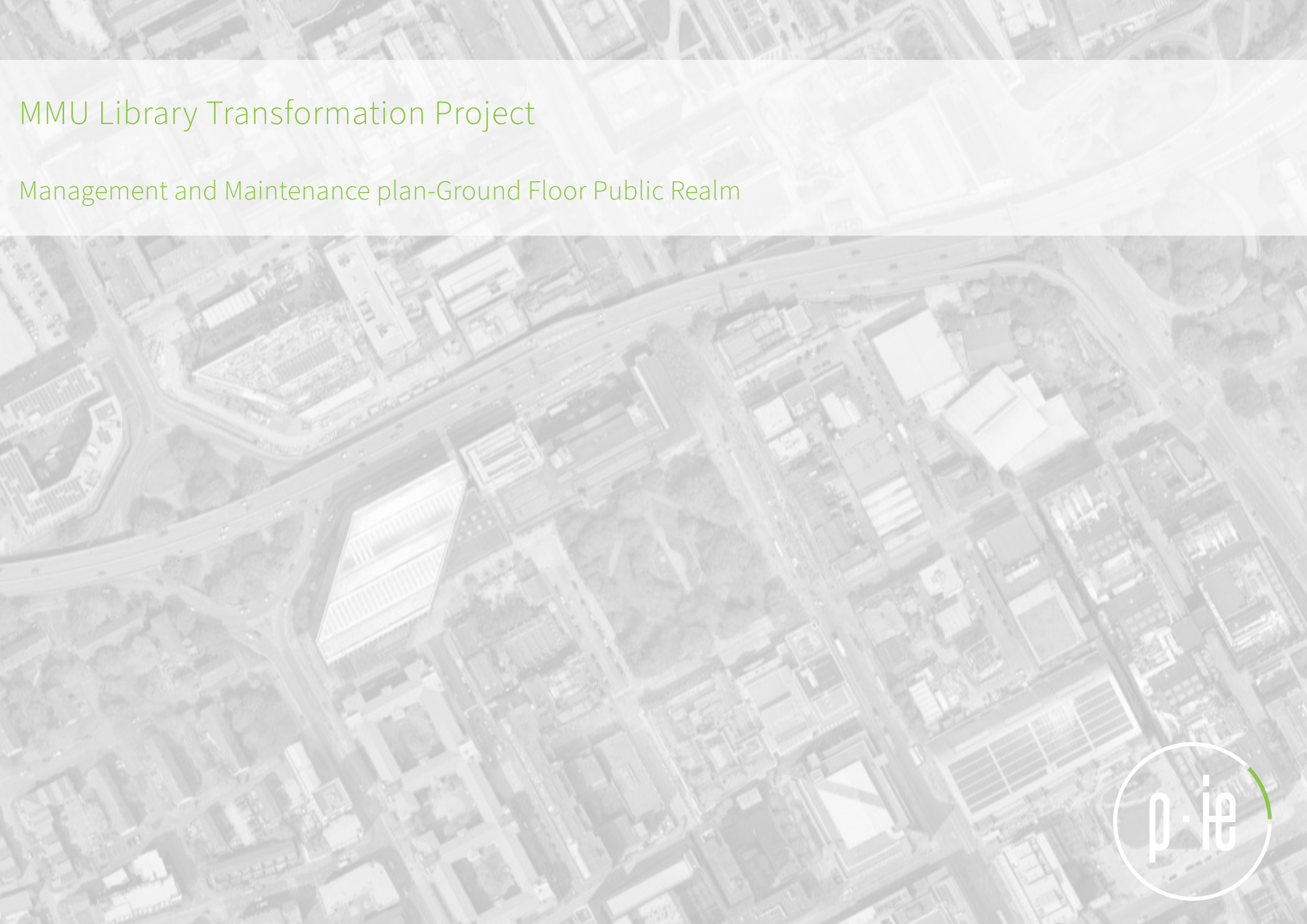




MMU Library Transformation Project

Management and Maintenance plan-Ground Floor Public Realm



DOCUMENT CONTROL

FILE NAME	
1044B-PLA-ZZ-XX-RP-L-000004 MAN- AGEMENT AND MAINTENANCE PLAN	
PREPARED BY (INITIALS)	
EKH	
CHECKED BY (INITIALS)	
GB	
PLANNING	

LANDSCAPE MANAGEMENT PLAN | PRINCIPLES

There should be a commitment to the ongoing high quality management and maintenance of the public realm. The long-term success of any landscape is reliant upon a detailed understanding of the parts and how they go together but this is just the start of the journey and perhaps the most important aspect, invariably overlooked, is to ensure that there is a defined and committed programme of maintenance.

BRIEF

The brief below describes the framework:

- The management plan will cover a time period of 5 years
- The Management Plan must give consideration to environmentally sensitive design and management
- The conservation of existing features will be a prime consideration
- The Management Plan will seek to provide a net increase in the nature conservation value of the site

MONITORING

The Management Plan's life span has been divided into key stages of 5 yearly intervals. These will be used as the basis for developing the plan and setting reviewing targets.

Monitoring is of fundamental importance, since this is the means by which the success of the plan will be measured. It is therefore important to establish standardised survey and monitoring methods, which enable valid year on year comparisons to be made. There will be a need for flexibility during its implementation. The Management Plan must be an evolving one, able to adapt to the specific needs of the space.

MANAGEMENT PRINCIPLES

Softworks:

To prescribe all necessary management and maintenance principles and management tasks to enable successful establishment and ensure the continued maturing of all landscape elements.

- To ensure the continuing health of existing vegetation
- To ensure the successful integration of existing and proposed vegetation
- To ensure that the management and maintenance regime is appropriate to the site
- To provide a mechanism for the ongoing monitoring and reviewing of the management plan and the specific maintenance operations contained therein.

A number of separate, yet inter related, vegetation types exist and are proposed for the site:

- Proposed herbaceous planting
- Proposed instant hedging
- Proposed tree planting

Hardworks:

- To put in place procedures for regular inspections of all paved areas.
- To outline specification and requirements for work by Public Utilities and general surface reinstatement
- To outline specification and sources of materials for repair/reinstatement (NBS Spec Public Realm)
- To establish winter maintenance procedures
- To put in place procedures for street cleaning
- To outline procedures for the maintenance of Street Furniture

1.0 SOFTWORKS | MAINTENANCE

A Health and Safety plan is an important consideration for any area of public realm. The landscape maintenance team will be expected to produce a risk assessment and method statement for the maintenance of the planting areas.

Highways

Maintenance works associated with works adjacent to highways will need to be considered as part of the general management and maintenance procedures

Chemicals

Chemicals generally should be restricted in use. All chemicals, herbicides, pesticides and fertilisers, should be approved by English Nature and should be used, stored and disposed of in accordance with EN guidelines and COSHH Regulations 2002.

MAINTENANCE OPERATIONS

Set out in the tables overleaf are the maintenance operations that should be carried out over the next 15 years in order to achieve the design objectives. They have been set out in a format that can be easily followed by all parties, ensuring that the Management Plan exists and a working document and not an archived report. The management prescriptions are flexible such that each section can be changed and updated on an annual basis, allowing targets to be set, progress monitored and accurate reporting made.

PROJECTED MAINTENANCE

The tree species have been carefully chosen for their suitability to the location. Formative pruning has already been carried out on the nursery and this will produce suitable growth and canopy shape for the space provided.

In the event of any structural damage to the trees by unknown circumstances such as an extreme weather event the following guidelines should be observed:

Where possible, pruning should be carried out in the dormant season to avoid excessive sap loss. The onset of sap pressure varies with species so the following timetable should be observed ;

Platanus x hispanica;	prune late Autumn to Winter
Prunus padus ‘Albertii’ ;	prune in Winter

Irrigation

Irrigation of the trees and shrub areas particularly during the first 3 years will be fundamental to their long term successful establishment.

NUTRITION

The tree pits have been backfilled with a suitable growing medium containing nutrition sufficient for the initial period of establishment.

After three years it would be advisable to apply an application of fertiliser in the Spring as a top dressing. A broad spectrum fertiliser such as HortiTop Complete (available from Hortifeeds) would be suitable. A routine soil test carried out every 2 years would establish the need for any supplementary fertiliser.

Trees with hard standing should have a liquid fertiliser applied annually during spring.

1.1 SOFTWORKS | PLANTING PLAN

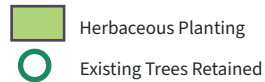
MANAGEMENT PRINCIPLES

Proposed individual trees:

- To ensure satisfactory establishment and continuing health.
- To maintain the plants in a healthy condition and develop the site tree structure.
- To ensure the successful establishment and continuity of the overall design concept.
- To establish a valued and appropriate amenity.

Ornamental, herbaceous, and rain garden planting:

- To ensure satisfactory establishment and continuing health
- To maintain plants in a healthy and attractive condition
- To ensure the successful establishment and continuity of the overall design concept.
- To establish a mechanism for the replacement of any failing plant or one which has reached maturity
- To ensure planting within public areas is maintained below a maximum height of 1m to meet the guidance set within Secure by Design with the exception of wall mounted climbers.



1.2 SOFTWORKS | TREE WORK

MAINTENANCE OPERATION

- **Identification:** Before starting work agree which trees are to be removed or pruned
- **Protection:** Avoid damage to neighbouring trees, plants and buildings
- **Standards:** To BS 3998 and Health & Safety Executive (HSE) 'Forestry and arboriculture safety leaflets'
- **Removing branches:** Cut as shown in Arboricultural Association Leaflet No 8 'Mature tree maintenance'. Cut vertical branches similarly, with no more slope on the cut surface than is necessary to shed rainwater
- **Appearance:** Leave trees with a well balanced natural appearance
- **Chain saw work:** Operatives must hold a Certificate of Competence
- **Tree work:** To be carried out by an approved member of the Arboricultural Association

ADDITIONAL WORK

- Defective, diseased, unsafe or weak parts of trees additional to those scheduled for attention: Give notice if detected.

PREVENTION OF WOUND BLEEDING

- **Standard:** To BS 3998, clause 8.

PREVENTION OF DISEASE TRANSMISSION

- **Standard:** To BS 3998, clause 9 and Appendix B.

WATER RESTRICTIONS

- **General:** If water supply is, or is likely to be, restricted by emergency legislation, submit proposals for an alternative suitable source of water. Obtain instructions before proceeding.

Maintenance Operation Number	Prescription	Year (s)	Season	Frequency (per year)
	TREE PLANTING			
	Maintenance during defects liability period of 5 years after planting whichever is the greater	1 – 5	As required	2 March - September
	To establish new planting, maintain a 1m diameter weed free area around all trees within grass. Trees within self bound gravel should be maintained totally free of weeds.	1 – 5	Spring - Autumn	1
	UNDERGROUND TREE GUY WIRES			
	Inspection / maintenance times: Quarterly and after strong winds	1 – 5	Throughout year	2
	Operations: Replace or re-secure loose or missing guy wires			
	Adjust to suit stem growth and to provide correct and uniform tension			
	Apply granular fertiliser according to manufacturer's recommendations	1 – 5	Spring - Autumn	Bi-annual
	Ensure trees remain firmly bedded after disturbance and re-firm as necessary	1 – 5	As required	1
	Control all pests and diseases as necessary	1 – 5	As required	To be determined
	Prune in accordance with good horticultural practice, thin, trim and shape as appropriate. Eg. Removing branches: Do not damage or tear the stem. Wounds: Keep as small as possible and cut cleanly back to sound wood. Cutting: Make cuts above and sloping away from an outward facing healthy, angled so that water will not collect on cut area. Larger branches: Prune neither flush nor leaving a stub, but using the branch bark ridge or branch collar as a pruning guide. Tools: Use clean sharp secateurs, handsaws or other approved tools. Disease of infection: Give notice if detected. Growth retardants, fungicide or pruning sealant: Do not use unless instructed			
	Prune all trees annually as needed to maintain a minimum 2.2m clear stem and desired form.	1 – 5	Autumn - early Winter	1 As required
	Watering – Regular checks using a moisture probe testing during the first two years after planting on a monthly cycle during the summer months of May-September	1 – 2	Monthly	24
	Water as necessary to ensure healthy growth	3	As required	As required
	Replace dead or damaged trees to original specification. Remove within 1 month or as soon as possible and replace within the next available planting season	1 - 5	Autumn	1
	Top up mulching to original specification annually	1 - 5	Spring	1
	Autumn LEAF REMOVAL			
	Collect accumulations of drifted leaves from the vicinity and from paved lawn area	1 - 5	Autumn/Winter	As required
	Arisings: Remove			

1.3 SOFTWORKS | HERBACEOUS PLANTING

MAINTENANCE OPERATION

- **Duration:** Defects Liability Period or 5 years, whichever is the greater.
- **Weed control:** Keep planting beds clear of weeds by applying herbicide.
- **Watering:** As necessary to ensure establishment of planting
- **Soil condition:** Fork over beds to keep soil loose, with gentle cambers and no hollows. Do not reduce depth or effect of mulch.

Maintenance Operation Number	Prescription	Year (s)	Season	Frequency (per year)
	HERBACEOUS PLANTING Maintenance during defects liability period or 5 years after planting whichever is the greater <ul style="list-style-type: none"> • Maintain weed free area to the surface of all planting areas • Application of granular fertilizer (15:15:15) • Ensure plants remain firmly bedded after disturbance and re-firm as necessary • Re-firm plant supports and replace as needed • Prune as necessary to encourage healthy growth as illustrated on the drawings: Prune herbaceous perennials as required to maintain form and supply supports as needed during the growing season. • Prune hardy herbaceous perennials in autumn retaining feature flower heads or seed heads to provide interest through the winter months • Prune tender perennials and borderline hardy perennials in spring once the risk of frost has passed (April / May). This is to protect the growing crown during winter. • Cut back early flowering perennials near to ground level after flowering to encourage fresh foliage and later summer flowering. Cut back again in spring. • Control all pests and diseases as necessary • Replace any dead/ under performing plants. Where planting continually fails to establish, undertake investigations to ascertain any underlying cause. • Watering – Regular checks using a moisture probe testing during the first year after planting on a monthly cycle during the summer months of May-September. • Water as necessary to ensure healthy growth. Water as necessary to ensure healthy growth. If water supply is, or is likely to be, restricted by emergency legislation, submit proposals for an alternative suitable source of water. Obtain instructions before proceeding. • Top up mulch planting to original specification at the start of each year after the cutting back of tender perennials. • Divide large groups of perennials every 3 years: • Divide summer flowering plants in spring or autumn providing that the ground is dry enough to work. • Divide spring flowering plants in summer after flowering. 	1 – 5 1 – 5 1 – 5 1 – 5 1 – 5 1 – 5 1 – 5 1 – 5 1 – 5 1 1 – 5 1 – 5 3 3	March / October Spring As required As required Spring/Summer Autumn April/May Summer & spring As required March/October May/September As required Spring Spring/Autumn Summer	9 1 Each maintenance visit Each maintenance visit 1 1 1 2 As required As required 5 As required 1 1 1

2.0 HARDWORKS | MAINTENANCE OPERATIONS

MAINTENANCE OPERATIONS – HARDWORKS

Surfaces need to be maintained such that they provide a safe passage for all pedestrians and highway users. It is also essential that areas, which have been subject to major investment, are protected and sustained through an effective maintenance regime. The success of any streetscape project will greatly depend on the attention given to maintenance.

It is important that paved surfaces are regularly inspected so that defects can be identified and rectified. Typically, early life maintenance or aftercare of new works will be the responsibility of the Main Contractor that delivered the works. The maintenance and defects liability period will generally be 12 months. The Main Contractor should visit the site at regular intervals during the maintenance period, to inspect all paved areas, and to undertake any remedial works. At the end of the maintenance period the contractor will be required to undertake remedial works to the satisfaction of the Client.

PAVING DEFECTS - RIGID

Common defects - Paved roads deteriorate in a variety of ways, depending upon the type of construction and cause of distress. When deterioration presents a safety hazard then maintenance becomes essential. Timely maintenance, in some instances can prevent deterioration progressing to a state where reconstruction is required. The majority of failures tend to be confined to the surface layers of paved roads, i.e. they concern the bedding and jointing that surrounds stone elements.

Descriptions and illustrations of common defects are given below:

Punching - Vertical downward movement occurs in and around wheelpaths. Punching shear is resisted by both the joints and bedding. The lower of the two capacities, joint shear or bed bearing will control the elements resistance to punching. The defect occurs in flexible and rigid surfacing. Localised or isolated areas of punching are likely to be due to poor workmanship. More widespread punching is more likely to be due to under design.

Progressive cracking - Debonding of the jointing material from stone elements commonly leads to progressive cracking. The continuous action of heavy vehicle tyres on the elements dislodges and pulverises sufficient quantities of the jointing material to cause a breakdown of the joint matrix. Inappropriate design and poor workmanship are likely causes. Factors likely to have contributed to this type of failure are:

- poor compaction of the bedding
- inadequate moisture content in stabilized bedding
- depth of elements
- low jointing strength
- early pavement trafficking
- inappropriate laying pattern

Movement - If the homogeneity of the upper layer is broken, it is impossible to control lateral movement with joint widths $\geq 10\text{mm}$. Once the surface matrix is broken, it allows the tyre interaction of the traffic to move the setts in angular directions, thus perpetuating the breakdown of the rigid surface. Ingress of water then adds to the problems. Rutting is common and depending on the construction of the pavement the underlying layers of the structure will gradually deteriorate.

Broken or damaged elements - Apart from being unsightly, cracking and spalling can become a hazard if it creates a trip. Spalling occurs during transport and laying, but can less commonly be a fault in the material. It can result during manufacture, impact loading, abrasion and weathering. Inappropriate size or depth of element results in fracture under loading.

TREATMENT OPTIONS

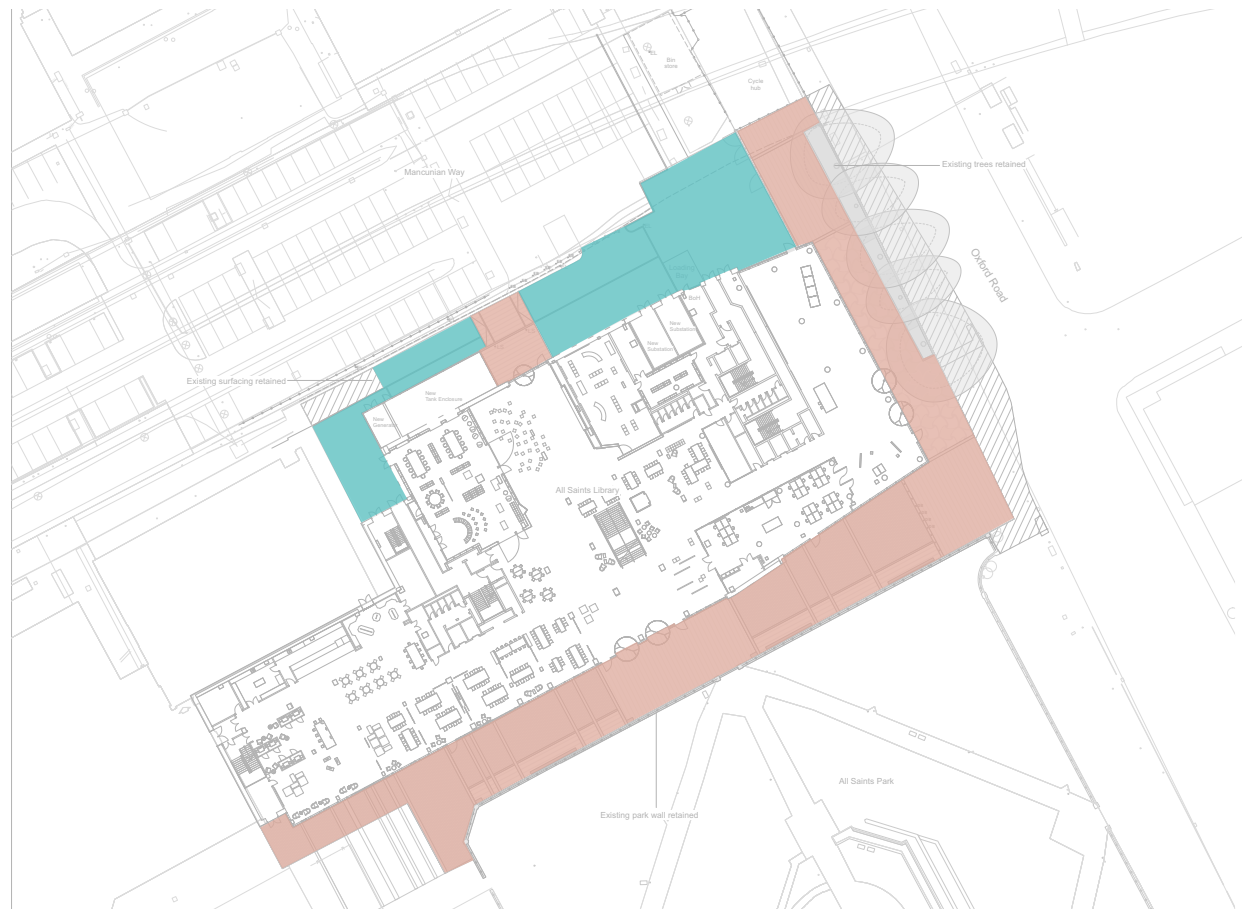
Maintenance treatment will depend on the type of defect and what has caused the deterioration. For some surfacings, topping up of jointing may be all that is required, but poor surface profile may require a site investigation to provide information on the condition of the pavement at depth. Suitable strategies can then be formulated based upon informed engineering judgment.

The table on the next page summarises some common defects, resulting problems and treatments.

2.3 HARDWORKS | MAINTENANCE

 NATURAL STONE PAVING

 TARMAC



2.1 HARDWORKS | TREATMENTS

Defect	Problem	Treatments	
		Temporary	Long-term
Expansion and contraction joint cracks	Cracking	Monitor/method statements from bedding and jointing material supplier required	Deep water ingress can lead to structural faults.
Debonding of jointing material	Initiation of failure mechanism	Monitor / investigate	Replace jointing or reconstruct if poor design
Broken or damaged elements	-	-	Replace or reconstruct
Missing elements	Trip, water ingress	Fill holes	Replace element
Rocking elements	Hazard to users	Relay	-
Spalling of arises or surfaces	Unightly trips	-	Replace
-	Loss of stability, water ingress	Fill wide gaps if hazard	Relay elements and strengthen edge restraint if necessary
Depressions and bumps (macadam)	Hazard for users	Fill or ramp. Contact undertaker if cause is failed reinstatement	Relay
Rutting (meacadam)	Hazard for users	Monitor, warn users	Relay
Slippery surface	Hazard for users	Warn users or restore texture	Clean, restore texture or renew surfacing
Surface contamination	Hazard for users and unsightly	Clean or neutralize	Replace surfacing if necessary
Vegetation	Surface slippery	Warn users, clean	Consider increasing frequency of maintenance
Water	Surface water	Salt if freezing	Relay surfacing to correct gradients and crossfall
-	Blocked drain	Clear blockage	-

Guidance: To ensure the chosen treatment is cost effective, consideration should be given to the maintenance history of the paved surfacing, its future use and the likely failure mechanism.

2.2 HARDWORKS | MAINTENANCE

LIFTING, REPAIR AND RELAYING

Relaying elements of flexible construction should be carried out in the same way as new construction (Refer to NBS specification). Additional guidance for flags is given in BS 7533-7:2010. Removing a damaged single element prior to relaying can be difficult, particularly if it is small element, as breaking it out may disturb adjacent modules. It may be necessary to consider relaying all elements, which about the damaged area, or to relay a full line of elements back to an edge restraint. If the surface has poor profile, elements will need to be lifted over the whole of the affected area. In all cases a complete renewal of the bedding material should always take place. An experienced paver is required to execute a good reinstatement.

Joint repairs

Where elements are part of a rigid construction and degradation of the cement mortar joint has occurred, it will be necessary to refill the joint. If necessary the joint should be raked out, which is time-consuming and costly. It may be more appropriate to use a small hand-held grinder with an attachment to remove the dust and debris, in a controlled manner, into some form of hopper. Once the joints have been cleaned out they can be refilled with a mortar appropriate to the trafficking category. Care is required to confine the mixture to the joint and prevent staining of the surface. Trafficking should only be allowed once the mortar has gained the appropriate strength.

Sealing

Proprietary sealing agents are commonly used on paved surfaces, to reduce moisture penetration of the laying course material, and minimise staining from spillages. The paving surface must be completely dry and clean before any sealer is applied with the manufacturer instructions adhered to at all times. Whilst such products may offer certain advantages, careful consideration must be given to the suitability of the sealant and any subsequent effect on the colour appearance and slip/skid resistance of the paving.

CLEANING

Generally

The following recommendations deal with vehicles and associated equipment for use on paved footways/footpaths/pedestrian areas and roads:

- The equipment should be purpose designed to sweep the particular area and surfacing product. If there is any doubt, the vehicle manufacturer should be consulted.
- Where possible, low ground pressure tyres should be fitted to reduce the risk of breaking or cracking of flags.

- Tyres should be inflated according to the manufacturer's recommendations, again to ensure minimum weight distribution per square mm.
- Polypropylene, not wire, brushes should be used.
- Sweeping brush pressures should be set to the minimum required to suit the particular task, i.e. surfaces swept regularly will require a lower setting than those swept infrequently or those covered with heavy deposits.
- When sweeping, engine revolutions should be set at the minimum required to maintain vacuum (suction) pressure.
- Operators, including reliefs, should be trained to manufacturers' recommendations and tyre and brush pressures should be regularly checked.
- Advice should be given to operators that, when equipment is stationary or left unattended, suction, brush rotation and water jetting equipment should be switched off to avoid the risk of damage to the area below the stationary equipment.
- In new or re-laid areas, agreement should be reached on a period of manual cleaning (at least four weeks) to allow the paving to settle and the joints to seal. This period may be reduced by using either a water-based bonding agent or elastomeric prepolymer sealant and by agreement with the cleansing authority on an appropriate sweeping regime.
- Following the use of mechanical cleaning operations, re-sanding of the joints in flexibly laid areas may be necessary.

The Use of Power Washing Equipment on Paved Areas

To aid in the removal of surface staining power washing equipment is often considered. Whilst such techniques offer certain benefits, particularly for larger areas, it is important that care is taken in their use to avoid damage to the structural integrity of the paving. When using any form of Power Washer the following guidelines should be strictly adhered to:

- The power washer should be used on a setting, which is sufficient to remove the dirt without causing any further distress. A low-pressure setting is recommended.
- Do not direct the power lance directly down on to the paving, as this can result in loss of jointing material.
- Ideally a spraying movement should be adopted holding the power lance at a shallow angle, not greater than 30° across the diagonal (i.e. not parallel to joints).
- Certain high-pressure jetting machines have been known to mark / damage the surface of certain types of paving material. It is therefore prudent to carry out a small test area before commencing on a larger area.
- The area should be inspected after cleaning to ensure that joints are full.

General Dirt and Detritus

To remove general dirt and detritus, regular brushing is recommended. If detritus reduces the intensity of the colour of the material then this can be reestablished by scrubbing with a mild detergent e.g. washing up liquid, and hot water.

Ensure all the detergent has been thoroughly washed from the surface on completion of the cleaning and the resulting run-off is carefully channelled to either drainage points or containers where it can be safely disposed of.

Moss, lichens and algae

Moss, lichen and algae can be prevalent on hard surfacing where the area is heavily shaded, is under trees or is not laid to an adequate fall. If such growths do occur and are considered undesirable then the area should be treated with a proprietary weed or moss killer used in accordance with the manufacturers' instructions. Such products take some days to be effective and are most effective when applied during a spell of dry weather. The washes work best if any thick growths are scraped off first and the wash is well brushed in. Some treatments leave a residue to discourage the re-growth of the moss and algae but this will only be of limited value if the surrounding conditions leave the paving damp and in shade.

Rust Stains

Initially action must be taken to eliminate the sources of staining. To remove the rust stain, the surface should first be wetted with clean water and then the affected area treated with a 7 to 10% dilution of Hydrochloric acid solution.

Guidance on the safe use of chemical treatments (Acid Washing) is given later in this document.

2.2 HARDWORKS | MAINTENANCE

Oil Stains

Oil can penetrate readily into hard surfacing materials, but it should not stain if any spillages are removed promptly with an absorbent material e.g. paper towels, cloth or absorbing granules. Do not attempt to wipe the stain as this will drive the oil into the surface of the units and spread it over a wider area.

If the stain persists then an emulsifying degreaser should be employed. Brush the cleaner onto the affected area, leave for a period of time according to the manufacturers instructions and then wash the emulsified oil away with plenty of clean water.

Alternatively the surface can be scrubbed with a detergent and hot water taking care to ensure that the strength of the detergent is not detrimental to the appearance of the paving. However, for persistent oil staining, steam cleaning may have to be considered.

Bitumen Stains

Fresh bitumen should be allowed to cool down before removing it with a paint scraper or similar. If it is particularly resistant, the use of ice to make the bitumen brittle may be required prior to scraping it from the paving. Any residue should be removed with an abrasive powder and finally the whole area rinsed with clean water. Certain proprietary cleaning agents are available to remove bitumen but these should be tested on an inconspicuous area of paving first.

Graffiti and Paint Stains

Both paint and graffiti are difficult to remove from most hard surfacing materials. Fresh wet paint should be soaked up with an absorbent material without wiping the paint, as this will spread the stain. It should then be treated with a suitable solvent such as white spirit and then the area washed with a de-greasing agent taking care in the disposal of the run-off material.

Dried paint should be scraped off as far as possible and then an appropriate paint remover applied.

Paint manufacturers may often be able to give more detailed advice on the removal of paint and graffiti. Therefore they should be consulted directly for specific recommendations.

Epoxy and Polyester Stains

Areas of solidified epoxy or polyester resin can be removed by carefully burning off the area with a blowtorch. Care must be taken not to inhale any fumes given off.

If, after burning, a black stain remains, this can be removed by scrubbing with detergent and hot water. For larger areas grit blasting may have to be considered, however the effect of such treatment on the micro texture of the surface should be carefully considered. Again it is advised that a small area be tested before any large-scale operations are undertaken.

Smoke, Fire and Tobacco Stains

Normally such stains can be removed by scrubbing with detergent and hot water. Where the stains persist, a mixture of scouring powder and household bleach can be used. It is important the bleach is washed from the area with clean water once cleaning is completed and the run-off carefully disposed of.

Beverage Stains

These can normally be removed by scrubbing the stain with detergent and hot water. If the stain is persistent, apply a household bleach solution and then rinse the area with clean water taking care to dispose of the run-off safely.

Chewing Gum

Chewing gum is a particularly difficult substance to remove from hard surfaces.

Newly discarded gum can be scraped off by using a mechanical scraper but hardened gum can only be removed by both freezing the gum and chiseling it from the surface of the paving or utilising a hot water/steam cleaner.

For specific advice on chewing gum removal it is recommended that specialist contract cleaning companies be contacted directly for further details.

Scuff Marks from Vehicle Tyres

These can normally be removed by steam cleaning, or by scrubbing the area with detergent and hot water.

It is important that prior to any acid cleaning being undertaken, the paving is checked to ensure that any signs of vanadium staining have thoroughly weathered away before acid cleaners are applied.

If some form of chemical treatment is required to remove more stubborn vanadium staining, then this should be undertaken using an organic acid that will not have the aforementioned effect of "fixing" the stain to the paving.

Acid Washing

Stubborn and persistent stains that will not generally weather away **naturally will require the application of a specific acid cleaning treatment to remove them.**

Prior to any acid cleaner being applied, the surface must be thoroughly wetted with clean water to prevent the acid being absorbed directly into the paving. A dilution of 7 to 10% of hydrochloric acid should then be prepared and applied to the affected area.

As the staining begins to dissolve, some frothing may be apparent, which should be followed by agitation of the surface using a stiff bristle brush to completely remove all trace of the stain.

Once this process is complete the whole surface should be rinsed thoroughly with clean water, taking care to dispose of the run off safely. In the vast majority of cases, one

treatment will be sufficient; however, in some cases re-treatment may be required.

When using any form of chemical treatment the following guidelines should be strictly adhered to:

- With deeper stains, the degree of acid treatment may result in an acid etched appearance.
- Protective clothing (gloves, boots, goggles etc.) should be worn at all times when using chemicals and the appropriate first aid measures must be available on-site.
- Take care to ensure that surrounding materials and landscaping are protected. Soft landscaping and exposed metals can be severely affected by chemical treatments.
- It is better to treat several times with the correct dilution than to use concentrated acid, which may damage the surface of the unit.
- When diluting acids, always add acid to water and not water to acid.

General Cleaning

An annual detergent wash is also recommended.

Drainage Channel

An annual detergent wash is also recommended.

3.0 STREET FURNITURE | MAINTENANCE

MAINTENANCE OPERATIONS – STREET FURNITURE

In addition to the recommendations below, also refer to the maintenance and operational instructions from the individual street furniture suppliers. Advice from the suppliers can also be sought regarding the maintenance of their products using the contact details supplied.

TIMBER TO BENCHES

The timber should be treated with Osmo or Owatrol Rubbing Oil. Every 2 years the wood should be cleaned down using the a pre treatment solution which de-oxidises the wood before re-coating with the Oil. As long as this is done, the wood will keep its colour and will have a much greater lifespan than if left untreated. Osmo/Owatrol Oil are commercially available products and will be available through any good wholesaler or exterior furniture supplier.

STEEL FURNITURE: BOLLARDS

The stainless steel should be washed down with soap or mild detergent and warm water followed by a clear water rinse.

For folding bollards, ensure the post is kept clean and free of debris. Clean and lubricate the lock using a lubricant similar to WD40. Always ensure the cover plate is closed when the bollard is not in use. Clear any debris around the cover plate and hinge. Contact the supplier - ATG access for further advice. Contact: +44 (0)345 350 3799



3.1 STREET FURNITURE | MAINTENANCE

Bespoke timber benches

A maintenance routine is not required but some inspection and maintenance may prolong the life of the benches.

Timber components should be inspected every 6 months, more in exposed locations, Regular cleaning can also prevent dirt and moss build up.

Hardwood

Hardwood can be cleaned with a Molecular Nano (MN) cleaning product and treated with an MN sealant (a non-film forming hardwood treatment that slows down greying, and protects against dirt and other factors that impact the quality of the wood).

While cleaning, it would be great to also check for any damages or splintering that may require repair.

Splinters, sharp edges or graffiti can be removed through light sanding.

Resin or gum exudation may occasionally occur on the finished surface of timber, especially during periods of warm weather. The condition generally will diminish with the passage of time. Excesses of resin remaining on the surface can be removed with a sharp blade. Care should be taken to work with the grain and to avoid marking the surface.

If you wish to maintain surface colouring, Sadolin Industrial Mais is a suitable base coat for any further staining or specialist treatments you wish to apply on site.

The long life expectancy of Naturally Very Durable Hardwood will not be significantly impaired if left in the natural state.

Stainless Steel

Polished Stainless Steel components should be cleaned using stainless steel polish and a lint free cloth. Light damage (surface scratches etc.) can be removed using an emery pad (240 grit) and freeing oil such as 'WD40'. Care should be taken to follow the direction of the brushing grain. It is recommended that a trial repair be carried out on an unimportant surface first. No corrosive cleaners or other

abrasives should be used. Any contamination, especially carbon steel scuffs from vehicles, should be instantly removed in order to avoid corrosion.

Powder-coated steel

Powder-coated steel should be cleaned annually with water

and possibly a mild detergent. Care should be taken to avoid scratching as it may limit the lifespan of the materials. Any deep scratches found should be repaired immediately.

Galvanised steel

Galvanised steel may have a shiny surface initially, but this

will quickly dull off to an expected matt grey finish. Little regular cleaning will be required if the components are exposed to rain (or cleaning with a low pressure hose), and offers high levels of protection against scratching. Water or a mild detergent can be used for cleaning annually. Be aware that cleaning with stronger substances for graffiti

removal will effect the lifespan of the steel.

Heavy damage to any product should be reported to Woodscape for specific advice on possible repairs.

ALL Maintenance, Repair & Cleaning procedures should be

documented, as this information may be requested should you ask Woodscape to inspect or repair an installed product.

4.0 STREET FURNITURE | LIGHTING

MAINTENANCE OPERATIONS – LIGHTING- Phase 1A

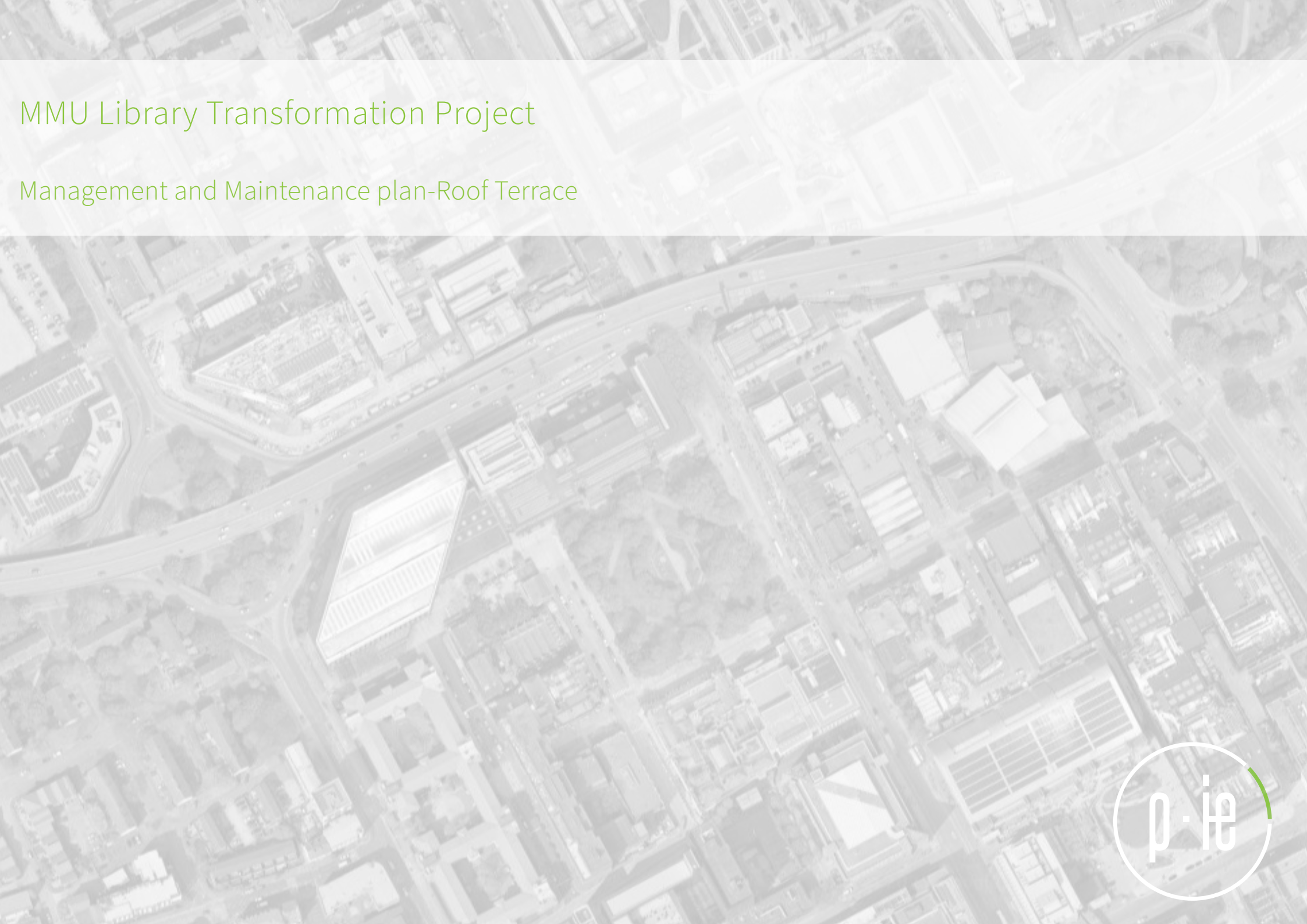
In addition to the recommendations below, also refer to the maintenance and operational instructions from the individual lighting suppliers. Advice from the suppliers can also be sought regarding the maintenance of their products using the contact details supplied.

LIGHTING STACK

Check side panels and light fittings periodically and tighten if required. Clean as required in accordance with supplier/ manufacturer's recommendations and periodically inspect LED light fittings and control boxes.

TREE UPLIGHTER





MMU Library Transformation Project

Management and Maintenance plan-Roof Terrace



LANDSCAPE MANAGEMENT PLAN | PRINCIPLES

There should be a commitment to the ongoing high quality management and maintenance of the public realm. The long-term success of any landscape is reliant upon a detailed understanding of the parts and how they go together but this is just the start of the journey and perhaps the most important aspect, invariably overlooked, is to ensure that there is a defined and committed programme of maintenance.

BRIEF

The brief below describes the framework:

- The management plan will cover a time period of 5 years
- The Management Plan must give consideration to environmentally sensitive design and management
- The conservation of existing features will be a prime consideration
- The Management Plan will seek to provide a net increase in the nature conservation value of the site

MONITORING

The Management Plan's life span has been divided into key stages of 5 yearly intervals. These will be used as the basis for developing the plan and setting reviewing targets.

Monitoring is of fundamental importance, since this is the means by which the success of the plan will be measured. It is therefore important to establish standardised survey and monitoring methods, which enable valid year on year comparisons to be made. There will be a need for flexibility during its implementation. The Management Plan must be an evolving one, able to adapt to the specific needs of the space.

MANAGEMENT PRINCIPLES

Softworks:

To prescribe all necessary management and maintenance principles and management tasks to enable successful establishment and ensure the continued maturing of all landscape elements.

- To ensure the continuing health of existing vegetation
- To ensure the successful integration of existing and proposed vegetation
- To ensure that the management and maintenance regime is appropriate to the site
- To provide a mechanism for the ongoing monitoring and reviewing of the management plan and the specific maintenance operations contained therein.

A number of separate, yet inter related, vegetation types exist and are proposed for the site:

- Proposed cultivated turf
- Proposed herbaceous planting
- Proposed instant hedging
- Proposed tree planting

Hardworks:

- To put in place procedures for regular inspections of all paved areas.
- To outline specification and requirements for work by Public Utilities and general surface reinstatement
- To outline specification and sources of materials for repair/reinstatement (NBS Spec Public Realm)
- To establish winter maintenance procedures
- To put in place procedures for street cleaning
- To outline procedures for the maintenance of Street Furniture

1.0

SOFTWORKS | MAINTENANCE

A Health and Safety plan is an important consideration for any area of public realm. The landscape maintenance team will be expected to produce a risk assessment and method statement for the maintenance of the planting areas.

Highways

Maintenance works associated with works adjacent to highways will need to be considered as part of the general management and maintenance procedures

Chemicals

Chemicals generally should be restricted in use. All chemicals, herbicides, pesticides and fertilisers, should be approved by English Nature and should be used, stored and disposed of in accordance with EN guidelines and COSHH Regulations 2002.

MAINTENANCE OPERATIONS

Set out in the tables overleaf are the maintenance operations that should be carried out over the next 15 years in order to achieve the design objectives. They have been set out in a format that can be easily followed by all parties, ensuring that the Management Plan exists and a working document and not an archived report. The management prescriptions are flexible such that each section can be changed and updated on an annual basis, allowing targets to be set, progress monitored and accurate reporting made.

PROJECTED MAINTENANCE

The tree species have been carefully chosen for their suitability to the location. Formative pruning has already been carried out on the nursery and this will produce suitable growth and canopy shape for the space provided.

In the event of any structural damage to the trees by unknown circumstances such as an extreme weather event the following guidelines should be observed:

Where possible, pruning should be carried out in the dormant season to avoid excessive sap loss. The onset of sap pressure varies with species so the following timetable should be observed ;

Acer platanoides;

prune late Winter or early Spring

Betula albosinensis Fascination ;

prune late Summer

Prunus serrulata 'sunset boulevard' ;

prune late Summer

Irrigation

Irrigation of the trees and shrub areas particularly during the first 3 years will be fundamental to their long term successful establishment.

NUTRITION

The tree pits have been backfilled with a suitable growing medium containing nutrition sufficient for the initial period of establishment.

After three years it would be advisable to apply an application of fertiliser in the Spring as a top dressing. A broad spectrum fertiliser such as HortiTop Complete (available from Hortifeeds) would be suitable. A routine soil test carried out every 2 years would establish the need for any supplementary fertiliser.

Trees with hard standing should have a liquid fertiliser applied annually during spring.

1.1 SOFTWORKS | PLANTING PLAN

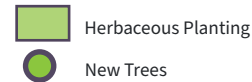
MANAGEMENT PRINCIPLES

Proposed individual trees:

- To ensure satisfactory establishment and continuing health.
- To maintain the plants in a healthy condition and develop the site tree structure.
- To ensure the successful establishment and continuity of the overall design concept.
- To establish a valued and appropriate amenity.

Ornamental and herbaceous planting:

- To ensure satisfactory establishment and continuing health
- To maintain plants in a healthy and attractive condition
- To ensure the successful establishment and continuity of the overall design concept.
- To establish a mechanism for the replacement of any failing plant or one which has reached maturity
- To ensure planting within public areas is maintained below a maximum height of 1m to meet the guidance set within Secure by Design with the exception of wall mounted climbers.



1.2 SOFTWORKS | TREE WORK

MAINTENANCE OPERATION

- **Identification:** Before starting work agree which trees are to be removed or pruned
- **Protection:** Avoid damage to neighbouring trees, plants and buildings
- **Standards:** To BS 3998 and Health & Safety Executive (HSE) 'Forestry and arboriculture safety leaflets'
- **Removing branches:** Cut as shown in Arboricultural Association Leaflet No 8 'Mature tree maintenance'. Cut vertical branches similarly, with no more slope on the cut surface than is necessary to shed rainwater
- **Appearance:** Leave trees with a well balanced natural appearance
- **Chain saw work:** Operatives must hold a Certificate of Competence
- **Tree work:** To be carried out by an approved member of the Arboricultural Association

ADDITIONAL WORK

- Defective, diseased, unsafe or weak parts of trees additional to those scheduled for attention: Give notice if detected.

PREVENTION OF WOUND BLEEDING

- **Standard:** To BS 3998, clause 8.

PREVENTION OF DISEASE TRANSMISSION

- **Standard:** To BS 3998, clause 9 and Appendix B.

WATER RESTRICTIONS

- **General:** If water supply is, or is likely to be, restricted by emergency legislation, submit proposals for an alternative suitable source of water. Obtain instructions before proceeding.

Maintenance Operation Number	Prescription	Year (s)	Season	Frequency (per year)
	TREE PLANTING			
	Maintenance during defects liability period of 5 years after planting whichever is the greater	1 – 5	As required	2 March - September
	To establish new planting, maintain a 1m diameter weed free area around all trees within grass. Trees within self bound gravel should be maintained totally free of weeds.	1 – 5	Spring - Autumn	1
	UNDERGROUND TREE GUY WIRES			
	Inspection / maintenance times: Quarterly and after strong winds	1 – 5	Throughout year	2
	Operations: Replace or re-secure loose or missing guy wires			
	Adjust to suit stem growth and to provide correct and uniform tension			
	Apply granular fertiliser according to manufacturer's recommendations	1 – 5	Spring - Autumn	Bi-annual
	Ensure trees remain firmly bedded after disturbance and re-firm as necessary	1 – 5	As required	1
	Control all pests and diseases as necessary	1 – 5	As required	To be determined
	Prune in accordance with good horticultural practice, thin, trim and shape as appropriate. Eg. Removing branches: Do not damage or tear the stem. Wounds: Keep as small as possible and cut cleanly back to sound wood. Cutting: Make cuts above and sloping away from an outward facing healthy, angled so that water will not collect on cut area. Larger branches: Prune neither flush nor leaving a stub, but using the branch bark ridge or branch collar as a pruning guide. Tools: Use clean sharp secateurs, handsaws or other approved tools. Disease of infection: Give notice if detected. Growth retardants, fungicide or pruning sealant: Do not use unless instructed			
	Prune all trees annually as needed to maintain a minimum 2.2m clear stem and desired form.	1 – 5	Autumn - early Winter	1 As required
	Watering – Regular checks using a moisture probe testing during the first two years after planting on a monthly cycle during the summer months of May-September	1 – 2	Monthly	24
	Water as necessary to ensure healthy growth	3	As required	As required
	Replace dead or damaged trees to original specification. Remove within 1 month or as soon as possible and replace within the next available planting season	1 - 5	Autumn	1
	Top up mulching to original specification annually	1 - 5	Spring	1
	Autumn LEAF REMOVAL			
	Collect accumulations of drifted leaves from the vicinity and from paved lawn area	1 - 5	Autumn/Winter	As required
	Arisings: Remove			

1.3 SOFTWORKS | HERBACEOUS PLANTING

MAINTENANCE OPERATION

- **Duration:** Defects Liability Period or 5 years, whichever is the greater.
- **Weed control:** Keep planting beds clear of weeds by applying herbicide.
- **Watering:** As necessary to ensure establishment of planting
- **Soil condition:** Fork over beds to keep soil loose, with gentle cambers and no hollows. Do not reduce depth or effect of mulch.

Maintenance Operation Number	Prescription	Year (s)	Season	Frequency (per year)
	HERBACEOUS PLANTING			
	Maintenance during defects liability period or 5 years after planting whichever is the greater			
	• Maintain weed free area to the surface of all planting areas	1 – 5	March / October	9
	• Application of granular fertilizer (15:15:15)	1 – 5	Spring	1
	• Ensure plants remain firmly bedded after disturbance and re-firm as necessary	1 – 5	As required	Each maintenance visit
	• Re-firm plant supports and replace as needed	1 – 5	As required	Each maintenance visit
	• Prune as necessary to encourage healthy growth as illustrated on the drawings: Prune herbaceous perennials as required to maintain form and supply supports as needed during the growing season.	1 – 5	Spring/Summer	1
	• Prune hardy herbaceous perennials in autumn retaining feature flower heads or seed heads to provide interest through the winter months	1 – 5	Autumn	1
	• Prune tender perennials and borderline hardy perennials in spring once the risk of frost has passed (April / May). This is to protect the growing crown during winter.	1 – 5	April/May	1
	• Cut back early flowering perennials near to ground level after flowering to encourage fresh foliage and later summer flowering. Cut back again in spring.	1 – 5	Summer & spring	2
	• Control all pests and diseases as necessary	1 – 5	As required	As required
	• Replace any dead/ under performing plants. Where planting continually fails to establish, undertake investigations to ascertain any underlying cause.	1 – 5	March/October	As required
	• Watering – Regular checks using a moisture probe testing during the first year after planting on a monthly cycle during the summer months of May-September.	1	May/September	5
	• Water as necessary to ensure healthy growth. Water as necessary to ensure healthy growth. If water supply is, or is likely to be, restricted by emergency legislation, submit proposals for an alternative suitable source of water. Obtain instructions before proceeding.	1 – 5	As required	As required
	• Top up mulch planting to original specification at the start of each year after the cutting back of tender perennials.	1 – 5	Spring	1
	• Divide large groups of perennials every 3 years:	3	Spring/Autumn	1
	• Divide summer flowering plants in spring or autumn providing that the ground is dry enough to work.	3	Summer	1
	• Divide spring flowering plants in summer after flowering.			

2.0 HARDWORKS | MAINTENANCE OPERATIONS

MAINTENANCE OPERATIONS – HARDWORKS

Surfaces need to be maintained such that they provide a safe passage for all pedestrians and highway users. It is also essential that areas, which have been subject to major investment, are protected and sustained through an effective maintenance regime. The success of any streetscape project will greatly depend on the attention given to maintenance.

It is important that paved surfaces are regularly inspected so that defects can be identified and rectified. Typically, early life maintenance or aftercare of new works will be the responsibility of the Main Contractor that delivered the works. The maintenance and defects liability period will generally be 12 months. The Main Contractor should visit the site at regular intervals during the maintenance period, to inspect all paved areas, and to undertake any remedial works. At the end of the maintenance period the contractor will be required to undertake remedial works to the satisfaction of the Client.

PAVING DEFECTS - RIGID

Common defects - Paved roads deteriorate in a variety of ways, depending upon the type of construction and cause of distress. When deterioration presents a safety hazard then maintenance becomes essential. Timely maintenance, in some instances can prevent deterioration progressing to a state where reconstruction is required. The majority of failures tend to be confined to the surface layers of paved roads, i.e. they concern the bedding and jointing that surrounds stone elements.

Descriptions and illustrations of common defects are given below:

Punching - Vertical downward movement occurs in and around wheelpaths. Punching shear is resisted by both the joints and bedding. The lower of the two capacities, joint shear or bed bearing will control the elements resistance to punching. The defect occurs in flexible and rigid surfacing. Localised or isolated areas of punching are likely to be due to poor workmanship. More widespread punching is more likely to be due to under design.

Progressive cracking - Debonding of the jointing material from stone elements commonly leads to progressive cracking. The continuous action of heavy vehicle tyres on the elements dislodges and pulverises sufficient quantities of the jointing material to cause a breakdown of the joint matrix. Inappropriate design and poor workmanship are likely causes. Factors likely to have contributed to this type of failure are:

- poor compaction of the bedding
- inadequate moisture content in stabilized bedding
- depth of elements
- low jointing strength
- early pavement trafficking
- inappropriate laying pattern

Movement - If the homogeneity of the upper layer is broken, it is impossible to control lateral movement with joint widths $\geq 10\text{mm}$. Once the surface matrix is broken, it allows the tyre interaction of the traffic to move the setts in angular directions, thus perpetuating the breakdown of the rigid surface. Ingress of water then adds to the problems. Rutting is common and depending on the construction of the pavement the underlying layers of the structure will gradually deteriorate.

Broken or damaged elements - Apart from being unsightly, cracking and spalling can become a hazard if it creates a trip. Spalling occurs during transport and laying, but can less commonly be a fault in the material. It can result during manufacture, impact loading, abrasion and weathering. Inappropriate size or depth of element results in fracture under loading.

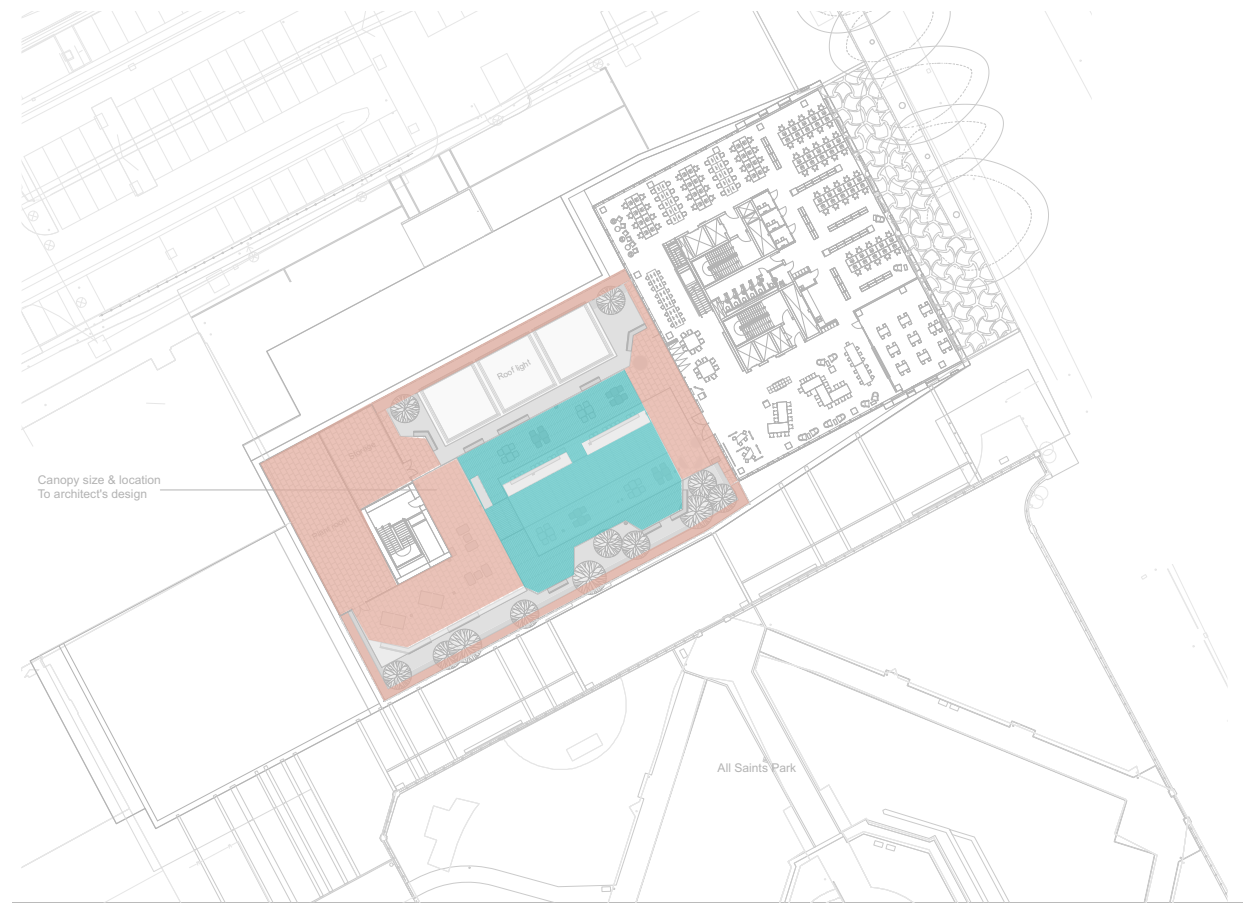
TREATMENT OPTIONS

Maintenance treatment will depend on the type of defect and what has caused the deterioration. For some surfacings, topping up of jointing may be all that is required, but poor surface profile may require a site investigation to provide information on the condition of the pavement at depth. Suitable strategies can then be formulated based upon informed engineering judgment.

The table on the next page summarises some common defects, resulting problems and treatments.

2.2 HARDWORKS | MAINTENANCE

-  Concrete Paving Flag
-  Concrete Plank Paving



2.3 HARDWORKS | TREATMENTS

Defect	Problem	Treatments	
		Temporary	Long-term
Expansion and contraction joint cracks	Cracking	Monitor/method statements from bedding and jointing material supplier required	Deep water ingress can lead to structural faults.
Debonding of jointing material	Initiation of failure mechanism	Monitor / investigate	Replace jointing or reconstruct if poor design
Broken or damaged elements	-	-	Replace or reconstruct
Missing elements	Trip, water ingress	Fill holes	Replace element
Rocking elements	Hazard to users	Relay	-
Spalling of arises or surfaces	Unightly trips	-	Replace
-	Loss of stability, water ingress	Fill wide gaps if hazard	Relay elements and strengthen edge restraint if necessary
Depressions and bumps (macadam)	Hazard for users	Fill or ramp. Contact undertaker if cause is failed reinstatement	Relay
Rutting (meacadam)	Hazard for users	Monitor, warn users	Relay
Slippery surface	Hazard for users	Warn users or restore texture	Clean, restore texture or renew surfacing
Surface contamination	Hazard for users and unsightly	Clean or neutralize	Replace surfacing if necessary
Vegetation	Surface slippery	Warn users, clean	Consider increasing frequency of maintenance
Water	Surface water	Salt if freezing	Relay surfacing to correct gradients and crossfall
-	Blocked drain	Clear blockage	-

Guidance: To ensure the chosen treatment is cost effective, consideration should be given to the maintenance history of the paved surfacing, its future use and the likely failure mechanism.

2.3 HARDWORKS | MAINTENANCE

LIFTING, REPAIR AND RELAYING

Relaying elements of flexible construction should be carried out in the same way as new construction (Refer to NBS specification). Additional guidance for flags is given in BS 7533-7:2010. Removing a damaged single element prior to relaying can be difficult, particularly if it is small element, as breaking it out may disturb adjacent modules. It may be necessary to consider relaying all elements, which about the damaged area, or to relay a full line of elements back to an edge restraint. If the surface has poor profile, elements will need to be lifted over the whole of the affected area. In all cases a complete renewal of the bedding material should always take place. An experienced paver is required to execute a good reinstatement.

Joint repairs

Where elements are part of a rigid construction and degradation of the cement mortar joint has occurred, it will be necessary to refill the joint. If necessary the joint should be raked out, which is time-consuming and costly. It may be more appropriate to use a small hand-held grinder with an attachment to remove the dust and debris, in a controlled manner, into some form of hopper. Once the joints have been cleaned out they can be refilled with a mortar appropriate to the trafficking category. Care is required to confine the mixture to the joint and prevent staining of the surface. Trafficking should only be allowed once the mortar has gained the appropriate strength.

Sealing

Proprietary sealing agents are commonly used on paved surfaces, to reduce moisture penetration of the laying course material, and minimise staining from spillages. The paving surface must be completely dry and clean before any sealer is applied with the manufacturer instructions adhered to at all times. Whilst such products may offer certain advantages, careful consideration must be given to the suitability of the sealant and any subsequent effect on the colour appearance and slip/skid resistance of the paving.

CLEANING

Generally

The following recommendations deal with vehicles and associated equipment for use on paved footways/footpaths/pedestrian areas and roads:

- The equipment should be purpose designed to sweep the particular area and surfacing product. If there is any doubt, the vehicle manufacturer should be consulted.
- Where possible, low ground pressure tyres should be fitted to reduce the risk of breaking or cracking of flags.

- Tyres should be inflated according to the manufacturer's recommendations, again to ensure minimum weight distribution per square mm.
- Polypropylene, not wire, brushes should be used.
- Sweeping brush pressures should be set to the minimum required to suit the particular task, i.e. surfaces swept regularly will require a lower setting than those swept infrequently or those covered with heavy deposits.
- When sweeping, engine revolutions should be set at the minimum required to maintain vacuum (suction) pressure.
- Operators, including reliefs, should be trained to manufacturers' recommendations and tyre and brush pressures should be regularly checked.
- Advice should be given to operators that, when equipment is stationary or left unattended, suction, brush rotation and water jetting equipment should be switched off to avoid the risk of damage to the area below the stationary equipment.
- In new or re-laid areas, agreement should be reached on a period of manual cleaning (at least four weeks) to allow the paving to settle and the joints to seal. This period may be reduced by using either a water-based bonding agent or elastomeric prepolymer sealant and by agreement with the cleansing authority on an appropriate sweeping regime.
- Following the use of mechanical cleaning operations, re-sanding of the joints in flexibly laid areas may be necessary.

The Use of Power Washing Equipment on Paved Areas

To aid in the removal of surface staining power washing equipment is often considered. Whilst such techniques offer certain benefits, particularly for larger areas, it is important that care is taken in their use to avoid damage to the structural integrity of the paving. When using any form of Power Washer the following guidelines should be strictly adhered to:

- The power washer should be used on a setting, which is sufficient to remove the dirt without causing any further distress. A low-pressure setting is recommended.
- Do not direct the power lance directly down on to the paving, as this can result in loss of jointing material.
- Ideally a spraying movement should be adopted holding the power lance at a shallow angle, not greater than 30° across the diagonal (i.e. not parallel to joints).
- Certain high-pressure jetting machines have been known to mark / damage the surface of certain types of paving material. It is therefore prudent to carry out a small test area before commencing on a larger area.
- The area should be inspected after cleaning to ensure that joints are full.

General Dirt and Detritus

To remove general dirt and detritus, regular brushing is recommended. If detritus reduces the intensity of the colour of the material then this can be reestablished by scrubbing with a mild detergent e.g. washing up liquid, and hot water.

Ensure all the detergent has been thoroughly washed from the surface on completion of the cleaning and the resulting run-off is carefully channelled to either drainage points or containers where it can be safely disposed of.

Moss, lichens and algae

Moss, lichen and algae can be prevalent on hard surfacing where the area is heavily shaded, is under trees or is not laid to an adequate fall. If such growths do occur and are considered undesirable then the area should be treated with a proprietary weed or moss killer used in accordance with the manufacturers' instructions. Such products take some days to be effective and are most effective when applied during a spell of dry weather. The washes work best if any thick growths are scraped off first and the wash is well brushed in. Some treatments leave a residue to discourage the re-growth of the moss and algae but this will only be of limited value if the surrounding conditions leave the paving damp and in shade.

Rust Stains

Initially action must be taken to eliminate the sources of staining. To remove the rust stain, the surface should first be wetted with clean water and then the affected area treated with a 7 to 10% dilution of Hydrochloric acid solution.

Guidance on the safe use of chemical treatments (Acid Washing) is given later in this document.

2.3 HARDWORKS | MAINTENANCE

Oil Stains

Oil can penetrate readily into hard surfacing materials, but it should not stain if any spillages are removed promptly with an absorbent material e.g. paper towels, cloth or absorbing granules. Do not attempt to wipe the stain as this will drive the oil into the surface of the units and spread it over a wider area.

If the stain persists then an emulsifying degreaser should be employed. Brush the cleaner onto the affected area, leave for a period of time according to the manufacturers instructions and then wash the emulsified oil away with plenty of clean water.

Alternatively the surface can be scrubbed with a detergent and hot water taking care to ensure that the strength of the detergent is not detrimental to the appearance of the paving. However, for persistent oil staining, steam cleaning may have to be considered.

Bitumen Stains

Fresh bitumen should be allowed to cool down before removing it with a paint scraper or similar. If it is particularly resistant, the use of ice to make the bitumen brittle may be required prior to scraping it from the paving. Any residue should be removed with an abrasive powder and finally the whole area rinsed with clean water. Certain proprietary cleaning agents are available to remove bitumen but these should be tested on an inconspicuous area of paving first.

Graffiti and Paint Stains

Both paint and graffiti are difficult to remove from most hard surfacing materials. Fresh wet paint should be soaked up with an absorbent material without wiping the paint, as this will spread the stain. It should then be treated with a suitable solvent such as white spirit and then the area washed with a de-greasing agent taking care in the disposal of the run-off material.

Dried paint should be scraped off as far as possible and then an appropriate paint remover applied.

Paint manufacturers may often be able to give more detailed advice on the removal of paint and graffiti. Therefore they should be consulted directly for specific recommendations.

Epoxy and Polyester Stains

Areas of solidified epoxy or polyester resin can be removed by carefully burning off the area with a blowtorch. Care must be taken not to inhale any fumes given off.

If, after burning, a black stain remains, this can be removed by scrubbing with detergent and hot water. For larger areas grit blasting may have to be considered, however the effect of such treatment on the micro texture of the surface should be carefully considered. Again it is advised that a small area be tested before any large-scale operations are undertaken.

Smoke, Fire and Tobacco Stains

Normally such stains can be removed by scrubbing with detergent and hot water. Where the stains persist, a mixture of scouring powder and household bleach can be used. It is important the bleach is washed from the area with clean water once cleaning is completed and the run-off carefully disposed of.

Beverage Stains

These can normally be removed by scrubbing the stain with detergent and hot water. If the stain is persistent, apply a household bleach solution and then rinse the area with clean water taking care to dispose of the run-off safely.

Chewing Gum

Chewing gum is a particularly difficult substance to remove from hard surfaces.

Newly discarded gum can be scraped off by using a mechanical scraper but hardened gum can only be removed by both freezing the gum and chiseling it from the surface of the paving or utilising a hot water/steam cleaner.

For specific advice on chewing gum removal it is recommended that specialist contract cleaning companies be contacted directly for further details.

Scuff Marks from Vehicle Tyres

These can normally be removed by steam cleaning, or by scrubbing the area with detergent and hot water.

It is important that prior to any acid cleaning being undertaken, the paving is checked to ensure that any signs of vanadium staining have thoroughly weathered away before acid cleaners are applied.

If some form of chemical treatment is required to remove more stubborn vanadium staining, then this should be undertaken using an organic acid that will not have the aforementioned effect of "fixing" the stain to the paving.

Acid Washing

Stubborn and persistent stains that will not generally weather away **naturally will require the application of a specific acid cleaning treatment to remove them.**

Prior to any acid cleaner being applied, the surface must be thoroughly wetted with clean water to prevent the acid being absorbed directly into the paving. A dilution of 7 to 10% of hydrochloric acid should then be prepared and applied to the affected area.

As the staining begins to dissolve, some frothing may be apparent, which should be followed by agitation of the surface using a stiff bristle brush to completely remove all trace of the stain.

Once this process is complete the whole surface should be rinsed thoroughly with clean water, taking care to dispose of the run off safely. In the vast majority of cases, one

treatment will be sufficient; however, in some cases re-treatment may be required.

When using any form of chemical treatment the following guidelines should be strictly adhered to:

- With deeper stains, the degree of acid treatment may result in an acid etched appearance.
- Protective clothing (gloves, boots, goggles etc.) should be worn at all times when using chemicals and the appropriate first aid measures must be available on-site.
- Take care to ensure that surrounding materials and landscaping are protected. Soft landscaping and exposed metals can be severely affected by chemical treatments.
- It is better to treat several times with the correct dilution than to use concentrated acid, which may damage the surface of the unit.
- When diluting acids, always add acid to water and not water to acid.

General Cleaning

An annual detergent wash is also recommended.

Drainage Channel

An annual detergent wash is also recommended.

3.0 STREET FURNITURE | MAINTENANCE

MAINTENANCE OPERATIONS – STREET FURNITURE

In addition to the recommendations below, also refer to the maintenance and operational instructions from the individual street furniture suppliers. Advice from the suppliers can also be sought regarding the maintenance of their products using the contact details supplied.

TIMBER TO BENCHES and Tables

The timber should be treated with Osmo or Owatrol Rubbing Oil. Every 2 years the wood should be cleaned down using the a pre treatment solution which de-oxidises the wood before re-coating with the Oil. As long as this is done, the wood will keep its colour and will have a much greater lifespan than if left untreated. Osmo/Owatrol Oil are commercially available products and will be available through any good wholesaler or exterior furniture supplier.

Steel and Hardwood Movable Circular Bench

Steel Movable Furniture

Steel Table Tennis Table



3.1 STREET FURNITURE | MAINTENANCE

Bespoke timber benches

A maintenance routine is not required but some inspection and maintenance may prolong the life of the benches.

Timber components should be inspected every 6 months, more in exposed locations, Regular cleaning can also prevent dirt and moss build up.

Hardwood

Hardwood can be cleaned with a Molecular Nano (MN) cleaning product and treated with an MN sealant (a non-film forming hardwood treatment that slows down greying, and protects against dirt and other factors that impact the quality of the wood).

While cleaning, it would be great to also check for any damages or splintering that may require repair.

Splinters, sharp edges or graffiti can be removed through light sanding.

Resin or gum exudation may occasionally occur on the finished surface of timber, especially during periods of warm weather. The condition generally will diminish with the passage of time. Excesses of resin remaining on the surface can be removed with a sharp blade. Care should be taken to work with the grain and to avoid marking the surface.

If you wish to maintain surface colouring, Sadolin Industrial Mais is a suitable base coat for any further staining or specialist treatments you wish to apply on site.

The long life expectancy of Naturally Very Durable Hardwood will not be significantly impaired if left in the natural state.

Stainless Steel

Polished Stainless Steel components should be cleaned using stainless steel polish and a lint free cloth. Light damage (surface scratches etc.) can be removed using an emery pad (240 grit) and freeing oil such as 'WD40'. Care should be taken to follow the direction of the brushing grain. It is recommended that a trial repair be carried out on an unimportant surface first. No corrosive cleaners or other

abrasives should be used. Any contamination, especially carbon steel scuffs from vehicles, should be instantly removed in order to avoid corrosion.

Powder-coated steel

Powder-coated steel should be cleaned annually with water

and possibly a mild detergent. Care should be taken to avoid scratching as it may limit the lifespan of the materials. Any deep scratches found should be repaired immediately.

Galvanised steel

Galvanised steel may have a shiny surface initially, but this

will quickly dull off to an expected matt grey finish. Little regular cleaning will be required if the components are exposed to rain (or cleaning with a low pressure hose), and offers high levels of protection against scratching. Water or a mild detergent can be used for cleaning annually. Be aware that cleaning with stronger substances for graffiti

removal will effect the lifespan of the steel.

Heavy damage to any product should be reported to Woodscape for specific advice on possible repairs.

ALL Maintenance, Repair & Cleaning procedures should be

documented, as this information may be requested should you ask Woodscape to inspect or repair an installed product.

4.0 STREET FURNITURE | LIGHTING

MAINTENANCE OPERATIONS – LIGHTING

In addition to the recommendations below, also refer to the maintenance and operational instructions from the individual lighting suppliers. Advice from the suppliers can also be sought regarding the maintenance of their products using the contact details supplied.

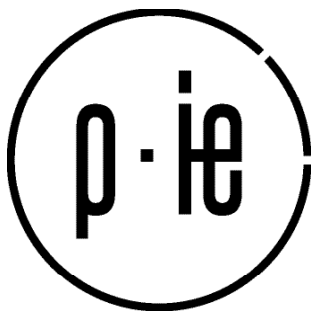
LINEAR LIGHTING

Street lighting should be maintained as per the manufactures' guidelines and in line with the Overseeing Organisation's maintenance regime.

TREE UPLIGHTER

RECESSED LOW LEVEL LIGHTING





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