Historic Environment
Conservation Advice Note
Stone Cleaning

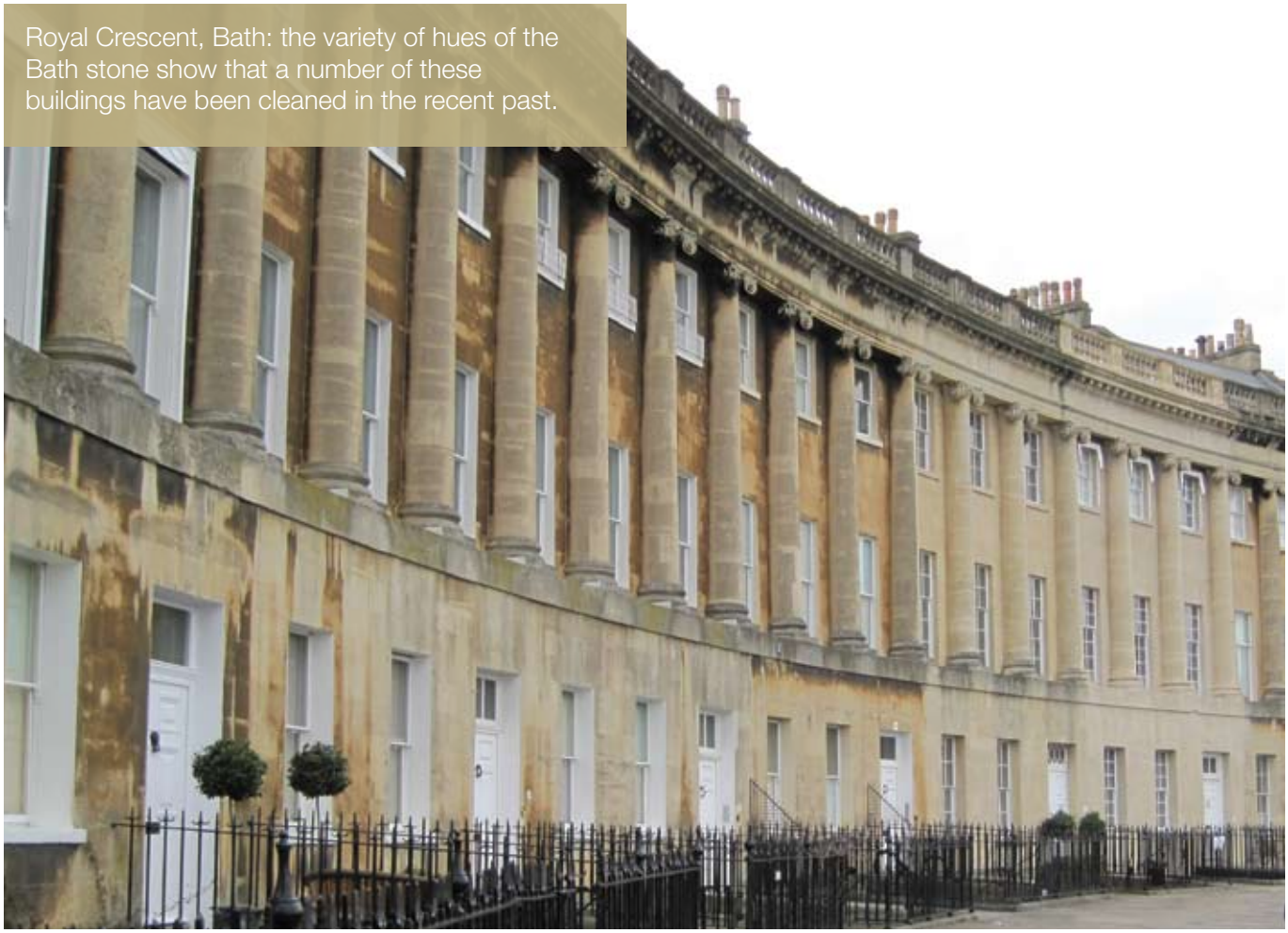
The Cleaning of Bath Stone

Is it necessary to clean Bath stonework or should soiled stonework be left untouched?

Bath & North East Somerset Council

BATH PRESERVATION TRUST

PATRIMONIO MUNDIAL · WORLD HERITAGE · PATRIMOINE MONDIAL



Royal Crescent, Bath: the variety of hues of the Bath stone show that a number of these buildings have been cleaned in the recent past.

Bath Stone

Stone cleaning can cause unnecessary damage to historic buildings. The aim of this leaflet is to provide advice on how to avoid both preventable distress to Bath stonework and unnecessary expense.

Dirty stonework is usually an urban problem. It is the result of weathering and pollution, originally from coal fires and more recently from motor vehicle exhausts.

This document will be of particular relevance to Bath where there is a high concentration of listed buildings constructed from Bath stone.

Soft and mellow limestone has been quarried in the Bath area since Roman times. The industry was small until 1726 when Ralph Allen began to buy up land for quarries on Combe Down, overlooking Bath from the south.

Bath stone is a freestone which means it can be worked freely (cut or sawn in any direction). “When it is a delicate honey-colour turning to gold in the sun, Bath stone can give exquisite pleasure” (Clifton-Taylor 1978). When quarried the stone has a light cream or buff colour. It weathers to a creamy honey hue following exposure to the air and adopts a surface patina often enhanced by natural organic compounds and lichens, the majority of which do no damage and should be preserved.

Significant soiling to one of Bath's listed buildings.

Why Clean Stonework?

There are a number of reasons for cleaning the stonework of a historic building. The most commonly cited are:

- To improve the appearance of the stonework.
- To remove impervious paintwork.
- To blend original stonework with new work, such as an extension or repairs.
- To slow down damage or decay which is due to deposits on the masonry.
- To reveal the condition of the building where the deposits may be concealing cracks, failed pointing, damaged stonework or structural faults.
- To allow other actions such as repair, pointing and protection.

Heavy soiling of buildings is not simply an aesthetic problem; it can also be a cause of decay. Vehicle exhausts emit sulphur dioxide and nitrogen dioxide.

Sulphur dioxide reacts with the stone to form calcium sulphate. In protected areas of stone (which are not washed by rainwater), these crystals trap pollution causing a black crust to form. This causes the pores of the stone to become clogged and movement of water in and out of the stone is affected. In turn, this can cause the stone to deteriorate, triggering blisters and spalling of the surface. The effect of limestone decay is therefore greatest along heavily trafficked roads. Although sulphur dioxide levels are recorded as falling this is being adversely offset by the catalytic effect of atmospheric pollutants.

ACTION TAKEN TO COUNTER THE HARMFUL EFFECTS OF NATURAL CHANGE, OR TO MINIMISE THE RISK OF DISASTER, SHOULD BE TIMELY, PROPORTIONATE TO THE SEVERITY AND LIKELIHOOD OF IDENTIFIED CONSEQUENCES, AND SUSTAINABLE.

English Heritage 2008

The surface of the stone starts to break up when the pores become blocked.

Undertaking a pre-cleaning survey.

Two important stages must precede the commencement of any cleaning method to the building.

1. A Pre-cleaning Survey

The survey is a key first step. It should be undertaken by a conservation architect or surveyor, or established independent conservator. The survey should provide background information on the style and construction of the building and identify the nature, pattern and cause of the soiling on the building. It should analyse whether or not the soiling is causing damage or decay. Previous treatments should be identified which may include historic painted signs on the stonework. These factors must be considered in the context of the building itself, its history, construction, location and proximity to other buildings. It is possible that a survey will conclude that it is unnecessary to remove the soiling but if the results indicate that the cleaning of the building is necessary, then this course of action must be thoroughly justified.

IT IS POSSIBLE THAT A SURVEY WILL CONCLUDE THAT IT IS UNNECESSARY TO CLEAN THE BUILDING AT THIS JUNCTURE. RECORDING THE CURRENT SITUATION AND MONITORING OVER TIME MAY BE SUFFICIENT.

2. Identification of the conservation objectives

Where action is necessary, a clear set of conservation objectives should be prepared. These will normally include:

1. Identifying any ‘honourable scars’ that reflect the age of the building and should be retained.
2. Protection of zones not being cleaned.
3. A clear description of the proposed end result including the repair of damaged stonework that may be found.
4. The need for trial areas to establish the optimum methods and understand any adverse impacts from cleaning.
5. The selection of a proposed cleaning method and its justification.

The cleaning of a building is a skilled operation and must be carried out by a trained professional conservator or a conservation contractor with relevant experience.

SOME BUILDINGS ARE UNDER PRESSURE FOR A SECOND ROUND OF CLEANING AND IT IS VITAL THAT ONLY THE LEAST HARMFUL TECHNIQUES ARE SPECIFIED.

Identify previous treatments, which may include traditional painted signs on the stonework.

Cleaning should only be carried out by trained operatives.

Cleaning Methods

Government advice offered in 'Planning and the Historic Environment' currently PPG15, indicates that cleaning should only be undertaken by specialist firms under close supervision. PPG15 is proposed to be replaced by PPS15 which is currently out to consultation.

The type of soiling and the pre-cleaning survey will determine the most appropriate method of cleaning.

There are a number of methods that can be used which divide into four main categories:

Physical Methods:
These include brushing and rubbing, wet and dry abrasives or surface dressing.

Water based Methods:
Such as sponging, water sprays and steam cleaning.

Chemical Methods:
Are applied as poultices or liquids using organic solvents, acidic or alkaline treatments.

Special Techniques:
These include laser cleaning and ultra-sonics.

The methodology will be defined by the survey results. Trials must always start with the more gentle options (such as intermittent sprays using minimum water, poulticing and wet air abrasion) but it is also imperative that the method is being used in a sensitive way by somebody aware of its possibilities and limitations.

Inappropriate cleaning methods can cause damage. Some methods are usually not appropriate for the relatively soft Bath stone – dry air abrasive, high pressure or continuous water spraying and acids for example. Too much water can mobilise salts present in the stone, causing fixings and iron cramps to corrode as well as damage to internal plasterwork, timber or decoration. It also renders the stone liable to the effect of frost which can cause shattering of the surface. Cleaning with water should be avoided at times when frost is likely.

Abrasive methods can cause pitting of the surface and allow the pores of the stone to be opened allowing re-soiling to quickly take place. Acids will dissolve Bath stone so acid based cleaning compounds must be dilute and specially formulated. Rinsing after any chemical is essential.

THE PRACTICAL RISKS OF EMPLOYING STONE CLEANING CONTRACTORS WILL BE KEPT TO A MINIMUM IF REPUTABLE COMPANIES ARE INVOLVED. THESE COMPANIES SEE THE STONE CLEANING ACTIVITY AS INSEPARABLE FROM THE MAINTENANCE AND REPAIR OF THE WHOLE FAÇADE AND ARE ABLE TO OFFER A RANGE OF CLEANING TECHNIQUES.

Ashurst/Dimes 1999

Ultimately the health of a building is not determined by its appearance but by what is happening on the surface of the stone; the appropriate method of cleaning must be the most effective for that particular situation. Over-cleaning should always be avoided and will lead to further damage and expense.

This photograph illustrates a comparison, soiled stonework adjacent to a cleaned area. The cleaning has been over-zealous and the surface patina has been removed giving a white appearance to the stone.

Cleaning Methods Compared

The following cleaning methods are considered potentially safe for Bath stone buildings, although all methods have their place in conservation or for special circumstances.

1. Nebulous Spray or Intermittent Mist Spray Washing

From fixed nozzles this method applies the lowest quantity of water for the minimum time to soften the surface dirt. The dirt is then removed by gentle brushing (natural bristle brushes are least damaging). This is a carefully monitored process to avoid saturation of walls, such as may happen with a domestic hose or power washer.

2. Poultices

This method is appropriate in cases where pollutant blemishes that are not soluble in water have to be removed and for the restoration of finely detailed stonework. A poultice is made from clay, paper pulp or latex with a variety of chemical additives that are deemed suitable for removing specific types of soiling.

3. Alternatives

In recent years there has been an increase in popularity of abrasive spray techniques and superheated pressure systems. These are very useful in certain circumstances but as they normally rely on the use of hand held equipment there is an increased risk of removing surface patina from the stone. There is also the possibility of an ‘over-cleaned’ appearance which could harm the character and appearance of the building. It is therefore vital that only experienced operatives are employed for this type of work.

POULTICES SHOULD ONLY BE USED IN SPECIAL CIRCUMSTANCES BY SKILLED PERSONNEL WHO UNDERSTAND THE INHERENT RISKS ASSOCIATED WITH THEIR USE.

A HARSHER METHOD IS SCRAPING THE SURFACE DOWN WITH A SUITABLE TOOL SUCH AS A MASON’S DRAG WHICH IS SOMETIMES USED TO REMOVE PAINT FROM FLAT SURFACES.

….UNFORTUNATELY THIS TECHNIQUE REMOVES SOME OF THE SURFACE TO ACHIEVE CLEANING.

….IN MOST SITUATIONS IT IS A TECHNIQUE TO AVOID, UNLESS THERE HAS BEEN DEEP STAINING OF A SURFACE OR A PAINT WHICH WILL NOT YIELD TO SOLVENTS AND MUST BE REMOVED.

Ashurst/Dimes 1999

Poultices being used to remove specific soiling to this entablature.

A specialist sensitively cleaning a carved mask stop.

Listed Building Consent

Cleaning a listed building usually requires listed building consent from the Council.

Formal approval is required as cleaning has the potential to harm a building's fabric and is likely to alter the character of a building by changing its appearance, or a group of buildings if it is part of a terrace.

Bath and North East Somerset Council's Historic Environment Team, within Planning Services, will assess the method proposed and give full consideration of the impact upon the building's character following an application for listed building consent. If the application is successful the outcome is likely to be consent with conditions. Conditions can include the provision of further details such as bona fides of the proposed contractor or the inspection of a sample panel which will remain as a guide to the contractor indicating the expected finished result of the cleaning operation.

GRIT OR SAND BLASTING IS NEVER A RECOMMENDED TECHNIQUE BECAUSE OF THE DAMAGE IT CAN CAUSE TO THE SUBSTRATE. SIMILARLY, STANDARD STEAM CLEANING EQUIPMENT CAN BE DAMAGING IN THE HANDS OF AN UNSKILLED OPERATIVE.

The Team will give appropriate advice on the issues surrounding cleaning buildings prior to receipt of a proposal if required. This will be given with a view to satisfying the applicant's aims in accordance with the possible risks to the character and appearance of the building.

The safeguarding of the character of the building and its setting is the fundamental consideration to a successful listed building consent application.

Listed Building Consent would be required prior to cleaning this listed building.

APPLICANTS FOR LISTED BUILDING CONSENT MUST BE ABLE TO JUSTIFY THEIR PROPOSALS. THEY WILL NEED TO SHOW WHY WORKS WHICH WOULD AFFECT THE CHARACTER OF A LISTED BUILDING ARE DESIRABLE OR NECESSARY. THEY SHOULD PROVIDE THE LOCAL PLANNING AUTHORITY WITH FULL INFORMATION, TO ENABLE THEM TO ASSESS THE LIKELY IMPACT OF THEIR PROPOSALS ON THE SPECIAL ARCHITECTURAL OR HISTORIC INTEREST OF THE BUILDING AND ON ITS SETTING.

PPG15 Planning and Historic Environment 1994

REPAIR NECESSARY TO SUSTAIN THE HERITAGE VALUES OF A SIGNIFICANT PLACE IS NORMALLY DESIRABLE IF:

- **THERE IS SUFFICIENT INFORMATION COMPREHENSIVELY TO UNDERSTAND THE IMPACT OF THE PROPOSALS ON THE SIGNIFICANCE OF THE PLACE;**
- **THE LONG TERM CONSEQUENCES OF THE PROPOSALS CAN, FROM EXPERIENCE, BE DEMONSTRATED TO BE BENIGN, OR THE PROPOSALS ARE DESIGNED NOT TO PREJUDICE ALTERNATIVE SOLUTIONS IN THE FUTURE;**
- **THE PROPOSALS ARE DESIGNED TO AVOID OR MINIMISE HARM, IF ACTIONS NECESSARY TO SUSTAIN PARTICULAR HERITAGE VALUES TEND TO CONFLICT**

Conservation Principles Policies and Guidance
English Heritage 2008

Summary of Advice

1. The potential applicant should consider why the building needs cleaning. Is it for aesthetic reasons or is the soiling harming the building in any way?

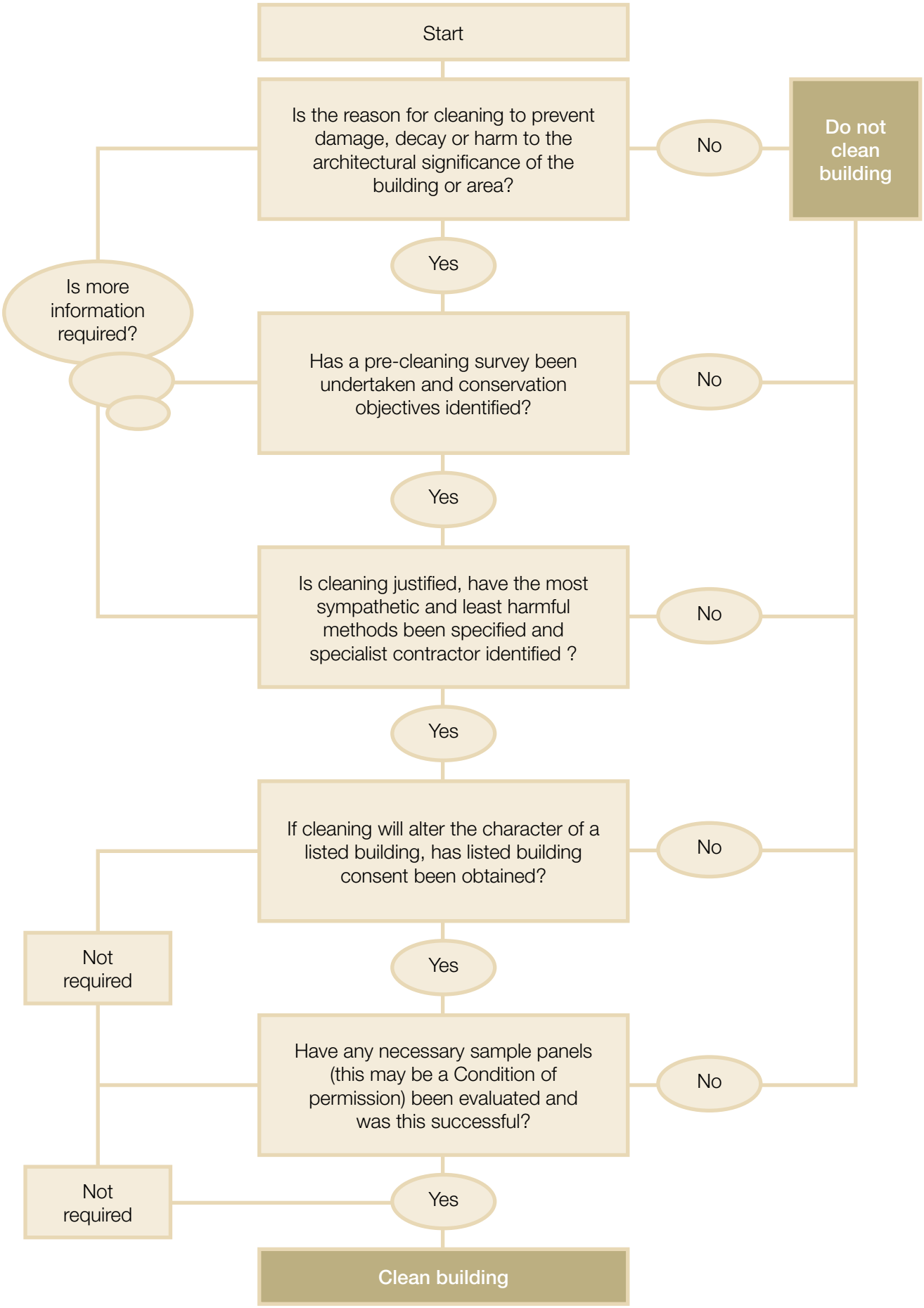
2. The applicant should have a Pre-Cleaning Survey undertaken. This should assess whether cleaning is essential and, where it is, make recommendations on the most sympathetic method to be used.

3. If the building is listed for its special architectural and historic interest a Listed Building Consent Application must be made and consent issued before any cleaning works are started.

4. In determining the application the Council must be satisfied that cleaning is both necessary and worthwhile to remove potentially corrosive dirt or to bring a major improvement in the appearance of the building and its context. Unjustified proposals are unlikely to be supported. The presumption will be in favour of the least potentially damaging method of cleaning, which in the case of Bath stone is likely to be water washing unless other methods are justified.

5. The Historic Environment Team of Bath and North East Somerset Council can offer advice before or during the process of an application. For example if your property is constructed from other types of stone such as White or Blue Lias or Old Red Sandstone the Historic Environment Team can provide guidance. The contact details appear later in this document.

Summary of Advice Flow Chart



Contact Details

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The Bath Preservation Trust is a registered charity supported by over 1400 members, who share a passionate concern and interest in the city. They receive no government funding, but are financially supported by members, by grants and donations and by income from their museums.

The purposes of the Trust are:

- To encourage and support the conservation, evolution and enhancement of Bath and its environs within a framework appropriate both to its historic setting and its sustainable future, and
- To provide educational resources, including museums, which focus on the architectural and historic importance of the city.

The Trust is prepared to give advice on all historic environment issues.

This leaflet is published in 2010 as part of series of Conservation Advice Notes issued by the Council in association with partners on a variety of built heritage issues.

This documents about community involvement in planning can be made available in a range of community languages, large print, Braille, on tape, electronic and accessible formats from the Planning Policy team.

Tel 01225 477722, Minicom 01225 477535.

Bibliography and Suggested Reading

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THE WIDESPREAD USE OF BATH STONE HAS BEEN A VITAL INGREDIENT IN GIVING THE CITY AND SURROUNDING AREAS ITS BEAUTY AND HOMOGENOUS ARCHITECTURAL CHARACTER. THE BATH PRESERVATION TRUST HAS 75 YEARS OF EXPERIENCE ASSISTING IN THE CONSERVATION OF WHAT IS NOW RECOGNISED AS A WORLD HERITAGE SITE. IT IS OF THE UTMOST IMPORTANCE THAT WE PASS ON THIS LEGACY FOR FUTURE GENERATIONS TO ENJOY. THE TRUST COMMENDS THE GUIDANCE NOTE TO ALL OWNERS AND CUSTODIANS OF BATH STONE PROPERTIES.

Bath Preservation Trust 2009

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