

The World at Wentworth
Wentworth Castle Conservatory, Stainborough

Design and Access Statement incorporating
PPS5 Summary Statement of Significance

buttressfulleralsopwilliams · architects

CONTENTS

Contents 2
Introduction 3
design parameters 5
Design Proposals - the conservatory 11
design proposals – new build extension 18
landscape proposals 20
mechanical & Electrical services 25
accessibility 48
consultation 49
planning policy statement 5 justification and summary statement of significance 50
impact assessment 57
appendices 66

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

INTRODUCTION

Aims and Objectives of this Report

This report is written to support the Planning and Listed Building Consent applications for the restoration and extension of Wentworth Castle Conservatory, Stainborough, on behalf of the Wentworth Castle and Stainborough Park Heritage Trust (WCSPHT).

Design Team and Scope of the Application

WCSPHT appointed Buttress Fuller Alsop Williams Ltd as architects and design team leader in June 2010, to develop the strategy for the restoration and extension of Wentworth Castle Conservatory in order to form an integral element of the wider visitor attraction of the Gardens, and also a key attraction in its own right.

As part of the design team, included within Buttress Fuller Alsop Williams remit, are the following:

Conservation Architect/Design Team Leader:	Buttress Fuller Alsop Williams
Structural Engineers:	Thomasons Consulting Engineers
Mechanical and Electrical Engineers:	Silcock Leedham Services Engineers
Landscape Architects:	Scott Wilson
Ecologists:	Golder Associates
Horticultural Specialist:	David Mitchell (Royal Botanical Gardens, Edinburgh)
Access Consultants:	CEM Ltd
CDM Co-ordinator:	Buttress Fuller Alsop Williams

In addition WCSPHT have separately appointed Buro Four as Project Managers and Davis Langdon as Quantity Surveyors. Janvs have been appointed to develop their interpretation design, to be primarily housed within the former Potting Shed and to provide the links with the wider site.

Initial pre-application consultation has been undertaken with Barnsley Metropolitan Borough Council's (Barnsley MBC) Conservation Officer in addition to English Heritage, both in terms of the implication of the built proposals and those for the landscape design. In addition the scheme was presented to the Barnsley Design Review Panel on 28th September 2010.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

This report has been prepared to summarise and describe the design of the proposed modifications and alterations, which have been agreed following extensive internal consultations within the Trust and the design team.

The initial phase of the design work included identifying the constraints imposed by the buildings and the various changes in levels within the site, and identifying how these may best be resolved by means of an options appraisal resulting in a preferred option. In parallel the brief was further developed to inform the Stage C Design Proposals, thus enabling the current proposals to be prepared.
A condition survey was undertaken to appraise the extent of fabric repairs required to ensure the building could be restored to an adequate level. This was a combined Structural and Building Fabric Survey. This report has been prepared to highlight the design considerations which have been undertaken and aims to describe and justify the proposal in a structured way.

Interface with other Consultants

This report contains sections from members of the design team and should be read in conjunction with the submitted application form and drawings. This report has been prepared by Buttress Fuller Alsop Williams (conservation architects) and has been developed in conjunction with the rest of the design team to ensure a coordinated, sympathetic and appropriate response to the brief has been achieved.

In addition to the new build elements, the team have also prepared a study on the repairs to the existing conservatory building, together with the relationship with the wider landscape. Each consultant looked at the building in relation to their differing fields and produced appropriate reports. The works identified within these reports have been incorporated into the scope of works for the proposed scheme, or where appropriate, will be identified within the planned maintenance & management plan.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

DESIGN PARAMETERS

Following detailed research, study and analysis, the Design Team has established several key parameters which have inevitable influences on the design of the proposed facilities. The principles of these have been defined as follows:

Initial Brief

The initial requirements were identified in the tender documents which described WCSPHT's principal objectives. The key elements of this were as follows:

- "Provide ideas and proposals for developing the World at Wentworth...The ideas could include facilities for catering, provision of external space to the conservatory, a more harmonious approach to providing facilities and provision of education areas".
- "Identify how the site could be improved to ensure that the World at Wentworth becomes the gateway to the Gardens, and is not an area which visitors come across part way into their visit".
- Provision of structural input to cover the restoration of the existing conservatory, and liaison with services engineers to provide a suitable environment within the conservatory for the multiple uses planned by the client.

Key drivers for the project include the desire to see the existing conservatory fully restored and utilised to maximise its potential as a visitor space in addition to the retention of a prominent and innovative example of Victorian glass house design.

The conservatory's fundamental original purpose is also key to the proposals; i.e. to house plants. The planting scheme is envisaged to be a major element of the overall interpretation of the site and the incorporation of exotic planting (which was historically provided in the conservatory) would look to achieve this.

In order to achieve a sustainable solution to support the restoration of the conservatory and generate future income, WCSPHT intend to utilise the site as an interpretative gateway and

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

orientation space which in addition will have the capability to include events, with the provision of flexible education spaces also an important element of the brief.

Development of the Brief and Consultations

The following brief was developed following the successful tender process and a number of meetings with the trust aimed at developing and refining the scope of the project.

The Brief

How does the title "**World at Wentworth''** relate to the development? The title is a link to the planting within the listed gardens which has been sourced from all around the world. The interpretative elements will include information as to how the plants came to be at Wentworth. Referencing the early expeditions which crossed the world searching for and returning with previously unknown plant types.

How does the Conservatory & **''World at Wentworth''** become a gateway to the gardens? By reversing the visitor route entry into the park visitors will be lead directly to the Conservatory where signage, and the design of the building, is to guide them into the starting point for their exploration of the gardens. When the Conservatory is being used for private functions it will be closed to the public although access to the flexible space and interpretative area should be able to be maintained (assuming the private function is only using the Conservatory)

Elemental Briefs

Restoration of the Grade II* Listed Victorian Conservatory and Potting Shed.

New Build and refurbished facilities to support the educational programmes and operation of the facilities (including toilets, plant space etc)

The Conservatory (including associated new & restored facilities) is to provide facilities for;

Learning through display, interpretation and activities centred either in the Conservatory or the flexible space (as BFAW tender drawing)

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

Growing Plants:

The Conservatory is not to be a “hot house”, as this would prevent other events being undertaken within it, but is to be a “temperate” area. It is important that the environmental is such that it does not prevent events, such as weddings taking place in a comfortable environment but will support the selected plants.

The environmental parameters of the Conservatory are to be agreed with Michael Klemperer (Estates Manager) with technical advice from BFAWs consultant, David Mitchell.

The planting to have discrete labelling.

The BFAW tender drawing layout of the Conservatory offers a compromise between a purely events space and a Conservatory for plants which is supported by the Trust.

The lighting within the Conservatory is to provide both a functional and a decorative function with simple control to be provided.

Education Facilities

Brief to be developed in conjunction with newly appointed Learning & Community Engagement Officer, Peter Clegg

Flexible space (adjoining Conservatory) & Conservatory to be used as additional educational spaces to provide maximum capacity for school visits (otherwise they will be limited by the single classroom)

Flexible Space

To be used for teaching, displays, events. A real multi function space providing simple space for a variety of users.

To be provided with a hard floor

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

Weddings & Events:

The Conservatory is to be licensed for Weddings.

The Conservatory is to provide facilities for events, either on its own or in conjunction with the use of the flexible space, or a temporary marquee erected adjacent to the Conservatory

Allowance for up to 80 - 100 in a wedding ceremony within the Conservatory.

It is intended that Weddings are generally timetabled for around 4pm, ie the Conservatory will be open earlier for visitors and will then close for the private wedding function. This closure will be advertised by the Trust on their website and within literature to avoid visitors being disappointed, arriving at the Conservatory to find it is closed. Also, the time of day will limit this being an issue.

The facilities will not generally be open for evening events however occasional evening corporate events may be an income generator for the Trust and so could be undertaken.

Catering

To assist in providing event catering to the Conservatory, temporary Marquee and flexible space it is envisaged that a “corporate kitchen” space will be provided within the facilities associated with the Conservatory.

The corporate kitchen space will be used by outside caterers for plating/heating food.

Café: There is to be no permanent café facility associated with the Conservatory.

Toilets

The toilets within the World at Wentworth are to be for the use of garden visitors and also people attending any private functions within the Conservatory.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

Landscaping associated with the World at Wentworth

Hard & Soft landscaping associated with the sense of arrival at the World at Wentworth (from the new entrance direction).

A new area of public realm adjacent to the Conservatory, ideally with a hard surface, upon which to erect a temporary marquee for events.

Marquee size to be up to 100ft x 40ft.

Landscaping design to provide access routes for marquee and catering vehicles along with emergency vehicles. The potential use of the gates at the side of the Gun Room to be reviewed.

Power and water supply to marquee area to be designed into the public realm

External lighting will be required, as a minimum from the Conservatory to the College Road (along the new access route) to guide people from events back to the exit of the site.

A wider lighting scheme to illuminate areas adjacent to the Conservatory and Marquee to be reviewed

Improved linkages to the entrance

Key issues to be considered in order to develop a new route from the entrance to the World at Wentworth

Signage to ensure that visitors leave the main entrance with a clear direction

A clearly discernable route

Physical alterations to the section which intersects the main route to the college. This is likely to include a change in material and / or road heights in order to clearly demark that the priority is with the pedestrian visitors

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

Potentially a new route from the road to the World at Wentworth which lessens the amount of travel along the roadway and provides a more interesting approach

The sense of arrival when visitors approach the new World at Wentworth, ensuring that both the public realm and the building entrance work to guide people into the gateway to the gardens.

As part of the improvement of the access route an improved “pay boundary” should be provided.

Infrastructure

Utility Infrastructure to support the development.

Servicing infrastructure to provide suitable and safe access for vehicles to the site (eg for catering, marquee erection etc)

Miscellaneous Items

The Wentworth Castle Phase 1 did not provide sufficient storage space for the Trusts operations. Storage spaces to be incorporated, where required, into the World at Wentworth development. E.g. Storage required for wedding tables & chairs (stackable lightweight conservatory furniture) and also for any gardeners requirements.

The long term costs for heating / cooling spaces is an operational concern for the Trust. The team need to ensure that the environmental solutions provide the best long term reduced running costs (balanced against capital cost and the available budget)

The Trust are keen to incorporate green and sustainable technologies and thinking into the design of the World at Wentworth.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

DESIGN PROPOSALS - THE CONSERVATORY

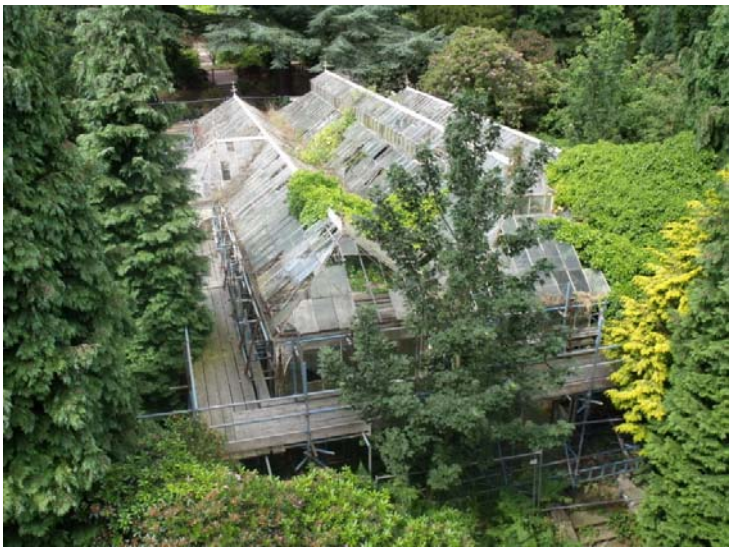
General Condition

As part of the preliminary assessment of the building, the design team carried out a condition survey of the building. This included a structural assessment by Thomasons Consulting Engineers, and review of the existing services as well as the fabric survey carried out by Buttress Fuller Alsop Williams.

The general condition of the conservatory is described by English Heritage on their Buildings at Risk Register as 'very bad', and the structure is currently being entirely supported by a scaffold frame, preventing it from collapsing. The structure and the remaining glass are in such a poor condition that only very limited access to the building is currently possible, and even then only while wearing full protective clothing.

The structural integrity of the conservatory is of great concern, and the inspection by the Design Team ascertained that all structural cast-iron columns are visibly beyond repair. This was established as part of a thorough condition survey which is incorporated as an appendix to this report.

The existing Potting Shed (lean-to) element is also in a very bad condition and is unsafe to access. There is a large felled tree currently resting across the glass roof structure which precludes full inspection.



Aerial View of Conservatory showing existing condition

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

Structural Condition

The columns, gutters and top chord of the trusses will all require replacement, as will all of the vertical glazing bars (we note that these are not the original members). Other members vary in the extent of repair / replacement required, but in general we anticipate that at least 33% will require replacement. These have been elementally scheduled as part of the condition survey.

Initial calculations on the existing structure have been undertaken by Thomasons. These have assumed that the structural members are in good condition without significant defects or distortions. Material properties have been taken from tables derived from historical data. Section properties have been calculated for the actual geometry of the members. As is often found with buildings of this nature the calculated values indicate that some members should have failed which have clearly worked for many years. It also suggests that the building should deflect far beyond acceptable limits as a result of wind loading. The failure of the overall frame to act as predicted suggests that the glazed walls and roof actually provide some degree of diaphragm action and assist the rigidity of the building. It is often necessary to take a view on the validity of calculations undertaken on historic structures in the light of the successful behaviour of the structure over the years, however, against this we must also consider whether aspects of the refurbishment of a building, such as how the glazing is fixed, may change the way in which the building has previously coped.

On this basis we have considered the existing frame (all members being free of defects) and its capacity to perform in the future. From this we have concluded that the top chord of the trusses have insufficient capacity, the tension rods of the trusses, however, are satisfactory. The gutters appear to be satisfactory. The purlins and the roof glazing bars are both satisfactory. The vertical wall glazing bars fail and will require an enhanced design, we anticipate that if a cruciform member is used (possibly of larger section than had been original) this can be overcome. This will use a section of similar profile to the historic section used, but of a larger cross-sectional area. This will be selected from historic profiles still available.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

Architectural Condition

The condition of the remainder of the building reflects the structural condition of the building. The masonry however is generally in a good condition – although all stonework requires both cleaning and repointing. The flooring internally is surprisingly well preserved, considering the lack of substrate and exposed condition. The floor is to be restored, with some areas of stone edging replaced.

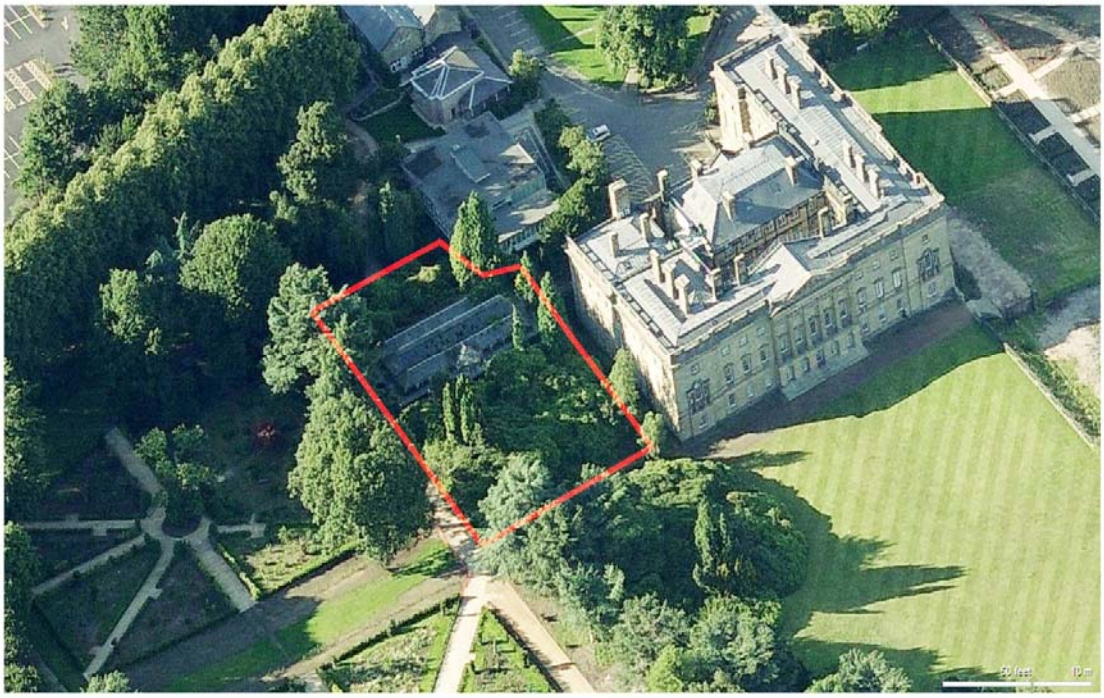
Around the perimeter of the building, internally, there is stone benching to the perimeter of the conservatory. These are all spalled and delaminated and require replacement with new York stone to match the existing.

The glazing externally is generally modern float glass, although there is high level historic glass retained – particularly to the clerestory. This may or may not be original to the building, but is both dirty and obscured by both scaffolding and vegetation. It is proposed that all glass is removed from the building, and replaced with modern hand drawn glass which will be historically accurate. This new glass will be toughened to provide adequate protection for this to be used as a public building.

The timber doors to the centre of each façade are generally sound, and can be retained and appropriately patch repaired and redecorated.

Both the timber and the iron frame require redecoration to an historically sensitive colour scheme. The iron frame will be decorated as part of the iron restoration package, prior to glazing. The timber will be decorated in complementary colours. To date paint scrapes have been undertaken by BFAW, which reveal the historic colours are a dark bottle green, with a blue/green to spandrels. Historic colours have been identified to replicate these, but to reduce the maintenance burden on a building of high internal humidity, a modern paint system will be used to suit both the timber and ironwork.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk



Aerial Photograph of site

Restoration of the Conservatory and Potting Shed

The Conservatory and Potting Shed are to be fully restored and the following methodology describes the scope of these works. Following a detailed structural inspection a considerable amount of the iron frame will need to be dismantled and rebuilt.

In order to facilitate the safe dismantling of the iron frame all of the existing glass will need to be removed beforehand. Additional scaffolding will be required in order to access the glass in the central bay.

Following a detailed recording and the labelling of individual components (in line with recognised building conservation practice), the cast-iron frame will be dismantled. The existing glass roof to the Potting Shed will be removed in addition to all internal fixtures and fittings. All of the heating pipework throughout the building is to be removed in order to facilitate new services. It should be noted that all pipework is modern mild steel and is in a poor condition. This will be replaced and new pipework installed in existing locations.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

As identified in the structural engineer's schedule, individual components of the iron frame are to be refurbished, repaired and replaced. All replacement materials will match existing, i.e. cast-iron columns, wrought iron trusses and glazing bars and cast iron gutters.

The new elements will include; decorative 'egg and dart' gutters to be replaced in cast iron. All historic opening lights will be fully restored with traditional hand-cranked winders and opening brackets, with a number of currently 'missing' opening lights reinstated to aid natural ventilation.

The historic electrical services conduits (timber sections suspended from trusses and horizontally below ridge lines) are to be restored and redecorated to match the existing. Approximately half of this restoration will involve new replacement timbers or 'spliced' elements. Historic service runs and lighting pendant positions are to be utilised for the provision of modern vapour-resistant cables and lighting.

The internal clay drainage elements running from each column position are to be rodded and surveyed using CCTV cameras. In the event of cracked or broken pipes being found, an approach of 'sleeving' the inside of the pipes will be adopted in order to avoid excavation of the drainage.

The position of the existing water storage tank is to be determined and the tank considered for reuse. The proposed 'cut and fill' landscaping to the south terrace is also intended to accommodate additional rainwater storage, for re-use as part of the development for the watering of plants.

Where the replacement cast-iron columns are to be utilised as rainwater pipes, these are to be lined internally in order to reduce future corrosion.

The floor to the Conservatory is to be restored. The existing floor tiles are to be cleaned using a low pressure hot water washing system. The re-bedding and replacement of floor tiles is to match the historic pattern as identified on the accompanying floor restoration drawing. Re-grouting will then be carried out throughout.

An additional area of floor is to be created to the centre of the conservatory to the proposed layout included within the application, with a new kerb formed to re-aligned borders. The new flooring is to be in encaustic tiles (i.e. painted and fired in order to fix a pattern or colour). The new tiles will be in a contrasting but complementary colour to the original design in order to be

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

recognisable in line with recognised building conservation philosophy. The Potting Shed floor is to be carefully lifted and new quarry tiles laid in its place.

The stone plinth and north wall are to be restored. All friable stone is to be lightly brushed off, with all algal growth to be cleaned using a low pressure hot water wash. All ashlar stonework joints both internally and externally are to be raked out and repointed using a lime mortar.

The restored conservatory frame is to be re-erected and redecorated in a historic colour scheme using modern primers, undercoats and finish coats. The re-glazing is to be carried out with new hand-drawn and toughened 4mm thick glass, using modern gaskets, beddings and sealants. These will form the traditional putty line but are less prone to drying out. A final coat of paint will be applied once the frame is glazed to ensure all elements are fully decorated and all glazing sealants are over-painted.

All cast-iron grates to floor heating trenches are to be replaced in cast iron, with new stainless steel support brackets to sandstone edges to be formed throughout. Currently there are no grates in this position.

The cast-iron upstands to the perimeter benches are to be replaced as identified by the structural engineer's metalwork restoration schedule, retaining all sound grates.

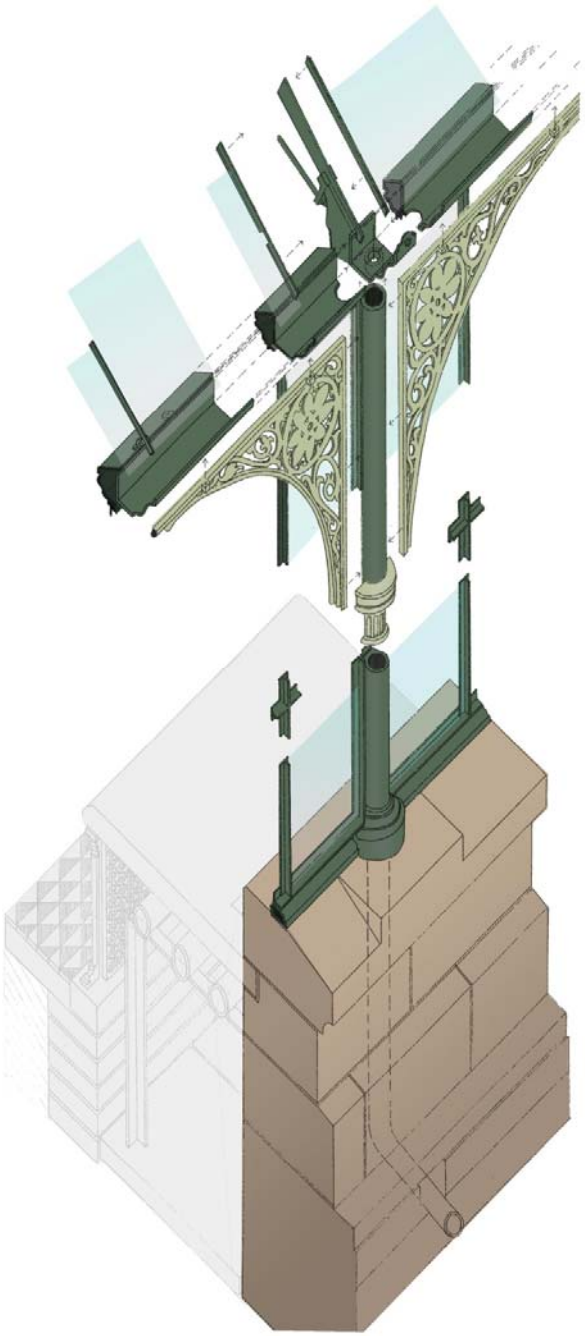
Timber doors and frames are to be repaired, including all necessary spliced repairs. These are to be re-hung using new ironmongery with new locks fitted throughout. The existing thumb latches are to be retained and refurbished for re-use.

The refurbished iron canopy adjacent to the south entrance is to be re-glazed using hand-drawn glass, toughened to match the external glazing. This will then be redecorated to an historic colour scheme.

The masonry walls of the Potting Shed are to be brushed down of any friable material and fully repointed in a suitable lime mortar. The relevant masonry repairs are to be identified and carried out in accordance with accepted building conservation philosophy following further investigation.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

Following development of the interpretation scheme, the retained planting beds are to be re-planted as detailed by the landscape architect (drawings and report included within the application).



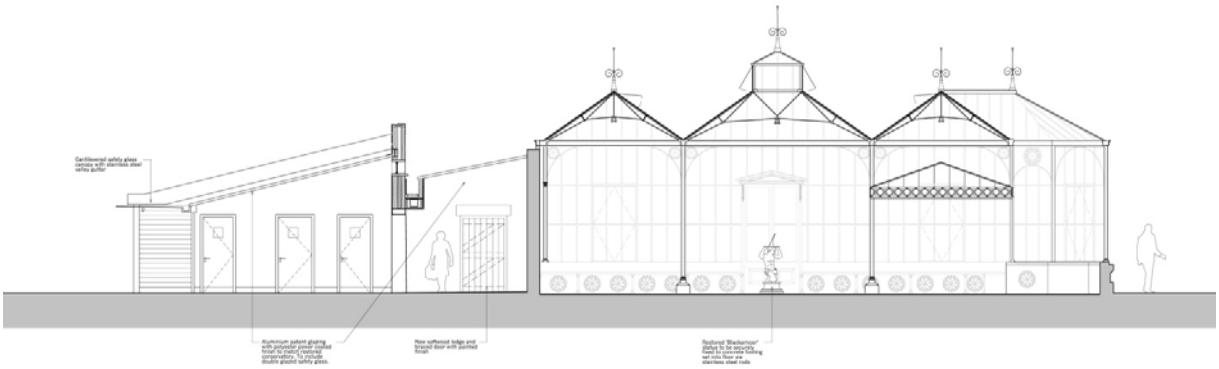
Coloured isometric of restored frame

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

DESIGN PROPOSALS – NEW BUILD EXTENSION

The proposed extension will utilise the existing Potting Shed structure and build on it to form an Interpretation Foyer and a link between the historic Conservatory and the New Build. The walls are to be blockwork cavity walls with a rendered finish to the external face and plasterboard and skim (with a painted finish) internally. These walls are to be built off the existing Potting Shed walls. The roof to the Potting Shed is to be made up of double-glazed safety glass, which will be framed in modern aluminium and decorated to match the colour of the Conservatory. This will allow a shallower pitch to be incorporated. The proposed store rooms to either side of the Potting Shed will be roofed in a Sarnafil membrane with a pebble over-covering.

The new build itself will consist of a central glazed corridor with solid elements on either side. The building will consist of a cedar-boarded external cladding on a timber framed, insulated structure. This will be mounted on a low level cavity wall plinth with a stone wall externally. Internally there will be a variety of wall finishes; plasterboard and skim with painted finish to the entrance lobby, flexible use space and stores; painted plasterboard to the kitchen; tiled walls to the washrooms (to 50% height with painted plasterboard above this); and a painted fair-faced blockwork to the plant room. The main entrance will be full-height glazing which will be set back from the main north wall.



Section through New building and Conservatory

The main roof will be a mono-pitch sedum green roof on a Sarnafil single-ply membrane, which will be mounted on rigid insulation board, on structural steel rafters. This will sit on a plywood diaphragm deck. A gutter will be formed in Sarnafil within a pebble margin and 75mm upstand to the edge of the green roof, which will terminate via 'rain chains' and overflow spitters at each end of the building. The fascia will be made up in plywood and clad in terne-coated stainless steel. The

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

central core of the extension will have a glazed roof to the same pitch as the green roofs although it will be recessed below the fascias. A structural glass canopy will project from the roof above the main entrance to provide cover.

Floors are to consist of a variety of materials dependant on the space; entrance lobby, flexible use space and the washroom floors will be in quarry tiles; the kitchen and stores will have a non-slip vinyl covering; and the plant room is to have an epoxy floor paint. All ceilings are to be in plasterboard and skim with a painted finish. The flexible use space ceiling will be pitched to mirror the roof.

All windows are to be double glazed and to be composite aluminium windows within a timber frame. This will also be the case with the main entrance doors. Internal doors to the Conservatory and Potting Shed are to be oversized softwood and fully-glazed. These doors will also be automated. Other internal doors will be traditional softwood 'ledge and braced' doors with vertical boarding and painted finish.

All sanitaryware is to be from the Armitage Shanks range. All cubicles are to be Thrislington mid-range.



Perspective view of proposed entrance building

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

LANDSCAPE PROPOSALS

Wentworth Castle and Stainborough Park form a Conservation Area and the gardens and park are Grade I on the 'Register of Parks and Gardens of Special Historic Interest'. The conservatory is a Grade II* listed building on the English Heritage 'Heritage at Risk Register' and the adjacent Wentworth Castle is Grade I listed. The conservatory and surrounding area provides unique opportunities for enjoyment, interpretation and learning, offering attractions to people from a wide range of backgrounds.

The existing route to the conservatory from the Visitors Centre is indirect and does not actively lead visitors to the conservatory, which does not fulfil the aim of being the first destination within the parkland landscape. It is therefore proposed to provide a resin bound gravel surfaced route that draws people in an intuitive and direct manner and helps establish the conservatory as a primary destination. There will be a shared surface introduced to the road and fingerpost signage leading the visitor to the path through the woodland. On crossing Lady Lucy's Walk, realignment and widening of the path strengthens the approach to the restored conservatory from the north. This widened existing route from the Coach House and Gun Room is subject to re-surfacing, in resin bound gravel, and provides a visual link between buildings that form the core of the educational/event facilities in the heart of the gardens. As the visitor gets to the new entrance building the proposed route reinforces existing axes inherent throughout the landscape and it reinforces the axial symmetry of the building, and widens to a Yorkstone paved arrival square, which complements and enhances the formal, geometric, building plan. Replanting of holly hedges along this route will further emphasise this link, and screen views of adjacent college buildings, thus improving the setting of the area.

A hard landscaped square, with seating and planting, will maximise the sense of arrival at the new entrance building, located to the north of the restored Conservatory and Potting Shed, and be a celebration of the approach and sense of arrival carrying on through to the new building. The restored structure is to form a 'gateway' to the estate's 60 acre Pleasure Gardens for both day and educational visitors and therefore this space is key in the revised circulation vision for The World at Wentworth. This new courtyard will be surfaced with Yorkstone paving, of a suitably small unit to allow vehicular traffic in the form of restricted service and catering vehicles. The widened approach will also allow emergency vehicles to the front of the building. The arrival square will be a gathering and meeting place for park visitors, with low walling to some of its

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

perimeter allowing informal seating opportunities and acting to retain the land and planting. The soft landscape design will complement and enhance the arrival space, screening views of the existing college building and providing softening to the new building, tying the building into the landscape.

Entry to the conservatory is gained from here through the new building. A flexible performance and events space is created at the heart of the conservatory defining the use of the building and improving its effective use to generate revenue. However, the historic design of the internal planting beds has not been compromised to achieve this. Instead the eight planting beds are to remain, and be restored, in their original locations and house plant collections suitable for a temperate climate, to the theme of 'The World at Wentworth'. The four central beds have been truncated, yet with the original shape represented within the carefully considered hard landscape detailing of the floor. For further details on the planting philosophy for the conservatory and the associated external planting, reference should be made to 'Wentworth Conservatory and Terrace Proposed Planting and Interpretation Themes' document, prepared by David R Mitchell – Curator, Royal Botanic Garden Edinburgh. This is enclosed as part of the application.

Should the visitor not wish to enter the conservatory at this time there are steps linking the formal hard surfaced arrival square to Cedar Walk, along with an alternative ramped resin bound gravel path that wraps around the arrival square, taking a route through the proposed planting scheme. A resin bound gravel path to the west of the conservatory also provides a link between the arrival space and the conservatory terrace continuing to form a perimeter path. This also allows catering access to the new entrance building's kitchen, and a level route to enable this kitchen to serve marquee functions on the conservatory terrace. Best efforts have been made to achieve inclusive design and circulation, within an inherently steeply sloping site.

On leaving the conservatory to the south the ground has been reprofiled with a new, level, terrace created for the visitor to enjoy. Engineering the landform in this way also provides a plane upon which the conservatory sits, and it can be viewed in all its splendour. Reprofiling the ground maximises the terrace for flexible use, and again reinforces the formal symmetry of the conservatory building and the wider landscape of the formal gardens. Retaining walls surround the terrace, retaining a planted bank up to the existing Cedar Walk to the west and creating a planted embankment down to Wentworth Castle to the east. This hard landscaped events space to the south of the conservatory is proposed to be surfaced in a combination of Yorkstone flags (closest to the conservatory) and self binding gravel. The Yorkstone area of the terrace is

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

immediately outside the conservatory to the south side and enables internal/external linking social space. The terrace will provide a setting to the building and a link to the site for the temporary marquee. The self binding gravel area will itself have planting, linking to the planting themes within the conservatory, within Versailles planters. Although moveable, these planters will form part of a design to the terrace that is also reflected in the surfacing by the use of different gravel tones. This design ensures that at times of the year when there are not marquee, or other, events held on the terrace it still remains an integral part of the designed space when experienced by visitors to Wentworth.

Although the rhododendrons that currently cover the land immediately to the south of the conservatory, on the former lawn, will need to be cleared, there may be opportunities to take cuttings from some selected specimens to allow planting elsewhere in the gardens. To the southern end of the terrace, and its associated perimeter path, the visitor has a number of options in continuing their visit experience. A retained sloping heathland swath visually links the Broad Avenue to the South Lawn (and maintains the historic vistas) and proposed new steps can be used to circulate to other areas of the park and gardens by allowing the visitor to reach Cedar Walk from the conservatory terrace. This heathland has been identified as a UK Biodiversity Action Plan (BAP) and Barnsley BAP priority habitat, and it is therefore proposed to be protected to the maximum extent possible, allowing a sufficient construction zone for the terrace.



View from the South Lawn

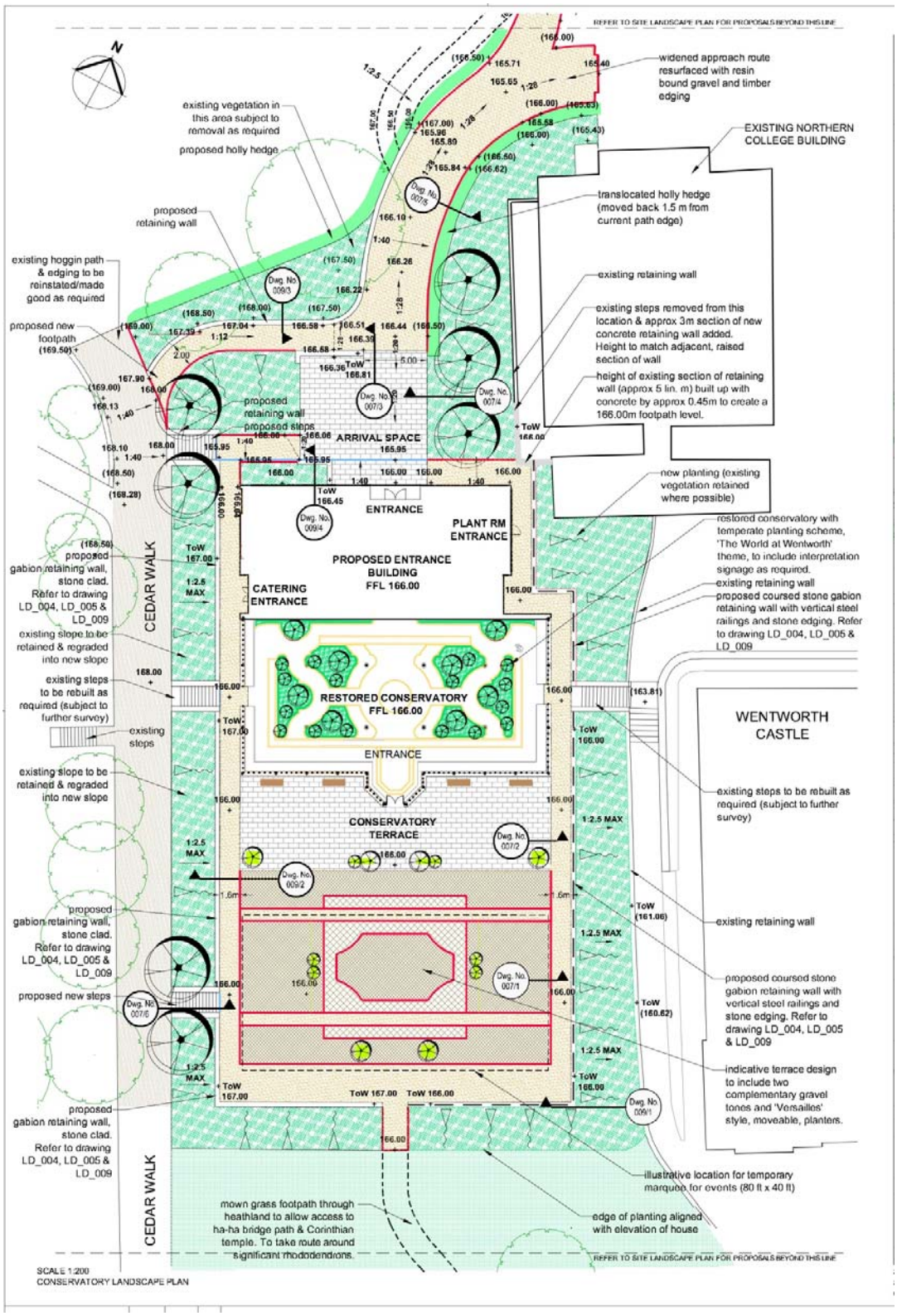
buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

The visitor may choose to take the cleared mown grass footpath, through the heathland and then the rhododendron collection beyond this, linking the proposed conservatory terrace to the Corinthian Temple and ha-ha bridge path, providing wider links to the gardens and parkland. Some further clearance of rhododendrons will need to occur to achieve this; however the path will avoid the most significant specimens and in fact allow the public to get closer to these plants.

Orientation signage highlights the differing routes and will support existing wayfinding and interpretation is to be introduced upon arrival to help visitors choose a suitable themed route.

There are known Great Crested Newt, bat and badger populations within the vicinity, and reference should be made to Ecological Appraisal for the Proposed Restoration Work 'The World at Wentworth', prepared by Golder Associates for further details. This is enclosed within the application. Tree and vegetation works will also need to be planned with a consideration of Conservation Area notification requirements and the protection of nesting birds.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk



buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

MECHANICAL & ELECTRICAL SERVICES

Introduction

This outline feasibility report briefly describes the Mechanical, Electrical and Public Heath engineering services under consideration for the restoration and extension to the Wentworth Castle Conservatory. The report is based on engagements with the client to outline the brief and the detail planning drawings and areas developed by Buttress Fuller Alsop Williams Architects and the occupancy profiles developed by Silcock Leedham.

The report and services strategy drawings are based on Architectural drawings supplied by Buttress Fuller Alsop Williams

The proposals have been developed based on the building layouts and construction information provided by the Architect and approximate loadings based on the understanding of the usage of each area.

Where necessary the building is to comply with Part L2 of the Building Regulations. The services installations are to be designed to be energy efficient. Close collaboration with building control will be required to balance the requirements of Building Regulations with the limitations imposed by the conservatories Historic Grade II* listed building status.

The building fabric and services systems have been thermally modelled using software in accordance with CIBSE AM11 to ensure that they satisfy the regulations and the design team are working together to ensure that the requirements of the regulations are achieved. In addition modelling has been carried out to determine peak temperature profiles that may affect the use of the space for corporate functions, civil wedding ceremonies and social events.

Scope of Works

The project consists of the restoration of the existing conservatory and potting shed at Wentworth Castle and construction of a new build extension to the rear of the conservatory. The renovation shall allow the space to be used for multi purpose use, the primary use of the conservatory shall be to house a collection of temperate plants on public display with the additional use of the space for learning, social and corporate events including using the space as a civil wedding ceremony venue.

The combined new and existing building will house multiple facilities and provide accommodation and services to numerous user groups.

The principles adopted in the development of the mechanical and electrical services are to provide, where possible a low energy, passive solution, maximising natural ventilation and passive cooling strategies.

To assist and optimise the design of the systems, a detailed fabric analysis has been carried out to review the thermal performance of the building elements and the impact on the internal loads.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

Environmental Design Conditions

The mechanical services systems design and equipment selection shall be based on the following environmental design conditions;

External Conditions	Winter	-5.5^{0}C 100% RH	
	Summer	28^{0}C db / 21^{0}C wb	
Internal Design Conditions	Winter	Conservatory (Frost Protection)	10°C
		Conservatory (Functions)*	15-20 °C
		Interpretation Foyer	20°C
		Flexible Use Area	20°C
		WC Accommodation	18°C
		Entrance Lobby	18°C
		Stores	16°C
		Plantroom	12 °C
	Summer	Upper temperature control of the conservatory is by natural ventilation only by opening windows. Stage D thermal simulation indicates that the peak summertime internal temperature exceeds CIBSE recommendations for human comfort conditions. Peak internal conditions exceed 40 °C for a short duration.	
		Estimated Building Peak Heating Load 115kw	

Energy Targets & Consumption

In accordance with the core aims of the client brief to provide a sustainable M&E solution the following design energy loads are anticipated.

WATER GAS AND ELECTRICITY CONSUMPTION

Gas Load	=666 MWh per annum
Water	= 550 m3 per annum
Electricity	= 61 MWh per annum

Water usage does not take account of any external irrigation requirements or external catering requirements

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

MECHANICAL ENGINEERING SERVICES

This report is to be read in conjunction with the mechanical services stage D drawings;

- Electrical & Mechanical Services, External Services Layout BFW0016/U/6001
- Mechanical Services, Conservatory Above Ground Drainage Layout BFW0016/M/5201
- Mechanical Services, Conservatory Domestic Water Services Layout BFW0016/M/5301
- Mechanical Services, Heating Services Layout BFW0016/M/5601
- Mechanical Services, Ventilation Services Layout BFW0016/M/5701
- Mechanical Service, Plantroom Layout & Schematic Detail BFAW0016/M/5801

Existing Incoming Mains Services

Mains Water

The renovated conservatory shall be supplied with a new sub-metered potable mains cold water supply. The supply shall be taken from the site wide Yorkshire Water distribution network installed throughout the Northern College Site. The supply shall enter the development within the main Plantroom. The new supply shall be complete with all necessary isolation and backflow prevention devices. The water meter shall incorporate pulse technology to enable future connection of automated meter reading and interrogation facilities'.

It should be noted that the new water supply will be taken (with agreement) from the Northern College network infrastructure, Northern College will control the supply and an agreed usage tariff will need to be signed up to with the Northern College.

Gas Service

It is proposed to serve the conservatory with a new dedicated gas supply to serve gas fired boiler plant. The new gas supply shall be taken from the existing gas main pipework route run between the utility authorities main meter enclosure and the Northern College main boiler house. The new branch shall be installed and buried along a route to be agreed. The gas supply shall enter the development in the Plantroom complete with a sub meter. The gas meter shall incorporate pulsed technology to enable future connection of automated meter reading and interrogation facilities'.

It should be noted that the new gas supply will be taken (with agreement) from the Northern College network infrastructure, Northern College will control the supply and an agreed energy Tariff will need to be signed up to with the Northern College.

Electric Service

Refer to electrical installation section of this report for details of incoming power supplies and proposals.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

LPHW Heating System

The conservatory, potting shed and associated new build elements of the project shall be heated by a low pressure hot water heating system to meet the calculated heat loads of the development.

Heat loss, heat gain and peak summertime temperatures calculations have been carried out to determine plant loads and predicted peak summertime temperatures. All loads have been calculated assuming the conditions noted in section 3 – Environmental Design Conditions. These conditions have been discussed and agreed with the client and their specialist consultants following a review of the Stage C report.

Day to day operation of the heating system shall control the internal air temperature of the conservatory 10ºc for the protection of the plant collection. During functions the space temperature shall be raised to control to a minimum temperature of 15 ºC. As a minimum the system shall be designed to achieve a 20 ºC temperature differential between external and internal conditions.

New Build Areas & Potting Shed (Interpretation Foyer)

It is proposed to provide heating to the potting shed area and new build construction by the installation of an underfloor heating system. Each space area shall have a dedicated, and individually controlled circuit.

Conservatory Heating System

It is proposed to heat the conservatory by the incorporation of a low pressure hot water natural convection heating system by use of exposed finned element (gilled) pipework system. The gilled pipework shall be located in the existing floor trenches and exposed beneath the perimeter potting benches. The material specification for the pipework shall be galvanised steel with a black powder coated finish. Output of the heating shall be automatically adjusted dependant on a control signal from temperature sensors located in the conservatory. The heating system shall be compensated to match the system flow temperature dependant on external weather conditions.

Heat Source

Consideration has been given to the installation of a number of different types of heat source to serve the LPHW heating system. Each type of system is identified below.

- Biomass Boiler
- Air Source Heat Pump
- Ground Source Heat Pump
- Natural Gas Fired Boiler Plant.
- Gas Fired Combined Heat & Power

Having considered each system on both a technical and cost basis, it is proposed that the scheme is advanced using natural gas fired boiler plant.

The gas fired boiler solution provides the simplest and lowest cost installation requiring the least plantroom space when compared to all other systems under consideration.

Following discussions with the Wentworth Castle Trusts botanical consultant it is recommended that the heating system serving the conservatory is designed to incorporate two boilers and the heat circuit serving the conservatory with a twin bodied pump such that in the event of a failure of one of these critical systems some level of heating could be maintained to provide frost protection for the plant collection.

The installation will be designed to take full advantage of condensing boiler technology to maximise boiler efficiency.

The installation of gas fired plant will require a new sub metered gas main connection to the Northern College's site wide distribution; it is likely that the additional load placed on the gas main can be accommodated by the existing gas service with no upgrade to the site wide capacity. Northern College are in the process of acquiring a schedule of connected gas loads across their site, once in possession of this information an application will be made to the local supply authority to check the capacity of the existing site wide gas supply.

Heat Distribution & Emitters

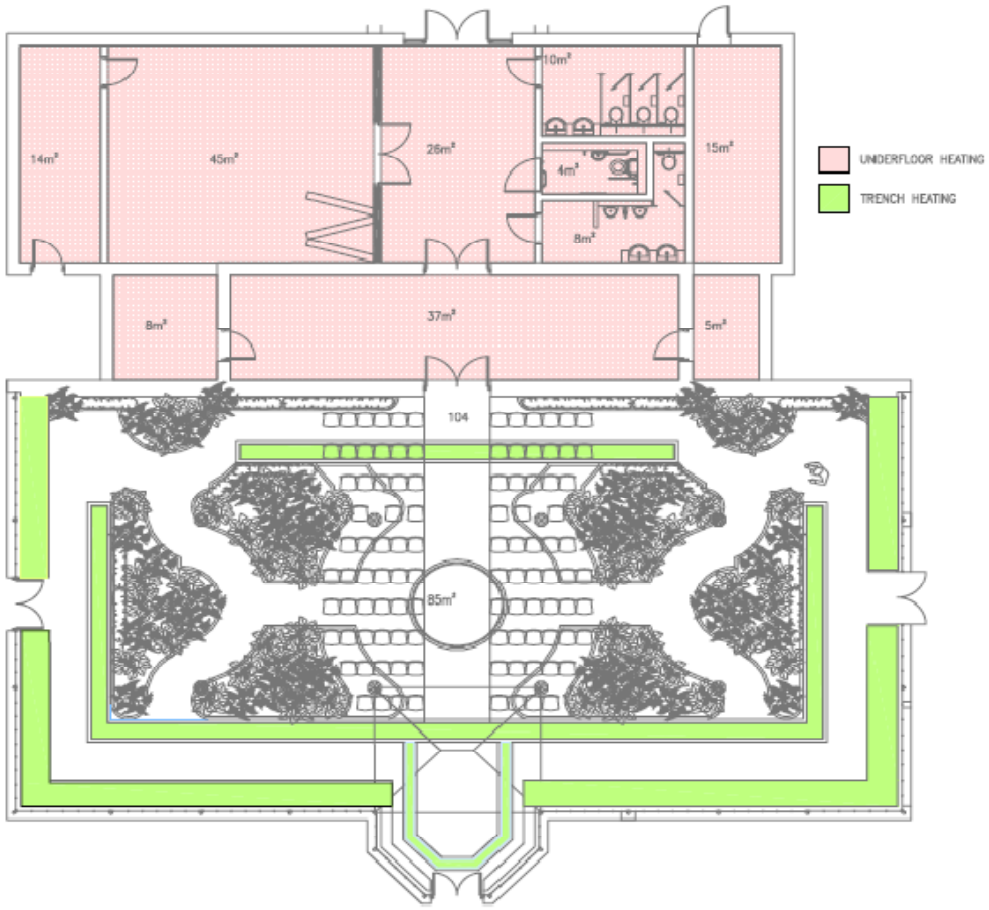
From the boiler plant a conventional LPHW secondary heating system shall be provided to serve the building. The proposed methods for the space heating of the development are as follow;

A new floor slab is to be provided to the new build and potting shed areas of the building. It is proposed that a new underfloor heating system shall be installed in these areas, allowing maximum flexibility within the spaces without wall space been occupied by radiators or heat emitters.

An over door heater shall be provided over the main entrance

The conservatory shall be heated by a warm air natural convection system which shall be achieved by the replacement of the existing exposed pipe heating sections. A new gilled tube installation shall be installed below the potting benches and in the existing heating pipework trenches. The floor trench sections shall be covered with an open mesh type grille. The finish and style of the grille shall be selected to compliment the architectural finishes and style of the conservatory, selection shall be by others. Connections to the new gilled tube sections will run from the plantroom to the positions in the conservatory by use of continuous buried pre-insulated pipework sections.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk



Heating Services Provision

Ventilation Systems

It is proposed to install simple and discrete stand alone mechanical ventilation systems to serve the following areas.

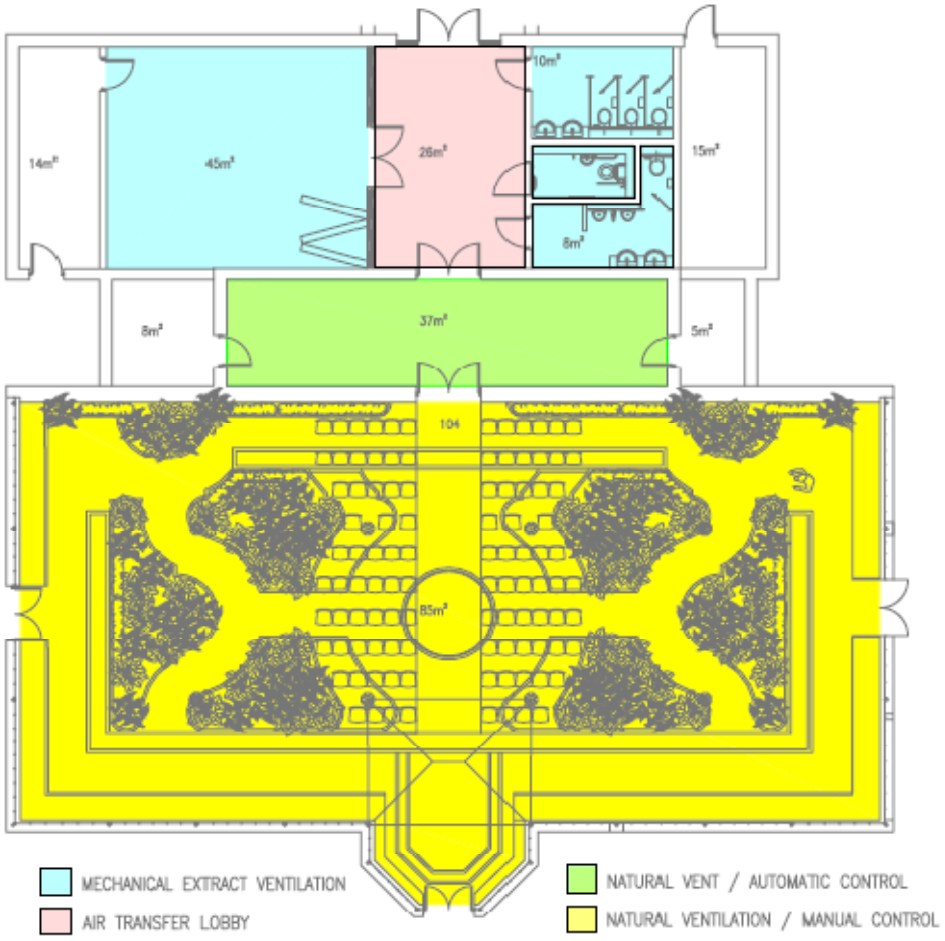
- Catering Store
- WC Accommodation

The use of two speed fans and occupancy detection will enable automatic local control providing a constant trickle ventilation rate with increased ventilation rate when the building / space is occupied. The use of individual fans and independent operation will result in a lower installation and operational costs.

The conservatory area shall incorporate a number of manually controlled axial bladed fans to provide air movement in the conservatory area. The fans shall be portable and shall be provided as part of these works. Final details of the specification of the fans shall be agreed with horticultural staff prior to issue of tender documentation.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

Fresh air ventilation and peak temperature control of the conservatory space shall be provided by the renovation and manual operation of the mechanical window opening mechanisms. The potting shed shall be complete with automatic opening windows / roof lights openings which shall operate automatically from an intelligent controller supplied as part of the window manufacturers package. Air from the potting shed shall be used for make-up air for extract ventilation systems.



Ventilation Services Provision

Domestic Hot & Cold Water Services

Hot and cold water services shall be provided to suit the final requirements of the building to include supplies to the followings areas

- WC & Sanitary Accommodation
- Catering Preparation / Store Area
- Conservatory Irrigation System
- Marquee Standpipe

Hot Water Installations

Hot water shall be generated by use of an un-vented hot water storage vessel served by the gas fired boiler plant. The heater shall be located in the Plantroom.

Cold Water Installations

A metered mains cold water supply shall enter the development in the Plantroom. The mains cold water shall distribute to serve cold water outlets as dictated by the final agreed architectural layout.

In the event of depletion of the rainwater storage tank (see below), a metered cold water feed shall be supplied to act as system back-up from the mains supply. A pumped irrigation distribution pipework system from the rainwater collection tank shall be installed within the conservatory to manually operable standpipe positions (4No) and to serve the flushing WC's.

Rainwater Collection System

A new rainwater harvesting system shall be designed and installed as part of the conservatory renovation works. The rainwater collected from the conservatory roof shall be stored for use as WC flushing supplies and irrigation systems to the conservatory and external terrace areas. Investigation shall be carried out regarding locating an original buried tank and reviewing it's suitability for reuse. In the event of the existing store not being suitable for re-use a new buried tank shall be proposed. The final position for this tank shall be in the new cut and fill area to the South elevation of the building beneath the terrace area.

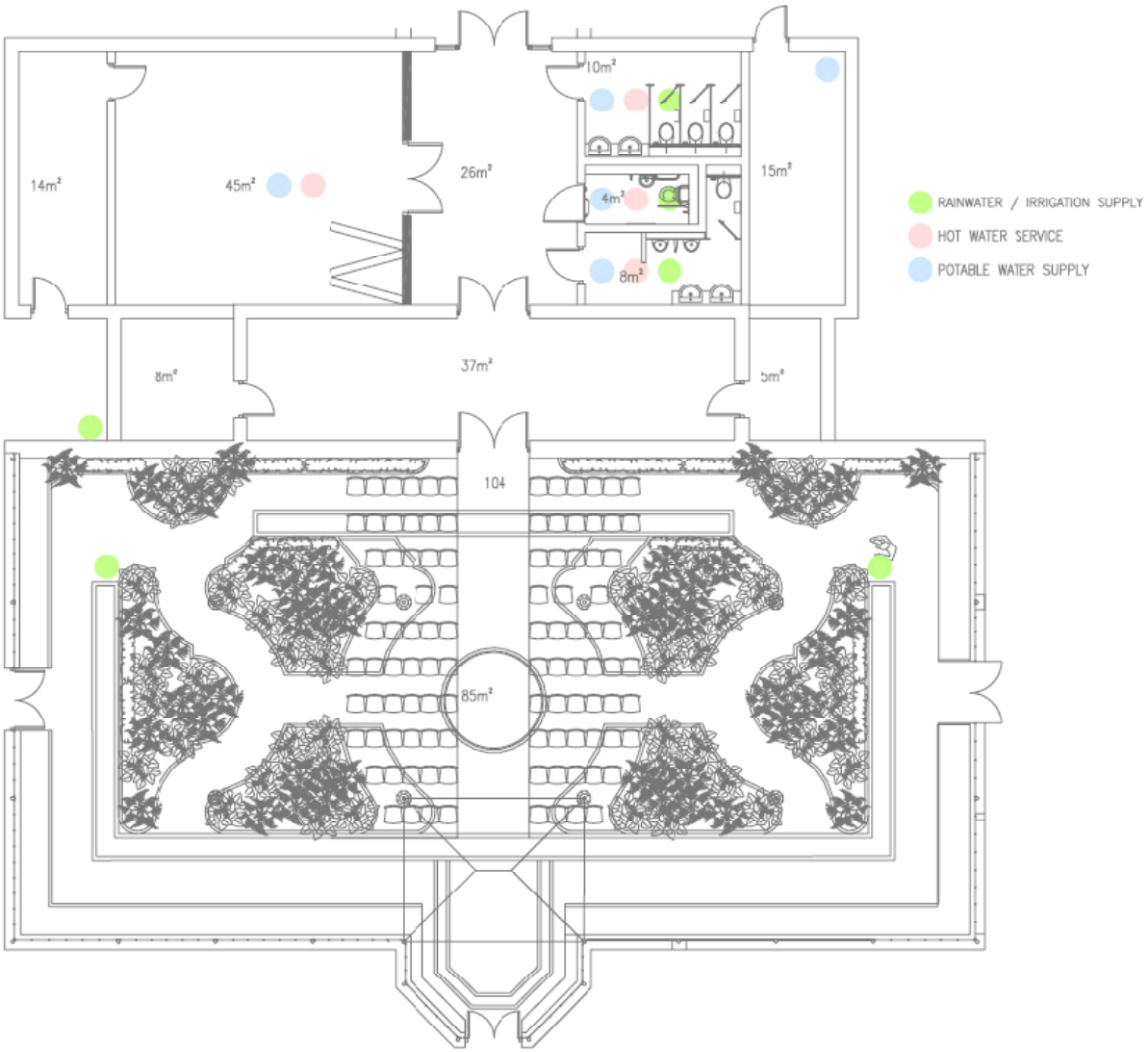
Automatic Controls Installation

The development shall be provided with a standalone bespoke automatic direct digital control system which shall be installed in the plantroom and shall operate and monitor the following systems

- Primary Heat Source System Installation
- Heating System Ancillary Equipment & Circulation Pumps
- Hot Water Heater Operation
- Irrigation Tank / Rainwater Collection System
- Energy Metering of Power
- Utility Meter Reading (gas and water)

The system shall initially be standalone and not connected to any site wide installation, however the system shall be capable of been addressed and accessed remotely.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk



Proposed Hot & Cold Water Service Provision

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

ELECTRICAL ENGINEERING SERVICES

This report is to be read in conjunction with the electrical services stage D drawings listed below;

- Electrical & Mechanical Services, External Services Layout BFW0016/U/6001
- Electrical Services, Conservatory Small Power, Fire Alarm & Security Layout BFW0016/E6201
- Electrical Services, Ancillary Areas Small Power, Fire Alarm & Security Layout BFW0016/E6202
- Electrical Services, Conservatory Lighting & Emergency Lighting Layout BFW0016/E/6301
- Electrical Services, Ancillary Areas Lighting & Emergency Lighting Layout BFW0016/E/6302

Existing Incoming Electrical Engineering Services

It is understood that the existing electrical supply to the conservatory originates from the adjacent classroom block. However, this supply is currently isolated and redundant therefore should be removed as part of an enabling works package at an early stage of the construction works.

Electrical Infrastructure

Through carrying out a site survey and through engagement with YEDL, the Wentworth Castle Trust and Northern College, it has been established that the electricity supply to the site is via overhead lines to a substation located near the site entrance.

Wentworth Castle Trust currently operates a small number of buildings on the site and obtains their electricity from the Northern College electricity supply network. The trust electricity usage is sub-metered from the college and charged to the trust at agreed rates.

Previous design reports determine a current site (including both College & Trust) maximum load of 205KVA with a site maximum capacity available of 288KVA and a billing agreement in place for a maximum of 228KVA. (if you exceed a billing agreement with your supplier you will generally be charged a higher rate for electricity used above the agreement limit).

This suggests a maximum 83KVA unallocated capacity is currently available. The electrical loads quoted have been confirmed by site services personnel as a total site load and reasonably accurate information.

It has since been established that the YEDL Site Distribution Transformer has a total capacity of 500KVA. The factor which restricts the available site capacity to 288KVA is the rating of the YEDL owned Low Voltage (LV) fuses attached to the substation.

The current load assessment for the conservatory, new build element & marquee supply will require a maximum electrical load of circa 40KVA

From an electrical supply basis, and technical solution, it is possible to connect the new development direct to the existing infrastructure without upgrade of either the YEDL Distribution

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

Transformer, YEDL Fuses (@ 288KVA)or the College LV switch panel whilst keeping within the current 288KVA limit.

The billing agreement may have to be renegotiated (by the College with YEDL) in the future if the electrical demand regularly exceeds the 228KVA. The college would need to refer to their connection agreement to assess any consequences of increasing the billing agreement should it be required.

The college LV equipment is circa 1970's and becoming obsolete. There are no apparent issues with connecting to it but at some time in the future the College will have to upgrade it (due to its age), whilst in the event of a future development requiring an electrical load in excess of the 288KVA total site supply there would be a requirement to upgrade this equipment and the YEDL LV switchgear. The indicative costs for this upgrade are circa £60K.

This upgrade would give the College a new LV Panel (from which the Trusts also draw their electrical supply) and also the whole site access to the 500KVA supply, thereby future proofing the site for further development.

In summary, we can connect directly to the existing supply without requiring any significant infrastructure upgrades. Currently the World at Wentworth project costs are not including the £60K budget estimate for the electrical upgrade.

LV Distribution

A new dedicated sub-main will be taken from the exiting Northern college main switch panel via a new switchfuse coupled to the existing bus-bar chamber with integral KWh meter.

The new metered three phase supply will be run below the re-routed access pathway from the substation adjacent to the Coach House. This new supply cable will terminate within a new dedicated LV switchboard for Conservatory building located within the plantroom.

The LV switchboard will provide supplies to lighting and power circuits, mechanical control panels, temporary marquee connection and fire alarm supplies. Distribution board protective devices will be RcBo devices with safety earth leakage trip function.

Distribution of electrical services within the new building area will generally be within ceiling voids where practicable. Service routes within the conservatory shall make use of the existing below ground trenches serving cable routes into the plant bedding areas for connection to luminaires, and the use of the historic timber trunking that runs at high level.

The M&E engineering building services specification will indicate the requirement to provide high quality finishes to all M&E engineering services provided, especially those located in exposed positions. M&E services which necessitate adjustment or control will be located appropriately to ensure tamperproof operation.

General Power

Power outlets will be provided throughout the buildings as per the client's requirements. Within the Interpretation Foyer and Flexible Use spaces, a discreet flush finish installation method shall be deployed utilising recessed white accessories and recessed galvanised steel conduit linked to surface galvanised steel trunking installed within voids where possible.

Within the Conservatory, power outlets will be provided in discreet positions within IP67 weatherproof enclosures for general use such as cleaning. To the area designated for the event seating, power outlets shall be located at the front, central and rear of the space for the plugging in of equipment such as music systems during events.

It is proposed that an external 63A TP&N supply is provided run within underground ducting to the external terrace area designated for the installation of a temporary marquee. The supply will terminate within a retractable service pillar or service bollard, examples of such are seen opposite. This supply be metered to allow the Trust to monitor usage.





The general power requirements will include but not be limited to the supply and installation of the following:-

- 230volt Cleaners socket outlets
- 230volt General sockets outlets
- 230volt future planters uplighting
- General power supplies to fixed FF&E equipment (requiring a power supply)
- General power to CCTV installation
- General power to intruder alarm installation
- General power to IT and Data installations.
- Mechanical Power Supplies

Power Factor Correction

It is not envisaged that any power factor correction equipment will be required. However, spare ways on the LV Switchboard could be utilised should equipment be required in the future.

Earthing and Bonding

The installation will be as per the requirements of BS 7671. The IEE Wiring Regulations 17th Edition and the British Standard BS7430 Earthing.

The earthing installation will consist of a main earth bar within the plantroom.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

The earth bar will have the following items connected to it:

- Main electrical circuit protective conductor
- Incoming water pipework
- Incoming gas pipework
- Ventilation ductwork
- Heating pipework
- Cable containment
- Building Structure

Internal Lighting

Design Considerations

In developing the interior lighting solution the main aim should be to deliver a system which offers an energy efficient installation that is both responsive to the building user's requirements and also embraces the architectural features of the building. The overall solution should ultimately aim to encompass the appropriate degree of visual comfort and visual interest.

The supporting information is intended to offer suggestions as to the types of luminaires that could be employed in achieving the solution. All light fittings are to be agreed with the Client and Project Architect.

Proposals for both general lighting and emergency escape lighting are offered with particular attention given to the following design influences:

- *Energy consumption/ Energy efficiency* – utilisation of a combination of LED's, low energy T5 and compact fluorescent light sources plus the introduction of intelligent control systems where practical.

- *Maintenance impact(s)* – standardisation of equipment through the employment of a limited number of lamp sources and luminaire types within the installation.

- *Sustainability/Longevity of installation* – utilising products of a high quality manufacture sourced from well established companies with proven track records within the industry. It is important to consider the initial capital outlay against the energy savings, life cycle costs and pay back periods in order to establish a 'cost efficient' solution.

- *Application and Function* – luminaires are to be selected to suit their location, the application of the space and through the provision of local functional controls where appropriate.

- *Compliance with current legislation and guides* – this is coordinated with the point detailed above and can be achieved through the utilisation of the correct optic attachments and through the demonstration of installation performance via calculations and measurement.

- *Control and Daylight Integration* – this element is crucial in delivering an optimum solution to all of the above and has influence on all areas of the installation, via the selection of appropriate local manual devices, automatic devices and remote control, an appropriate system can be delivered.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

- *Aesthetics and Delivery of a Dynamic and Interesting Visual Environment* – to be achieved through the careful selection of equipment that is both functional and aesthetically pleasing. In terms of the visual environment this is achieved via control and diversity of luminaire types. Selection of common 'themes' to families of luminaires also results in creating coordinated spaces i.e. all spaces of the same application utilise the same type of fitting throughout the scheme.

Interpretation Foyer - Display Lighting

For architectural features and display areas that can be enhanced or accentuated through the utilisation of additional direct illumination the proposal would be to highlight said features by employing LED spot lights and combined track and up-light arrangements as shown in the images below.





General circulation lighting will be provided by wall lights, due to the majority of the ceiling / roof structure being glazed.

Plant Areas /Storage/Kitchen Areas

A standard utilitarian low energy T5 fluorescent is proposed for these areas with a louvre attachment selected to suit the local environmental conditions. Focus is on functionality and durability rather than aesthetics in these areas.





WC's & Changing Rooms

In providing general lighting to the above areas it is proposed that a luminaire consistent with that which is utilised for corridor areas is employed within these rooms, complete with an IP44 glass cover in order to offer a degree of Ingress Protection where required.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

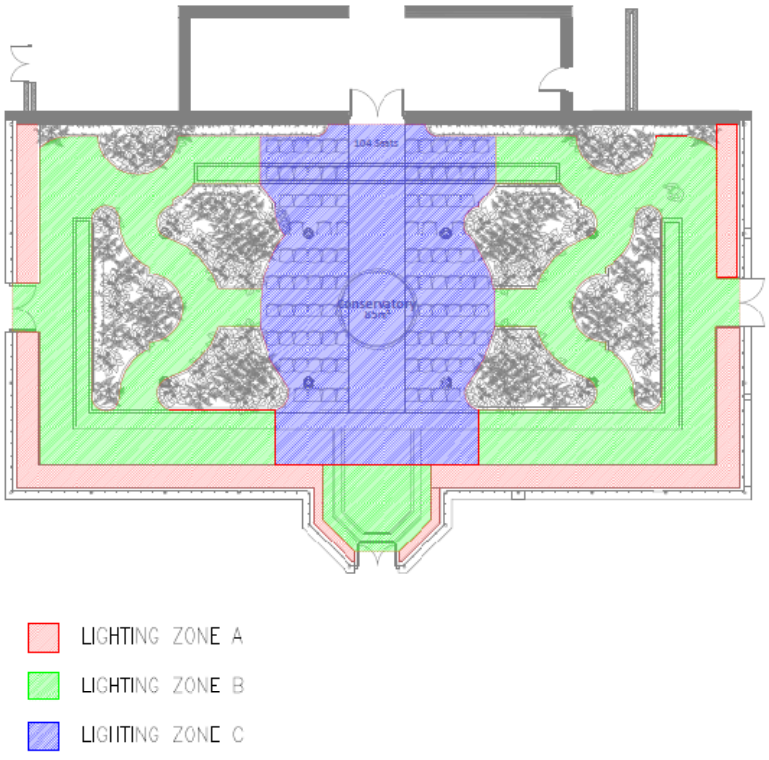


Flexible Use room

A flexible lighting scheme is required in this space, to suit its multi-use nature. A suspended direct/indirect main lighting luminaire should be used for general day-to-day usage, an example of a suitable product can be seen below. This luminaire would be dimmable in conjunction with a scene set system and could be combined with some feature display lighting or wall lighting to create different ambiences.

Conservatory Lighting

The aspiration for the internal lighting to the conservatory is to keep the system simple and functional. It is felt that the choice of luminaire should be 'honest and true' demonstrating modern technologies rather than attempt to pretend / recreate the use of luminaires to match the original fixtures used. The solution being obvious in its difference to the original lighting scheme when the conservatory was first constructed.



buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

To demonstrate the options currently being considered, the conservatory has been split into 3No zones.

It is recognised that maximising the use of natural daylight is beneficial both in terms of enhancing the quality of a space and making best use of a free and natural resource. The nature of the conservatory building being fully glazed will allow the use natural daylight as the prime means of lighting during the daylight hours. However, it is felt that integrating automatic daylight linking lighting controls into the complex existing structure of the building is unnecessary, given the fact that the building and inherently its occupation will be managed closely by the Wentworth Castle Trust staff. Therefore, for each option a simple manual control system is proposed, allowing the staff to 'set the scene' according to the task in hand / event taking place.

Lighting Zone A:

Within this zone it is proposed to install LED uplighter luminaires adjacent to each main structural column, recessed into the potting bench or mounted above it. These luminaires will be designed to illuminate the internal structure of the conservatory, creating a feature of the building during hours of darkness when viewed from outside.



It is proposed that these luminaires will be of the 'white' light 4000K variety to create a subtle lighting effect. Given the location and consideration of the building's heritage surroundings, it is not felt that the client would desire a colour changing LED lighting system within this zone. Although this is an option should budgets and aspirations allow.

These luminaires will be controlled by manual switching to allow the building manager to choose the occasion upon which they are utilised. It is thought that this would be limited to events such as weddings and evening conferences etc.

Lighting Zone B:

Design Parameters: 150lux average



Zone B indicates the areas that are proposed to utilise LED luminaires recessed into the raised walls of the plant beds or potting benches, designed to illuminate the walkways allowing safe movement during hours of darkness. An example of the luminaire type can be seen adjacent, although should the curved nature of the walls restrict its installation, circular spot type luminaires would be considered.

Due to the nature of the space, these luminaires will also provide a degree of decorative lighting to the walkways, as well as the functional aspect. This lighting system could also be utilised for the emergency lighting scheme, see section 9.8

Lighting Zone C:

Design Parameters: 300lux average



This zone creates an interesting dilemma with regards the lighting system, due to the flexibility required of the space – with particular regards to its use for functions and events.

It is proposed that metal halide widebeam spotlights are mounted on bespoke brackets, onto the central 4No structural columns. These would be wired from below ground and up internally to the column. Utilising metal halide lamp source allows the higher lux levels required to be achieved from fewer fixtures, whilst providing excellent colour rendering.

The column mounted luminaires should be supplemented by a pendant type luminaire mounted from the timber trunking ways, one beneath each roof section. The choice of this luminaire should be based around providing a non-direct lighting distribution so as to soften the directional lighting provided by the column mounted downlighters. These luminaires will be able to be used independently from the column mounted downlighters for day-to-day use of the conservatory and should be utilised for the emergency lighting requirement also.

Lighting Controls Strategies

The lighting control strategy is to be developed in line with client requirements with regard to the overall solution. The schedule below details the proposals on an area specific basis. As previously mentioned the utilisation of intelligent lighting controls is key in delivering a lighting installation that is customised to suit the buildings application and Client requirements. It is fundamental in minimising energy consumption and managing the visual environment.

The table below describes the lighting control strategies for specific areas of the scheme.

Area Description	Lighting Controls	Comments
Store Rooms	Absence/Presence detection is to be provided via PIR automatically switching off lights if room is unoccupied for a predetermined period of time. Manual override switches are to be provided.	All time delays and presets are to be agreed with Client.
WC's	Absence/Presence detection through the utilisation of PIR's.	Integration with ventilation fan controls
Corridors/ Circulation/ Stairs	Absence/Presence detection through the utilisation of PIR's	

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

Flexible Use	Daylight linked dimming (where applicable) to regulate the maintained horizontal illuminance. General lighting control to be via scene set system to provide lighting scenes for various usages of the room, with absence detection via PIR automatically switching off lights if room is unoccupied for a predetermined period of time.	
Kitchen	Manual switching complimented by Absence/Presence detection automatically switching off lights if room is unoccupied for a predetermined period of time.	
Reception/ Foyers/ Lobbies	Manual switching complimented by Absence/Presence detection automatically switching off lights if room is unoccupied for a predetermined period of time.	
Conservatory	Manual Switching throughout. See section 9.6	

Emergency Lighting

Emergency lighting will be provided in accordance with the requirements of BS EN 1838 and BS5266 and the requirements of the Fire Officer. It is proposed to provide a central battery static inverter system, whereby the batteries used to operate the chosen emergency luminaires are housed together in a central location.

The static inverter element provides a 230V output from the batteries. This has the advantage of enabling traditional luminaires to be used in an emergency mode, as opposed to the often unsightly emergency luminaires used to illuminate large spaces – in this case the conservatory. Where dedicated emergency lighting luminaires are still utilised, this system enables much smaller discreet units to be selected, due to the batteries being sited remotely.

Conservatory

Within the conservatory, dedicated emergency lighting fixtures will be provided. Consideration will be given to mounting discreet LED luminaires designed for emergency lighting distribution patterns, onto the underside of the timber trunking running at high level. A product example can be seen opposite.

Depending upon the final luminaire choice for the main lighting system, there may be scope to utilise these fixture for the emergency lighting also therefore eliminating the need for separate emergency luminaires.



31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

For exit signage within the conservatory, decorative exit signs will be chosen to compliment the area, to be agreed with the project architect.

All other internal areas

For all other internal spaces, dedicated LED emergency luminaires will be utilised fed from the static inverter system, predominantly recessed where possible into ceiling finishes, an example of which can be seen opposite.

External Lighting

An external lighting scheme in accordance with BS5489-1:2003 will be provided to facilitate safe and secure pedestrian movement around the site and aide security. Consideration will also be given to the vehicle movements for access for deliveries for events, which may occur during hours of darkness.

To maximise energy saving a review of the lighting levels and switching arrangement will be made during the detailed design phase with a view to reducing the lighting levels when the building is unoccupied. The schemes will be designed to complement the building and minimise the environmental impact of light pollution, in accordance with ILE guidance note for the reduction of obstructive light.

It is evident that the area and pathways currently surrounding the conservatory building has no external lighting. Due to the change in use of the building, with particular respect to its use for evening functions, the introduction of an external lighting scheme to allow safe access and movement in and around the building is essential.

Entrance / Service road

To enable the safe movement of vehicles in an area where pedestrians may also be present, the new access route to the building must be lit to a level to reflect such a conflict zone.

The current proposal is to light the space with low level bollard lighting to complement existing lighting which is being retained, supplemented with flush mounted wall lighting integrated within landscape retaining walls.

This lighting treatment will be required along the entire length of the revised access route although existing lighting will be reused where practicable.

Building Perimeter – Security lighting

Building mounted luminaires shall be used to provide illumination to the immediate perimeter of the new building.
The luminaires and lamps are to be selected to suit CCTV use as part of a co-ordinated security measure.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

Garden / Terrace Walkways

This zone of lighting is specifically for use during events (particularly weddings) whereby guests may be invited to wander through the immediate garden / terrace area. The illumination will provide safe pedestrian movement along a designated route via low level decorative bollards and lighting integrated within landscape retaining walls.

It is proposed to base the external lighting design on the criteria below:-

Area	**Maintained Illuminance**	**Comments**
Combined Roadways / Pedestrian Routes	5 lux average, 1 lux minimum	Lighting to BS 5489-1:2003 Class S4
Perimeter Zones and Building Security	10 lux average, 3lux minimum	Lighting to BS5489-1:2003
Walkways	3 lux average, 0.6 lux minimum	Lighting to BS5489-1:2003 Class S5

Induction Loops

To conform with the Disability Discrimination Act (DDA) 1995, an induction loop will be provided to the flexible use space. At this stage it is envisaged that this will take the form of a cable loop within the floor or ceiling, loop amplifier and microphone system.

Fire Alarms

A new analogue addressable fire detection system will be installed to meet the requirement of category L2 of BS5839 part 1:2002. Building Control, and the Fire Officer will be consulted during the detailed design phase to confirm the above and relevant recommendations incorporated into the final system design.

Generally the new fire alarm system will comprise but not limited to the following:-

- Fire Alarm control panel located within the lobby.
- Smoke and heat detectors
- Fire alarm sounders and indicators (combined with smoke detector heads where possible).
- Manual Call Points.
- Fire alarm interface units as required to mechanical equipment.
- Fire Alarm Zone Charts

Within the conservatory, great care will be needed for the integration of Fire Alarm equipment into the existing structure. It is proposed that manual alarm call points be provided due to potentially

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

high humidity and temperature levels and the subsequent risk of false alarm associated with automatic devices. Manual call points will also require careful integration onto the building fabric.

The system will be of the Apollo protocol so as to enable interfacing with the Northern College site wide fire alarm system.

Security

The design of the security services shall be aimed to minimise risks of theft, criminal damage, vandalism and personal attack.

The factors considered as part of this strategy shall comprise of:

- Closed Circuit television
- Security Lighting
- Intruder Alarm System

CCTV

The extended envelope of the building will be afforded CCTV coverage that will operate in conjunction with main security / intruder detection system. Internal CCTV coverage will be provided to the lobby area outside of the toilets, to monitor this space during events. CCTV coverage to the conservatory will be limited to mounting cameras onto the wall between the conservatory and the interpretation room, so as to eliminate the difficult integration with the conservatory building structure.

The CCTV systems shall be designed to monitor the following areas:-

- Entrances
- Main lobby
- Interpretation foyer

The system to be capable of producing images and record pictures (both still and video with time and date), from which individuals may be readily recognised in the areas specified: both during daylight and in darkness and be able to be used to aid police prosecutions.

Minimum acceptable image heights as a percentage of monitor screen height to recognise a known individual is to be 50% and unknown individual is to be 120%.

The system shall include a centralised digital recording system with access being given to the main security office within the Northern College building. The recording system is to be located in the store room within a secure cabinet.

The CCTV system shall be configured to provide pre-programmed camera selection upon the receipt of alarms from the following auxiliary system.

- Intruder alarm system
- Access control system

Intruder Alarm System

Intruder detection will be by the use of PIR detection complete with door contacts at all external doors.

The intruder detection and alarm system shall be designed to cover:

- Rooms with external windows
- All Entrances / Fire Exits
- Emergency Exits
- All points of possible authorised and unauthorised entry.

Zoning shall be provided on an area by area basis with a keypad provided at the main staff entrance. All fire escape doors shall be continuously monitored during occupancy hours. A local alarm shall be activated when the doors have been opened and an alarm signal sent to the central control station.
It is understood that the Wentworth Castle Trust's current security company will maintained as the keyholders and primary response to alarm activation.

Access Control System

Upon consideration of the building and its usage, it is not proposed that any access control system is required to the building. Where areas are restricted to members of the public, simple lock and key operation of doors would be sufficient.

Disabled Alarm Systems

A Disabled Toilet Alarm system shall be installed to the disabled toilet. Local audible and visual alarm shall be provided. The system will comprise of a pull cord with a reassurance lamp, a wall mounted reset button and an over-door illuminated indicator with tone generator.

Data/Comms Installations

Minimal Data provision is required in the building. It is proposed that telephone points are provided in the kitchen, flexible use space and the interpretation foyer. Data outlets shall be provided also within the kitchen, flexible use space and the interpretation foyer only.

A data cabinet shall be provided, within the store room. A multi-pair copper backbone cable shall be routed form the cabinet and shall be connected to the northern College network, which supports the Trusts systems.

The building will be provided with Cat 6 data cabling following dedicated containment mostly located within voids. Cat 6 cabling will terminate in RJ45 outlets at each location.

Lightning Protection

At this stage, it is not envisaged that a Lightning Protection system will be required on the new building or the conservatory. A risk assessment will be carried out in accordance with BS EN 62305

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

during the detailed design phase to assess whether protection is required. Due to the building being recessed into and overshadowed by the surrounding landscape and the scale of the surrounding trees, it is unlikely that a risk assessment would result in the building requiring protection.

The main electricity and telecommunications supplies for the building will be protected by a suitably sized surge suppression units to protect the internal systems and wiring from lightning induced surges. Each unit will be fully labelled and will incorporate full status indication.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

ACCESSIBILITY

The project will be fully accessible to all public areas, to people of all ages and abilities. As the proposed conservatory development is to be single storey throughout, there is no stair or lift provision required and as such the building will have no issues with access. The existing paths from the visitor car park will be reconfigured to minimise their steepness. The transition between the arrivals space and Lady Lucy's Walk, and also to the Conservatory Terrace will also be accessible for all ages and abilities. A wheelchair-accessible toilet will be provided off the main entrance space within the conservatory extension, and this represents a good proportion of the total toilet provision.

The provision of induction loops will be as described in the Mechanical and Electrical Services proposals.

Phil Chambers, Access Consultant with CEM Ltd, has reviewed the design and determined that all reasonable steps have been taken to ensure equality of access to the restored Conservatory, new build and the wider landscape. It should be noted that there are a number of paths and flights of steps to the wider site which are not accessible to many people, but at all times there are alternative accessible routes. While some of the paths and routes to the wider site are created using mown grass, gravel, hoggin and other non-accessible materials, primary routes to the Conservatory and new terrace are formed in resin-bonded macadam surfaces to aid accessibility.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

CONSULTATION

Throughout the development of the conceptual and detailed designs a series of consultations were undertaken to ensure that the development of the buildings would meet the demands of future users and the requirements of the key stakeholders. This process is seen as essential to provide solutions which will attract the greatest number of visitors, both new and repeat. The consultation built further on that undertaken to inform the HLF Stage 1 bid and is seen as an important part of the process of developing the design.

Meetings were held on-site with the following organisations to discuss the design and inform design development:

- Barnsley Conservation Officer – Tony Wiles: 2nd August 2010.
- English Heritage Landscape Architect – Andy Wimble: 4th August 2010.
- English Heritage Architects – Hilary Roome and Kathryn Gibson: 2nd September 2010.
- English Heritage Joint Meeting – Kathryn Gibson and Andy Wimble: 11th November 2010.

In addition there were regular meetings with:

- Trustees of the Wentworth Castle and Stainborough Park Historic Trust.
- Employees of the Wentworth Castle and Stainborough Park Historic Trust, including Heritage Director, Estates Manager and Education Co-ordinator.

The design was also presented to the Barnsley Design Review Panel on 28th September 2010. Their report will form part of the planning application. While the design review panel noted that the design could be an 'echo of the Conservatory' or a 'strong contemporary solution', further consultation with statutory consultees resulted in a firm steer towards continuing with a design which is modern, yet submissive to the historic structures and landscape.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

PLANNING POLICY STATEMENT 5 JUSTIFICATION AND SUMMARY STATEMENT OF SIGNIFICANCE

Introduction

The proposals have been assessed against the latest policy and guidance within PPS5; this replaces the government's previous guidance within PPG15 and PPG16. Using the structure of this document the statement illustrates how the project has considered sustainable design. Text which is italicised below is taken directly from the DCLG document PPS5. Responses are **in Bold**.

It is considered that the proposals at Wentworth Castle Conservatory affect a Designated Heritage Asset for the following reasons:

1. The Conservatory is a Grade II* Listed Building.
2. It is within the curtilage of the Grade I Listed Wentworth Castle building.
3. It is situated within a Grade I Listed Landscape.
4. It is situated within the Wentworth Castle and Stainborough Park Conservation Area.

It should be noted that the above have differing levels of significance, and the interventions proposed have differing effects on each of the above. As PPS5 requires consideration of all of the above within one co-ordinated document, the aspects that affect the different statutory designations listed above will be separately considered and identified within the report.

> *The policies in this PPS are a material consideration which must be taken into account in development management decisions, where relevant. Therefore the development management policies in the PPS can be applied directly by the decision-maker when determining whether development should proceed.*
>
> *The policies and principles set out in this statement also apply to the consideration of the historic environment in relation to the other heritage-related consent regimes for which planning authorities are responsible under the Planning (Listed Buildings and Conservation Areas) Act 1990.*
>
> *Those parts of the historic environment that have significance because of their historic, archaeological, architectural or artistic interest are called heritage assets. Some heritage assets*

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

possess a level of interest that justifies designation and particular procedures apply to decisions that involve them. This statement also covers heritage assets that are not designated but which are of heritage interest and are thus a material planning consideration.

History

The following account of the history of the Wentworth Castle Conservatory are extracted from the statement of significance written by Hillary Taylor Landscape Architects.

The Conservatory stands close to the western front of Wentworth Castle, at the north-eastern corner of the remarkable, restored, 18th century, formal Gardens. The Conservatory was one of a number of highly decorative 'setpieces' added to the Gardens in the late 19th / early 20th centuries, including the Azalea Garden, directly west of the Conservatory, and the Victorian Flower Garden, further to the south-west.

To the north of the Conservatory are the Gun Room (c 1732) and Coach House (19th century). The Gun Room is a small brick building with carved sandstone pediment and pilasters and decorative internal plasterwork. It is an exquisite, ornamental garden building, which plays an important compositional role, serving to terminate the east end of The Avenue (c.1722) and acting as a hub, commanding the various circulation routes in the vicinity. By the late 19th century, the building was used for storing guns - hence its name. The adjacent Coach House is first shown on a c.1824 map of Stainborough and had been enlarged to the south-west by 1891, when it is depicted on the first edition 25 inch OS (published 1893). Anecdotal evidence suggests that the building may have been used as a squash court (possibly by the Army, during World War II). It was later used as a recording studio by Northern College students. A photograph of c.2000 shows a lean-to glasshouse that once stood against its south wall. It can be seen that the scale and design of the glasshouse had rather an intrusive visual impact on the adjacent Gun Room.

It is likely that FWT Vernon-Wentworth, who inherited the estate in 1814 and appears to have had a particular interest in industry and new technologies, commissioned the Conservatory. By the late 1870s, day-to-day management of the estate was passing to his son, TFC Vernon-Wentworth, who is also likely to have had a hand in the Conservatory's development. A marvellous photograph of FWT as an old man in the Conservatory (almost certainly taken in the 1880s), suggests that he was very proud of the family's new creation.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

The Conservatory, with its attached, glazed Potting Shed, seems most likely to have been constructed c.1877, though it is sometimes, mistakenly, dated to the 1840s. It is first depicted on the first edition 25" OS, surveyed in 1891 (Fig.3/4). In August 25th, 1887, The Journal of Horticulture and Cottage Gardener described a visit:

> *"Near the mansion is situated a spacious Conservatory, built of iron and glass on the ridge and furrow principle. Here are some large plants of Orange and Lime trees, the latter bearing exceptionally fine fruit, also noble examples of Palms, such as Chamaerops, Areca sapida, Latania borbonica, &c, under the shade of which winding walks were formed, the groundwork being covered with mass of Ferns, Mosses, Begonias, &c, whilst flowering plants were tastefully arranged in the front or sunny part of the structure, amongst which several pots of Lilium harrisi with its pure white trumpet shaped flowers stood out prominently. The roof throughout is gracefully festooned with healthy and well-flowered specimens of Passifloras, Tacsonias, Coboea scandens, and other suitable plants. When lit up by means of electric light, with which this fine house as well as the whole of the establishment is furnished, the effect must be charming and fairy-like in its nature."*

The description of the luxurious vegetation suggests that the Conservatory was already well-established by 1887. That is, indeed, very likely, but on the other hand, it might only have been a matter of a year or two. it is possible that the Chamaerops (Chamaerops humilis, a hardy palm from the Mediterranean), Areca sapida (Rhopalostylis sapida, or Nikau palm, from New Zealand) and Latania borbonica (Latania lontaroides, now a very rare palm, found only on the island of Reunion, in the Indian Ocean) were all brought in as sizeable plants, and possibly still remained in their pots. The citrus plants were, almost certainly, managed likewise. The Passiflora, Tacsonia (Passiflora antioquiensis, introduced from Columbia in 1858) and the Cobaea scandens (also from South America) are all fast-growing climbers and could have reached the roof in a matter of months.

The glasshouse is mainly iron (unlike earlier glasshouses, by Paxton, where hollow, cast iron columns were employed, but where other members - arches, glazing bars and gutters - were timber). The fabricators, Crompton and Fawkes (established 1883), characterised the Conservatory as an 'iron winter garden' when they included it in their catalogue in 1889. It has slender, cast iron column supports, spandrels and decorative details, whilst the smaller structural members that were not held in compression, such as the tension rods, are wrought iron. This

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

serves to confirm that the structure dates from the final quarter of the 19th century and is another reason for excluding some of the fancifully early dates ascribed to it.

It is the use of iron, rather than timber that has been the undoing of the building. The hollow columns, designed to carry water to the underground system, are inaccessible and, inevitably, have rusted. The short-lived nature of such materials was accepted at the time. Messenger and Co. Ltd's 1926 glasshouse catalogue points out that "houses made entirely of iron do not have the long life that might be expected, owing to the rapid corrosion which takes place in a damp atmosphere, while they are extravagant in first cost and very expensive to maintain."

What is most remarkable about the structure, however, is not the iron - but the use of electricity, from c.1886, to illuminate it. This extraordinarily early use of electricity for a garden glasshouse - and the 'fairy-like' character thus lent to the Conservatory - had obviously enthused the gardening journalist in 1887, and its importance must not be underemphasised. The 1880s saw the first domestic electrical appliances becoming available in shops; but electric lighting in houses was not widespread until many years later. Indeed, anecdotal evidence suggests that the Conservatory was reputedly electrified earlier than Buckingham Palace. Its introduction in the Wentworth Conservatory illuminates - literally - how important the structure, and technical innovation, were to the Vernon-Wentworths.

By 1903, Bruce Canning Vernon-Wentworth - who had inherited in 1902 - installed a glazed bridge, linking the Conservatory to the Castle. This is depicted on the 2nd edition 25" OS map. revised 1903 and published 1906 (Fig. 3/5). The bridge was probably built by Messenger & Co. Ltd (though a plaque on this link commemorated the work of 'Crompton and Fawkes Chelmsford').

It appears, therefore, that the Conservatory had reached its final form by the start of the 20th Century. The large, open structure employed existing technology - under-floor hot water heating, invented in the early 19th century; and brand new technology - electric lighting. It housed a fashionable collection of exotic plants and was surrounded by rhododendrons, recently new to Britain. Above all, the building was beautiful. The use of wrought and cast iron, rather than timber, allowed a delicacy of design to both the functional elements (such as columns and grilles) and the decorative ones (spandrels and finials).

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

Heritage Asset

The Conservatory is a significant building in its own right, reflected in its Designated Heritage Asset status (Grade II* listed). It is also situated within a significant historic context, which includes the adjacent Wentworth Castle (Grade I listed) and the surrounding Grade I listed landscape. The significance of the building and its setting is described below, and this has informed an approach of sensitivity towards the proposed design.

Vulnerability

The most obvious and pressing concern with the condition of the Conservatory is its current condition which is described on English Heritage's Buildings at Risk Register as 'very bad'. As described elsewhere the structural integrity is severely compromised and the building is currently dangerous to enter and supported by a scaffold.

The need to restore the Conservatory is evident and in order to ensure the future of the building in the long term a viable and financially sustainable use is also required. This will involve the sensitive restoration of the building and also the ability to maximise its potential as a visitor facility in accordance with the wider context of the Stainborough Gardens. The proposals take into account these issues in addition to understanding the Conservatory's historical importance.

Heritage Value

Below, the heritage value of Wentworth Castle Conservatory is measured by using the guidelines established in the English Heritage Publication 'Conservation Principles Policies and Guidance for the Sustainable Management of the Historic Environment' (2008). It should be noted that the overall significance of the building cannot be calculated by simply adding the constituent elements listed below – often buildings are considered of greater value than the sum of their parts - as such the summary statement of significance is written to bring a conclusion to this.

Evidential Value

There are several evidential elements within the Wentworth Conservatory. Surviving exotic plants found in and around the conservatory, including Citrus plants, Camellia japonica and rhododendrons are evidence of the Victorian obsession for collecting and displaying exotic plants.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

There is also evidence that the conservatory used advanced technology innovations including electricity, hot water and heating pipes and rainwater collection. This demonstrates Vernon-Wentworths' enthusiasm for cutting-edge technology. There is also the survival (albeit in a very poor state) of the original cast ironwork and some glazing. This gives an insight into the original construction and provides a material reference in order for a faithful restoration to take place.

Historical: Illustrative

The Conservatory was part of the great mid 19th century greenhouse building boom which was initiated in the 1840s by the great Palm House at Kew Gardens. It is an example of glass and iron structures of its type and is illustrative of the early 19th century advances in technology and development of cast and wrought iron as a building material. In addition to this the conservatory demonstrates early sustainable design methods such as water harnessing (rainwater was collected and fed into the hollow columns, which took it to underground tanks) and solar gain (the columns were as thin as possible to let in the maximum amount of light).

Historical: Associative Value

The conservatory demonstrates an early use of advanced technology innovations including electricity, hot water and heating pipes and rainwater collection. Anecdotal evidence suggests that it was electrified before many houses, including Buckingham Palace. In addition to this its link with the designers of the building, Crompton and Fawkes, is also a significant association. It is believed to be the only surviving example of a Crompton and Fawkes conservatory.

Aesthetic: Artistic Value

The fabricators, Crompton and Fawkes (established in 1883), characterised the Conservatory as an ‘iron winter garden’ in their catalogue (1889). The Conservatory was an ornamental centre piece of the late 19th century gardens and its delicate and slender structure was the height of fashion at during the 1880s.

Communal: Symbolic Value

The Conservatory is symbolic of the greenhouse building boom initiated by the great Palm House at Kew Gardens. It is a rare surviving glasshouse of its type and the combination of advanced

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

technology with well-crafted, elegant engineering, elaborate and exotic planting, represents the wonder and achievements of the Victorian era.

Communal: Social Value

To many local people, the conservatory is iconic. The quality and elegance of the design is very distinctive and it prompts a great deal of local pride. Generations of local people have helped to shape the area (many of who are still alive, including gardeners who worked there in the 1960s) and retain a special interest in the site. The national exposure in recent years through the 'Restoration' television series (ultimately unsuccessful) has also brought the Conservatory to wider attention locally and within a wider context. The renewed gardens have attracted enthusiastic attention towards the entire Park which has sparked a new interest to the now derelict conservatory on both regional and national level.

Summary of Significance

The Conservatory in Wentworth Castle gardens is a fine example of a late Victorian glasshouse and utilises a combination of advanced technology, well-crafted and elegant engineering, elaborate, exotic planting. Its distinctive aesthetic appearance is still apparent today even though it has fallen into disrepair. It is of high local, social and historical value and demonstrates the technological achievements made during the Victorian era. In addition to this, it is evident of the Victorian obsession for collecting and displaying exotic plants. The Conservatory's location within the gardens of the grade I listed Wentworth Castle and Stainborough Park gives it a high group value as it was one of 26 ornamental structures added to the park during the late 19th century – early 20th century. The conservatory, once restored, could once again delight visitors and become home to more unusual plants. Overall the building is an important Designated Asset with the context of the conservation area and justifiably listed grade II*.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

IMPACT ASSESSMENT

The impact of the proposals on the Designated Heritage Asset is considered below using the structure of PPS5 to consider differing aspects. This format is used to illustrate how this relatively new policy and guidance has been used to assess the impact of the development upon the asset.

Policy HE1 Heritage Assets and Climate Change

HE1.1 *Local planning authorities should identify opportunities to mitigate, and adapt to, the effects of climate change when devising policies and making decisions relating to heritage assets by seeking the reuse and, where appropriate, the modification of heritage assets so as to reduce carbon emissions and secure sustainable development. Opportunities to adapt heritage assets include enhancing energy efficiency, improving resilience to the effects of a changing climate, allowing greater use of renewable energy and allowing for the sustainable use of water. Keeping heritage assets in use avoids the consumption of building materials and energy and the generation of waste from the construction of replacement buildings.*

The proposed development considers climate change and proposes a number of interventions which aim to address the reduction of carbon emissions and other forms of sustainable design. The following aspects of the scheme are a direct result of the need to consider climate change:

- **The reuse of the original trenches and perimeter benches for the provision of heating within the Conservatory.**
- **The restoration of original opening lights within the Conservatory structure to enable natural ventilation and cooling within the space when required.**
- **The capacity to control the temperature in the Conservatory in order to ensure that the heating can be kept to the minimum level needed to sustain plant life during periods when the building is not in use.**
- **As part of the Conservatory restoration works, a new rainwater harvesting system will be designed and installed.**
- **The design of the Conservatory extension has been carried out to meet the requirements of Approved Document L of the Building Regulations, including an underfloor heating system and a well insulated green roof construction.**

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

After considering a number of interventions which would provide environmental benefits, the elements highlighted above have a direct material change to the asset, and as such influence the significance of the building within its historic setting. It is however considered that these interventions do not substantially reduce the significance of the assets.

A number of design decisions have been taken to reduce the impact of the aspects listed above:

- **The position of the new extension has been determined to reduce its impact on the vista of Wentworth Castle and the Conservatory.**
- **The existing configuration of rainwater collection via cast-iron columns will be retained.**
- **The new mechanical and electrical provision to the Conservatory will utilise existing service runs in order to mitigate their visual impact.**

HE1.2 *Where proposals that are promoted for their contribution to mitigating climate change have a potentially negative effect on heritage assets, local planning authorities should, prior to determination, and ideally during pre-application discussions, help the applicant to identify feasible solutions that deliver similar climate change mitigation but with less or no harm to the significance of the heritage asset and its setting.*

A number of sustainable solutions were considered for the building which were ultimately avoided due to their impact on the Designated Heritage Asset and the wider historic site. These included:

- **Ground source heat pumps (these could not provide the required energy saving to be financially viable).**
- **Biomass boiler (this could not be serviced on this site.**
- **Photovoltaic array (this was considered to be too visually imposing on the Designated Heritage Asset).**

While the Conservatory uses significant a significant amount of fuel to heat, the thermal modelling to ensure that a naturally ventilated solution is feasible has reduced the carbon emissions without changing the historic fabric, i.e. single-glazed traditional glass.

31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

HE1.3 *Where conflict between climate change objectives and the conservation of heritage assets is unavoidable, the public benefit of mitigating the effects of climate change should be weighed against any harm to the significance of heritage assets in accordance with the development management principles in this PPS and national planning policy on climate change.*

While the building will incur significant heat loss in winter months, this is essential as the structure cannot structurally withstand significant snow loads. The thin glass will melt snow if the heating level is maintained.

Policy HE6: Information requirements for applications for consent affecting heritage assets

HE6.1 *Local planning authorities should require an applicant to provide a description of the significance of the heritage assets affected and the contribution of their setting to that significance. The level of detail should be proportionate to the importance of the heritage asset and no more than is sufficient to understand the potential impact of the proposal on the significance of the heritage asset. As a minimum the relevant historic environment record should have been consulted and the heritage assets themselves should have been assessed using appropriate expertise where necessary given the application's impact. Where an application site includes, or is considered to have the potential to include, heritage assets with archeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where desk-based research is insufficient to properly assess the interest, a field evaluation.*

- **The Conservatory significance has been assessed using the English Heritage publication, 'Conservation Principles, Policies and Guidance for the Sustainable Management of the Built Environment' (2008) by accredited architects in building conservation at Buttress Fuller Alsop Williams. This work built on the statement of significance written by Hilary Taylor Landscape Architects. Desk-based studies were supplemented by in depth condition surveys and paint scrape analysis.**
- **A full ecological appraisal has been carried out by Golder Associates to determine the impact of any local habitats on the proposals and advice on how this can be mitigated through the proposals.**

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

HE6.2 *This information together with an assessment of the impact of the proposal should be set out in the application (within the design and access statement when this is required) as part of the explanation of the design concept. It should detail the sources that have been considered and the expertise that has been consulted.*

As well as the sources listed previously, the following expertise has been drawn upon:

- **Conservation Architects, Buttress Fuller Alsop Williams have been engaged to develop the detailed design and planning information which form this application, as well as acting as agent for the application.**
- **Golder Associates have been employed by the Wentworth Castle and Stainborough Park Heritage Trust to carry out an ecological appraisal of the site.**
- **David Mitchell, curator of the Royal Botanical Gardens, Edinburgh has been involved with the preparation of the proposed planting scheme for the restored Conservatory.**
- **Barnsley Metropolitan Borough Council's Planning Department and Conservation Officer have provided pre-application advice, with the following staff involved:**

  Tony Wiles, Conservation Officer

- **In addition, English Heritage were consulted, with pre-application advice given by**

  Kathryn Gibson, Historic Buildings and Areas Advisor for West Yorkshire.
  Hilary Roome, Architect, Yorkshire and North-East Regions.
  Andy Wimble, Landscape Architect, Yorkshire Region.

HE6.3 *Local planning authorities should not validate applications where the extent of the impact of the proposal on the significance of any heritage assets affected cannot adequately be understood from the application and supporting documents.*

Policy HE7: Policy principles guiding the determination of applications for consent relating to all heritage assets

HE7.2 *In considering the impact of a proposal on any heritage asset, local planning authorities should take into account the particular nature of the significance of the heritage asset and the value that it holds*

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

for this and future generations. This understanding should be used by the local planning authority to avoid or minimise conflict between the heritage asset's conservation and any aspect of the proposals.

As noted in the statement of significance, the heritage asset is significant for a number of reasons, and each asset has a different level of significance. As such it is important that the story of Wentworth Castle, the Conservatory and the listed gardens is able to be continually and holistically interpreted upon this site. The proposals will allow better public interpretation of this important historic site.

HE7.4 *Local planning authorities should take into account:*

- *The desirability of sustaining and enhancing the significance of heritage assets, and of utilising their positive role in place-shaping; and*
- *The positive contribution that conservation of heritage assets and the historic environment generally can make to the establishment and maintenance of sustainable communities and economic vitality by virtue of the factors set out in HE3.1*

HE7.5 *Local planning authorities should take into account the desirability of new development making a positive contribution to the character and local distinctiveness of the historic environment. The consideration of design should include scale, height, massing, alignment, materials and use.*

The restored Conservatory and new build extension will be a positive contribution to the character of the historic context by reinstating this important element of the site and the associated vistas. The new build has been designed from a modern standpoint but with a degree of sensitivity and subservience to the existing Conservatory structure. This is reflected in its, scale and massing, and also its position to the north of the Potting Shed, where its visual impact across the site is minimised.

HE7.6 *Where there is evidence of deliberate neglect of or damage to a heritage asset in the hope of obtaining consent, the resultant deteriorated state of the heritage asset should not be a factor taken into account in any decision.*

HE7.7 *Where loss of significance is justified on the merits of new development, local planning authorities should not permit the new development without taking all reasonable steps to ensure the new*

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

development will proceed after the loss has occurred by imposing appropriate planning conditions or securing obligations by agreement.

It is considered that the new development will not result in a loss of significance to the Designated Heritage Asset, rather it will complement the historic context.

Policy HE9: Additional policy principles guiding the consideration of applications for consent relating to designated heritage assets

HE9.1 *There should be a presumption in favour of the conservation of designated heritage assets and the more significant the designated heritage asset, the greater the presumption in favour of its conservation should be. Once lost, heritage assets cannot be replaced and their loss has a cultural, environmental, economic and social impact. Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. Loss affecting any designated heritage asset should require clear and convincing justification.*

Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated heritage assets of the highest significance, including scheduled monuments, protected wreck sites, battlefields, grade I and II listed buildings and grade I and II* registered parks and gardens, World Heritage Sites, should be wholly exceptional.*

The Conservatory is a Grade II* listed building within a Grade I registered landscape and therefore harm or loss should be wholly exceptional.

It should be noted that the proposals to the building do not involve any demolition of the structure, rather the dismantling of the cast-iron frame and the replacement of the members that cannot be adequately replaced. The Conservatory will be rebuilt to the existing design and works will be carried out to safeguard against future deterioration or decay. These works are seen as necessary for the conservation of the building and as a result of the precarious state of the Conservatory, it could realistically be ascertained that no intervention may result in further loss of fabric and potential structural failure.

Where alterations are proposed to the listed landscape, these design decisions have been taken following consultation with the local planning authority and English Heritage and are seen as essential in ensuring the viability and financial sustainability of the

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

Conservatory and the wider site. Where new paths are proposed, this is as a result of the requirement to provide access for all ages and abilities and these have been located so that their impact on the landscape are mitigated as much as possible.

HE9.2 *Where the application will lead to substantial harm to or total loss of significance local planning authorities should refuse consent unless it can be demonstrated that:*

(i) the substantial harm to or loss of significance is necessary in order to deliver substantial public benefits that outweigh that harm or loss; or

(ii) (a) the nature of the heritage asset prevents all reasonable uses of the site; and

(b) no viable use of the heritage asset itself can be found in the medium term that will enable its conservation; and

(c) conservation through grant-funding or some form of charitable or public ownership is not possible; and

(d) the harm to or loss of the heritage asset is outweighed by the benefits of bringing the site back into use.

Whilst there are proposed interventions within the landscape and the (necessary) removal of damaged fabric from the Conservatory, it is not considered that this amounts to substantial harm or loss of significance. Indeed, the proposals seek to introduce a viable use of the heritage asset that will enable its conservation.

HE9.4 *Where a proposal has a harmful impact on the significance of a designated heritage asset which is less than substantial harm, in all cases local planning authorities should:*

(i) weigh the public benefit of the proposal (for example, that it helps to secure the optimum viable use of the heritage asset in the interests of its long-term conservation) against the harm; and

(ii) recognise that the greater the harm to the significance of the heritage asset the greater the justification will be needed for any loss.

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

It is considered that without the proposed works, there is the potential for further decay and loss of the Conservatory fabric which may preclude its long term conservation.

HE9.5 *Not all elements of a World Heritage Site or Conservation Area will necessarily contribute to its significance. The policies in HE9.1 to HE9.4 and HE10 apply to those elements that do contribute to the significance. When considering proposals, local planning authorities should take into account the relative significance of the element affected and its contribution to the significance of the World Heritage Site or Conservation Area as a whole. Where an element does not positively contribute to its significance, local planning authorities should take into account the desirability of enhancing or better revealing the significance of the World Heritage Site or Conservation Area, including, where appropriate, through development of that element. This should be seen as part of the process of place-shaping.*

While it is recognised that the Conservatory is one of the most significant elements within the Conservation Area, it is considered that its current appearance and condition detracts from its contribution to its context. With this in mind it is considered that the proposals, with the restoration of the Conservatory included will improve the contribution to the conservation area and reinstate the high level of significance that the structure embodies.

Policy HE10: Additional policy principles guiding the consideration of applications for development affecting the setting of a designated heritage asset

HE10.1 *When considering applications for development that affect the setting of a heritage asset, local planning authorities should treat favourably applications that preserve those elements of the setting that make a positive contribution to or better reveal the significance of the asset. When considering applications that do not do this, local planning authorities should weigh any such harm against the wider benefits of the application. The greater the negative impact on the significance of the heritage asset, the greater the benefits that will be needed to justify approval.*

The restoration works to the Conservatory by definition will preserve the positive contribution of the building to the significance of the asset(s). It is also considered that the design of the extension has been carried out in order to mitigate its impact on the

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

heritage asset as much as possible and it is not seen as harming the Conservatory's heritage value.

In addition, the proposals have been designed to mitigate their impact on the wider site, including Wentworth Castle and the listed landscape.

HE10.2 *Local planning authorities should identify opportunities for changes in the setting to enhance or better reveal the significance of a heritage asset. Taking such opportunities should be seen as a public benefit and part of the process of placeshaping.*

The proposals aim to enhance the significance of a heritage asset via its full restoration which will reveal its original elegance and aesthetic value. They will utilise the Conservatory as a gateway and orientation point to open up and integrate with the wider site, and the proposed alterations to the landscape will ensure the viability of these works by providing improved accessibility and the capacity to host events that will generate revenue.

Policy HE12: Policy Principles guiding the recording of information related to heritage assets

HE12.1 *A documentary record of our past is not as valuable as retaining the heritage asset, and therefore the ability to record evidence of our past should not be a factor in deciding whether a proposal that would result in a heritage asset's destruction should be given consent.*

The proposals will not involve the destruction of the heritage asset. There are elements of the original Conservatory fabric that have decayed beyond repair, and these will be removed and replaced to match the existing. Any replacement works will be carried out based on accurate survey information of the existing structure, which will also form a historic record.

APPENDICES

Proposed Planting and Interpretation Themes by David Mitchell (Royal Botanical Gardens, Edinburgh)

buttressfulleralsopwilliams · architects
31-33 Princess Street, Manchester, M2 4BF · telephone +44 (0)161 236 3303
Fax +44 (0)161 236 3603 · website: www.bfaw.co.uk · email: contact@bfaw.co.uk

Royal Botanic Garden Edinburgh

Wentworth Conservatory and Terrace
Proposed Planting and Interpretation Themes



David R Mitchell ~ Curator
3rd December 2010

Introduction

As a result of a previous collaboration with Simon Dowse of Scott Wilson Landscape Architects on the Sheffield Botanic Garden Pavilions David Mitchell, Curator of Projects at the Royal Botanic Garden Edinburgh was approached by the Manchester based project architects Buttress- Fuller- Alsop –Williams to work on the Wentworth Conservatory Restoration Project Bid. It was agreed that he would act as a specialised advisor providing guidance on plant selection, cultural requirements and appropriate environmental parameters and equipment for the conservatory.

In addition he would research the historic relevance and background to the selected taxa, ensuring the creation of strong interpretative themes which would link the conservatory to the terrace, the terrace to the adjacent landscape and through that to the plant collections within the wider parkland as requested by the Wentworth Trustees. Ultimately the key objective to this holistic approach was the development of a more meaningful visitor experience within the refurbished complex and site, one which reflected the history of the building whilst making it relevant to society today.

Planting Philosophy

The planting philosophy contains five main elements each chosen to reflect the main theme of 'The World at Wentworth'. The plants have all been researched and selected to fit with this and the individual themes detailed below. In addition they have been chosen for their architectural and horticultural qualities as well as general availability to the public today, should they wish to grow them.

- The World at Wentworth ~ Ambassadorial Plants for the Conservatory.
  A selection of plants previously known to have been cultivated at Wentworth, each acting as a key interpretative player within the building telling a range of stories.

- The World at Wentworth ~ Potted Treasure the History of the House Plant.
  A range of plants chosen for the benches and for the understory bed planting which will reflect the cultivation of pot plants in the home past and present.

- The World at Wentworth ~ Changing Seasons.
  A range of bulbs and other plants have been specially selected to provide seasonal interest with low maintenance. **Note**: the list provided is examples only, it could be greatly extended following discussion with Wentworth staff.

- The World at Wentworth ~ The Terrace Landscape.
  A range of quality landscape plants specially chosen to reflect the great age of plant collecting and the links between our own gardens and the wider world.

- The World at Wentworth ~ 17th Century Planters and Collectors.
  A range of plants specially selected for Wentworth to reflect the links to this important group of individuals who were the first to import plant material from North America bringing about considerable change in British gardens and landscape including that of Wentworth.

All of the above have four potential interpretative themes or strap lines running through them which can be explored in a variety of ways at various levels, depending on the wishes of the client and the needs of the audience.

These are

- The World at Wentworth.
- The Plant Collectors ~ Hidden Lives Hidden Gems.
- Science in the Conservatory.
- Plants and People ~ Past and Present.

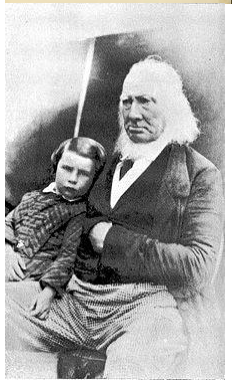
The detail of each theme or strap line is given under the individual plant entries. Clearly there is a great deal of information, however the aim is not to say it all at once but rather to put in place a strong concept designed to lay down a foundation upon which future education and community programmes can be built. A concept which can continue to grow in the future after the restoration is completed, one which will inspire all generations to think and be creative in the way we celebrate the past and link it today, using it as a tool to shape our future and that of the environments we live in. '*History should be the Ship not the Anchor*' and I believe this document will aid Wentworth to become that more effectively. It should also allow the Trust to develop a stronger Wentworth brand ensuring the conservatory becomes a destination in its own right, distinct from what would be found in a botanical garden or similar elsewhere in the British Isles.

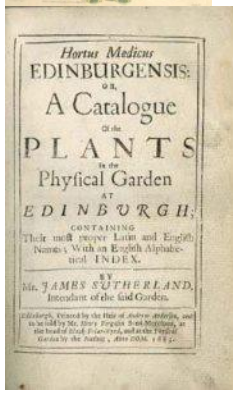
David R Mitchell
3rd December 2010

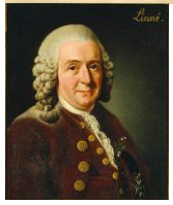
SECTION ONE ~ AMBASSADORIAL PLANTS FOR THE CONSERVATORY

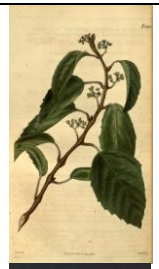
Twelve Potential Key Ambassadorial Focal Plants with Working Interpretation Themes / Strap Lines

Sp= specimen **Sc** =Succulent **Clm** = Climber **Gc** = Ground Cover

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Acacia drummondii	Drummonds Wattle (Sp) 1830-63? 0.0c	James Drummond (c1786-1863) .b Hawthornden, Midlothian. d. Perth Western Australia Employee of George Dickson Nurseryman Edinburgh, Curator Botanic Garden Cork Institute, Went to the Swan River Colony Western Australia as Government botanist and Superintendant of the Botanic garden, later set up his own seed collection business sending seeds to W. J. Hooker,at Kew. He was by far the most successful collector of Western Australian Plants of this time. Many exciting tales of his dangerous adventures in the outback until he was in his seventies, and his encounters with aboriginal peoples.	Swan River Australia	Like other acacias it is adapted to survive the harsh conditions of the Australian desert. The deep tap roots search out water, fire retardant, chemicals in the bark to help it survive the first wave of bush fire, and it can also shed its small fine leaves quickly to reduce transpiration. The flowers are pollinated by solitary bees, other insects and nectar seeking birds. Like other members of the pea family it has nitrogen fixing root nodules to help it to thrive in nutrient poor soils.	Acacias have many important economic uses ranging from fuel, gums, paper pulp, the extraction of cellulose for use in the production of plastic to textiles and honey. This particular species is generally seen as green house or conservatory ornamental plant. In Mediterranean climates it is also used as landscaping plant.	 

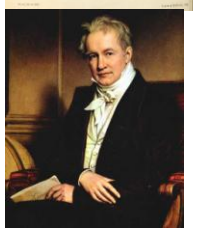
Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Agave americana	Century Plant (Sc) 5.0c	The plant was first brought into flower in Britain during 1820 by the Revered James Yates (1789-1871) who grew the plant from a seedling outside in his garden at Salcombe in Devon. It is not known exactly who brought the plant to Britain from the New World nor exactly when it arrived but it is listed in James Sutherlands *HORTUS MEDICUS EDINBURGENSIS* (1683) or A Catalogue of Plants in the Physical Garden at Edinburgh at the time, from that we can derive that it was in cultivation prior to that date.	Central America	This xerophytic species is monocarpic meaning it flowers once and then dies, often leaving young plantlets at the base and if pollinated producing thousands of seed. It has several special adaptations which allow it to survive in the desert. These include a thick waxy cuticle to cut down transpiration, water storage in both the fleshy roots and in a mass of water retentive cells called spongy mesophyll, found in the centre of the leaves. The breathing pores normally found on the upper and lower surfaces are only present on the under side of the leaf reducing transpiration further. It is pollinated by insects, humming birds and migratory bats.	This agave is often grown as an ornamental pot and landscape plant. Both it and several other species are of considerable economic importance being used for the manufacture of rope, cordage and twine. In the 18th century it was highly valued for use as a surgical thread. Others species are used medicinally and for the production of the alcoholic drink Tequila.	 

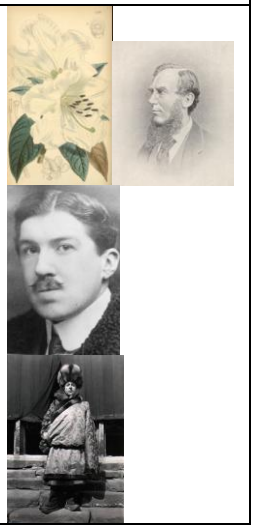
Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Araucaria hetrophylla	Norfolk Island Pine 1793 0.0c	The plant was encountered by Captain James Cook in 1774 on his second voyage of Discovery in the vessel Resolution. Cook also discovered its relative *A. bidwellii* on the island he called New Caledonia.	Norfolk Island	This species is endemic to Norfolk Island meaning it does not occur naturally any where else in the world. It is IUCN vulnerable in the wild due to threats from agriculture and habitation. The flowers are wind pollinated and the cones produce winged seed to help them fly in the breeze aiding distribution.	This attractive ornamental tree is highly valued for indoor decoration being used in conservatories and public spaces such as shopping malls. In milder regions it is utilised by the landscaping industry. It was once planted on Ascension Island to provide sailing-ship masts, and is used commercially as a timber tree in South Africa.	  
Chamaerops humilis	Palmento (Sp) 1731 5.0c	This species was first described for science by the great Swedish botanist Linnaeus in his work *Species Plantarum* (The Species of Plants) published in 1753. It is however likely that the plant had been in cultivation long before that time having been introduced through trade links with North Africa.	Mediterranean	This palm has special scent glands in its leaves which give off a sweet fragrance to attract the weevils which pollinate the flowers.	One of the most widely used landscaping palms in the world. The leaves are a source of vegetable horse hair (Algerian fibre, *(crin végétal)* which is used in upholstery. The young flower buds are edible.	 

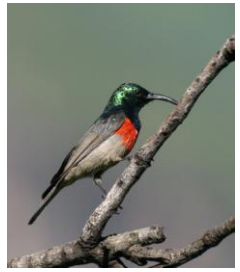
Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Cissus antarctica	Kangaroo Vine (Clm) 1790 5.0c	This plant was first discovered by Sir Joseph Banks and Dr William Solander during the voyage of the Endeavour with Captain James Cook 1768-71.	Australia	This is one of the many plants collected pressed and dried as part of Banks and Solander's scientific studies of Australia or New Holland as it was then known. The botanical illustration which appeared in Curtis Botanical Magazine 1824 was prepared from living specimens introduced to Kew garden by Banks in 1790.	The Kangaroo Vine is still widely used as a conservatory plant and house plant, as well as in indoor landscaping within public spaces such as shopping malls and airports. The large black fruit are eaten by aboriginal peoples as part of a bush tucker diet.	  
Cobaea scandens	Cup & Saucer Plant (Clm) 1787 5.0c	Named in honour of the Spanish Jesuit missionary, naturalist and explorer, Father B Cobo (1572-1659). It was also used by Charles Darwin in his research published as The Movements and Habits of Climbing Plants 1875; he was particularly interested in the way the tendrils move and grip nearby supports.	South America	The blooms have a sweet cabbagy musky aroma from late evening until dawn, and are thought to be pollinated by bats. The fragrance then changes during the day to smell sweetly of honey, attracting bees and other insect pollinators.	The Cup and Saucer plant is a popular greenhouse and conservatory species which thrives in temperate conditions, full sun or partial shade. It is still widely grown today in both public collections and private gardens.	 

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Cyathea dealbata	Silver Tree Fern Ponga (Sp) 1830's? 5.0c	Dumont d'Urville *The Voyage of the Astrolabe* 1826-29 The plant was also encountered by the Cornishman William Colenso (1811-1899) an amateur botanist and printer, during his expedition of 1841 and was included in a batch of over 600 hundred herbarium specimens sent to Hooker at Kew in the same year .	New Zealand	Fossil evidence traces this ancient land plant back to the Cretaceous around 146 to 100 million years ago. Like other ferns it has a mysterious and fascinating method of reproducing itself. The cycle has several stages involving a mature sporophyte, sporangia, fern spore, gametophyte, fern sperm male (antherozoid) and egg female (archegenium) a, tiny new frond, and finally a young sporophyte.	The Silver Tree Fern is an important landscaping plant throughout the wet temperate regions of the Southern Hemisphere and in milder areas of Britain Europe and North America. As ferns seemed to reproduce without flowers 'Fern Seed' was deemed to be magical, with the power to make you invisible. In Henry IV, part 1, Gadshill boasts to the Chamberlain "*we have the receipt of fern seed, we walk invisible*" in the hope that this would convince him to assist with a crime.	 

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Cycas revoluta	Japanese Sago Palm 1758 7.0-10.0c	Living plants were exported from Japan illegally via Batavia to the *Hortus medicus* in Amsterdam, by the botanist Carl Peter Thunberg (1775 -1828). Georg Eberhard Rumpf, or Rumphius, a German botanist in the service of the Dutch East India Company and author of remarkable *Hortus Amboinense*, is also said to have introduced it to Holland. Rumphius had an amazing life with many notable incidents and achievements.	Japan Yonaguni Island Okinawana Japan	The ancient land plants are members of the family *Cycadaceae* and date back to before the age of the dinosaurs. They are generally thought to be wind pollinated, however recent studies of the species on Yonagunia Island suggests insects can also play a role. The plant is a living example of evolution in action, as it appears to be in the initial stages of developing a floral structure which facilitates animal pollination rather than relying totally on the wind as many early flowering plants did.	This prized ornamental species has now become one of the most commonly grown cycads in the world, being used both as pot plant and in the landscape. The seeds are also used as a food source where it occurs naturally in a group of islands to the south of Japan.	

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Dracaena draco	The Dragon Tree 1640 10.0 to 13.0c	The famous German naturalist and explorer Alexander Von Humboldt (1769-1859) encountered mature specimens this strange tree during his short stay in Tenerife during June 1799, when he climbed Mount Teide before continuing across the Atlantic for his famed adventures in South America. His encounters with the plant are recorded in his journal and in Curtis Botanical Magazine. The plant was most likely first introduced by traders returning from the Canary Islands.	Endemic to the :~ Canary Isles Madeira Cape Verde islands South Morocco	This IUCN category Red Date book species is listed as Vulnerable primarily due to the serious threat from deforestation in the wild. It is a close relative of asparagus, and can live to become several hundred years old attaining a height of 20 metres. One plant in Gibraltar is thought to have been planted in 1460.	The plant is popular today as a house, conservatory and pot plant. It is also used outside in the Mediterranean as a landscape feature. A highly prized resin referred to as 'Dragons Blood', was once derived from the sap for use as a medicine to stop the flow of blood from wounds. It was also used in varnishes, photo engraving and as a colouring dye.	 
Howea fosteriana	Kentia palm (Sp) 1869 12.0c	This rare and endangered palm is named after a New South Wales senator William Foster. It was discovered and described for science by the Scottish Botanist Charles Moore who was born in Dundee and went to Sydney in 1848 to become Director of the botanic garden. Moore visited the island in 1869 and described the species in 1877.	Lord Howe Island, Australia	Kentia palm is endemic (found nowhere else in the world naturally) to Lord Howe Island, a World Heritage Site. Seeds are harvested annually under licence from the wild populations and distributed around the world for use in the horticultural industry.	Kentia is probably the most commonly grown palm in the world, being famed for its elegant habit and ability to tolerate neglect. It has been popular as house plant since the 1850's, and still is today being found in shopping malls, offices and hotels across the globe.	 

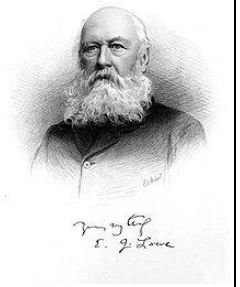
Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Passiflora antioquiensis	Red Banana (Clm) Passion Flower 1858 5.0-7.0c	First introduced into cultivation in Belgium in 1858 by M. Von Volxem, an enthusiastic amateur gardener who found it growing originally in a garden in Bogota South America. It occurs naturally at altitudes between 1800- 2700m meaning it is cool growing which has aided it's success in gardens.	Columbia	The plant has evolved large red flowers which last three to four days specifically to attract, Humming Birds the main group of pollinators. These amazing birds hover and feed on the nectar held deep within the flowers using their long tongue which although not hollow acts like a sophisticated straw.	This passion flower has become popular again with amateur gardeners in recent years. It has also been used extensively to breed a range of interesting hybrids with nodding flowers. In South America and New Zealand, it is grown for its edible fruits which are sweet and succulent.	
Rhododendron edgeworthii	1851 5.0-7.0c	First discovered and described from specimens collected in Sikkim by Dr J. D. Hooker (1817-1911) in 1851, who also used material collected by the French Missionary Pére Jean Marie Delavay (1834-95) in 1886.	Eastern Himalaya	*Rh. edgeworthii* often grows as an epiphyte, in the upper tree canopy, in an attempt to gain better light levels in the dank cool forest. In drier regions it can also be found growing as a terrestrial on cliffs. Like other Maddenii species, it is highly scented, a pollination strategy which attracts bumble bees in particular.	This beautifully scented species was originally collected by George Forrest in China during 1910 at between 8000 and 13,000 feet. It was later introduced again by Reginald Farrer (1880-1920) and the American Dr Joseph Rock (1884-1962. It is the parent of several hybrids which are highly sought after today.	

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Strelizia reginae	Bird of Paradise Crane lily 1773 10.0c	Francis Masson FLS was born 1741 near Aberdeen. He started as a garden boy before travelling to London around 1760 to gain employment at Kew. Here, Joseph Banks appointed him Kew's first plant hunter, instructing him to sail with Captain Cook to Cape Town, South Africa. Masson made several visits to this region, introducing many plants from the Cape's rich flora, especially from around Table Mountain. During one expedition, he had a dangerous encounter with a party of convicts, who intended to take him hostage. Escaping and returning to Kew, Masson was crowned in glory and his reputation as an introducer of new and exciting plants was firmly established. Later he collected in the West Indies, where he was imprisoned by a French expeditionary force on Grenada before eventually being released. Instructed by the Crown to sail to Canada in 1797, he went on to spend the next seven years exploring the Great Lakes region; however, his plant introductions were meagre.	South Africa	These exotic looking flowers are in the plant family *Strelitziacea*e and are closely related to bananas. The bright flowers are especially attractive to *Nectarinia afra* the Double Collared Sunbird a common resident of the Cape. When it alights on the ‘arrow ‘ to feed on nectar, it presses its body against the swollen stigma thus transferring the pollen already on its wings from another flower, at the same time it picks up fresh pollen which it transfers to another bloom.	This unusual ornamental was originally introduced into Kew Gardens as a stove house plant. Today it is used by the landscaping industry around the world, and can be seen in gardens, hotel and holiday resorts throughout the tropics. It is also grown commercially as cut flower in California and Hawaii, from where it is exported to Europe weekly.	  

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Strelizia reginae continued	Bird of Paradise 1773 10.0c	Eventually, Masson was granted permission to return to England because of ill health, but his recall came too late and he died in 1805 before he could set sail. His plant introductions from South Africa include *Pelargonium, Mesembryanthemum, Lobelia, Gladiolus, Kniphofia, Erica* or Cape Heaths, and from North America, the beautiful *Trillium grandijlorum.*: A specimen of *Encephalartos altensteinii* (a Cycad), which Masson collected in the Eastern Cape and brought back to Kew in 1775, is still thriving in the famous Palm House to this day. Consideration should be given to planting this species at Wentworth.	South Africa	See above	See above	

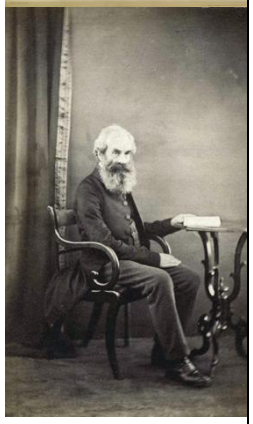
SECTION TWO ~ THE WORLD AT WENTWORTH ~ POTTED TREASURE THE HISTORY OF THE HOUSE PLANT

‘Potted Treasure’ Examples Potential Taxa with Working Interpretation Themes / Strap Lines						
Plant Name	**Common Name & Date of Introduction Night Minimum**	**The Plant Collectors Hidden Lives Hidden Gems**	**The World at Wentworth**	**Science in the Conservatory**	**Plants and People Past and Present**	**Images**
Aspidistra elatior	Cast Iron Plant (Gc) Bar Room Plant 1823 7.0-10.0c	John Damper Parks (1792-1866) collected plants for the Horticultural Society of London in China and Java now part of Indonesia. He sailed on the M.S Lowther Castle in May 1823 and returned on the same vessel the following year to introduce *Aspidistra elatior, Camellia reticulata* and *Coelogyne fimbriata* as well as fifteen different types of chrysanthemum (later described by Sabine). In addition he also introduced the much treasured *Rosa bankasiae* var *lutea* still widely grown today. **Note:** This plant should be considered for the Wentworth Terrace. Parks also left an informative journal giving details of his activities during these travels. On his return he became gardener to the Earl of Arran at Bogor in Sussex prior to setting up his own nursery business near Dartford in Kent.	China	This widely cultivated plant was once thought to be pollinated by slugs and snails! However recent research from Japan shows that it is actually pollinated by small crustaceans, known as amphipods.	This is one of the most widely cultivated plants in China today. Here in Britain according to the Oxford English Dictionary it was *‘often regarded as a symbol of dull middle class respectability’*. It was highly popular in the Victorian era, later it fell from favour and became the subject of musical hall jokes. The singer Gracie Fields had a famous song entitled ‘*The Biggest Aspidistra in the World’*. In 1936 the novelist George Orwell published a socially critical work entitled *‘Keep the Aspidistra Flying’*.	 

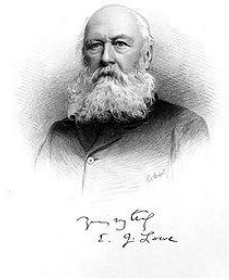
Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Asplenium nidus	Bird-Nest Fern 1820 10.0c	The finest dried specimens of this commonly grown fern arrived at Kew from Mauritius from 1826-29, having been sent by a Mr C Telfair a surgeon from Belfast who was the Superintendant of the Botanic Garden at Pamplemousess. It was sometimes grown as *Neottopteris* reflecting the fact that it was found in many parts of the New World including the Pacific islands from where it was first introduced by the Scottish plant collector Alan Cunningham (1791- 18309 in the year 1825. Cunningham travelled in the tropics extensively whilst in the employment of Kew, before eventually becoming Superintendant of the Botanic Garden in Sydney in 1837. Mr Lowe in his eight volume work *Ferns British and Exotic* states that '*no collection however limited should be without it*', he also thanks a Mr Henderson of Wentworth House, for his assistance in providing plants.	Global Tropics	Although a shade tolerant species it enjoys good light for healthy growth. It is normally found as a pioneering epiphyte in the upper reaches of the forest canopy. Here it roots on to the branches of tall trees, where the large leaves act as litter trap for falling leaf debris, which decays providing vital nutrients for the plant. Mature plants can reach 1.5m in diameter.	The birds nest fern has been popular as a house plant since Victorian and Edwardian times. Today it remains an important part of a global trade in ornamental ferns worth millions of pounds per annum. In some cultures the young fronds are cooked and eaten, it is also used to prepare a hair wash, traditional medicines and a contraceptive.	 

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Begonia fuchsoides	Fuchsia begonia 1846 10.0c	William Purdie was born in Scotland in 1817 and on leaving school became a gardener at the Royal Botanic Garden Edinburgh. During 1843 he was sent by Dr William Hooker of Kew to collect plants in Jamaica it was here that he met the German collector Hartweg. During the first year he explored the dense forests of the island regularly sending Wardian cases back to Kew. In 1844 he went to Colombia where he found the begonia in the mountains near Ocana Mountains. During 1846 Purdie was appointed Government Botanist and Superintendant of the Botanic Garden at Port of Spain, Trinidad. He made two further collecting trips one to Venezuela in 1851 the other to Puerto Rico in 1854. He died in Trinidad in 1857. The begonia first flowered in the nursery of Mr Veitch of Exeter in 1847.	Mexico	Over one thousand four hundred species of begonia occur naturally in the tropical and warm regions of the Americas and Asia. This species with its nectar rich pendulous red flowers is thought to be pollinated by humming birds	Begonias are key horticultural plants, in the home and in the landscape. Today over 10,000 different hybrids have been raised and grown around the world, but the species remain popular. Combined they form part of a multimillion pound industry.	

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Begonia rex	King begonia, Painted-leaf begonia 1856 10.0c	This species is thought to have first come into cultivation purely by accident. It is said by some that the plant appeared in the sheath of an orchid which was presented for auction by the botanist Charles Simmons in 'Stevens' auction room, London. It was spotted by the Belgian nursery man Jean Linden who reputedly paid over 10,000 francs for the specimen. Within two years Linden was selling the young plants to the public at over 50 francs each. It was also made popular by the work of Edward Joseph Lowe (1825-1900) a fern grower and hybridist who did much to promote plant cultivation during Victoria's reign (1837 1901). Lowe published several popular works including *Fern Growing* 1895 and *Beautiful Leafed Plants* l861 in which he describes *Begonia rex var grandis* raised in 1858 by Messers Rollinson and Sons of Tooting describing it 'as a magnificent variety ~ which cannot be passed over in silence'. '	Indian Assam	The attractive foliage is actually a survival mechanism developed by the plant in response to low light levels on the forest floor. The leaf has evolved in two specific ways which improve its ability to capture what little light is available. Firstly it coats the under side of its leaf in purple pigment, this mirrors the light which has passed through the thickness of the leaf back into the chloroplasts, so that they can use it again. Secondly the leaf develops transparent cells on the upper surface these act as lenses which focusing the dim light into a beam which stimulates the chlorophyll more effectively.	The King begonia thrives in low light levels; perhaps this was the main reason why it became one of the most common Victorian house plants. Although the species remains popular today, it has been surpassed by the five hundred plus 'rex ~ cultorum' hybrids derived from it. These have much brighter foliage and come in a wider range of colours, often with a metallic sheen. Work on the group first began around 1920 and today many have Awards of Garden Merit from the Royal Horticultural Society. The most popular include the cultivars 'Escargot', 'Fireworks' and 'Ironstone'.	 

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Cliva miniata	Bush lily 1841 -1854? 10.0c	It is named after the Lady Charlotte Florentia Clive Duchess of Northumberland, who later became Governess to Princess Victoria later Queen Victoria. First described in Curtis Botanical magazine in 1854 as being imported direct from Natal by Messers Backhouse of York Nursery. The plant is almost certainly connected with James Backhouse (1794-1869) a member of the Quaker family from the same nursery, who toured South Africa between 1838 and 1840 having been to Australia prior to that where he was particularly interested in Eucalyptus. He returned to the family business in York in 1841 before going on to explore Norway and into the Arctic Circle.	South Africa	Wild populations are increasingly threatened by urban sprawl and harvesting of the bulbs for traditional medicines. Unlike the other species which have downward facing flowers and are pollinated by sunbirds, this species with upright flowers is insect pollinated, bees collect the pollen and hover flies are attracted by the nectar. It is also visited by butterflies including the Swallow tail.	Common in Victorian times it remains a popular house plant today. Enjoying a partial shade and a tight root run in a big clay pot, it will flower regularly in early spring. A bright yellow form var *citrina* is also popular.	 

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Maranta leuconeura	Prayer Plant 1875 10.0c	The genus is named after a Venetian botanist Bartolomeo Maranta ca.1500-1571. He trained at the botanic garden in Pisa before moving to Naples and then to Rome where he founded a botanic garden. In addition he was physician to the Duke of Mantua. It is not known exactly how the plant arrived in Europe from the New World	Brazil	All plant leaves are factories which manufacture sugars and starches for food, through the process of photosynthesis. Light is the key to making this happen and plants must do all they can to obtain the maximum amount. Especially when they grow in the competitive environment of the forest floor. Adaptations including leaf lenses and varying colours such as is seen in begonias, but they may also involve leaf rolling and moving the position of leaves in response to light during the day. The Prayer Plant rolls it leaves at night, then repositions them to face the sun in the morning.	The Prayer Plant remains a popular house plant today, often seen in bathrooms, conservatories and terrariums. Cultivars like 'Kerchoveana' or Rabbit's Tracks on account of the large brown leaf spots and 'Erythroneura, which has striped pale and dark green leaves with red veins (Herringbone Plant) are the most popular however.	

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Nephrolepis exaltata	Boston fern 1793 7.0-10.0c	Like many other ferns the Boston fern was the subject of the Victorian fern craze known as *'Pteridomania'* which swept the country and saw people of all social classes growing, collecting and scouring the countryside for ferns to grow in the home and in the garden. As well as in specially designed glasshouses for those who could afford them. According to Edward Joseph Lowe (1825-1900) the Victorian fern grower and author ~*Fern Growing* 1895 the plant was 'introduced by Mr Anderson into the Royal Gardens, Kew in the year 1793'. This is most likely one William Anderson (1766-1846) who was originally from Edinburgh and eventually became gardener to James Vere of Kensington Gore, where 'he manages with superior skill and more scientific knowledge than is often met with'.	South America Polynesia Africa	This fern is a good example of how plants can evolve and mutate in shape and form. The first recorded mutation of this species was noticed in a batch of plants which arrived in a shipment from Philadelphia to Massachusetts, about 1870. This form was eventually given the name 'Bostoniensis' it remains popular in the United States today.	The Boston fern has long been popular as a house plant on account of its ability to thrive in cool shady conditions; this and its neat erect growth habit made it extremely popular with the Victorians. Today it is generally one of the many named variants which have arisen from it that are offered for sale, rather then the species itself. The fronds are also used a great deal by florists.	 

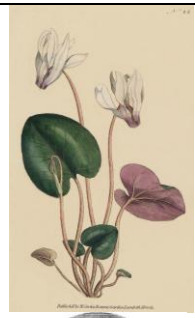
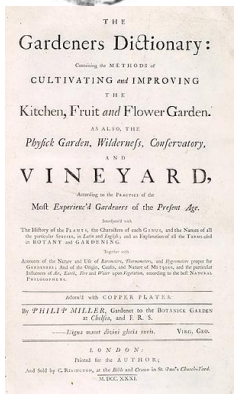
Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Streptocarpus rexii	Cape primrose 1822 10.0c	It was first introduced to Kew by Mr James Bowie (c.1789-1869) from Knysna South Africa. Bowie the son of a London seeds man, later became a gardener at Kew; it was from here that he was first sent to collect plants with Alan Cunningham in Brazil 1814-16. Later 1816-23 he travelled to the Cape, again for Kew, it was during this time that he discovered the plant growing on the estate of a Mr George Rex, after whom it is named.	South Africa	Discovered in 1818 it was the first of the genus to be described for science as *Didymocarpus rexii*. Soon it became S*treptocarpus biflorus* or *S. floribundus*. Pollen was crossed by staff at Kew and Veitch's Nursery with *S dunii* this resulted in many garden hybrids.	This species soon became very popular after its first introduction. Being of good habit, flower colour and size its genetic base can still be found in many of the newer garden cultivars we cultivate as pot plants today.	
Zantedeschia aethiopica	Arum lily 1731 -5.0c	**See entry under *Strelizia reginae* Above ~** Francis Masson FLS was born 1741 near Aberdeen. He started as a garden boy before travelling to London around 1760 to gain employment at Kew. Etc.	South Africa It is now naturalised globally in the tropics.	The plant is linked to a South African climbing frog, *Hyperolius horstockii*, which can change colour to blend with the background. Usually dark brown in colour, it is often seen on the large white flowers singing loudly to attract a companion, whilst also eating insects attracted by the faint scent given off by the flowers.	In some parts of the world this plant is called 'Pig lily' in reference to its use as a pig fodder. However it is better known as an important economic flower crop, large numbers are used throughout the world for displays at weddings, funerals and other important events all year round. Here in Britain we import thousands of stems per week.	 

SECTION THREE ~ THE WORLD AT WENTWORTH CHANGING SEASONS

Examples of Interchangeable Seasonal Taxa with Working Interpretation Themes / Strap Lines						
Plant Name	**Common Name & Date of Introduction Night Minimum**	**The Plant Collectors Hidden Lives Hidden Gems**	**The World at Wentworth**	**Science in the Conservatory**	**Plants and People Past and Present**	**Images**
Amaryllis belladonna	Belladonna lily Jersey lily 1712 -5.0c	**See entry under *Strelitzia reginae* Above ~** Francis Masson FLS was born 1741 near Aberdeen. He started as a garden boy before travelling to London around 1760 to gain employment at Kew. Etc. The bulb was first thought to have been introduced to Britain from Portugal in 1712, at that time the true country of origin was not fully understood. It was later introduced direct from its native land by Francis Masson, who had found it in the Cape of Good Hope during 1772-74, whilst botanising on behalf of Sir Joseph Banks and Kew. Notable Masson sailed to the Cape with Captain James Cook and met and botanised with the Swedish botanist Carl Peter Thunberg at this time.	South Africa Namaqualand	The flowers are mainly pollinated by noctuid moths which are attracted by the heavy lemony scent, highly prevalent in the evening. They are also visited during the day by carpenter bees, although they do not seem to work many plants within a population. After flowering, often triggered by bush fires the plant produces fleshy seeds, as these do not withstand periods of extended drought the plant times seed dispersal to happen just prior to the arrival of the seasonal winter rains, after which germination takes place very quickly.	This sweetly scented bulb is named after a shepherdess who was celebrated by the poets Ovid and Virgil. It generally flowers in the autumn without the leaves; as a result it appears to stand tall, therefore the plant was considered to represent ‘pride’ in the Victorian language of flowers. The species is still grown today as house plant and in the conservatory, it is varied in colour from white through rose pink to carmine, this has resulted in the availability of many named hybrids.	 

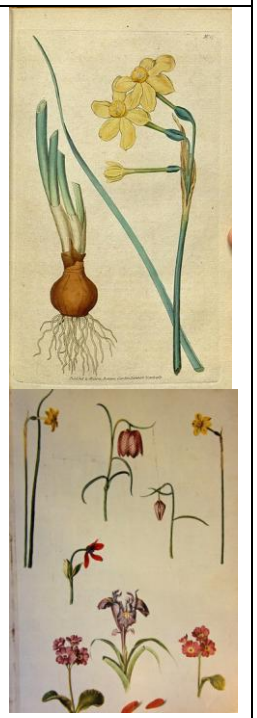
Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Camellia japonica	1739 5.0c	*Camellia japonica* and *Camellia sinensis* are two of the many important horticultural and commercial plants introduced by Robert Fortune Born in 1812 near Kelloe and he died 1880 in London (Brompton) after an adventurous life which started with an education in the parish school at Edrom, he later became an apprentice in the gardens of a Mr. Buchan at Kelloe. Next he moved to the Royal Botanic Garden Edinburgh before going on to the Horticulture Society's garden in Chiswick, London, in 1840. He was soon appointed by them to work in China 'to collect seeds and plants of ornamental or useful kind, not already cultivated in Britain'. Once in China, he worked diligently to source the plants as instructed - including Peking peaches from the Emperor's garden (said to weigh 2lbs each), tea of different qualities, double yellow roses and the true mandarin orange.	China Japan	*Camellia sinensis* (tea) is an extremely important plant medicinally which was known to have medicinal properties over 5000 years ago. The leaves contain chemicals such as caffeine and theobromine as well as theophylline a drug good for asthma attacks and kidney transplant treatment. It also contains flavonoids which are good for heart disease and possibly cancers	Fortune risked summary execution at the hands of the Chinese authorities by entering the country illegally - and disguised as a Chinese peasant - in order to smuggle out specimens of the tea plant a form of camellia for the British East India Company. In doing so he established tea plantations in India and ultimately gave you Britain's favourite 'cuppa' tea, think of that next time you have one. The camellia species he introduced are still grown in specialised collections, much more important are the many cultivars that were raised from them. Today they form part of a multimillion pound horticultural industry.	 

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Camellia japonica Continued	Both the *Anemone japonica* and the *Trachycarpus fortunei* should be considered for the Terrace areas at Wentworth	He collected a wide range of plants including *Chrysanthemum, Cryptomeria japonica, Anemone japonica, Dicentra spectabilis, Mahonia japonica 'Bealei'*and *Weigela rosea.* In total, Fortune made five major journeys to China and Japan between 1843and 1861, introducing over 200 species. His greatest finds were *Lilium auratum, Primula japonica,* the Umbrella pine *Sciadopitys verticillata* and the Chusan palm *Trachycarpus fortunei.* Fortune's marvellous eye for a plant is clear; he was also highly skilled in the transportation of live plants over great distances, in difficult circumstances. Returning to Britain in 1862, he settled in Kensington, London and enjoyed eighteen years of comfortable retirement, paid for by the success of his books and the sale of oriental antiques which he had collected on his travels.	China Japan	See above	See above	 

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Cyclamen persicum	1731 7.0 - 10.0c	The genus first appears in English herbals in the works of the botanist, apothecary and author John Parkinson (1567-1650). Born in Nottinghamshire Parkinson eventually rose to become Kings Herbalist ('Botanicus Regius Primarius'). He had a garden at Long Acre in London, his two works *Paradisi in Sole Paradisus Terrestris* 1629 and *Theatrum Botanicum* 1640 became the foundation of English botany. The latter contains a reference to *C. hederifolium* another species used in hybridising which would be suitable for outside cultivation in the terrace garden at Wentworth. It is not until Phillip Miller publishes the 8th edition of his *Gardeners Dictionary* in 1768, that we see one of the first uses in print of specific epithet *persicum.*	Turkey Iran Iraq	The species is currently being recommended for addition to the International Union for the Conservation of Nature endangered species red data book list. The sweetly scented flowers are pollinated by various species of bee in the wild, which transfer the pollen on their head and proboscis. The pollen does not stick to the stigma of a new flower unless it is sticky and receptive this is to avoid self pollination.	*Cyclamen persicum* is the best known and most widely cultivated of all the cyclamen. Since the 1860's it has been used to breed a myriad of garden hybrids. This work was mainly carried out in Britain by firms such as Sutton of Reading and others in Holland. Today the plant makes up a large percentage of the Christmas pot plant market around the world. Here in Europe alone over 200 million plants are grown from seed and sold annually.	  

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Hyacinth orientalis	1596 5.0-10.0c	Basilius Besler (1561-1629) the respected Nuremberg apothecary was curator of the greatest botanical garden in Europe of its time outside Italy. His greatest legacy is the elephant sized folio first published in 1613. This sumptuous volume of which only 300 original copies were made illustrates over 1100 plants in 367 copper plate engravings. The plants are ordered in the book to reflect their flowering time in the garden of his patron at Eichstätt, Prince Bishop Johann Konrad van Gemmingen. *Hortus Eystettensis* depicts over sixteen different cultivars of hyacinth, in rare copies these are hand coloured. Phillip Miller *Gardeners Dictionary* 1743 published in Britain lists over twenty double flowered and multicoloured varieties. It also notes the cost of the plants with reference to individual bulbs being as much as five to ten pounds per root, a small fortune at that time and anything between £430 and £850 pounds today!	Eastern Mediterranean	The blooms are highly scented giving of fa heady fragrance, in the wild they are pollinated by a wide range of insects including honey bees. The flowers are used by the perfume industry in France in the production of scent, being specifically grown to compete with synthetic phenyl acetaldehyde.	In the Victorian language of flowers the blooms sorrow. They have been popular with gardeners for centuries and remain so today. By 1753 some 351 different types were being offered by one nursery alone, this increased to over 2000 by the 19th century. In recent years it has reduced dramatically, with the number of cultivars being sold being around 220. The City of Haarlem was once the main centre of breeding, in the 17th century when individual bulbs were known to fetch over £200 each. Today they are more modestly priced, but make up a multimillion pound industry.	 

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Lilium regale	Regal lily 1904 5.0-10.0c	This highly scented lily was first discovered by the English plant collector, botanist and author Ernest Wilson (1867-1930). Born in Chipping Campden he started life as gardener at Kew, before collecting in China for Veitchs nursery, after which he joined the staff of the Arnold Arboretum in the USA. He eventually became Assistant Director then Keeper from 1927-1930. The bulb was discovered during 1903 when he was working for the Arnold but sent 300 bulbs to Messer's Veitch and Sons, who flowered them in 1905. Initially it was sold as *L. myriophyllum* and such was it 'a thing of beauty' that this caused a massive resurgence of interest in the genus.	Szechwan China	Recent studies suggest the plant may have developed the sweet fragrance to deter nectar robbing ants. It is thought to be pollinated by night flying moths. E. H. Wilson made a significant contribution to botany, introducing plants and writing over a dozen volumes including *China Mother of Gardens*, which describes his adventures, plants discovered and the impact China has had on the modern garden	*Lilium regale* is an extremely important bulb commercially around the world. Since it's first introduction it has always been popular with gardeners and florists. Today hundreds of thousands of bulbs are produced from seed each year. These are sold for use in gardens and patio pots, as well as grown in quantity for cut flowers. It has also been used in plant breeding.	 

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Narcissus jonquilla	Rush Leaf daffodil 1578 5.0-10.0c	The rush daffodil was introduced to Britain from Spain. It is sometimes know as the jonquil a word derived from the Spanish *junquillo* meaning rush in reference to the leaves. The plant is illustrated twice in the *The Florilegium of Alexander Marshal*. These two volumes held by the Royal Library at Windsor Castle represent the only surviving example of a florigelium by an 17th century English Botanical artist. In them Alexander Marshal (1620-82) illustrates in watercolour some 600 hundred plants native and exotic, as well as insects, birds and mammals. He was well connected in botanical circles and for several years resided with John Tradescant the Younger (1608-62) illustrating plants from Tradescant's. Phillip Miller *Gardeners Dictionary* 1743 lists several different varieties and discusses the annual importation of bulbs from Holland and Flanders where 'Gardeners are very industrious in raising these and other bulbous rooted flowers from seed'.	Spain Algeria	Some daffodil species i.e. the native *Narcissus pseudocorus* are bee pollinated however this species is butterfly pollinated. Look at the shape of the flower and you can see that it has evolved to provide the butterfly with a flat landing platform whilst also offering both the stigma and Anthers readily to the insect thus ensuring good transfer of pollen between plants.	This extremely sweetly scented species which has been grown in gardens since the 16th century remains popular today. It is also used in the production of scent.	

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Conservatory	Plants and People Past and Present	Images
Pelargonium peltatum	Ivy –Leafed Geranium 1701 5.0-10.0c	The Ivy leafed geranium was first cultivated in Britain in 1701 by Mary Somerset Duchess of Beaufort who owned botanic gardens at Chelsea and at Badminton in Gloucestershire. It had arrived in Holland the year before having been sent in a batch of plants from the Cape Province by the then Governor Willem Adriaan van der Stel.	South Africa	The plant is pollinated in the wild by various species of carpenter bees; the flowers are also visited by Common Bronze, Common Geranium Bronze and Dickson's geranium Bronze butterflies who feed on the nectar.	The plant and its many hybrids have remained popular from the time of introduction to the present day. Although the species is still grown, it is mainly the cultivars which are seen trailing in hanging baskets and tubs. The leaves were once used to prepare an antiseptic for the treatment of wounds, starches and burns and a deep blue dye used in painting and for dyeing cloth was extracted form the petals. The sap was used in traditional African medicine to treat sore throats, and the young leaves and buds were eaten to quench thirst, and the petals which are an astringent were used to make a wash for greasy skin.	

SECTION FOUR ~ THE WORLD AT WENTWOTH IN THE TERRACE LANDSCAPE

Examples of Interpretative Themes for a range of plants chosen from the indicative planting schedule for exterior landscape adjacent to the conservatory						
Plant Name	**Common Name & Date of Introduction**	**The Plant Collectors Hidden Lives Hidden Gems**	**The World at Wentworth**	**Science in the Garden**	**Plants and People Past and Present**	**Images**
Betula papyrifera var *kenaica*	1891 Hardy	The paper birch *Betula papyrifera* was first introduced to Britain in 1750, but this subspecies from Alaska did not arrive at Kew until 1891, the key difference to the species is in the size of the leaves, which are smaller.	Alaska	This species is a pioneer plant in boreal forests, and is often the first tree to re-colonise areas exposed by forest fires. The bark is the staple food of Moose in the winter; white-tailed deer also feed on it, as do snowshoe hares and porcupines. The seeds are eaten by mice and the leaves are an important source of food for many butterflies.	The bark is highly water resistant and will not rot, for this reason it was once used in the construction of sod roofed houses and the timber was utilised in furniture making. The sap if tapped can be boiled down to make syrup. Native Americans from many tribes had a long list of uses for various parts of the plant including food, fibre, medicines, basket making, dyes, torches and waterproof containers. Here in the UK the plant is widely used by the landscape industry and in gardens today.	

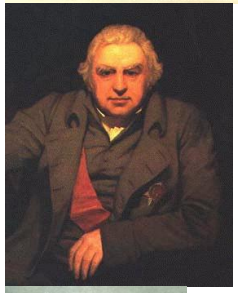
Plant Name	**Common Name & Date of Introduction Night Minimum**	**The Plant Collectors Hidden Lives Hidden Gems**	**The World at Wentworth**	**Science in the Garden**	**Plants and People Past and Present**	**Images**
Cornus kousa var *chinensis*	1907 Hardy	This variety was introduced to Britain by the English plant collector, botanist and author Ernest Wilson (1867-1930). Born in Chipping Campden he started life as gardener at Kew, before, collecting in China for Veitchs nursery, after which he joined the staff of the Arnold Arboretum in the USA. He eventually became Assistant Director then Keeper from 1927-1930. He discovered it in 1907 in Hupeh, China and sent it to the Arnold, it was forwarded to Kew in 1910.	China	The flowers which are extremely small use large papery bracts, actually adapted leaves to attract a range of small pollinating insects such as bees, beetles and flies all of which feed on the pollen.	This beautiful tree is ideal for small gardens or confined spaces and as such is very popular with gardeners who seek good flower and autumn colour; it has received an Award of Garden Merit from the Royal Horticultural Society. The sweet juicy fruit can be eaten raw or cooked, the skin is unpleasant but the flesh is said to taste like custard. The timber which is heavy is used to make craftsman's mallets in Japan.	 

Plant Name	**Common Name & Date of Introduction Night Minimum**	**The Plant Collectors Hidden Lives Hidden Gems**	**The World at Wentworth**	**Science in the Garden**	**Plants and People Past and Present**	**Images**
Davidia involucrata var *vilmoriniana*	Dove Tree Handkerchief Tree Ghost Tree 1897 Hardy	The genus *Davidia* which contains a single species *involucrata* was first discovered in 1869 near Mupin China by Jean Pierre Armand David (1826-1900) the French Missionary and naturalist after whom it is named. *Davidia involucrata* var *vilmorniana* was first introduced in 1897 via a small parcel of thirty seven seeds sent to Maurice de Vilmorin (1849-1918) by the French Missionary Paul Guillaume Farges (1844-1912) however only one of these germinated and that - not until 1899!. It was fully established in cultivation after the English plant collector, botanist and author Ernest Wilson (1867-1930) sent a large quantity of seed while collecting in China for Messers Veitch during 1899-1901, from which some thirteen thousand plants were raised. Soon afterwards Farges sent more seed to Vilmorin which also germinated very well.	China	Unlike the members of the plant family Cornaceae which are mainly thought to be insect pollinated *Davidii* now is considered to be primarily wind pollinated although several different bee species have been noted visiting the nectarless flowers. The large papery bracts are primarily thought to have evolved to protect the vulnerable pollen from the rain	This highly ornamental plant is much sought after by those with the larger garden, in light of its beauty it has received an Award of Garden Merit from the Royal Horticultural Society.	  

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Euonymus europeaus	Spindle Tree Native Hardy	The Reverend William Turner (1508?-1560) physician and botanist is considered by many to be the 'the father of English botany'. Born in Morpeth in Northumberland he was the son of a tanner. He was educated at Pembroke College Cambridge after which he held various college appointments before going to Oxford. He published his *Libellus de re Herbaria* in 1568 and it is one of the earliest botanical works to come from Cambridge, today it is considered to be one of the seminal works of British Botany. In addition to his writing he travelled widely on the continent collecting plants and practising medicine, it was during this time that he became friendly with great the German botanist Conrad Gesner who respected his work deeply. He returned to Britain in 1547 and established a garden at Kew.	Europe	The fruit is eaten by birds which then distribute the seed in their dropping once they have passed through the gut. These seeds which contain the alkaloids theobromine and caffine, the first also found in cocoa and the other in coffee are poisonous to humans.	Turner comments *' I know no good property that this tree hath, saving only it is good for making spindles and bird cages*' However the plant which is known to be poisonous was used to makes dyes, yellow from the seed and pink from the fruit case. It was also used medicinally in herbal medicine for the treatment of a variety of ailments including stomach disorders, liver complaints and fever. The timber was also used for knitting needles, tooth picks and carving. Today both it and various cultivars are widely grown in gardens for the good autumn colour and fruit.	 

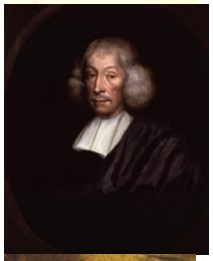
Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Hydrangea quercifolia	Oak Leaf Hydrangea 1803 Hardy	Little is know about John Lyon's early life, he was born 1765 near Gillogie in Forfarshire. Some time in his twenties he became gardener to William Hamilton in Philadelphia. Described as an amiable, well-bred and intelligent man, he collected plants throughout Pennsylvania, Florida, Tennessee and the Southern States from 1799 to 1814. He kept meticulous and detailed journals of these travels and of the ten trips he made around Pennsylvania, Maryland, West Virginia and further south to the Carolinas, Georgia and Tennessee. These provide a fascinating insight into the work of a plant hunter, including accounts, personal comments on his well-being, and observations on the medicinal uses of plants; they also detail the names of the homesteaders and officials he often stayed with and, as such, they are an important social record of the period. Commercially minded, he was as much a horticulturist as a plant hunter, taking great care to look after his plants at the four reserve gardens he set up in the	North America	The small cream to green flowers are surrounded by larger much more attractive papery bracts the plant has evolved these adapted leaves to make the flowers appear more attractive to pollinating insects such as butterflies and bees.	This handsome but slightly tender plant was first introduced in 1803 it has been in cultivation since that time in both large gardens and specialist collections. In recent years it has been famed for its good autumn colour and large flowers becoming much more widely grown. Today it has an Award of Garden Merit from the Royal Horticultural Society and is produced by over fifty UK nurseries. Several named cultivars are also available.	

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Hydrangea quercifolia continued	See above	region. He accumulated and grew material in these properties, waiting until he had a large enough cargo to justify shipment to England, accompanying them himself twice in 1806 and 1812. Although he introduced large quantities of plants at once, many of them were duplicates of existing species and only a few were new to science; these included *Dicentra eximia, Hydrangea quercifolia, Iris fulva,* and *Chelone lyonii.* From reviewing his client list, it is clear that Lyon was well-connected and respected, working with President Thomas Jefferson, the American botanist John Bartram and the famous London nurserymen Lee and Kennedy, as well as William Townsend Aiton – the Royal Gardener at Kew. Lyon was renowned for the huge shipments of American plants that he sent home to his famous clients in Britain - one particular cargo that he dispatched contained over 3,600 specimens. He died in North Carolina in 1814.	North America	See above	See above	

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Paeonia suffruticosa	Moutan Paeony 1787 1843-5 Hardy	This species has been cultivated in China for over two thousand years, many cultivars were raised and so refined was the plant that the Chinese referred to it as 'King of Flowers'. It was first introduced to Britain by Sir Joseph Banks who had instructed those trading in Canton to obtain it. Several were sent but they perished on the long journey. Finally he obtained it in 1724 through the good auspices of a Dr John *Duncan 'a medical gentleman attached to the East India Company'* who on returning to England presented Banks with a living plant, sadly the plant did not live long. A further consignment of seven plants most likely procured by the traders Daniel and Thomas Beale arrived in 1794. Exporting the plants was fraught with problems as the Chinese officials guarded them closely. It was not until fifty years later that the plant collector Robert Fortune discovered the centre of production several hundred miles inland from the coast, and was able to send home some twelve or thirteen new varieties	China	The root and the bark which have antiseptic properties are used in traditional Chinese medicine to treat inflammation, sores and abscess as well as blood disorders and other ailments such as tumours and cancerous growths.	*Paeonia suffruticosa* and the many named hybrids derived from it are extremely choice plants for the garden, sought after by both amateur and connoisseur collector gardener. One of the rarest and best which is sadly difficult to obtain is *Paeonia suffruticosa* subsp *rockii* however a few nurseries in the country claim to be able to supply it. The huge white flowers with dark maroon marks at the base of the petals make it an absolute delight well worth the trouble of seeking out.	  

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Parrotia persica	Iron wood 1846 Hardy	This large growing shrub famed for its rich autumn colour was first introduced in to Britain through the Royal Gardens at Kew. They were part of a batch of plants sent by Dr F.E.L. von Fischer the Director of the Imperial Garden at St Petersburg in 1846. The genus is named after the German born physician and botanist Professor Parrot who made the first ascent of Mount Ararat in 1829. Parrot travelled extensively in the Crimea and the Caucasus from 1811 to 12 and was a physician to the Russian army in 1815.	Caspian Sea	Iron wood is a relative of the witch hazel and as such is in the plant family Hamamelidaceae. Fossil evidence of the genus has been found in the worlds largest deposits of travertine in Turkey these date back to the Pliocene 1.5-2 million years ago. The small bisexual flowers are wind pollinated rather than insect, this again links to the plants ancient past.	The plant is widely grown in specialist garden collections and public landscapes today. There are also a wide range of good cultivars available all with varying attributes which make them individually appealing for both the large and smaller garden one of the best for autumn colour is known as ‘Jodrell Bank’ after the arboretum near Manchester where it arose.	 

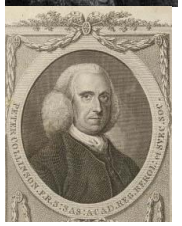
Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Sambucus nigra	Native Hardy	Nicholas Culpeper (1616-1654) was born the son of a clergyman in London, he went on to study in Cambridge after which he became an apothecary's apprentice. Following participation in the English Civil war on the Cromwellian side he went on to establish an English herb garden in Red Lion Street near Spitalfields, London. Culpepper firmly believed in the use of native plants and scorned the work of John Parkinson and John Gerard and the inclusion of exotics this and his back background in astrology and mysticism made him a controversial figure at times. In balance he also believed that medicine should be available to all especially the poor. One way he sought to provide that was through the publication of a book known as *The English Physician – Medicines Made of English Herbs* in the hope that it would standardise practices and make medicine more readily available. It was affectionately known as Culpeppers Herbal and was pirated and published on many occasion after his death.	Europe	Once common in the English countryside the plant is now much reduced in numbers due to the removal of hedgerows. Overall this practice this practice has had a significant impact on our natural ecosystems reducing the biodiversity which relied upon it. Especially the bird populations which used the berries as a valuable food source, and the large variety of moths including the Brown tail, the Buff ermine, the Emperor and Swallotailed, to which it was an important host and food plant.	Culpepper extols the virtues of Elder thus '*Under the dominion of Venus the first shoots of the common Elder boiled like Asparagus, and the young leaves and stalks boiled in fat broth does mightily carry forth phlegm and choler*'. He also suggested the use of the berries for dropsy and a decoction of the roots for adder bites and that of mad dogs. The plant is known to be toxic but is still used in herbal medicine today. The flowers and the fruits are used in cooking and the making of jams, jellies and cordials even wine. Several coloured foliage cultivars are also widely grown in gardens and in public landscapes.	 

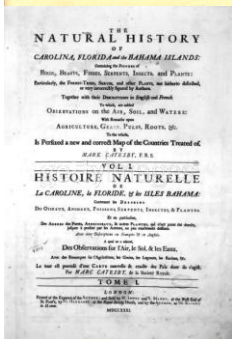
lant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Viburnum opulus	Guelder Rose Native Hardy	This native wild flower is recorded in the writings of two of the nation's most eminent botanical scholars of native plants. Firstly that of the Rev John Ray (1627-1705) who is considered to be 'one of the founders of modern science'. Ray the son of a blacksmith who went on to study at Trinity College Cambridge records the plant in his *Catalogus Plantarum circa Cantabrigiam* 1660 of the plant growing in the hedgerows near his home in Cambridgeshire and again in his work which covered the flora of much of Britain *Historia Plantarum* 1686-1704. The illustration opposite was taken from a much later work that of James Sowerby (1757-1822) botanical artist, engraver botanist and zoologist who completed the 2500 plates for one of the most remarkable feats in publishing at that time *English Botany* 1790-1814 published in 36 volumes. The text of the work was written by Sir James Edward Smith.	UK and Europe	The flowers of the wild species rather than the selected garden forms and varieties have nectar which contains indole they also give off a distinctly fish aroma which makes them attractive to flies	This plant is native to Britain, Europe and parts of Asia; it has been grown in our gardens since before 1600. Both species and several cultivars raised from it are still widely grown today. It is sometimes known as Cramp Bark as it was used in herbal medicines associated with childbirth. The fruit which is high in vitamin C can be eaten fresh but it is very bitter; however it is made into a sauce similar to cranberry and served with poultry. The twigs were used as cooking skewers. Its common name is derived from the Dutch Province of Gueldres, where it was first cultivated.	  

Plant Name	Common Name & Date of Introduction Night Minimum	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Viburnum plicatum mariesii	Japanese Snowball Bush 1877-9 Hardy	The wonderful form of the species was introduced into cultivation by the English plant collector Charles Maries (1851-1902) who collected it in Japan for Messer's Veitch the nurserymen during years 1877-1879. It was named by Veitch in 1902 and received an Award of Garden Merit in 1929 from the Royal Horticultural Society. Maries was born in Stratford-Upon- Avon and was educated at Hampton Lucy Grammar School where he excelled at botany under Professor Henslow. Next he went to Chelsea Physic Garden and then on to work for Messers Veitch, eventually exploring and collecting plants in China and Japan on their behalf. In 1882 he was recommended by Sir Joseph hooker for the post of Superintendant of the gardens of the Maharaja of Durbhungah where he laid out the grounds before going on to work for the Maharaja Scindia of Gwalior where he laid out the state gardens and remained in the post until his death.	Japan /China	The small individual flowers have both male and female parts and are insect pollinated. These tiny blooms have evolved to form a large cluster known as corymb to make themselves more attractive to the insects, which are also attracted by the sweet heady scent.	This cultivar has remained popular with gardeners since its first introduction and is today stocked and sold by over fifty seven nurseries throughout the UK under the name *Viburnum plicatun f tomentosum* 'Mariesii' In Japan the fruits and young leaves are sometimes used in cooking although they are said to be an acquired taste.	 

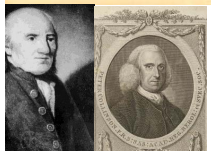
SECTION FIVE ~ 17TH CENTURY PLANTERS AND COLLECTORS

Additional plants for the adjacent landscape specifically chosen to represent the connections between Wentworth and The 3rd Duke of Argyll Archibald Campbell who was linked to the early North American collectors Mark Catesby (1692-1749) and John Bartram (1699-1777). Note: Bartram an American botanist, naturalist and explorer regularly sent seed and other plant material to the London nurseryman Peter Collinson who in turn sold it to his wealthy clients including Archibald Campbell. Mark Catesby was an accomplished botanical and natural history artist much of whose legacy is now in the Royal Collections, the North American flora is illustrated in his work *Hortus Britanno-Americanus* 1763.

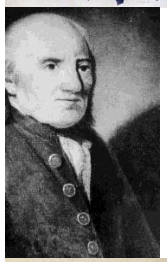
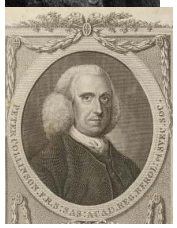
Plant Name	Common Name & Date of Introduction	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Acer pensylvanicum	Moosewood 1755 Hardy	John Bartram (1699-1777) born in Darby, USA a Quaker farmer on Schuylkill River where he also developed a botanic garden. By 1765 he was Kings Botanist in America and Linnaeus described him as 'The greatest natural botanist in the world'. He collected in the Blue Mountains, Virginia and Delaware and eventually corresponded with the London nursery man Peter Collinson (1694-1768) who supplied the Britain's great estates. This partnership changed our gardens for ever with Bartram sending plants and seed including *Acer pensylvanicum* to Collinson in his famous boxes. The plants were propagated and sold by Collinson who was described by Dr Fothergill 'as the means of introducing new and beautiful plants into Britain than any man of his time'	Eastern North America	In the natural environment Moosewood is eaten by Moose *Alces alces*, Porcupines *Erethizon dorsatum*, and Snowshoe hare *Lepus americanus*. The small flowers are generally wind or insect pollinated.	The bark of this decorative tree was once used by Native Americans to prepare medicines which treated a wide variety of ailments including bronchial complaints and as a laxative. The timber was used as fire wood and to make arrow heads. In Britain as in other temperate regions it is widely planted as an ornamental tree, its has good autumn colour and attractive bark making it ideal for the small garden. It is currently stocked by over 20 nurseries in the UK and can be found in many garden centres. .	  

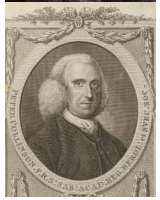
Plant Name	Common Name & Date of Introduction	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Amorpha fruticosa	False Indigo 1724 Hardy	The plant collector and artist Mark Catesby (1682-1749) was born in Sudbury Suffolk. Having worked with English botanist John Ray, he went to Virginia in 1712, and sent seeds to Bishop Compton. In 1714 he travelled to Jamaica again sending further specimens back to Britain, before returning to England in 1719. He returned to New England in 1722 but the expedition was fraught with problems and ill health and Catesby departed for the Bahamas in 1725, before returning home in 1726. He spent the rest of his life producing *The Natural History of the Carolina, Georgia, Florida and Bahama Islands 1730-47.* He personally illustrated the birds, plants he had encountered, engraving the plates also, before dealing with colouring for the printing. Next he wrote a significant work on the trees and shrubs of the	Eastern North America	The plant uses small resinous pustules which contains 'amorpha' a contact stomaich insecticide to protect itself from insect attack. It also contains small quantities of indigo pigment but not enough to harvest commercially.	The fibre of this plant was once used by Native Americans as a bedding material, as well as arrow shafts. Although it was considered ornamental when first introduced, it is not widely grown today. However it is still the most popular of all the species and several nurseries in England still stock it.	  

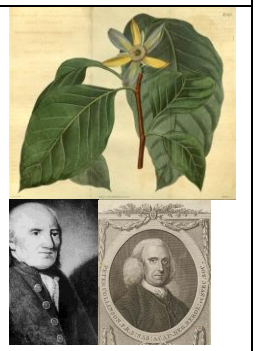
Plant Name	Common Name & Date of Introduction	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Amorpha fruticosa Continued	False Indigo 1724 Hardy	region *HORTUS EUROPÆ AMERICANUS or a Collection of 85 Trees and Shrubs etc.* Many of the plants he introduced were propagated and sold by the nurserymen Thomas Fairchild (1667-1729) and Christopher Gray (1693/4-1764). Later in life through the auspices of John Clayton (1694-1773) he introduced and grew *Stuartia malcodendron.* Consideration should be given to obtaining and planting this rare tree species to Wentworth.				
Catalpa bignonioides	Indian Bean Southern Catalpa 1724 Hardy	**See entry under *Amorpha fruticosa* above** The notes in Curtis Botanical Magazine indicate that Catesby discovered the plant in Carolina and brought it back himself, they also say that the tree grows well in sheltered situations and is more tolerant of the smoke of large towns than many other trees.	Eastern North America	In its natural environment the plant acts as the sole host to the Catalpa Sphinx Hawk Moth *Ceratomia catalpae* whose larvae known as Catawba Worms feed on the leaves, they grow to over 5cm in length and are a highly desirable bait for keen fishermen.	There are no records of the plant being used by Native Americans, but the brittle timber which does not rot easily was used by European settlers for fence posts and railway sleepers. Today it is widely grown as an ornamental in many temperate regions of the world including Europe.	

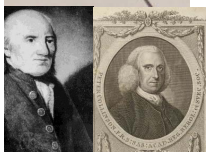
Plant Name	Common Name & Date of Introduction	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Coreopsis lanceolata	Tickseed 1724 Hardy	**See entry under *Amorpha fruticosa* above** The illustration showing the plant being pollinated by *Papilio aeneas* is taken from a rare work by the Dutch botanist, artist and curator of Leiden Botanic Garden Nicholas Meerburgh (1734-1814). The fifty coloured plates in *Afbeeldingen van zeldzaame gewassen* are said to have been drawn engraved and coloured by Meerburgh himself	Eastern North America	Like many other daisies Tickseed is bee pollinated. It is currently used in special seed mixes specifically designed for habitat restoration programmes connected with the conservation of native American bees.	Although introduced nearly 300 years ago the species and several new hybrids raised from it are still in cultivation today. These include 'Sonnekind' and 'Walter'. Native Americans once used the plant to make red dyes, prepare medicines and herbal teas.	
Dodecatheon meadia	Shooting Star or American Cowslip 1704 1745 Hardy	**See entry under *Acer pensylvanicum* above** The American Cowslip was first collected in Virginia by the Missionary John Banister just before his death in 1692. It is known to have flowered in the garden of Bishop Henry Compton (1632-1713) however the plant did not survive very long and was later reintroduced by John Bartram, who sent it in one of his famous boxes to the nurseryman Peter Collinson. Not long after it also appeared in the Andersons Edinburgh nursery at a cost of 2s 6d a small fortune to working man at that time	Eastern North America	Although wide spread in several US States the plant is considered to be threatened in the wild in several regions due to development and climate change which is effecting prairie ecology. The flowers are pollinated by bumble bees with six different species having been observed visiting plants in one region alone.	The charming plant remains popular with gardens especially alpine growers. Like other species in the genus the plant was the inspiration for designs in Native American art work it was also used as Love medicine by women 'in the hope that it would help them gain power over men'!	 

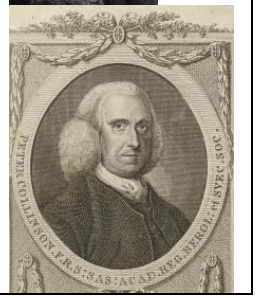
Plant Name	Common Name & Date of Introduction	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Erythronium americanum	Yellow Adders Tongue Trout Lily 1738 Hardy	**See entry under *Acer pensylvanicum* above** The illustration opposite from Curtis Botanical Magazine 1808 was prepared from living material supplied by Mr Conrad Loddiges (1738-1826) the leading nurseryman of Hackney and Mr William Salisbury of the Botanic Garden Brompton which once stood in the grounds of the Brompton hospital. Salisbury had taken over the running of the 3.5 acre garden from his partner Curtis in 1799.	Eastern North America	Like the shooting star the trout lily is pollinated primarily by bumble bees and blowflies both of which feed on the rich supply of sweet nectar. The pollen is also eaten by a number of small beetles.	Like other species it is still popular with gardeners, for spring display. It will also naturalise and establish very well. Native Americans used a juice extracted from the plant 'to clean wounds which would not heal' it was also used as a treatment for fever and as a contraceptive.	
Juniperus virginiana	Eastern Red Cedar Mid 17th century Hardy	**See entry under *Acer pensylvanicum* above** The cedar is noted in John Evelyns *Sylva or a Discourse on Forest-Trees* 1664; he states 'it is the largest juniper in cultivation' at that time. It was reintroduced by Bartram, being favoured for its narrow vertical habit it was widely planted in several large estates. Collinson notes in his own copy of the *Sylva* that over 1000 cedars were planted in one estate alone.	Eastern North America	The fruits of the cedar are eaten and distributed by over fifty species of bird, including Bob white *Colinus virginianus*, Sharptail grouse *Pedioecetes phasianellus*, Mourning dove *Zenaida macroura*. They are also favoured by opossum *Didelphis marsupialus*.	The tough durable timber was once used for fencing and railway sleepers. However it is best known for the manufacture of lead pencil wood casings. Fragrant oil is also distilled from the shavings and the waste wood as well as the foliage, for use in the perfume industry.	

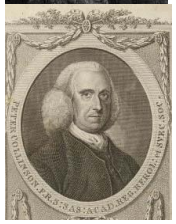
Plant Name	Common Name & Date of Introduction	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Lilium superbum	American Turks cap lily 1738-40 Hardy	**See entry under *Acer pensylvanicum* above.** Actually the third lily to be imported from America it is known to have flowered profusely in the garden of Peter Collinson during 1738. It was at this time that a Dr Trew of Nurenberg commissioned the famous botanical artist Georg Dionysious Ehert to illustrate it (see illustration opposite). So glorious is the plant that the great Swedish botanist Carl Linnaeus and honoured it with the specific name 'superbum' in 1762.	Eastern North America	Like many other plants in the American flora this species is considered to be threatened in several US States, due to habitat loss. The flowers are important sources of nectar for the swallow tail butterflies which pollinate it. These include the Spice bush *Papilio troilus*, Pipevine *Battus philenor*, Eastern tiger *Papilo glaucus* and the Great spangled fritillary *Speyeria cyebele*. The plant is also visited by Humming birds which enjoy the nectar and also transfer pollen unwittingly from one flower to another with their head.	This vigorous growing lily has been given an Award of Garden Merit by the Royal Horticultural Society and is readily available from nurseries today. The roots were once used as a food source by Native Americans.	   

Plant Name	Common Name & Date of Introduction	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Liriodendron tulipifera	1638 Tulip Tree Hardy	**See entry under *Acer pensylvanicum* above** The plant was introduced before Bartram's time however he re-collected it on several occasions forwarding material to Peter Collinson, who then sold it to numerous large estates around the country, he speaks of planting sixty nine in one estate alone. John Evelyn considered it a difficult tree to grow when commenting about it in his famous *Sylva*, even today it is clearly much slower growing in the British Isles than in the Americas. Phillip Miller (1691-1771) noted in his *Gardeners Dictionary* 1731-68 that the first plants to flower did so in gardens of the Earl of Peterborough at Parson Green near Fulham.	Eastern North America	The large cup shaped flowers are pollinated by several species of bee. There are only two species in the genus *Liriodendron tulipifera* which only occurs in America and the other *Liriodendron chinese* which is only found in China, both are related to magnolias. Fossil evidence from the Early Cretaceous Late Tertiary collected in both China and America indicates that they are ancient land plants with now extinct relatives which once grew on the same landmass some 99.6 to 66.5 million years ago, you can say they once kept company with dinosaurs.	The Tulip tree was used to treat a wide range of ailments by Native Americans including rheumatism, worms and snakebite. The timber was also used to make canoes, and the early settlers used it to make cribs and cradles. One particular canoe made from a single trunk for Daniel Boone was said to be over 18m long! Here in Britain it has been highly valued as an ornamental tree since its introduction to Bishop Comptons garden in Fulham, 1638. Today it and several good cultivars are stocked by over forty nurseries plus garden centres.	  

Plant Name	Common Name & Date of Introduction	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Lobelia cardinalis	Cardinal Flower 1626 1756 -5.0c	**See entry under *Acer pensylvanicum* above** The cardinal flowers first arrived in Britain in 1626 just in time to receive a note in John Parkinson's famous work *Paradisi in Sole Paradisus Terrestris*, or Park-in- Sun, Park-in-Earth. It was later sent in larger quantities by Bartram to Collinson. The common name is said to be derived from the fact that when the Queen saw the plant for the first time she noted that the colour of the flowers reminded her of the socks of the cardinals.	Eastern North America	The Cardinal flower is pollinated by the Ruby throated humming bird *Archilochus colubris* among others. The pollen is also frequently eaten by mites to the extent that it appears to be limiting the plants ability to effectively reproduce itself in the wild from seed. Although widely distributed in the USA, it is under threat in the wild in several states.	The flowers were used in the ceremonial rain dance by Native Americans, who also used other parts of the plant to aid swelling and rheumatism. The species is still widely grown in Britain today, but the cultivar 'Queen Victoria' which has purple foliage is more popular, it also has an Award of Garden Merit from the Royal Horticultural Society.	
Magnolia acuminata	Cucumber Tree 1736 Hardy	**See entry under *Acer pensylvanicum* above** This elegant fast growing tree was introduced by Bartram who sent it to Collinson who then distributed it to his clients. These included the Dukes of Richmond Norfolk and Bedford and Lord Bute who supplied the Royal garden at Kew.	Eastern North America	Fossil evidence exists to date the genus back more than 100 million years. The young twigs are eaten by deer and the tough sweet smelling waxy flowers are pollinated by beetles. It is threatened within its natural distribution and is protected under the Canadian Species at Risk Act.	The timber for furniture making today, whilst Native Americans used the plant in traditional medicine to treat toothache, stomach cramp and worms. It is a very hardy plant and both the species and several clones are widely available in Britain today.	

Plant Name	Common Name & Date of Introduction	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Ptelea trifoliata	Shrub Trefioil 1693 1724 Hardy	**See entry under *Amorpha fruticosa* above** First introduced into England in 1693 the original stock failed to establish and the plant was reintroduced in 1724 by Catesby, who also prepared the illustration with the swallow tail butterfly. The plant had become firmly established in the nursery trade by 1727 and was being distributed to the great estates of the day	Eastern North America	This species is endangered and threatened in the wild in three US states: Pennsylvania, New York and New Jersey, it is secure elsewhere in its distribution. The plant provides a habitat for birds and mammals and nectar for butterflies, including the Eastern tiger swallowtail *Papilio glaucus* and the Giant swallow tail P*apilio cresphontes*, it is also the larval host for both species.	The root of the plant which was held as sacred was used a panacea by Native American Shaman to make other medicines more powerful. It was also used to treat pulmonary complaints. It also contains antifungal alkaloids and the flowers are used as hop substitute in the brewing of beer.	
Rhododendron periclymenoides	Pinxterbloom 1734 Hardy	**See entry under *Acer pensylvanicum a*bove** The plant first arrived with Peter Collinson from Bartram in 1734, like *Rh viscosum* it caused quite a stir among collectors and was soon used to raise vast numbers of garden hybrids	Eastern North America	The small seeds are distributed by birds. The plant is also adapted to survive natural bush fires by re sprouting from the root crown. With its binding root system it is key species for the prevention of soil erosion from heavy rainfall on steep mountain slopes	The species is rarely seen or grown today having been surpassed by the cultivars. However two British nurseries still continue to stock it and make it available.	 

Plant Name	Common Name & Date of Introduction	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Rhododendron viscosum	Swamp Azalea, Swamp Honey Suckle 1734 Hardy	**See entry under *Acer pensylvanicum* above** The plant first arrived in one of Bartram's boxes during 1734, and it is still appreciated and grown today. It was widely hybridised after its introduction and Loddiges catalogue of 1836 lists over one hundred and six varieties grown from it, the majority are lost to cultivation now.	Eastern North America	The sweet scented flowers are generally pollinated by bees but in recent year's field observations have shown that some species of bee now bore into the nectaries at the base of the flower tube, thus reaching the nectar without coming into contact with either the pollen bearing anthers or the stigma. The illustration showing the Wood peewee flycatcher is taken from James Audubon's *Birds of America*.	The plant has received an Award of Garden Merit from the RHS and is worthy of a space in larger gardens on account of its hardiness and late flowering, however you need to find a good form such as 'White Foam'. It has reputedly been used to breed a good many of the well known garden azaleas we have today	   

Plant Name	Common Name & Date of Introduction	The Plant Collectors Hidden Lives Hidden Gems	The World at Wentworth	Science in the Garden	Plants and People Past and Present	Images
Veratrum viride	Indian poke 1763 Hardy	**See entry under *Acer pensylvanicum* above** The illustration from Curtis Botanical Magazine 1808 was prepared from living material taken from the Brompton Botanic Garden which was once located in the grounds of the Brompton Hospital. The site which was owned and run by Mr Curtis and Mr William Sainsbury regularly supplied material to the Royal garden at Kew and for illustration. The plant was most likely the prodigy of material sent by Bartram to Collinson in 1763.	Eastern North America	Recent analysis has revealed that the plant contains a very high percentage of complex alkaloids, many of which have been investigated for the treatment of hypertension; however the research was discontinued after they were found to have adverse side effects.	Although toxic the plant was once widely used by Native Americans for a variety of medicinal purposes including coughs colds, rheumatism, stomach complaints, skin disease and high blood pressure. It was also thought to give protection from evil spirits and to act as a good luck charm. Under controlled conditions some homeopathic practitioners still use it today. It is also favoured by garden designers around the temperate regions of the world for its unusual foliage and form.	  

BIBLIOGRAPHY

ARBER. A. (1938) *Herbals Their Origin and Evolution A Chapter in the History of Botany 1470-1670 3rd Ed*. Cambridge University Press. Cambridge. UK

ATTENBOROUGH. D. (1995) *The Private Life of Plants*. BBC Books. London. UK

AUSTIN. D. (2009) *The Rose*. Garden Art Press Woodbridge.UK.

BARCELOUX. D.G. (2008) *Medicinal toxicology of natural substances*. John Wiley and Sons. Hoboken. USA

BEAN. W. J. (1976-1988) *Trees and Shrubs Hardy in the British Isles Vols. I-IV. Plus Supplement*. John Murray. London. UK

BLAMEY, M & GREY-WILSON, C. (2003) *Cassell's Wildflowers of Britain and Northern Europe.* Cassell. London. UK

BLAMEY. M & WILSON. G. W. (2003) *Wild Flowers of Britain and Northern Europe*. Cassell. London.UK

BRETSCHNEIDER. E.V. (2002 reprint) *History of Plant Collecting in China 1898*. Ganesha Publishing. London.UK

BRICKELL. C. (1996) *A-Z Encyclopaedia of Garden Plants. The Royal Horticultural Society*. Dorling Kindersley. London.UK

BROWN. D. (1988) *Ariods Plants of the Arum Family*. Century Hutchinson Ltd London. UK

BURT. W. H. & Grossenheider. R. P. (1980) *Mammals ~ Peterson Field Guides.* Houghton Mifflin Company. Boston. USA

CAMPBEL- CULVER. M. (2001) *The Origin of Plants*. Headline Book Publishing. London.UK

CHITTENDEN. F. J. (1965) *The Royal Horticultural Society Dictionary of Gardening Vols 1-4 + Supplement 2nd ed*. Claredon Press Oxford. UK

COATS. A. M (1969) *The Quest for Plants*. Studio Vista. London.UK

COX. E.H.M. (1945) *Plant Hunting in China*. The Scientific Book Guild. London. UK

CULPEPPER. N. Introduction by MABEY. R. (2007) (First published 1653) *The English Physician Enlarged*. Folio Society. London. UK

DESMOND. R. (1994) *Dictionary of British and Irish Botanists and Horticulturalists*. Taylor Francis & The NHM. London.UK

DRANSFIELD (1985*) Genera Palmarum*. Allen Press Lawerence. USA.

GARDENER. J. (2000) *Magnolias A Gardeners Guide*. Timber Press. Portland. USA

HADFIELD. M. et all (1980) *British Gardeners A Biographical Dictionary*. A. Zwemmer Ltd. London. UK

HAMMERSON. G. A. (2004) *Connecticut Wildlife: biodiversity, natural history and conservation*. University Press New England. Lebanon. USA

HORWOOD. C. (2007) *Potted History The Story of Plants in the Home*. Francis Lincoln Ltd. London. UK

JONES. D. L (1987) *Encyclopaedia of Ferns*. British Museum Natural History. London. UK

JONES. D. L. (1993) *Cycads of the World. Reed*. Chatswood. Australia

JONES. D. L. (2000 reprint) *Palms Throughout the World*. Reed New Holland. London. UK

LAIRD. M. (1999) *The Flowering of the English Landscape Garden and Pleasure Grounds 1720-1800.* University Pennsylvania Press. Philadelphia. USA

LANCASTER. R. (1989) *Roy Lancaster Travels In China a Plantsmans Paradise*. Antique Collectors Club. London. UK

LEITH-ROSS. P (2000) *The Florilegium of Alexander Marshal.* The Royal Collection. London. UK

LITTGER. K.W. & DRESSENDORFER. W (2000) *The Garden at Eichstätt Basillus Besler's Book of Plants*. Taschen. Koln.Germany.

LOUDON. J.C. (1871) *An Encyclopaedia of Gardening. Longmans Green and Co*. London. UK

LOWE. E. J. (1856) *Ferns British and Exotic Vols 1-8.* Groombridge & Sons London. UK

LOWE. E. J. (1861) *Beautiful Leafed Plants.* Groombridge & Sons London. UK

MABBERLEY. D. J. (2008) *Mabberleys Plant Book*. Cambridge University Press. Cambridge. UK

MANNING. J. GOLDBLATT. P. & SNIJMAN. D. (2002) *The Colour Encyclopaedia of Cape Bulbs*. Timber Press. Portland. USA

MARINELLI. J editor (2004) *Plant*. Dorling Kindersley. London.UK

MILLER P. (1743) *The Gardeners Dictionary*. Rivington. London.UK

MILLER. D. (1996) *Perargoniums a Gardeners Guide to Species*. Batsford. London.UK

MITCHELL. D. R. (1997) *Pitlochry Festival Theatre Proposals for a Garden to Celebrate Scottish Plant Collectors and Botanists*. Unpublished RBGE. Edinburgh. UK

MOERMAN D. E. (1988) *Native American Ethnobotany*. Timber Press. Portland. USA

MOORE. D. & WHITE. D. (2003) *Cassells Trees of Britain and Northern Europe.* Cassell. London. UK

MYERS. A. & PRITCHARD. M. B. (1998) *Empires Nature Mark Catesby's New World Vision.* Omohundro Institute University of Carolina Press. London.UK

PAUW. A. & JOHNSON. S. (2002) *Table Mountain a Natural History*. Fernwood Press. Vlaeberg. South Africa

PETERSON. R. T. (1980) *Eastern Birds ~ Peterson Field Guides.* Houghton Mifflin Company. Boston. USA

PETRIDES. G. A. (1986) *Trees and Shrubs ~ Peterson Field Guides*. Houghton Mifflin Company. Boston. USA

SUN. Ji. et all Multifunctional bracts in the dove tree Davidia involucrata (Nyssaceae: Cornales): rain protection and pollinator attraction. American Journal of Natural History 171(1): 119-124.

TONKS. E. et all (1883-1920) *Curtis Botanical Magazine Vols 1-120*. London. UK

VEITCH. J. H. (1906) *Hortus Veitchii*. James Veitch & Sons Chelsea. London.UK

WILSON. C. G. (1988) *The Genus Cyclamen*. Royal Botanic Garden Kew. London. UK

WOODCOCK. H.D. & STEARN. W. T. (1950) *Lilies of the World*. Countrylife. London. UK

David R Mitchell ~ Curator Projects

Royal Botanic Garden Edinburgh 3rd December 2010