




BUCKINGHAM PALACE RESERVICING PROGRAMME SUMMARY REPORT



A Palace fit for purpose for the next 50 years

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1 INTRODUCTION

Buckingham Palace is one of the United Kingdom's most prestigious buildings. It is instantly recognisable across the world as the home of The Queen and the British Royal Family and one of the most iconic working Palaces in history.

However, as the Palace's electrical cabling, plumbing and heating have not been updated since the 1950s, in the aftermath of the Second World War, the building's infrastructure is now in urgent need of an overhaul to avoid the very real danger of catastrophic failure leading to fire or flood, and incalculable damage to the building and priceless works of art in the Royal Collection.

The Royal Household is required *'to maintain the Occupied Royal Palaces in the United Kingdom as buildings of State, to a standard consistent with the Royal Household's operational requirements, as well as the Royal, architectural and historic status of the buildings in a manner which ensures value for money.'*¹

A series of detailed technical assessments have examined the material state of the Palace, including the electrical cabling, power generation, hot and cold water pipework and data systems (fire alarms, telephones and IT). These established that elements of the Palace's essential services are significantly beyond their maximum useful life and require urgent replacement to avoid the risk of devastating failure.

In order to address this urgent need, a number of options to replace the services throughout the Palace were considered by the Royal Household, in conjunction with HM Treasury. It was concluded that the most cost-effective way to replace the services, and ensure that the Palace is fit for purpose for the next 50 years, would be to undertake a phased programme of works over ten years, starting without delay in 2017 and finishing in 2027.

The phased reservicing programme should be sequenced wing-by-wing so as to enable the Palace to remain occupied and fully operational, and The Queen's Programme to continue to be delivered without interruption. Significant National events, such as the Changing of the Guard, the Trooping of the Colour, Investitures, Garden Parties and the opening of the Palace to visitors from all over the world during the summer months will also continue throughout the reservicing period.

In addition to replacing the essential services, the reservicing programme includes a plan to deliver tangible benefits and efficiencies. The operational effectiveness of the Palace will be increased by making the building more energy efficient and cost-effective. There will be a significant increase in the numbers of people visiting the Palace, with a renewed focus on education, the history of the Monarchy and British citizenship. It will also offer an opportunity for a new generation of construction professionals to work on a historic building through apprenticeships and graduate programmes.

All told, the reservicing programme presents a unique opportunity for innovation and investment in one of the world's most prestigious and iconic historic buildings, preserving it for future generations.

The objectives of the Programme are to:

- Replace the ageing core services of the Palace to eliminate the very real risk of fire or flood.
- Preserve the iconic Palace for future generations.
- Ensure Buckingham Palace remains fit for purpose as the principal residence of The Sovereign.
- Increase public access to the Palace.
- Improve the energy efficiency of the Palace.
- Ensure the Programme offers value-for-money.

¹ "The Framework Agreement relating to the Sovereign Grant" 22 June 2012, https://www.royal.uk/sites/default/files/media/sovereign_grant_framework_agreement_-_final_for_website.pdf, (accessed 14 November 2016).

2 EXECUTIVE SUMMARY

Buckingham Palace is one of the United Kingdom's most prestigious buildings. It is instantly recognisable across the world as one of the most iconic working palaces and as the home of The Queen.

It is a working building, where the Sovereign carries out Her official, ceremonial, diplomatic and representational duties as Head of State and Head of the Commonwealth. It employs over 300 staff in office accommodation and hosts over 90,000 people each year, who attend a range of events and functions from small lunches to large Receptions. This includes six Garden Parties which are held each summer at the Palace and are attended by approximately 40,000 members of the public. Over 30 investitures are also held each year at the Palace, with each one being attended by approximately 300 people including those receiving honours and their families.

The Queen grants an audience to the Prime Minister each week when both are in London, and to the Chancellor of the Exchequer before the presentation of the Budget. Members of the Privy Council, Foreign and British Ambassadors, High Commissioners, Bishops, senior officers of the Armed Forces and senior civil servants are also regularly received by The Queen at the Palace.

In addition, over 500,000 people visit the Palace during its summer opening, and millions of UK and overseas tourists visit the gates of Buckingham Palace to witness the Changing of the Guard throughout the year.

However, as elements of the Palace's plumbing, electrical cabling and heating have not been updated since shortly after the Second World War, the building's infrastructure is now in urgent need of a major overhaul to avoid the very real danger of catastrophic failure leading to fire or flood. This would result in incalculable damage to the building and/or priceless works of art in the Royal Collection.

Through the Sovereign Grant, the Royal Household is required *'to maintain the Occupied Royal Palaces as buildings of State, to a standard consistent with the Royal Household's operational requirements, and with the royal, architectural and historic status of the buildings in a manner which ensures value for money.'*

A series of detailed technical assessments have been undertaken to examine the material state of Buckingham Palace, including the electrical cabling, power generation, heating systems and pipework, hot and cold water pipework and data systems (fire alarms, telephones and IT). These assessments established that elements of the Palace's essential services are significantly beyond their maximum useful life and require urgent replacement.

In order to address this urgent need, a number of options to replace the services throughout the Palace have been considered by the Programme Board (The Board). The Board has recommended to the Lord Chamberlain's Committee (LCC) that the most cost-effective way to replace the services, and ensure that the Palace is fit for purpose for the next 50 years and the next three generations of the Monarchy, would be to undertake a phased programme of works, over ten years starting in April 2017.

The phased reservicing programme should be sequenced wing-by-wing so as to enable the Palace to remain occupied and fully operational, and allow The Queen's Programme to continue to be delivered without interruption. Significant National events, such as the Changing of the Guard, the State Opening of Parliament, the Trooping of the Colour, Investitures, Garden Parties and the opening of the Palace to visitors from all over the world during the summer months will also continue throughout the reservicing period.

In addition to replacing the essential services, the reservicing programme includes a plan to deliver tangible benefits and efficiencies. The operational effectiveness of the Palace will be increased by making the building more energy efficient and cost-effective. There will be a significant increase in the number of people visiting the Palace, with increased access for schools and the opportunity to focus on the history of the Monarchy and British citizenship. It will also offer an opportunity for a new generation of construction professionals to work on a historic building through apprenticeships and graduate programmes.

2.1 THE CONDITION OF THE PALACE AND RESERVICING REQUIREMENT.

The technical assessments established that there are a series of very old (over 60 years), fragile systems with a high risk of failure which need to be replaced as a matter of urgency over the next two years (2017-19). These include Vulcanised India Rubber electrical cabling, electrical panels, distribution boards, generators, boilers, drainage pipework and data systems.

Not carrying out these works would come with significant risks, including:

- **Fire.** A significant proportion of the wiring within the Palace is in a high risk category and needs immediate attention to reduce the very real risk of fire and failure. Some of the electrical (wired) systems are over 60 years old.
- **Declining resilience and operational failure.** The majority of the Mechanical & Electrical (M&E) services and systems are over 40 years old (some are over 60 years old) and are degrading, thereby creating a number of significant risks for the Palace. Total failure is an ever-increasing risk.
- **Degrading occupational environment.** The Palace's boilers are over 33 years old, and spare parts for them are difficult to source. This will continue to compromise the ability to provide acceptable living conditions, maintain the desired temperatures to preserve the works of art in the Royal Collection which are on display within the Palace, to provide compliant office working conditions for Royal Household employees and achieve energy efficiency.
- **Damage to building fabric.** The Palace's above ground drainage system consists of a mixture of lead and cast iron pipework. Failures due to sagging have been identified in the lead drainage pipework and joints. The potential for damage to the building fabric is high, particularly in areas where the lead pipework is buried in walls and floors.

The technical assessments noted that, whilst some systems require high priority immediate repair, others need wholesale replacement within the next 10 to 15 years in order to avoid the real risk of significant service failure, fire, flood, health and safety incidents, damage to the fabric of the Palace and/or the potential loss or damage to the works of art in the Royal Collection. The Palace's occupation by The Queen, the Members of the Royal Family, and Household employees could be significantly disrupted, as could The Queen's Programme. In addition, there could be substantial financial loss in terms of building damage (estimated at £250 million for a single wing). Catastrophic impacts have been experienced in the past following fires at other heritage buildings, including Uppark in West Sussex, Clandon Park near Guildford, Windsor Castle and Hampton Court Palace.

2.2 PROPOSED OPTIONS FOR RESERVICING.

A wide range of options were examined in developing the Strategic Outline Business Case (SOC) for HM Treasury with the estimated capital costs ranging from £313 million to £390 million.

Two options that were considered but rejected included the Full Decant option and the Full Occupation option.

The Full Decant option would involve completing the works over six and a half years and having to relocate, store and safeguard the extensive collection of works of art in the Royal Collection, as well as relocating The Queen, The Duke of Edinburgh and the other Members of the Royal Family, and all the Royal Household employees. It would be the most disruptive option with the greatest negative impact on delivering The Queen's Programme, and result in a significant loss of income during the programme.

The Full Occupation option would involve completing the works over twenty-one years, whilst the Palace remained fully occupied and the works were conducted in a piecemeal fashion. It would involve significant risk of material and systems failure and fire due to the length of the programme, and the increased complexity of adding new systems to an old infrastructure.

The two options which were selected for further consideration at the Outline Business Case (OBC) stage were:

- **Partial Occupation with Operational Refit.** This included a phased but continuous programme over eight years involving the relocation of 150 Royal Household staff into temporary accommodation. The

Operational Refit element included a package of improvements and repairs that provide significant qualitative and financial benefits after the completion of the works.

- Significant Occupation with Operational Refit. This included a phased programme of works over thirteen years which required fewer staff to be relocated to temporary accommodation (100), but with an increased risk of failure as a consequence of the longer programme.

In developing the OBC, the Royal Household examined the preferred options above in terms of timelines, procurement approach, operational impact and the timing of when benefits will be released. The result of this analysis has been the development of a hybrid “Ten-Year Phased Refit option”.

The ten-year phased refit option has an estimated capital cost £369 million (£222 million Net Present Cost after benefits over 50 years). The costs are spread over ten years and the programme allows the reservicing to take place whilst the Palace remains fully operational, occupied by The Queen, Members of the Royal Family and the majority of the Royal Household employees. The Queen's Programme can also continue without interruption, and there is the flexibility to react to any significant unplanned circumstances. This option:

- Allows for significantly lower risks of operational failure by allowing for works to be completed in advance of critical end of life forecasts (10-15 years) thereby reducing the risk of potentially ‘catastrophic end of life failure’.
- Provides value-for-money generated through the delivery and release of benefits. These include significant financial and operational benefits, which will enable:
 - More efficient operations.
 - Enhanced public access, and improved condition of the Palace.
 - Financial savings.
- Minimises the impact on day-to-day operations of the Palace, thereby enabling The Queen to remain in residence throughout the works and allowing normal public access, including the Buckingham Palace Summer Opening.
- Significantly enhances public access to Buckingham Palace with an increase in paying visitors of 22%, whilst also delivering up to 110 additional events per year.
- Achieves the sustainability objectives of the programme including an estimated 30% CO2 efficiency saving from the High Priority works (a saving of 410 carbon tons) with the reservicing works likely to release a further 10% saving (totalling 554 carbon tons overall).

2.3 THE PLAN - A TEN-YEAR PHASED REFIT PROGRAMME.

The ten year phased refit programme will take an incremental approach in the replacement of services, completing one wing at a time, awarding contracts separately for each phase, and minimising the financial and practical risks. It will also offer significant opportunities to capitalise on income generation, benefits and efficiencies to offset the capital costs, and increase public access.

The programme will start formally in April 2017, subject to the approval of funding, and continue for ten years completing in 2027. The High Priority works will take two years, from April 2017 to April 2019. These works will focus on replacing key services in the basement (electrical and heating generation and distribution). The detailed design work for the whole programme will run in parallel with the High Priority works over the next two years.

Following the design work, the programme will start in earnest in April 2019 and commence with the East Wing, rotating clockwise around the Palace to the South, South West and North Wings. The West Wing and State Apartments will be progressed incrementally throughout the ten years of the programme (two to three State Rooms at a time), so as to enable the Palace to open to over 500,000 visitors over the summer months as usual.

The programme includes a series of financial, material, commercial and public access benefits. The principal financial benefits are delivered through savings on utilities, commercial rent from office

accommodation at St. James's Palace, delivering more chargeable events at Buckingham Palace and enhanced Facilities Management Charges from a longer summer opening and additional private tours. The cumulative total of financial benefits each year on completion of the programme is estimated at £3.4 million.

In addition, the reservicing works are essential in maintaining the effective operation of the Palace, and would have significant direct and indirect social and economic benefits to the nation, including the following:

- Reducing the very real risk of significant operational failure in the short term, and the potential risk of catastrophic fire or flood damaging the Palace, stopping the Royal Household's operations and damaging the Royal Collection.
- Protecting and preserving one of the most iconic heritage buildings in the world for future generations, as well as enhancing and increasing public access to the Palace.
- Continuing to provide an appropriate venue for hosting visiting Heads of State and upholding the United Kingdom's status in the world.
- Substantially improving the operational efficiency of the Palace, thereby enabling better use of the Palace and delivering in almost 9% efficiencies, in terms of cost savings and income generation, on the 2016-17 operating budget (excluding property maintenance spend).
- Significantly improving the energy efficiency of the Palace by over 40% thereby saving 554 tons of carbon per annum.
- Maintaining the positive impact of tourism in London through the Palace remaining as the occupied residence of The Queen throughout the period of the programme.

The preferred option also maximises the benefits of improving the operational performance of the Palace through undertaking works which include:

- Enhancing space utilisation by reconfiguring areas in Buckingham Palace to provide additional office accommodation and improved meeting facilities.
- Additional public access and events by creating a dedicated visitor admissions and learning facility to extend opening periods, modifying the service lifts to improve access for events, and greatly improving access and facilities for disabled visitors.
- Improving the working environment for staff by relocating offices to rooms with natural daylight.

On completion of the Phased Refit, the Palace will be able to accommodate an additional 115,000 (22% increase) paying visitors and an additional 30,000 school children / students (an increase from the current 1,500) through a new visitor admissions and learning facility.

2.4 FUNDING AND RISK.

The capital requirement for the programme in the 10 years to 2026-27 is £369 million including VAT.

The Royal Household has considered its ability to fund this programme through the existing Grant at the current 15% of Crown Estate revenues from two years previously. However, the operational budget to support The Queen's Programme and the commitments on the property maintenance budget during the period 2016-21 indicate that additional funding of £369 million over ten years will be required to fund the programme from April 2017.

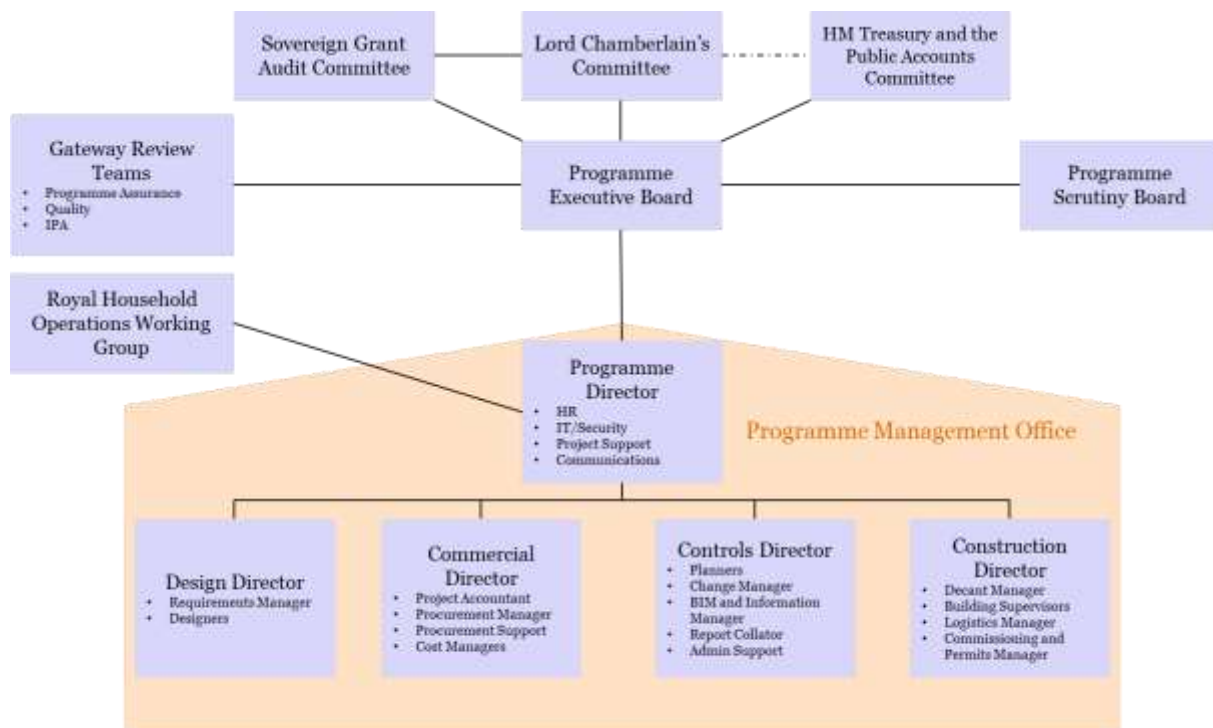
Risks to the programme will be managed and minimised. The Palace will be occupied throughout the programme, and the Royal Household's operations will continue with as little disruption as possible. The programme will be delivered by the Royal Household through a dedicated Project Management Office (PMO). Management of the risk will not be transferred to a separate delivery authority, and specifically will remain with the Senior Responsible Owner and the Accounting Officer, both of whom will be accountable to HM Treasury and Parliament. The SRO and the Accounting Officer, as members of the Lord Chamberlain's Committee, will provide regular reports on the programme's progress and the impact on the Royal Household's operations.

In addition to the maintenance and continual monitoring of a comprehensive risk register, programme risks will be mitigated through the PMO's careful management of the procurement and construction process, and the programme being delivered sequentially in phases. The phased approach also provides the flexibility required to adapt the programme as a consequence of any significant unplanned circumstances.

A series of formal Gateway Reviews and Checkpoint audits by independent consultants will also take place at key points throughout the programme starting in spring 2018.

HM Treasury will be engaged throughout the project, and will attend meetings of the Sovereign Grant Audit Committee and Programme Scrutiny Board. The SRO and Accounting Officer will also maintain close contact with the Palace of Westminster's restoration and renewal programme. There will be close monitoring of the project throughout, and the SRO and Accounting Officer will ensure that appropriate action can be taken early should the programme have to be changed as a result of any unexpected strategic circumstances or changes in market conditions.

The governance structure for the Programme will be as follows:



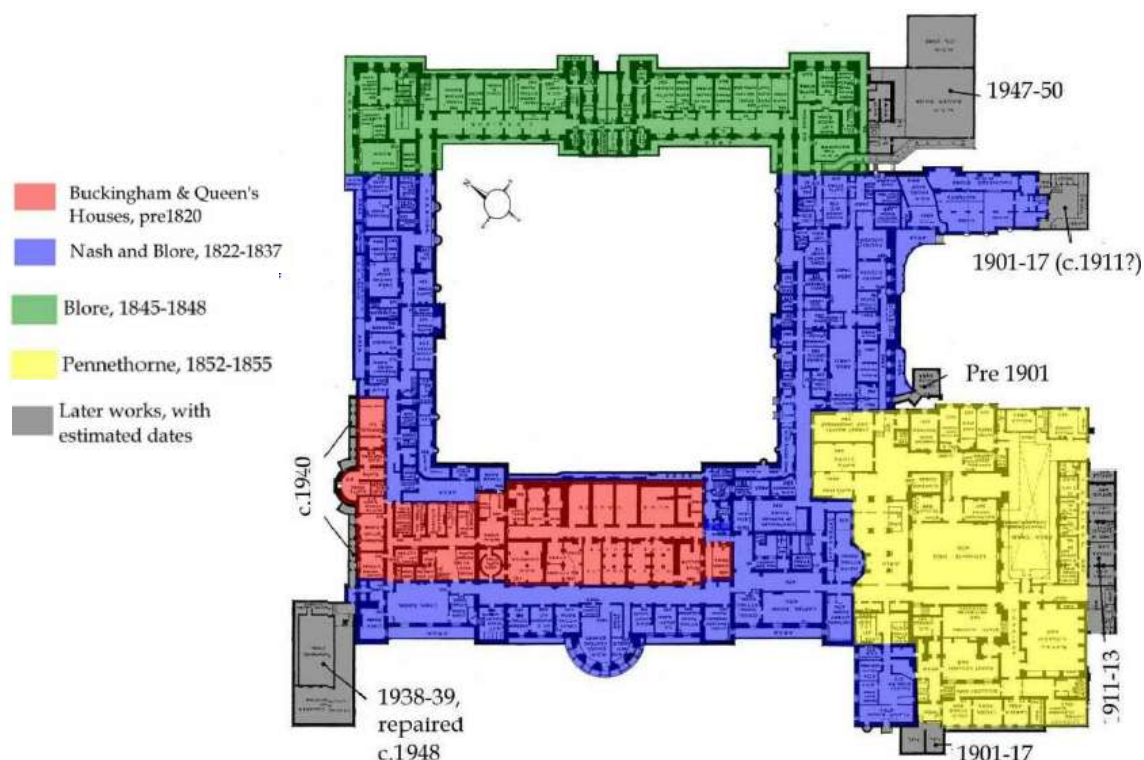
3 BUCKINGHAM PALACE

3.1 A BRIEF HISTORY OF BUCKINGHAM PALACE.

Buckingham Palace is a Grade I listed building of international standing and is the official residence of The Queen, The Duke of Edinburgh and other Members of the Royal Family. The history of the Palace dates back to the Seventeenth Century and the reign of King James I. Since then the building has been significantly extended and remodelled.

The History of Buckingham Palace from 1600 – 2016

1603 – 25	King James I commissioned a plantation of mulberries in what is now Buckingham Palace Garden, for the production of silk.
1628	King Charles I granted the garden to Lord Ashton.
1698	Let to John Sheffield, later known as the Duke of Buckingham.
1699	Upon acquisition, the Duke demolished the original building and created the new Buckingham House.
1761	The house was acquired by King George III as a private residence for Queen Charlotte.
1762	Work on remodelling the re-named ‘The Queen’s House’ began under Sir William Chambers.
1820 – 28	The famously extravagant George IV commissioned John Nash to transform the House to a Palace.
1845	Queen Victoria appointed Edward Blore to build a new wing in order to extend the entertaining and accommodation space within the Palace. The most iconic and significant element of Blore’s design was the central balcony and new main façade facing the Mall.
1852	Architect James Pennethorne completed the Ball and Concert Room and the Ball Supper Room linked to the State Apartments at their southern end. As part of these works, the triumphal arch was moved to the north-east corner of Hyde Park, now better known as Marble Arch.
1901 – 10	King Edward VII set about the completion of the interior redecoration, much of which can be seen in the State Apartments today. During this period improvements were made to the heating, ventilation and electrical lighting.
1913	Pollution took its toll on Blore’s original façade and it was replaced with hard wearing Portland Stone.
1950	Reservicing works took place after the Palace was bombed seven times in the Second World War, most famously with a direct hit to the Private Chapel.
1962	On the initiative of The Duke of Edinburgh, a new public exhibition gallery for the Royal Collection, The Queen’s Gallery, was created on the site of the former Private Chapel.
2002	The Queen’s Gallery was completely refurbished and expanded to mark Her Majesty’s Golden Jubilee.
2002 – 16	Minor works to keep the Palace in working condition have been carried out with no major reservicing or improvements taking place.



3.2 THE USES OF BUCKINGHAM PALACE.

The Palace is where The Queen carries out Her official, ceremonial, diplomatic and representational duties as Head of State of the United Kingdom and Head of the Commonwealth. In support of the delivery of these duties, the Palace hosts an estimated 90,000 people each year, who attend a range of events and functions, from small lunches to large Receptions. In addition, The Queen's Garden Parties are held each summer at the Palace and are attended by approximately 40,000 members of the public. Over 30 Investitures are also held each year at the Palace, with each one being attended by approximately 350 people receiving honours including their families.

Extract from Appendix A

<i>Event Type (FY 2015-16)</i>	<i>Number Held</i>	<i>Attendance</i>
Afternoon Tea (including six Garden Parties)	33	41,923
Investitures held by Her Majesty and other Members of the Royal Family	33	9,481
Receptions held by Her Majesty and other Members of the Royal Family	228	41,616
Total	294	93,020

The Queen grants an audience to the Prime Minister each week when both are in London, and to the Chancellor of the Exchequer prior to the presentation of the Budget. Members of the Privy Council, Foreign and British Ambassadors, High Commissioners, Bishops, senior officers of the Armed Forces and senior civil servants are also regularly received by The Queen at the Palace.

The Palace houses part of the Royal Collection, which is one of the largest and most important art collections in the world, and one of the last great European royal art collections to remain intact. Comprising almost all aspects of the fine and decorative arts, and running to more than a million objects, the Collection is a unique and invaluable record of the personal tastes of kings and queens over the past

500 years. The Royal Collection is priceless and is held in trust by The Queen as Sovereign for Her successors and the Nation.

During the summer opening of Buckingham Palace, which runs from the end of July to the beginning of October, the public are able to visit the State Rooms to see the Royal Collection and special exhibitions. In addition to over half a million visitors who visit the Palace during its summer opening, there are also millions of UK and overseas tourists who visit the gates of Buckingham Palace to witness the Changing of the Guard throughout the year. According to the London Economic Plan and Major Industries, the Changing of the Guard is the top tourist attraction in London, attracting over fifteen million visitors per year².

As well as the Palace being the focal point for State functions it is also the official residence for The Queen, The Duke of Edinburgh, and other Members of the Royal Family, including The Princess Royal, The Duke of York and The Earl and Countess of Wessex. Buckingham Palace is one of the few Head of State residences around the world which is also regularly used as residential accommodation for visiting Heads of State on official UK tours, providing international delegations with an appropriately prestigious welcome.

The Palace also provides the Royal Household with a wide range of facilities necessary to deliver the day-to-day operations in support of The Queen, with significant office accommodation for the approximately 300 office-based staff employed by the Royal Household, including key worker residential accommodation for those staff who require accommodation for the effective performance of their duties.

Although significant official engagements take place at other royal residences, Buckingham Palace is the only Palace in the Royal Household Estate that is capable of delivering the depth, diversity and variety of concurrent functions and events which are critical to the efficient scheduling of the Royal Family's programme. This frequently comprises three or four formal events each day.

More information and statistics on the Palace and its use are available at Annex A.

² The London Economic Plan, the Mayor of London. <http://www.uncsbrp.org/tourism.htm> (accessed 1 November 2016).



Her Majesty The Queen



The Wedding of HRH The Duke and The Duchess of Cambridge, 2011



Buckingham Palace Garden Party



Her Majesty The Queen with the Prime Minister, 13 July 2016



Her Majesty The Queen and other Members of the Royal Family watch the fly-past following The Queen's Birthday Parade, 2016



The Red Arrows fly over the Diamond Jubilee Concert, 2012

Gold Stage Coach.



Work in the Royal Kitchen.



Her Majesty The Queen presents Mr. Benedict Cumberbatch with his CBE, 2015.



Visitors at the Buckingham Palace Summer Opening exhibition, 2016.



The Green Drawing Room at Buckingham Palace.

4 THE CONDITION OF THE PALACE - THE OPTIONS APPRAISAL REPORT

Following the review by the House of Commons Public Accounts Committee (PAC) in January 2009, the Property Section of the Royal Household undertook a detailed condition survey of the Buckingham Palace Estate. The assessments were compared with a 'target condition' score, as agreed with the Department for Culture Media and Sport, and showed that 39% of the Estate was below target condition at 31 March 2012. At the end of 2015, 45% of the Estate was considered to be below target condition. This shows that despite increased investment by the Household in property maintenance, the condition of the estate is deteriorating at a faster rate than the Household has been able to respond up to date. It was established through the condition surveys that the services at Buckingham Palace would require replacement.

Based on the findings of the condition surveys in 2012 and 2015, the Royal Household decided to undertake further detailed investigations with a view to carrying out a full reservicing of Buckingham Palace. On 1st December 2015, Sir Alan Reid, the Accounting Officer, confirmed the appointment of Vice Admiral Tony Johnstone-Burt as the Senior Responsible Owner (SRO) for the Reservicing Programme. The SRO opened a competitive tender process for a team of heritage specialists to formally review the services of the Palace, and assess the options for undertaking any work. The Options Appraisal Report was delivered by a consortium led by WSP/HOK, and was completed on 1 July 2016. The Options Appraisal Report recorded that there are some serious long-term issues of conservation and repair, and that 'if these issues are not addressed, they will present a significant risk to the Palace'. The detailed data, and the consultants' recommendations, are outlined below.

4.1 BACKGROUND TO OPTIONS APPRAISAL REPORT.

The strategic and technical imperative to proceed with the reservicing programme is twofold. Buckingham Palace is one of the world's most prestigious and iconic historic buildings in the UK, recognised internationally as the home of The Queen and the British Royal Family, and it must be preserved for the Nation. Secondly, the ongoing operational occupation of Buckingham Palace as the home and principal office of The Sovereign must be maintained, both for the Nation and future generations. The programme presents a unique opportunity for innovation and investment in one of the world's most prestigious and iconic historic buildings, preserving it for future generations. The operational and potentially catastrophic risks associated with failure of its services mean that the Household needs to act now.

4.2 HEADLINE RECOMMENDATIONS OF THE OPTIONS APPRAISAL REPORT.

The principal recommendation of the OA Report was that action to address these issues must be taken. The consultants concluded "our professional view is that the problems with the existing services make 'Do Nothing' an unacceptable solution. If these issues are not addressed, they will present a significant risk to the Palace."³ The risks associated with 'doing nothing' are significant and include:

- **Fire risk.** A significant proportion of the wiring within the Palace is in a high risk category and needs immediate attention to reduce the very real risk of fire and failure. A proportion of the electrical (wired) systems have exceeded their maximum useful life, with the remainder of the systems being over their design life and projected to exceed their maximum useful life in the next ten to fifteen years. National Trust properties at Uppark in West Sussex and Clandon Park near Guildford, were both devastated by electrical wiring fires in 1989 and 2015 respectively. Similarly, the impact of fires on the Occupied and Historic Royal Palaces Estates have been felt directly at Hampton Court Palace and Windsor Castle in 1985 and 1992 respectively. Based on the possibility of a fire destroying one wing of the Palace, the cost to reinstate the damaged section could be in the range of £250m for construction works only. This does not take into account the potential loss of works of art in the Royal Collection or the fixtures, furnishings and equipment.

³ Options Appraisal for the Reservicing of Buckingham Palace, 1 July 2016, WSP | Parsons Brinckerhoff.

- **Declining resilience and operational failure.** The fact that the resilience of the mechanical and electrical (M&E) services is declining and that the risk of the services failing is relatively high, represents a significant risk to the Palace. The low voltage switchgear is beyond its maximum useful life. Due to the age of the installation, spare parts are now difficult to source and the current configuration is not safe for undertaking maintenance works. Total failure is an ever-increasing risk, the result of which would be a loss of power throughout the Palace, a situation which the existing standby generators could not resolve. Failure to rectify this issue could be damaging both in terms of reputation should power be lost during a State Visit or other national event, and in terms of health and safety, if power were to be lost completely.
- **Degrading occupational environment.** The Palace's heating system performs inefficiently due to its age and configuration, and the lack of controls. The Palace's boilers are beyond their maximum useful life, and spare parts for them are difficult to source. This has created the risk that the system will not work in full or in part, on an increasingly regular basis. This will compromise the ability to provide acceptable living conditions, maintain the desired temperatures to care for the Royal Collection's furniture and works of art within the Palace, and to provide compliant office-working conditions for employees of the Royal Household. The telephony installation is in need of an upgrade due to the growing absence of spares. As business demands increase over time and additional flexible working arrangements are required, the impact of failure or frequent periods of downtime associated with maintenance works could be significant.
- **Damage to building fabric.** The Palace's above-ground drainage system consists of a mixture of lead and cast iron pipework. Failures due to sagging have been identified in the lead drainage pipework and joints which will become worse over time. This could lead to water leaks across the Palace. The potential for damage to the building fabric is high, particularly in areas where the lead pipework is buried in walls and floors.

The findings of the Options Appraisal Report highlighted critical issues with the building services within Buckingham Palace and the need to plan and implement a comprehensive programme of reservicing in order to avoid the risk of significant failure, and to capitalise on a range of opportunities to deliver operational enhancements. In addition, the OA Report identified key areas requiring intervention include the following:

- A significant amount of High Priority works need to be undertaken over the next two years in order to avoid a catastrophic failure involving fire or flood.
- Key enhancements to the electrical system sub-distribution boards need to be undertaken within two to five years (see diagram on page 15).
- More comprehensive reservicing works need to be completed within fifteen years (by 2032).
- Reservicing of both the electrical and mechanical systems should be undertaken simultaneously in order to ensure value for money, avoiding the duplication of works and minimising the disruption to the operational output of the Royal Household.
- A number of opportunities exist to undertake works which would deliver significant efficiencies and public benefit. These include: enhanced public access, additional public events, rationalisation of accommodation and improved functionality.

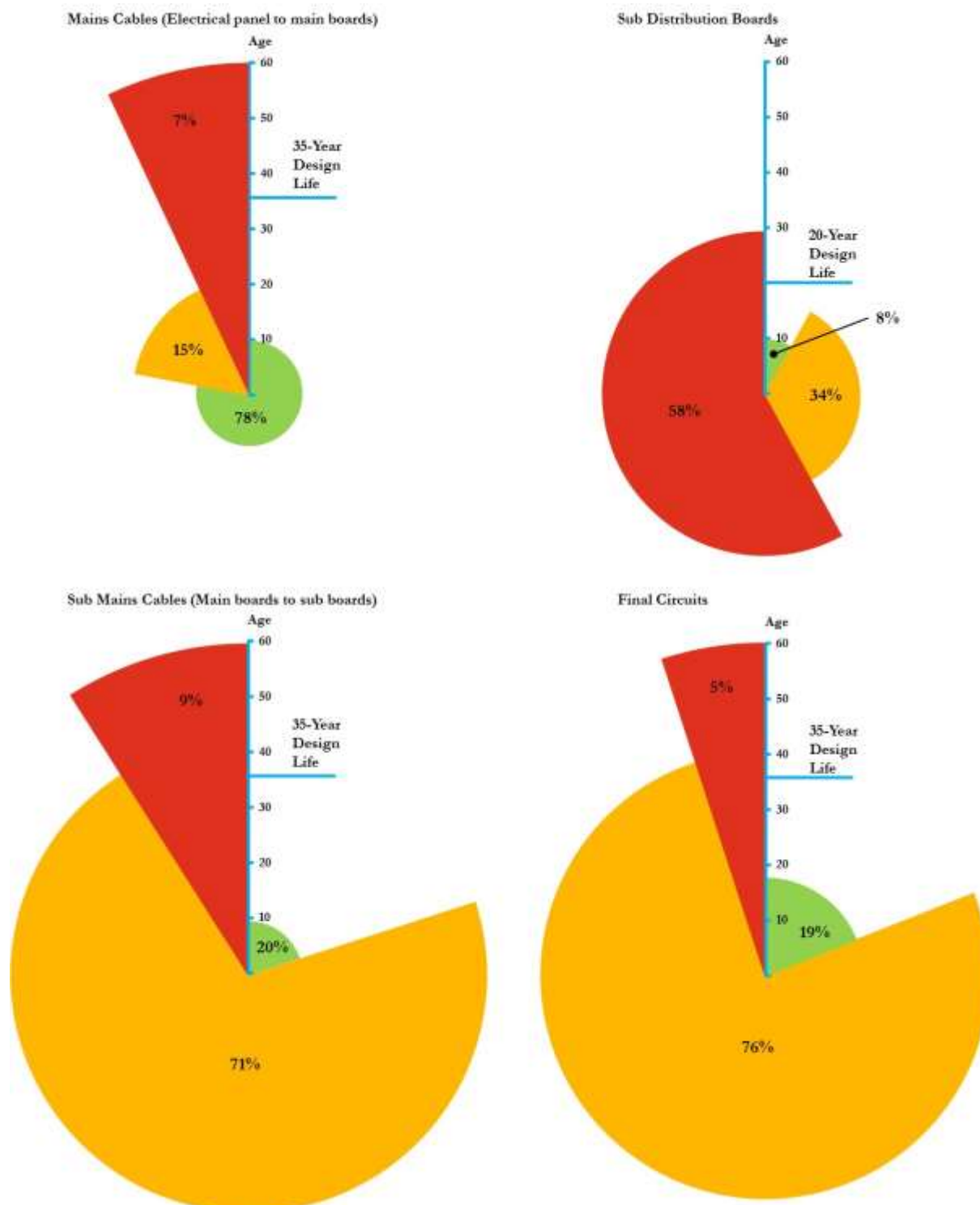
Noting the advanced age of many of the existing services in the Palace, the consultants recommended that work be completed prior to the point at which the maximum life expectancy of the services expires. This approach, they concluded, would minimise the risk of a catastrophic building failure. Depending on the preferred delivery scenario, the Options Appraisal Report concluded that the major works therefore need to be started within the next ten years and completed within the next fifteen years.

The consultants' findings and recommendations for individual services are detailed below.

4.3 DETAILED DATA FROM OPTIONS APPRAISAL REPORT.

4.3.1 Electrical (Wired) System

The Options Appraisal Report found that parts of the electrical system at Buckingham Palace were beyond their useful life, and that some parts were in need of urgent replacement. This is represented in the diagrams shown below.



The Options Appraisal Report found that there are still some very old **Vulcanised Indian Rubber (VIR) mains cables** which are considered to be a significant fire risk and are in need of urgent replacement. Between the main and sub-distribution boards, there are 26 **sub-mains cables** which are over 60 years old and considered to be a fire risk, and therefore in need of urgent replacement. In addition, over 70% of the other electrical cabling is more than 40 years old and should be replaced within the next ten to fifteen years.

The **sub-distribution boards**, which are located throughout the Palace, lack standardisation and many are of an age where spares are difficult to obtain. 92% of these boards are about to reach, or have exceeded, their design life by up to ten years and should be replaced as soon as possible. In addition, some of these boards are located in unsuitable positions, such as staircase landings, and therefore present ongoing health and safety hazards for staff and residents as well as the maintenance team.

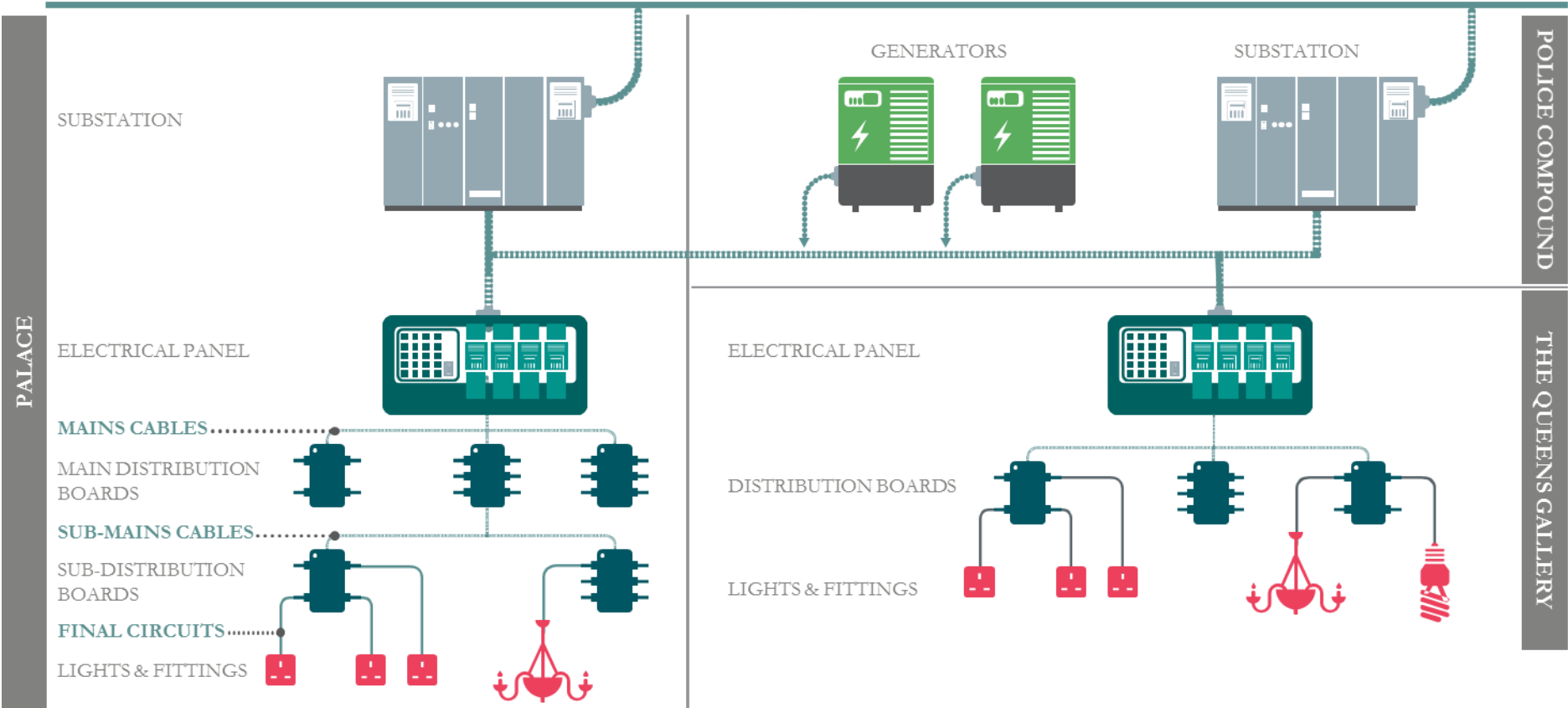
76% of the **final circuitry** (more than 1,700 circuits) is more than 40 years old and has already exceeded its design life. In addition, over 5% (130 circuits) of the final circuitry is more than 60 years old and therefore presents a serious fire risk. This cabling is located in less accessible areas, including the State Rooms.

A major concern is that the **substation** feeds an adjacent electrical panel that is 28 years old, and for which it is proving increasingly difficult to find replacement parts. This panel requires replacement. The metering system is also beyond its useful life, and unable to provide the information desired to optimise the running of the services. The associated switchgear will require replacement within ten years but this is the responsibility of the power provider, not the Royal Household.

In the event of a failure of the incoming mains power supply, backup power supplies are provided by two **generators**. Neither has been operated for significant periods and thus have further life remaining. Both generators would benefit from reconfiguration so that they will operate reliably when needed. The generators are sized to supply either the Palace or The Queen's Gallery, but cannot fully supply both at the same time, which is inappropriate for a back-up power system.

Although there is an up-to-date and comprehensive **fire detection system**, the Options Appraisal Report noted it is likely that should one of these cables cause a fire, it would be concealed and therefore may remain undetected until the fire had taken hold. A fire in any of these areas has the potential to cause serious damage to the fabric and contents of the Palace.

MAIN POWER SUPPLY



Electrical System

Power is provided via two substations, backed up by generators to main electrical panels which provide the power to main distribution boards, to sub-distribution boards and then on, via a network of cables, to the fittings (sockets, lights etc).

4.3.2 Upgrades to Existing Electrical Equipment

Electrical Panel. Although it is possible to refurbish parts of the panel, its replacement will ensure long-term compliance with existing regulations and best practice. The new panel should be located near to the existing one, at ground level, which would address any issues relating to safe access, and would also help to minimise any disruption to the Palace during the replacement process and future maintenance.

Sub-distribution Boards. The existing electrical sub-distribution boards need to be modernised and rationalised. 58% are beyond their design life and represent an increasing risk to the Palace. Some will need to be relocated more safely, away from corridors and stairwells.

Standby Generators. The two generators currently serving the Palace and The Queen's Gallery are in good condition, but are unreliable, and as a matter of high priority, the generator circuits and controls should be reconfigured to ensure that the generators operate effectively. There are two clear-cut options for this:

1. **Retain the existing two generators,** refurbish the older one and upgrade the controls. This will improve the confidence that they will perform as a back-up in the case of a power failure, but will not increase their capacity to cope with the full power demand of the Palace and The Queen's Gallery.
2. **Install an additional generator,** as well as refurbishing the existing generators and their controls. This would meet the full power demand of both the Palace and The Queen's Gallery in the event of a total mains power failure.

The Reservicing Programme will replace:

- 100 miles of electrical cabling.
- 6500 electrical sockets.
- 5000 light fittings.
- 330 distribution boards (fuse boxes).
- 20 miles heating pipework.
- 10 miles hot and cold water pipework.
- 2500 radiators.
- 500 pieces of sanitary ware.
- 20 miles of skirting board.
- 30,000m² floorboards taken up, equivalent to 3.5 football pitches.



- 1 Main Electrical Panel.
2 The trench under the Quadrangle.
3 Old and new unsupported cable ways.
4 Very old VIR cables joined to newer cables via plastic jointing box.
5 Data cables laid in unstructured format without trays.
6 Distribution boards have obsolete parts.

4.3.3 Heating

The Options Appraisal Report identified that the boilers at the Palace had some of their key parts replaced fifteen years ago, but are now three years beyond their extended design life and in need of replacement. As a result, there is an ever-increasing risk of significant failure of one or more of the boilers.

To provide a reliable service, the Options Appraisal Report recommended that all of the **boilers** need to be replaced. Modern boilers are much more efficient and would consume less gas, thereby reducing running costs. The chimney, through which the boiler gases rise, has significant deterioration in the brickwork, caused by sulphur from the waste gases. Lining the chimney is therefore necessary to prevent further deterioration.

The **heating pipework** was installed over 60 years ago. A number of valves are in poor condition and cannot be fully operated, which presents a significant risk of water damage should the wet systems need to be isolated in an emergency. Due to the lack of valves and limited controls, the heating system is inflexible, inefficient and unresponsive, and the pipes also cannot be connected to a modern pressurised system. In practical terms, this means that some unoccupied rooms have to be continually heated, thereby wasting energy.

The main boiler house also contains a gas-fuelled **combined heat and power unit (CHP)**. This is supplied by an external provider on a lease contract, which is due to expire in November 2017. It works in tandem with the boilers to provide heat and generates electricity, which is used within the Palace, thus reducing demand on the national power network.

Rooms are heated by a combination of ageing **radiators and convectors**, many of which are inefficient and too small for the size of each room. In some of the most significant rooms, the radiators are located in the lower section of the window shutter boxes in an attempt to conceal them from view. This compromise solution is inefficient and also prevents the shutters from being operated.

The cold water system's **storage tanks** are oversized and inefficient. One of the roof-mounted tanks for cold water and its supports are in need of renovation within the next two years.

4.3.4 Upgrades to the Existing Heating System

Replacement Heat Distribution Pipework

The replacement of the pipework will require lifting the floors and will be very disruptive to the occupants. The Options Appraisal Report noted that the best option is to retain this pipework until it is necessary to replace the wiring, and to then install both the cabling and pipework at the same time to limit disruption. As the replacement of cabling needs to be started within ten and completed within fifteen years, the replacement of the heat distribution pipework would need to be aligned with it.

Replacement of Radiators

All of the radiators within the Palace need to be reviewed for size, condition, suitability and performance as part of the design process. Most are old and ideally would be replaced at the same time as the pipework. Replacing the radiators would also allow the temperature of rooms to be controlled individually, which is not possible at the moment, and for temperatures to be adjusted in each room by its occupants.

Hot Water System

The hot water cylinders, which are located in the basement plantrooms, have recently been replaced and are functioning well. The network of hot water pipework should be replaced when the heating pipework is changed, to reduce disruption and cost.

Drainage Above Ground

The vertical pipes are old and in need of repair and renovation in places. It would be extremely disruptive to the decorations and fabric of the building to replace all the pipework, because much of it is embedded within the walls and follows indirect routes within the Palace's structure. It is therefore proposed that the pipework be thoroughly surveyed to establish pipe routes and the location of any required repairs. Localised repair is recommended to minimise damage in highly decorated spaces.

Below Ground Drainage

The drains below ground are generally in good order, but need some minor repairs as part of the Reservicing Programme. However, there are some sections of pipework that are not sized to meet modern design criteria for rainfall, and will need additional water storage chambers added below ground to protect the system from flooding.



7 Main boiler room.
8 Pipes and cables in the same congested vertical spaces.
9 Original lead above ground drainage pipes wind through the building.
10 Plantrooms have been recently refitted.
11 Some critical valves are seized shut.

4.3.5 Other Wired Systems

The Options Appraisal Report found that the current **fire-detection systems** are of a high standard. However, eventually these systems will need to be modified and upgraded to reflect technological advances and future changes to occupation levels within the Palace. Enhancements are currently being made to the fire alarm system to provide visual as well as audio alarms for disabled visitors and staff, including changes to the lifts to improve evacuation procedures, refuge areas, appropriate alarms and repeater signals in the lavatory areas. These works will be implemented as a high priority without significant disruption.

The existing **IT infrastructure** is well maintained and up-to-date and includes the provision of wireless solutions. However, it has been installed in a piecemeal fashion along routes designed to avoid asbestos contamination in certain areas of the Palace. As a result, the system is poorly structured and will prove difficult to replace when the cables become obsolete within the next ten years.

The Report concluded that the **telephone system** needs upgrading as it has reached the end of its useful life. It is recommended that telecommunications cabling is considered as part of the fibre-based IT network within the Palace. It is also recommended that the coverage of mobile phone networks should be boosted within the Palace.

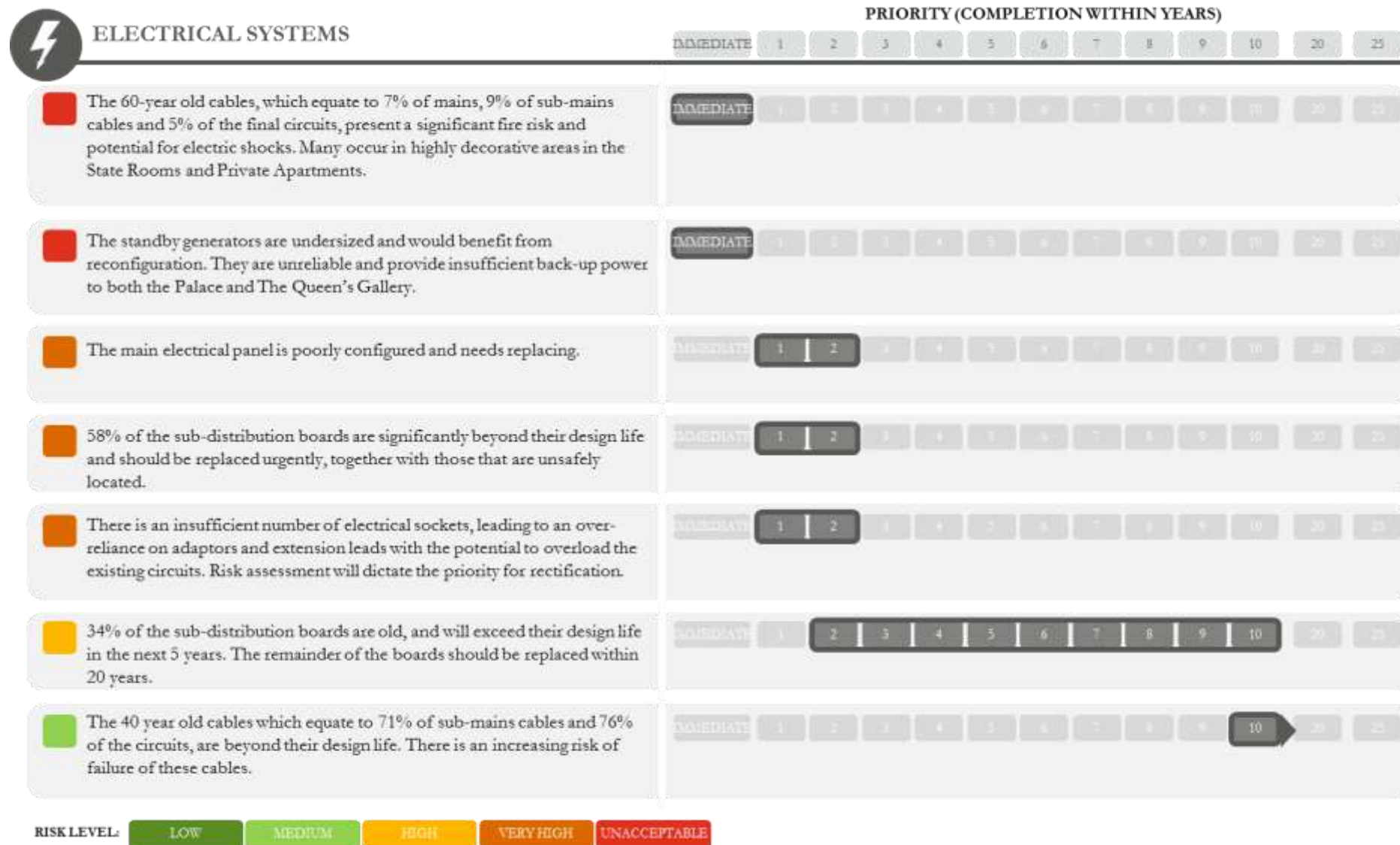
The existing services are controlled by a computer-based **Building Management System (BMS)**, which is 15-20 years old. The current installation is slow and subject to frequent failure. There is also a lack of consistency within the BMS software that makes the management of the system difficult. There are a number of electricity, gas and water meters installed within the Palace and, although many of them are connected to the BMS, the majority are no longer compatible with modern requirements. This makes the monitoring, recording, reporting and management of energy utilities difficult.

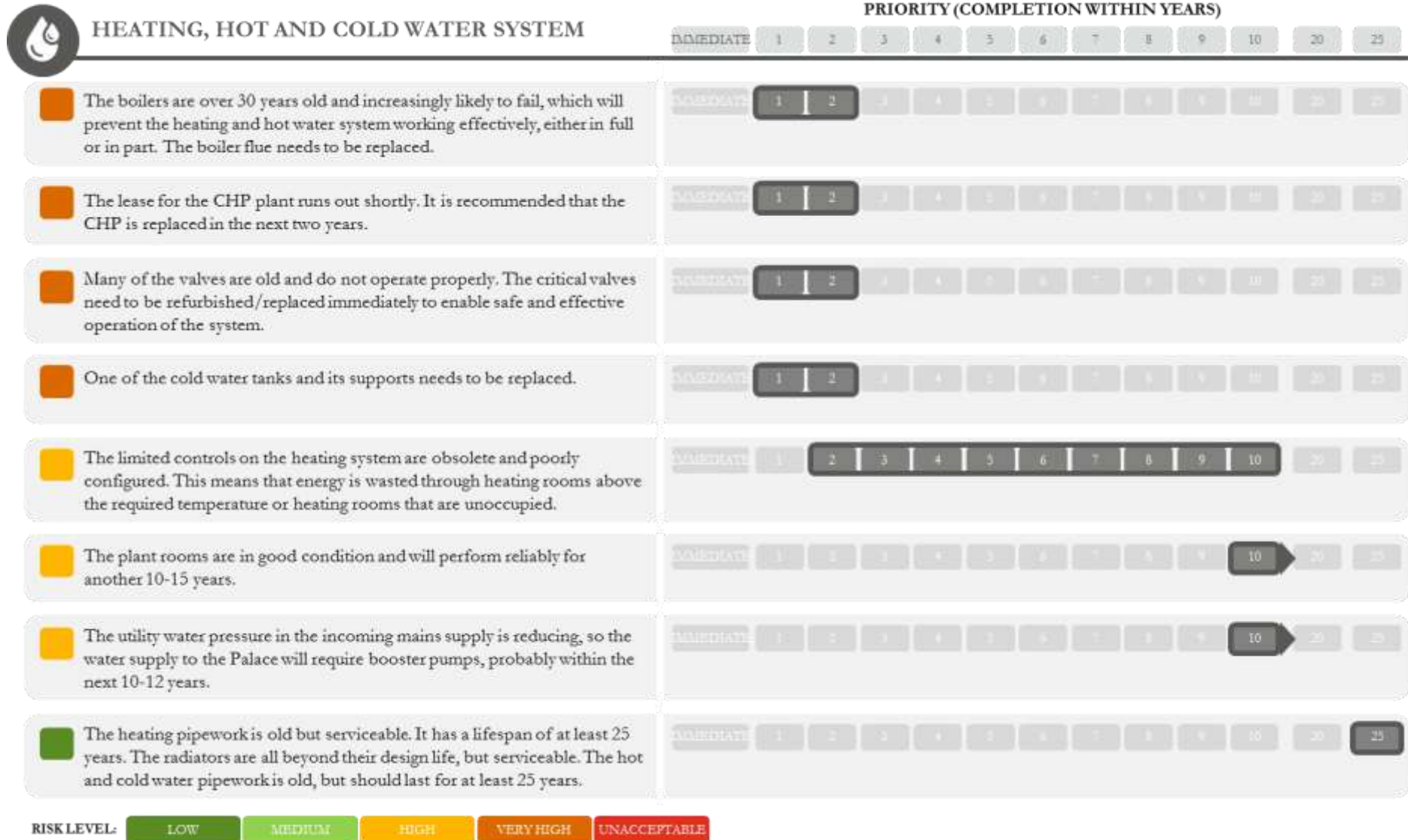
There is limited **temperature control** within zones, areas or rooms of the Palace, which makes the systems unresponsive to user demands and costly to run. The non-availability of control to the heating system is inappropriate for a building of this size. Consequently, it is difficult to control the heating levels within the Palace, resulting in energy being wasted in heating unoccupied areas. It is estimated that a 15% reduction in energy consumption could be achieved if a modern control system was installed.

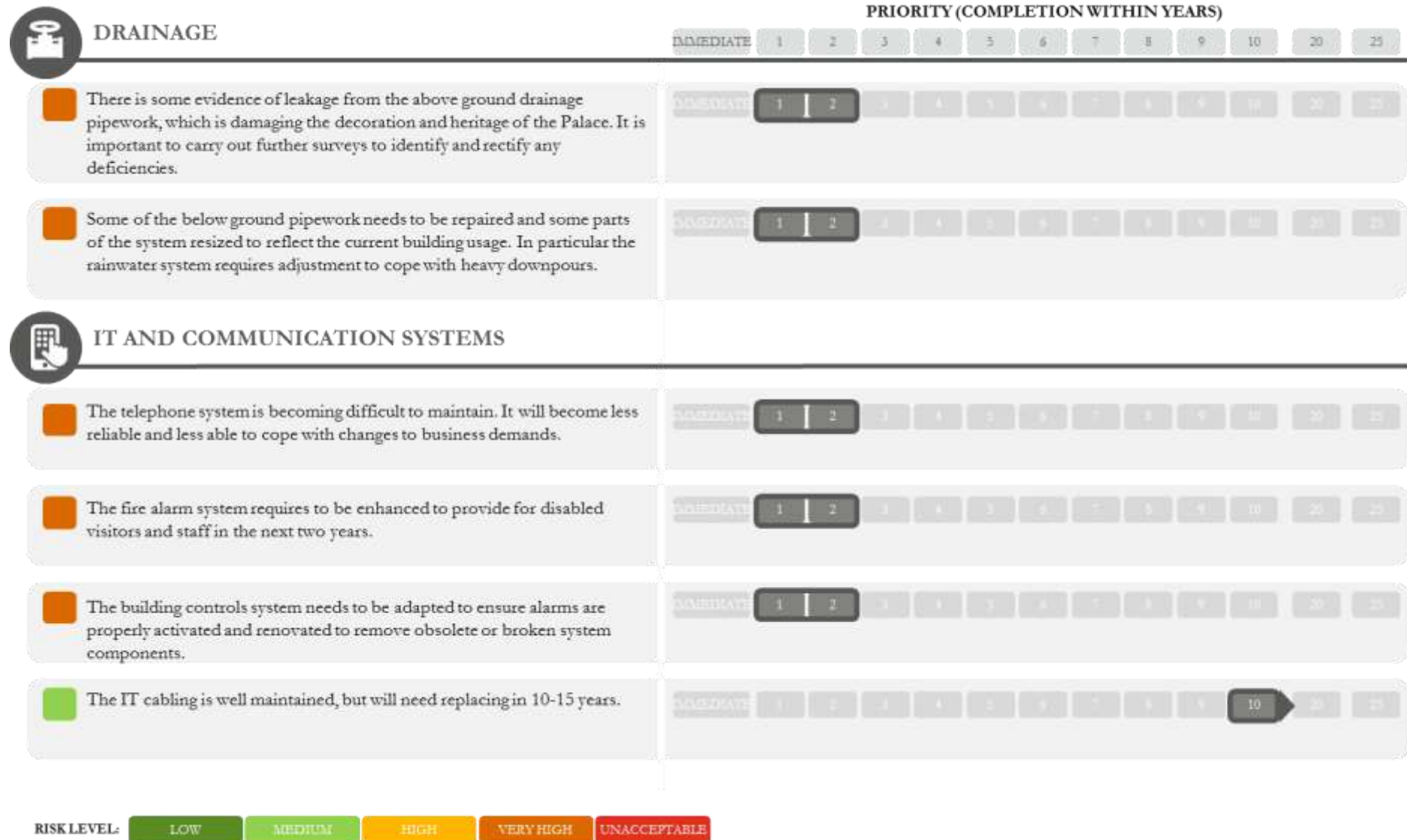


12 Pipework and cabling.
13 Buckingham Palace
Server Room.
14 Cabling and wires.
15 Water mains.

SUMMARY OF THE CONDITION OF THE EXISTING SERVICES







4.4 OPTIONS APPRAISAL REPORT RECOMMENDATIONS.

		<i>High Priority Urgent Works 2017-19</i>	<i>Replace within 10-15 years</i>
Electrical	Generators	Refurbish and reconfigure the two generators to improve reliability. IMMEDIATE ACTION.	Refurbish the two generators and add a further unit of the same size to improve resilience and reliability.
	Electrical panels	Replace and relocate the electrical panels which are poorly configured, and unsafe to maintain.	Replace and relocate the electrical panels which are poorly configured, and unsafe to maintain.
	Distribution boards	Replace old sub-distribution boards and relocate those positioned inappropriately.	Replace and reconfigure all electrical distribution boards throughout the Palace.
	Cables and circuits	Replace the very old cabling, which is a fire risk. IMMEDIATE ACTION.	Replace all cabling throughout the Palace.
	Sockets and fittings	Provide additional sockets to meet the current demand.	Install additional power sockets and fittings as required, to suit the functionality of the Palace.
	Power generation	No action.	Install solar electric panels on the roof.
Heating, Hot and Cold Water	Heat generation	Replace the existing four boilers and CHP unit, which will become increasingly unreliable.	Replace boilers and CHP with new technology, the likely option being a tri-generation unit. Other alternatives will need to be reviewed as part of the design process.
	Heating pipework	Refurbish seized valves, which prevent effective operation.	Replace all heating pipework throughout, installing new valves to enable efficient control. Replace all equipment and pipework in plant rooms.
	Radiators & convectors	No action.	Replace all radiators, convectors and control valves, to better suit individual rooms and improve efficiency.
	Hot water	No action.	Replace all hot water pipework and fittings.
	Cold water	Refurbish the substandard rooftop water tank and supports before they fail.	Replace all cold water pipework with a new pressurised water system incorporating boost pump sets and all fittings.
Drainage	Drainage	Undertake intrusive surveys of vertical drainage pipework to establish its integrity and repair any deficiencies. Repair below ground drains.	Repair the leaks on above ground drainage pipework and repair below ground drains, including improvements to meet modern design standards.
Other wired services	Fire	The fire alarm system would benefit from enhancements to provide for disabled visitors and staff.	Upgrade fire alarm system to reflect increased occupancy of the Palace; co-ordinate wiring with new electrical systems.
	IT	No action.	Create a new IT server room, incorporating a second incoming data cable, standby power, fire suppression and new fibre network. Improve the Wi-Fi coverage within the Palace.
	Telephone	Replace telephone system, which will increasingly struggle to meet operational demands.	Integrate the new telephone system with the IT system to increase functionality. Improve mobile telephone coverage within the building.
	Controls	Replace the controls to interface with new main equipment.	Install comprehensive controls systems throughout the Palace.

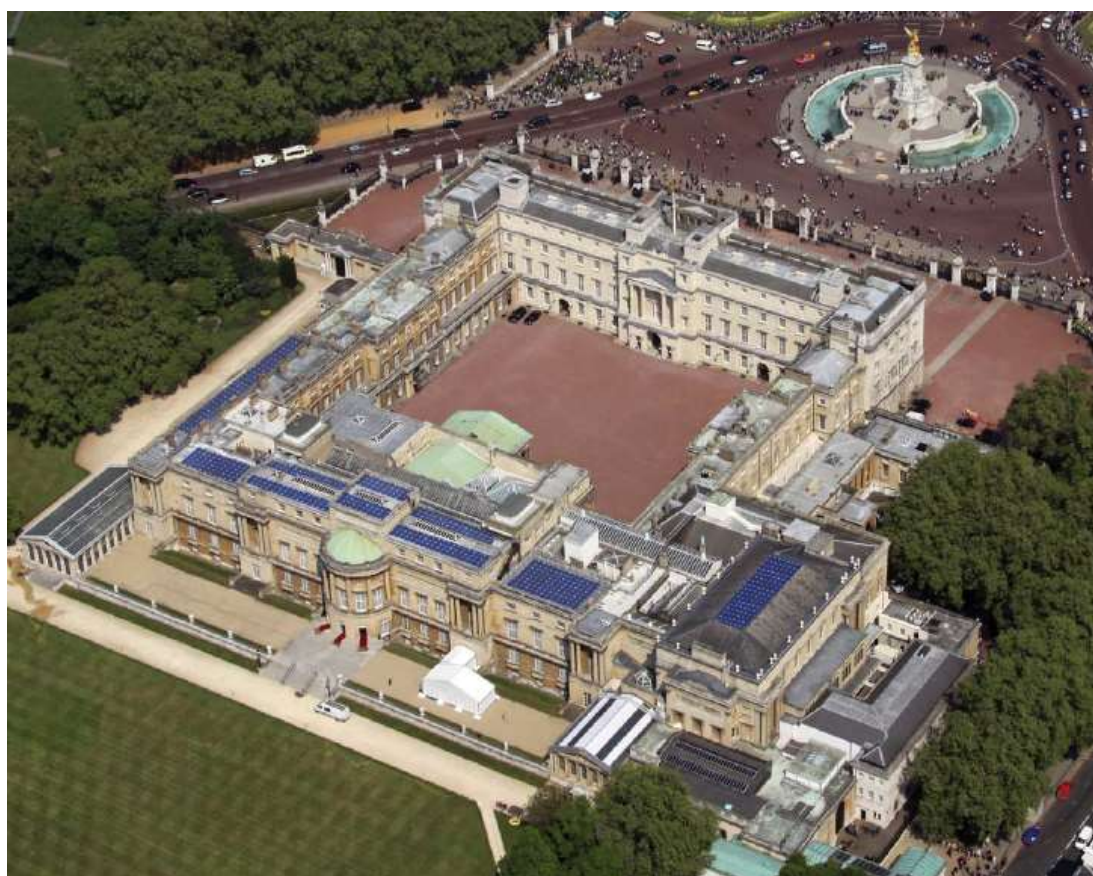
4.5 ENERGY EFFICIENCY.

The consultants indicated that there would be various ways to provide the Palace with electricity from alternative sources to supplement the present mains power. Having considered the proposals, the Household has included solar electric panels and an anaerobic digestion unit in its plans for the Reservicing Programme due to the energy benefits set out below.

4.5.1 Solar Electric Panels (Photovoltaic panels).

There is an option to install solar panels on the flat areas of the roof so that they are not visible from the ground or from the principal rooms in the Palace. Photovoltaic panels use sunlight to generate electricity which can be used to supplement the power from the grid. They are a zero-carbon solution, reducing the Palace's carbon footprint and electricity costs. Although the energy that could initially be provided from this source is less than 5% of the current building demand, this could increase to 10% over time as power consumption reduces and as the carbon content in grid electricity is lowered, in accordance with Government legislation. This option will be a viable, credible and potentially valuable addition to the Palace, particularly in terms of protecting the environment.

Mock up image of how solar electric panels could be installed at Buckingham Palace.



4.5.2 Anaerobic Digestion Unit.

This option generates biogas from food and other organic waste. The gas produced is then used to fuel a conventional boiler, but would be unlikely to create sufficient energy to supply more than 5% of the Palace's energy needs. A primary heat source, such as gas-fired boilers, would still be needed to meet the bulk of the Palace's energy requirements. Anaerobic digestion units are a low capital cost solution and would reduce the carbon footprint of the Palace by approximately 5%. This will also reduce the existing cost of waste removal from the site.

4.5.3 Alternative Power Supplies in the Future

Solar thermal panels, ground source heat pumps, electrical heating, and fuel cells were all identified as possible heating and power supplies in the future and will be considered as technology develops.

TIMELINE

Ten-Year Phased Refit of Buckingham Palace

2016-2017	2017-18	2018-19	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027	
	Project Year 1	Project Year 2	Project Year 3	Project Year 4	Project Year 5	Project Year 6	Project Year 7	Project Year 8	Project Year 9	Project Year 10	
				General Election		Jubilee (70)	Coronation (70)	Palace of Westminster Programme	General Election		
	Sovereign Grant (reviewed 2016-17)					Sovereign Grant (reviewed 2021-22)					
FUNDING NEGOTIATIONS + PMO ESTABLISHED	Urgent Work, Detailed Design and Temporary Accommodation										
			EAST WING								
					SOUTH WING						
							SOUTH WEST WING				
									NORTH WING		
		WEST WING (STATE APARTMENTS)									

5 FUNDING AND BENEFITS OF THE PROGRAMME

5.1 FUNDING.

The Household initially looked at four different ways of carrying out the Reservicing Programme, which were detailed in the Options Appraisal Report.

- Full Decant (6.5 years).
- Full Occupation (21 years).
- Significant Occupation (13 years).
- Partial Occupation (8 years).

One of the primary objectives for the Reservicing Programme is to ensure that it offers value-for-money. As a result, the Household considered the Net Present Cost of each option outlined above. Net Present Cost combines the capital construction costs of each option, less the benefits and savings that would be realised as a result of the Programme, adjusted for inflation over time. The benefits and savings associated with each option vary in value, as the length of the construction period for each option dictates when the benefits will be realised. As many of the benefits and savings will be realised at the end of each suggested option, their value was adjusted to take into account the impact of inflation. On construction costs alone, Partial Occupation was the cheapest option (£353m), followed by Full Decant (£360m). However, when the figures were converted to Net Present Costs, taking into account savings and benefits, it became clear that Full Decant would be the most expensive of the options. The Full Occupation option taking 21 years was considered to pose too great a risk to the Palace due to the age of the services. Accordingly, two options, Significant Occupation and Partial Occupation, were taken forward for further development.

<i>Option</i>	<i>Total Capital Cost</i>	<i>Net Present Cost</i>
Full Decant	£360m	£278m
Full Occupation	£374m	£246m
Significant Occupation	£390m	£243m
Partial Occupation	£353m	£232m

5.2 BENEFITS.

A summary of the projected benefits and associated cost savings and income generated appears below. The total of financial benefits each year on completion of the programme is estimated at £3.4m.

<i>Benefits</i>	<i>Qualitative Benefits</i>
Utilities savings	<ul style="list-style-type: none"> • Reduces the annual energy consumption of the Palace by 40%, thereby saving 554 tons of carbon.
Increase in Buckingham Palace Summer Opening (BPSO) Facilities Management Charge .	<ul style="list-style-type: none"> • Increase public access by over 115,000 visitors per annum by extending the BPSO by 15 days. • Enhance accessibility so as to improve all access and facilities so they are fully inclusive. • Improved quality of visitor experience through a dedicated visitor entrance, and improvement works to key features.
Rental of Visitor Admissions Facility	<ul style="list-style-type: none"> • Improved visitor experience following construction of dedicated visitor admissions facility allows RCT to process a larger number of visitors more efficiently. • Removing the requirement for temporary buildings at an annual cost of £350,000 reduces the set-up time for the BPSO and improves the visual appearance on entry to the Palace.

<i>Benefits</i>	<i>Qualitative Benefits</i>
Additional Learning Facility (outside BPSO)	<ul style="list-style-type: none"> • A new Learning Facility at Buckingham Palace incorporated within the new Visitor Admissions Facility and operated by RCT will provide the opportunity to explain the central role that monarchy continues to play, as a focus for national identity and a symbol of stability. • Increases school children visits from approximately 1,500 to 30,000 per annum.
Increase in Buckingham Palace evening tours	<ul style="list-style-type: none"> • Increase the number of evening tours by 150 per annum resulting in an additional 4,500 visitors per annum.
Additional Buckingham Palace events	<ul style="list-style-type: none"> • Enhancements to the service lifts and lavatories within the Palace will enable the Events team to work more efficiently running additional concurrent events. • Members of the Royal Family are able to host functions at Buckingham Palace which previously would have been held at third party locations.
St James's Palace Rental income	<ul style="list-style-type: none"> • Remodelling of spaces within Buckingham Palace enables enhanced utilisation and more efficient use of space resulting in the release of office space at St. James's Palace for commercial rental.
Continued public access during the works	<ul style="list-style-type: none"> • A full decant programme would have resulted in the closure of BPSO with the consequential loss of income.

5.3 PREFERRED OPTION – TEN-YEAR PHASED REFIT.

As a result of this analysis, the Household then developed the Significant Occupation and Partial Occupation scenarios further in the Outline Business Case presented to HM Treasury, and concluded that the most practical way forward - in line with the operational needs and the ability for the Palace to be divided into zones - was a hybrid of the two. This is the 10-Year Phased Refit.

The total capital costs of the 10-Year Phased Refit will be £369m. However, choosing the 10-Year Phased Refit will generate benefits of £139m over the 50-year extended lifespan of the Palace. That makes the Net Cost of the 10-Year Phased Refit £230m, which equates to a £222m Net Present Cost once inflation is taken into account.

This option:

- **Allows for significantly lower risks of operational failure** by allowing for works to be completed in advance of critical end of life forecasts (10-15 years) thereby reducing the risk of potentially 'catastrophic end of life failure'.
- **Provides value-for-money** generated through the delivery and release of benefits. These include significant financial and operational benefits enabling more efficient operations, enhanced public access, and improved condition of the Palace, along with financial savings.
- **Minimises the impact on day-to-day operations** of the Palace, thereby enabling The Queen to remain in residence throughout the works and allowing normal public access through the retention of annual events, including the Buckingham Palace Summer Opening.
- **Significantly enhances public access** to Buckingham Palace with an increase in paying visitors of over 20%, whilst also delivering up to 110 additional events per annum.
- **Achieves the sustainability objectives** of the programme including an estimated 30% CO₂ efficiency saving from the High Priority works (a saving of 410 carbon tons) with the reservicing works likely to release a further 10% saving (totalling 554 carbon tons overall).

5.4 REPORT CONTRIBUTORS.

This Summary Report draws on information contained in the Options Appraisal Report and the Business Cases prepared for HM Treasury. The Options Appraisal Report was written by a consortium of experts as follows:

- WSP | Parsons Brinckerhoff – Project Lead and Engineers.
- HOK – Conservation Architect and Space Utilisation Planner.
- Gleeds – Cost Adviser.
- Members of the Buckingham Palace Reservicing Programme Board.
- Berkshire Consultancy - Project Co-ordination.
- Sir Robert McAlpine – Construction Adviser.
- Accurro – IT, Telecoms and Controls Engineer.

Additionally, the Household was supported by PriceWaterhouseCoopers in the development of the Strategic Outline Business Case and Outline Business Case.

ANNEX A – STATISTICS FOR BUCKINGHAM PALACE IN 2015.

ENGAGEMENTS AND EVENTS

<i>Description (Financial Year 2015-16)</i>	<i>Number</i>	<i>Attendance</i>
Afternoon Tea (including 6 Garden Parties)	33	41,923
Breakfast	41	1,063
Lunch	162	3,481
Dinner	77	6,089
Investitures	33	9,481
Meeting Royal (hosted by an MRF)	58	812
Reception	228	41,616
Training course	192	3,706
Total	2,496	129,095

OFFICIAL ENGAGEMENTS

	<i>2015</i>	<i>2016</i>
Number of State Visits hosted at Buckingham Palace.	2	1
Number of audiences The Queen has hosted with the Prime Minister.	16	18
Number of audiences The Queen has hosted with a visiting Head of State (excluding State Visits).	7	7
Number of The Queen's audiences with incoming Ambassadors or High Commissioners.	36	41

VISITORS TO THE PALACE

	<i>2015</i>	<i>2016 (1 Nov 16)</i>
Total number of people visiting BPSO.	514,462	549,336
The Queen's Gallery visitor numbers.	194,520	138,109

ANNIVERSARIES AND CORRESPONDENCE

These figures are only for the UK, Realms and Overseas Territories with the exception of Canada, Australia and New Zealand, whose messages are arranged via the respective Governor-Generals' Offices.

	<i>2015</i>	<i>2016 (1 Nov 16)</i>
Messages from The Queen to couples celebrating 60th, 65th, 70th and above wedding anniversary.	35,962	30,450
Messages from The Queen to those celebrating their 100th, 105th and above birthdays.	7,737	6,589
Total messages sent by the Anniversaries Office.	43,699	37,039
Number of items of correspondence received for The Queen.	61,356	91,413
Items of correspondence sent out by Correspondence Office.	26,550	52,010

STAFF

	<i>2015</i>	<i>2016 (1 Nov 16)</i>
Total number of full-time staff at Buckingham Palace.	588	504
Additional part-time / seasonal staff working at Buckingham Palace.	371	516
Staff with live-in accommodation at Buckingham Palace.	37	37

ANNEX B – GLOSSARY OF TERMS AND ABBREVIATIONS.

BMS	Building Management System
BPSO	Buckingham Palace Summer Opening
CHP	Combined Heat and Power
LCC	Lord Chamberlain's Committee
M&E	Mechanical and Electrical
NPC	Net Present Cost
OBC	Outline Business Case
PAC	Public Accounts Committee
PMO	Programme Management Office
RCT	Royal Collection Trust
SRO	Senior Responsible Owner
VIR	Vulcanised Indian Rubber (covered electrical cabling)