is important for maintenance of water quality conditions, reducing the potential for algal bloom development and maximising the visual and ecological qualities of the proposed lake. As the lake will serve a flood storage function, the selected aquatic plant species should be able to tolerate variation of water levels and periods of submergence following peak storm events.

Plants may need to be provided with protective fencing, particularly during the establishment phase. Many plants, particularly the reed-type species, are generally resistant to waterfowl grazing once established and only temporary protection should be required. Routine maintenance of the aquatic plants will be required and consideration should be given to harvesting of plants such as reeds during the autumn to prevent release of stored nutrients back to the lake during winter degradation. The harvested plants may be disposed of to a suitable composting facility.

**Waterfowl control**

The lake will be designed to keep geese and other waterfowl to manageable numbers. Lake margins will be planted with a band of fringing emergent vegetation and bankside shrub plantings. This may assist in restricting access for geese from the lake to surrounding grassed areas. Surrounding grassed areas are also best maintained in a coarse state rather than as a manicured lawn area as this approach creates areas that are less suitable for grazing by birds.

**Fish stocking**

Fish can have a profound and detrimental influence on the ability to maintain clear water conditions through their selective consumption of large zooplankton that may help in reducing algal density. In addition, certain fish species
that feed on the lake bed, such as adult Carp and Bream, may give rise to the suspension of accumulated silts that may impact upon higher aquatic plants and visual quality, and may contribute to remobilisation of nutrients with silt deposits. There are no proposals to utilise the lake as a recreational angling amenity and consequently there is not a requirement for fish stocking to support a fishery.

**Leaf litter collection**
A large proportion of silt accumulating in lakes is derived from leaf litter from surrounding trees. Leaf litter entering a lake can contribute to both nutrient and organic enrichment that may lead to degradation of water quality conditions. The development of a marginal fringe of emergent vegetation may assist in reducing the entry of some leaves into the lake. An intensive leaf litter collection programme should be pursued from the lake surrounds and water surface during the autumn period.

The design of the Heslington East lake has been based around requiring the minimum of maintenance intervention. The maintenance works that are likely to be required include:

- routine litter collection
- leaf litter collection during the autumn
- maintenance of the introduced aquatic plants to include autumn harvesting
- annual maintenance of any installed aeration system
- routine maintenance of the surface drainage system to include emptying of catch pits and oil interceptors.

If filamentous algae should prove problematical then control approaches will be considered that may include the deployment of barley straw.

Routine monitoring will take place on at least an annual basis to assess water quality and ecological conditions within the waterbody and to audit management actions undertaken in the previous year.

**Hub basin**
The Hub building basin is part of the lake but separated from the main body of water by the central movement spine. Its position close to the Hub and its isolation from the main body of the lake means that it will have its own specific maintenance requirements as follows:

- **Dredging** – This is expected to be an infrequent occurrence (>five years). The frequency of dredging will need to be assessed by the University during the first few years of operation, drawing on the experience gained from managing the Heslington West main lake. The eastern edge (the area at the foot of the Central Vista) provides a suitable area where equipment and boats could be lowered into the basin.

- **Reed management** – Access needs to be gained to the reeds annually to cut and remove the reeds each autumn (known as reed harvesting). Access also needs to be gained to reeds that may have migrated in front of the Hub building, beyond the reed suppression slabs on the floor of the basin. These reeds will need to be cut back to keep this area of water, around the Pods, clear of reeds. The frequency of this operation will need to be assessed by the University during the first few years of operation. Where access to cut these reeds is not possible from land and has to be conducted more frequently than the reed harvesting operation, then access may need to be gained by other means, for example by boat.

- **Hub building Rain Water Pipe (RWP) outlets** – Access may need to be gained by maintenance persons to clean out RWP outlets or maintain flap valves, some of which are covered by the deck overhang. All RWP downpipes have been specified as having access hatches just before ground level, to provide easy access for rodding. Where the outlets exit into the basin, should access be required, then some of these outlets could be reached from the decking above. However, some access may still be required by other means, for example by shallow boat.

- **Basin outlet management** – The basin outlet weir has been designed with a screen at the inlet from the basin to prevent rubbish being carried through into the structure. This has been designed to be cleaned by rake from behind the handrail. The frequency of cleaning will need to be assessed by the University during the first few years of operation.

The outlet structure and pipes will require de-silting from time to time to ensure operation is maintained. The frequency of de-silting will need to be assessed by the University during the first few years of operation. The structure has been designed to allow access down into the weir area and onto the ends of the pipes that pass under the causeway. Part of the design includes penstock valves that will enable the pipes to be isolated from the main lake.
and basin. An experienced jetting contractor should be able to conduct the operation safely with the available access, following their own risk assessments.

Wetland areas
The wetland areas which border the south-western area of the lake are a mixture of pools designed and excavated to stay permanently wet, although with seasonally fluctuating water levels and several shallower ‘scrapes’ which will notionally hold water during the wetter autumn and winter months but dry out during the summer. Together these should provide an optimum range of habitats for both plant and animal communities, which will be encouraged to develop naturally over time.

Management intervention within the wetland will be minimal and it is envisaged the area will provide a valuable study facility both for the University and local schools.

The majority of management will take place during the autumn and will probably involve:

- the reduction of dominating vegetation – removed material will be left by the waterside for 24 hrs to allow any trapped invertebrates to return to the water
- the removal of large accumulations of fallen leaves
- the removal of any invasive alien species.

Wildfowl
The management of the wildfowl is closely related to the management of the lake because of the effect the wildfowl have on the lake and also because they would not be on campus were it not for the large body of water. Some of the species on campus are owned by the University and as such it has a duty of care to look after their welfare. In practice this consists of caring for injured birds in the secluded environment of the Walled Garden and if necessary taking them to the vet for treatment.

During the winter the birds are fed regularly to supplement their food source, this being a difficult time for them to find food through natural foraging. Despite this, however, it continues to be the University’s policy to discourage the visiting public and staff and students from feeding the birds, as this inevitably encourages a high population of wildfowl, attracts vermin and adds to the nutrient loading within the lake water.

Certain species of wildfowl are so numerous on campus that they present problems, particularly because of the amount of faecal material they produce. For this reason it is necessary to take measures to control numbers of Greylag and Canada geese and the University currently applies to DEFRA each year for a licence to dip eggs during the nesting season in paraffin. This will continue to be an iterative process annually.

Notwithstanding the problems manifested by large populations of geese, the wildfowl are largely enjoyed by all campus users. The University Biodiversity and Wildlife pages contain a ‘duck of the day’ link: [www.duckoftheday.co.uk](http://www.duckoftheday.co.uk) which takes you to a wildfowl picture which is changed daily.
Biodiversity

Biodiversity is an important aspect to the management of the external environment of the University. Biodiversity and habitat creation were probably not the primary concerns when the Heslington West landscape was being developed in the 1960s and 1970s. However over the course of the last 15 years or so, there have been subtle alterations to the way the landscape is managed on Heslington West to encourage wildlife, some of which have been outlined previously. Biodiversity considerations are at the forefront of the development of Heslington East, and although the two parts of the campus have developed at separate times and in separate ways, there are common overarching principles that should be adopted with the future management of both for example, biodiversity and habitat creation.

Data is available on the species of flora and fauna to be found on Heslington West but it is disparate and as such no comprehensive record is available. The Biodiversity sub group (an off-shoot of the Sustainability Forum launched in 2009 by the University) meets approximately on a monthly basis to discuss biodiversity on campus and how it can be improved. One of its primary objectives is to gather together information available on biodiversity on campus and to form this into a comprehensive database.

In the case of Heslington East, a lot of information has been produced in the form of reports from consultants which advise on the creation and management of a range of habitats to encourage biodiversity. Some of this information is transferable to Heslington West. However, the management of biodiversity on Heslington West is largely informed by the Environmental Association of Universities and Colleges (EAUC) and its guide to practical management of biodiversity of campuses. Not every approach outlined in this guide is applicable here at York, but many of the principles and practises are:

- Timing management operations carefully to reduce impacts on species that may be breeding or feeding or hibernating. For example, hedge cutting is largely carried out through the winter months to avoid disturbing nesting birds.

- Pest control. It would be much more difficult to maintain an estate the size of the University without the use of herbicides; however, where practical, the policy is to substitute a chemical control with a cultural control. Where this is not practical it is the policy to limit the range of chemicals used to those with as low a hazard rating as possible.

- Practise low intervention horticulture where appropriate, such as leaving perennials to stand over winter to provide food sources and adopting reduced mowing regimes in appropriate places around campus.

- Reduce chemical usage. For example substituting organic fertilisers for compound fertilisers and if possible using composted greenwaste.
Improve shrub beds and planting schemes: for example, use single flowering varieties rather than double flowering so pollen and nectar is easily available to foraging insects; use a variety of species with a range of flowering times; use trees and shrubs that hold their fruit or berries into winter.

Diversify structure to create a range of habitats by using a variety of plants and trees to provide differing heights and flowering patterns.

Composting greenwaste. This contributes towards the University’s recycling targets and provides an organic alternative to fertilisers or bought-in soil conditioners.

Providing additional shelter for fauna by introducing bird boxes, wood stacks and habitat piles.

Managing trees and woodlands to encourage biodiversity: for example, removing and controlling invasive non-native species; retaining standing old trees and dead wood; using a broad mix of tree species.

A baseline ecological survey was carried out on the Heslington East site during 2011, which included flora and fauna (birds, riparian mammals, bats and invertebrates). Additionally, breeding bird surveys are carried out on a fortnightly frequency throughout the recognised breeding season by a consultant ornithologist. The survey reports are all available through the Estates Department. These surveys have helped to inform the production of a long-term ecological management plan for the Heslington East campus, which again is available on request.
Archaeology

The city of York has a rich historical past so it is hardly surprising that the University campus has yielded up its own antiquities from time to time. In advance of building work on Heslington East, York Archaeological Trust (YAT) were commissioned to survey the site to find out whether it contained any areas of archaeological interest. They identified three areas of primary archaeological interest and completed a thorough investigation of two of these, situated under the new campus buildings, in 2008. The Department of Archaeology has been working on the third area, on Kimberlow Hill, since 2008 and completed work there in 2011. The discovery of extensive and complex organic deposits along a springline on Kimberlow Hill led to the appointment of On Site Archaeology in 2010 to undertake a further investigation in this area.

The Heslington East Project has provided an opportunity to bring together academic and commercial components of archaeological fieldwork, linked to both students training and community participation. It has resulted in one of the largest open area excavations ever seen around York. Prior to the archaeological fieldwork, which commenced in 2003, little was known about this area, since it had been used for arable agriculture for centuries.

From November 2007 until October 2008 YAT undertook the excavation of an area which is now beneath the new Heslington East buildings. Evidence was found for a series of palaeochannels flowing north-south out of the moraine. A single Neolithic pit was recorded and some Bronze Age pits, with wicker revetments, were focused on a managed waterhole or springhead. Evidence of Iron Age settlement consisted of two roundhouses and several ring gullies, set within an enclosure system. One of the roundhouses had been rebuilt in its location on three successive occasions. Iron Age activity around the waterhole was considerable and a skull, with preserved brain matter, was found in this location. The area continued in use into the Roman period with some limited evidence for activity comprising mainly a pit, ditch and range of artefacts. Work by specialists to assess all the materials and samples from the excavation continues.

Since 2008 the Department of Archaeology has been working on Kimberlow Hill with work focused on a Roman masonry building and associated features. In 2010 evidence was discovered for earlier Iron Age activity here too, and work at the beginning of 2011, by On Site Archaeology, has identified possible Bronze Age features along the springline. More information on the archeological findings on Heslington East can be viewed at: www.york.ac.uk/campus-development/expansion/archaeology.

King’s Manor

As well as the main campus at Heslington West and East, the University also occupies King’s Manor in the centre of the city. King’s Manor, which borders the Museum Gardens (the site of the old St Mary’s Abbey) was built to house the Abbots and probably dates from the 11th century. Following the dissolution of the Abbey, King’s Manor became the seat of the Council of the North. The University came to occupy King’s Manor in the 1960s and the Department of Archeology is based there. If it is ever necessary to do any tree planting at King’s Manor, then an archeological watching brief has to be maintained while tree pits are dug. A brief history of King’s Manor can be viewed at www.york.ac.uk/admin/presspr/kmanor/history.htm.
Siward’s Howe

On the north west corner of Heslington West stands Siward’s Howe. It is a terminal moraine left as the glaciers retreated at the end of the last Ice Age and is so called because it is fabled to be the burial place of the Danish warrior Siward. It is however likely to be the site of an ancient burial ground and there is a story of a University gardener coming across human remains while planting trees on Siward’s Howe several decades ago.

Heslington Hall and the Yew Garden

Heslington Hall is a 16th century mansion on the south east outskirts of York. It was built in 1568 by Thomas Eymis (Secretary to the Council of the North). Originally it was thought to have been built to house Elizabeth I on one of her visits to Yorkshire, but this remains unsubstantiated and was more likely an expression of Eymis’ rising wealth and status.

There is no record of garden making until 150 years after the Hall was built. In the intervening years the Hall passed to the Heskeths and then to James Yarburgh through his marriage to Ann Hesketh. James Yarbrugh is credited with planting the Yews and building the Gazebo – a 1760 painting also details a canal centred on the Gazebo, which may also have had the dual purpose of draining the low lying garden. The top section of Heslington West Lake, constructed some time during the 19th century probably had the same purpose – an idea extended with the construction of the main lake during the 1960s.

The Hall passed through heiresses to other families who assumed the Yarburgh name until 1875 when the Hall passed by marriage to the second Lord Deramore. In a Country Life publication ‘Gardens Old and New’ c1900 the grounds of the Hall are described thus: “The gardens occupy a notable place in the history of English gardening. Their strange, quaint and fantastic Yews, unlike anything else ever seen on sea or land, are own brothers to the better known curious creations of Levens [Hall]. There are no Judges' wigs nor royal courtiers shaped out of the ductile Yew at Heslington, but only cylinders globes and adoptions of beehive forms with some other odd imaginings.” However, the Yew shapes are described frequently as chessmen, which is borne out by this mid-1930s photograph.

The Yew trees in the Yew Garden are approximately 300 years old and may well represent some of the oldest trees in York. Until World War II, when Heslington Hall became Bomber Command, the Yew trees were maintained in very ornamental topiaried shapes. However, throughout the duration of the war and the intervening period before the Hall and grounds became part of the University, trimming of the trees was neglected and they consequently grew out of shape and despite being trimmed annually, they remain so.

One option as a treatment to the Yew Garden would be an attempt at restoration to their former shape. Indeed a feasibility report into this was commissioned in 1998 which concluded that such a treatment could work very well. However, such an undertaking would require thorough archival research, accurate measuring, detailed assessment and an extensive public relations exercise. Furthermore the work would have to be phased over a period of many years. Consequently, there is little interest or impetus to attempt any restoration and as such the management of the Yew Garden will continue in a similar vein for the foreseeable future.
The University and its community

The University has, in effect, two communities. It has an internal community of students and staff and in many ways it could be compared to a small town, with its own population, being looked after by staff such as the Estates Department. The second community is the external one, particularly the village of Heslington, who may visit the University campus as part of their relaxation and passive recreation, and who are affected by the University and its activities.

**Internal community**

The Grounds Section has particularly close links with the student community. The primary example of this is the provision of sports pitches for both representative and college sport. There are also numerous other examples of interaction and service provision:

- Practical help and advice with student project work, usually for students from the Department of Biology and the Environment Department.

- Help and support with the holding of outdoor events and concerts.

- Help and support with student initiatives, for example Edible Uni, which involves students taking over pieces of ground within the campus landscape and cultivating them to produce food plants, which students can use themselves, or which can be used by the production kitchens in the different University colleges. So far, production plots have been established in four different areas of the campus.

- The University Allotment Association also gives students and staff the opportunity of gardening on campus. There are also several allotment holders from the local community.

- Involvement of student volunteer groups in habitat management and creation initiatives. Recent examples include transplanting pendulous sedge from Heslington West to Heslington East around the lake margins, planting Snakes Head fritillary bulbs on Heslington East and tree planting as part of the creation of the Diamond Jubilee wood on Kimberlow Hill, Heslington East.
External community

The University continually endeavours to foster good relations with the local community and regularly holds communications forums with local bodies such as residents associations, Heslington Parish Council and good neighbours groups.

The University’s Directorate of External Relations also works closely with departments to support community relations in several different ways:

- the organisation and publicising of public lectures
- the organisation and publicising of concerts from the Sir Jack Lyons Concert Hall and Central Hall
- through the Centre for Lifelong Learning the University offers over 200 short courses which are open to anyone.

In addition to this there are many other areas where the University is active in promoting and increasing community outreach. Currently there is a working group looking at establishing a Nature Study Area (NSA) adjacent to the Wetlands on Heslington East. This would be a multi-use site for community outreach and ecological fieldwork incorporating experimental areas and space for community growing projects. It is anticipated that the NSA will incorporate an outdoor classroom built of sustainable material:

- boardwalks and dipping platforms
- an orchard and growing space supported by the York ‘Get growing’ project
- interpretation boards and bird and bat boxes made with the help of local school and community groups.

There are also plans to provide an outdoor gym (trim trail), which will track the perimeter of the University, taking in both Heslington East and West. The full route when it is completed will be approximately 10km in length. Among the benefits of this new outdoor gym will be to make sport and fitness easily accessible to staff, students and the local community, who will be welcome to use it.

The Woodland Trust recently granted the University Diamond Wood status for its woodland planting on Kimberlow Hill at Heslington East. As part of the Diamond Jubilee celebrations a community action week was organised jointly with the Woodland Trust in November 2012, to which local schools and the local community were invited to participate in the remainder of the tree planting for the wood.

A community fête was held in June 2012 on the new Heslington East part of the campus. It is anticipated this will become an annual event and encourage people from the local community to see what the campus has to offer in terms of facilities and opportunities for passive recreation. It is also hoped that in 2013 a community bonfire can also be held on campus for the benefit of local residents.

Another important aspect of community involvement is the voluntary work that University staff undertake out in the community. The University plays a pivotal role in the charity York Cares, which brings businesses, employees and community organisations together to make a positive impact on the city of York. The University employs a team of dedicated staff and sits alongside community and business stakeholders on the York Cares Board as well as leading bids for further charitable causes with the charity. Over 200 University of York employees have offered their time and expertise to projects including ‘Starting Blocks’, a scheme to equip young care-leavers with employability skills and work experience, and weekly lunchtime volunteering, team challenges and ‘lifeswap’ activities, such as taking a few hours to chat to elderly people or helping to renovate a piece of public land. Every year in October the staff of the grounds section take part in a team challenge to improve public open space. In 2010 the Section won a Vice-Chancellor’s award for its help with improvements to the nearby St Nicholas Fields site.

External community