



Environmental Management Strategy

To 2018

Strategy aims

Environmental management is a fundamental aspect of WYAS collections care. Through this environmental management strategy we aim to achieve a prudent, organised and flexible approach to creating, improving and maintaining storage, access and display environments for our collections.

This strategy applies to traditional, physical archive collections.

Background

Through managing the environment in which our collections are kept, we regulate temperature, humidity, light and ventilation to help optimise the preservation lifetime of these collections.

Whilst our oldest collection items date from the 12th century, their expected lifetime is still difficult to predict, any projections would also vary across our holdings. Our aim therefore is to preserve all our collections for the foreseeable future, and balance this mission against the energy demands necessary to achieve this. We will prioritise highly significant, sensitive or frequently used items for greater energy inputs and measures to further extend their preservation life. For example we hold two collections listed by UNESCO on the Memory of the World Register.

WYAS manages the environment at seven storage sites and five access locations. These facilities provide a range of options for energy economy and achieving our environmental specifications. For example, four storage areas are served by air conditioning and one facility has photo voltaic panels.

We collect environmental information such as temperature, relative humidity and moisture content and use this to make risk assessments with reference to PAS 198:2012 and PD5454:2012.¹ This helps us to identify and accommodate the relative strengths and weaknesses of the environments we manage.

We also collect information about the composite materials of our collections through our catalogue and surveys. In common with many established record offices in the UK, WYAS collections contain a range of materials. Different materials deteriorate at different rates and are affected by agents of deterioration in different ways. The suitability and stability of the storage environment in particular (as this is where the majority of the collections spend the majority of the time) have an impact on these rates of deterioration and vulnerability to loss and damage.

¹ PD5454:2012, *Guide for the storage and exhibition of archival materials*, British Standards Institute.

PAS198:2012, *Specification for managing environmental conditions for cultural collections*, British Standards Institute.

New collections of material arrive continually and need to be appraised for their environmental management needs. They may not have benefited from good environmental management in the past, so through this strategy we will mitigate damage which may already have occurred, such as damp, mould and insect damage which commonly result from poor storage conditions.

This strategy takes a positive, pragmatic and flexible approach to maximise the resources and impact of our environmental management activities.

What makes a good environment for our archives?

For the purposes of this environmental management strategy, we define the physical nature of WYAS collections as being predominantly paper (80-90%) whether in bound or in loose format.

Further, the vast majority of collections can be described as 'modern', around 90% being post 1837. As such, these materials are often products of more mechanised processes that emerged in the 19th century and therefore, conversely exhibit more limited stability than that offered by some older materials such as parchment and handmade paper. Smaller proportions of the collections consist of materials such as leather (bindings), parchment (deeds), wax (seals) and photographs. As a large proportion of the paper based collections are bound, leather as a covering material is widely distributed; the stability of leather directly affects the paper it protects and we prescribe environmental conditions which are sympathetic to both.

In general terms, the ambient environmental requirements for WYAS collections can be described as: well ventilated; moderate or dry relative humidity, moderate or cool temperatures (with only gradual fluctuations); dark or low light; minimal dirt and pollutants and insect and rodent pest free.

Temperature and humidity

WYAS's temperature and humidity environmental specifications are based on recommendations in PD5454 for 'mixed archives', a description which correlates with our collections. We stipulate therefore, that the majority of our collections are stored for the majority of the time within the ranges:

- 13 – 20 degrees Celsius (deg. C)
- 35 – 60% relative humidity (RH)

In certain conditions, paper may be relatively unaffected by 65% RH for short periods of time, however leather is more vulnerable to mould growth and should be kept below 60%.

Maintaining tightly controlled ranges of temperature and humidity is likely to be excessively energy consuming for the preservation returns achieved. Therefore, we aim to provide gradually fluctuating levels which accommodate seasonal changes for example.

Over the course of a month relative humidity should not fluctuate more than plus or minus 10% and the temperature by no more than plus or minus 5 degrees Celsius. This tolerance accommodates paper and iron gall ink which are dominant materials within WYAS collections.

Light

Components of WYAS collections are sensitive to colour change in response to exposure to light. Colour pigments, wood pulp papers, paper dyes, ball point and felt tip pens and colour photographs for example are suitable only for short term display (less than 7 weeks) to avoid noticeable fade. Iron gall ink and lignin free paper (pre-early 19th century) however have a slightly greater tolerance to light.

Our strategy is therefore to protect most of our collections completely from light most of the time. We will also adopt the default assumption of high light sensitivity and limit exposure to a maximum total of between 7 weeks and 2 years (if illuminance is at office level). PAS 198 will be referred to for further guidance.

Pollution

Materials within WYAS collections are also vulnerable to damage by pollutants such as sulphur dioxide, or present an internal source themselves for example in the form of acidity. We are currently not able to monitor levels of all known damaging pollutants in order to compare environmental levels against recommended threshold levels. Therefore, our requirement is that limiting pollutants is factored into our conservation and environmental management activities.

Achieving our aims

WYAS has identified ten paths towards achieving our environmental management aims and specifications.

PATH 1: Risk assessment of collections materials

The nature of the materials and formats which make up WYAS collections affects the environmental management approach which may be appropriate for them.

We assess and record this information in outline through our catalogue descriptions; this allows us to search for particular categories such as photographs which may be identified for targeted attention.

Surveys, such as the Preservation Assessment Survey (PAS) have also enabled us to establish an overall statistical picture of the materials and dates of our collections. We will continue to use survey approaches to risk assess our collections for environmental management purposes. These often relate to other project work such as packaging or removals which can be used as an opportunity to enhance our collection materials information.

Through internal training, we will enhance and extend the awareness of and ability to correctly identify and describe these different materials. This includes in particular

plastics, which may be present in photographic negatives such as cellulose acetate and cellulose nitrate. We will conduct tests on these materials to determine the appropriate actions required. As cellulose nitrate film poses an increased high fire risk and film remains outside our collecting remit, this is found alternative accommodation within a specialist archive.

We will use the professional expertise of conservation staff to identify and evaluate the specific sensitivity of particular items in relation to proposed display or to the effects of pollutants for example. This may involve use of specialist techniques, reference material or equipment such as UV light, magnification and chemical spot testing. Where additional expertise is required, WYAS will enlist the help of West Yorkshire Materials Testing or West Yorkshire Analytical Services.

PATH 2: Environmental monitoring

Effective environmental management relies on the regular collection of information on levels of temperature, humidity, light and pollution over time as a basis from which to design environment maintenance and improvement programmes.

The Conservation Team measures air temperature and relative humidity in all WYAS storage areas continuously via strategically placed loggers which are downloaded monthly and the data interpreted. Changes in technology over the years mean that the methods and equipment used to do this have evolved. We will continue to advance our provision in this respect, in particular by investing in continuous and telemetric monitoring, soon to be trialled at the West Yorkshire History Centre (WYHC) in Wakefield.

Accuracy of monitoring is important for continuity and comparison, so cross-reference measurements are made using hand-held thermohygrometers and calibrated equipment is used. Measurements are taken to an accuracy of one decimal place in degrees Celsius and % relative humidity.

Where provided, Buildings Managements Systems are also used as a source of information, in particular regarding the external environment and input to storage areas.

We also make visual checks, particularly in areas where air circulation is compromised.

Moisture is an accelerant for deterioration, especially in association with pollution and mould. The moisture levels of the majority of archive collections fluctuate more gradually than the surrounding air in response to changes in the levels of air temperature and relative humidity. Paper based materials have characteristic moisture levels which are relative to particular levels of temperature and humidity.

Building fabric materials also harbour moisture, the levels of which affect the adjacent storage environment.

To more fully understand the environmental management measures required, we take equilibrium moisture content (EMC) readings of archive materials and can compare these with these standard measures or with archives in different storage areas or locations. This information indicates for example if a collection is in the process of becoming damp or drying out, or to investigate local variations in conditions within a

storage area. We use this strategy to assess new collections where the quality of the environment in which it was previously stored is unknown.

By upgrading the equipment we use to do this (from an electrode based to a radio transmitter monitor), we will be able to measure the moisture content of masonry and be able to gauge the moisture stability, in particular, of newly constructed storage areas at WYAS Calderdale and Wakefield.

Light levels are measured on a spot check basis using a hand-held lux meter when assessing, for example, locations for display. Since we have recently built a dedicated exhibition space at WYHC, we will establish a continuous monitoring programme using blue wool cards in conjunction with parameters set out in PAS: 198 to indicate the cumulative exposure limits of the archives on display.

Pollutants are more complex to monitor. We will assess levels of acidity where required, for example in degraded packaging using pH tests. We may also evaluate levels and patterns of dust to inform cleaning regimes via strategic placement of glass slides to monitor accumulation. Where more specialist monitoring is required, such as for the presence of mould, we will commission the West Yorkshire Analyst Services to do this.

PATH 3: Record Keeping

WYAS retains records of its environmental monitoring activities from the early 1980s. Since 2002, electronic data loggers have been used and records kept as a combination of paper and electronic records. Older paper records, particularly from superseded buildings have been weeded and sampled for retention.

We retain these records as part of the wider WYAS collection, as 'archives about our archives', to be kept indefinitely in order to provide reference material to evidence performance over time. We also retain reports and correspondence to ensure our accountability, especially where implementation of environmental management strategies is influenced by the cooperation of other parties.

We will continue to manage our electronic data in line with our digital records management policy and use the data to report on environmental conditions and recommend interventions. We are working to enhance the IT support required to improve our ability to access, interrogate and report from these records, including the introduction of new software and proprietary equipment.

We will also continue to use our environmental records to explain and advocate for good environmental management both internally and with our partners.

PATH 4: Controlling Environmental Conditions

Temperature and relative humidity levels which are identified as being outside WYAS specifications in storage areas, in terms of either range or rates of fluctuation, are moderated by any, or a combination of the following means:

- portable ventilation (e.g. fans);

- portable dehumidifiers (desiccant or refrigerant depending on temperatures for most efficient energy use);
- air handling unit (AHU) adjustment or maintenance;
- portable air cooling unit;
- portable humidifier;
- low-level heating to reduce humidity (this may be a more efficient use of energy than dehumidification).

The preference within WYAS's defined acceptable ranges is for lower temperatures and lower humidity as these reduce rates of deterioration.

In three of our storage areas in particular, achieving or maintaining the desired level of control is an unrealistic challenge at certain times of year. Extra energy consumption and additional fire risks are incurred when intervening with portable electrical equipment for example. Therefore, we will seek more holistic and long term environmental management solutions, specifically installation of air conditioning at one facility, and bidding for grant funding to refurbish a combined storage facility for two others. We will use PD 5454 or its successor to frame any building or refurbishment specifications, a core element of which is the need for high thermal inertia as a means to promote low energy stability in environmental conditions.

Light exposure is minimised in the storage and access areas by means of passive infrared sensors (PIRS), UV filtered glass, blinds and packaging.

PATH 5: Zoned environments

Individual items or small groups of WYAS collections may require specific environmental management solutions or allowances, occasionally or indefinitely in the following circumstances:

- quarantine;
- acclimatisation from one environment to another;
- exhibition;
- consultation;
- transit;
- drying;
- pest control;
- high priority collections;
- sensitive media (such as photographs);
- sensitive support (such as cellulose acetate).

Zoned environments usually require greater energy input, therefore are prioritised for the above situations. The required conditions may then be maintained in a smaller, more efficient space than the main storage area.

1. **Freezer:** we will freeze items affected by insect pests, maintaining relative humidity through the use of sealed, air-excluded bags. In the unusual event of discovering cellulose nitrate in the collections, freezer storage may be used for temporary storage prior to transfer or migration.
2. **Cold and dry storage:** e.g. 13 degrees Celsius and 50% RH may be provided within a small storage area at WYHC, where high priority collections and sensitive media and supports may be stored. These measures however need to be balanced with the need to maintain collection integrity, as photographs for example may often be housed within a collection amongst other materials.
3. **Museum standard display cases:** these are in place at WYHC, however the area in which they are located is limited in terms of environmental control. Therefore we will mitigate the environment by means of low air exchange in the cases, use of non-polluting materials, UV filtered glass, desiccant gel to regulate humidity if required and blue wool cards to monitor light exposure.
4. **Acclimatisation:** two storage locations have specific acclimatisation rooms which can provide conditions, particularly temperature, between that of the strong room and the search room. This allows collections to stabilise and reduces physical risks of dimensional change and condensation for example. We will also ensure items remain within their packaging to help buffer the change in conditions.
5. **Quarantine/drying:** relative humidity at or below 50% may be used to quarantine and dry out new or damp collections. We will achieve this via use of dehumidification and ventilation; raising temperature alone may increase risks of mould or pest activity if the moisture content of the collections is high.
6. **Searchroom:** conditions are tailored for human comfort and may exceed the desired levels of temperature in particular (20 degrees Celsius). Where searchrooms are equipped with air conditioning, this may be altered to reduce excessive heat and dryness which can affect more sensitive items such as photographs and parchment. In extreme circumstances, items may be withheld from production, provided via a duplicate, or examined in the strongroom.

PATH 6: Packaging

Packaging is a simple and effective way of ‘dressing’ archives to help mitigate the effects of the environment. We aim, where practical to provide packaging for all WYAS items, preferably in a box if size and format allow.

External packaging will regulate both the level and rate of changes in temperature and humidity as well as cut out light and reduce dust ingress – a key source of pollutants. By using ‘archival’ grade packaging, we do not introduce any pollutants into the collections and also use the chemically buffering properties of these materials to help regulate the effects of acidity for example. This is particularly important in the tightly enclosed environment of display cases.

Many of our collections would also benefit from repackaging, a programme we will continue to carry out alongside other activities such as cataloguing and production.

PATH 7: Insect Pest Management

Integrated Pest Management (IPM) is included in this strategy as a key indicator for effective environmental management.

WYAS's approach to IPM will be building-centric, to accommodate the different risks associated with the varied building envelopes our collections occupy. We will also prescribe specific IPM for projects such as removals or for new collections.

Our IPM activities are directed towards all areas where collections may be used or stored at any time. Consideration will be given to the potential for cross-contamination from public areas, bins, windows and building materials, for example. We will liaise with cleaning staff on matters affecting these matters in particular.

Insect traps are strategically placed in strong rooms to monitor insect activity. At least every three months the insect traps are replaced as they become ineffective. We will further develop the use of species-specific traps targeted to monitor pests which we have identified as being a particular threat within an IPM zone.

PATH 8: Facilities Management

Effective facilities management is integral to both environmental management and energy economy. We will continue to improve this through working with our partners and landlords.

To further this aim, we will also seek or develop information management tools, such as a database, to better coordinate facilities management as well as increase efficiency, both in energy and resources.

Measures employed to reduce our energy demands include: use of PIR lights, photo voltaic panels at one site, AHU settings which permit a range rather than demand a set-point and blinds to reduce solar gain.

We have in the past experimented with switching of the AHU in one storage area over weekends, which, combined with high thermal inertia was found to create minimal impact on environmental conditions. This measure will save energy and we will seek to establish this as a regular feature of our environmental management strategy.

PATH 9: Housekeeping

Housekeeping in the storage and access environments, is an important facet of WYAS environmental management. Effective and targeted cleaning reduces the pollutants and dirt to which collections are exposed, as well as minimises the risk of mould and pest problems. We will liaise with cleaning staff to ensure limited moisture and chemicals are used and cleaning is conducted in priority areas. Storage areas with air handling have the advantage of air filtration which reduces air borne dust.

We will also continue to monitor the effectiveness of WYAS housekeeping based practices which include exclusion of food in collection areas, keeping surfaces and floors clear to enable effective cleaning and replacing collections and packaging promptly to the storage areas.

PATH 10: Training

WYAS's environmental management is enhanced by the appropriate training of staff, in particular in Conservation. CPD activity and training will continue to be actively supported in this area via the annual appraisal scheme. Further, the Conservation Technician and Conservator are currently being supported in their training on the Conservation and Collections Care Diploma and Professional Accreditation for Conservator-Restorers respectively.

The Conservation Team will continue to advise staff on environmental management matters, including collecting monitoring data, planning exhibitions and advocating for improved conditions.

Responsibility

The Head of Conservation will develop and update the Environmental Management Strategy. The Conservation Team will lead on the collection of environmental data and taking actions to regulate and maintain environments for collections within the temperature, relative humidity, light and pollution limitations set out in this strategy.

Review Date

This plan covers the period up to 2018 and will be reviewed and updated in early 2019.