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Executive Summary

- The library estate strategy is one element of the OULS strategic plan, *Vision for 2010* (www.admin.ox.ac.uk/lib/vision2010.pdf) which covers space, collections and user requirements and lays out the underlying human resource and IT strategies.

- The estates strategy deals with the pressing requirement to refurbish the current library estate, last properly addressed when the New Bodleian was built in the late 1930s.

- The proposals centre on a library ‘hub and satellite’ model which will consolidate the library estate in new and refurbished buildings on six main hubs (Central Bodleian; Radcliffe Science Library; John Radcliffe Hospital/Old Road Campus; Social Sciences at St Cross; Humanities and Area Studies on the RI site; Osney Mead for library support functions, including storage). Academic requirements will determine which satellite libraries remain in addition to the hubs.

- This estate strategy, together with enhanced electronic provision, will improve services to users at lower operating costs by reducing both space and library staff requirements. The value of existing library sites will be available for realisation by the University.

- The depository is an essential part of the overall estates strategy. The existing book stores are full and, on the Central Bodleian site, are inadequate in terms of both storage conditions for stock and the working environment for staff.

- The urgent need to refurbish the New Bodleian and replace and upgrade the storage for the 3.5 million volumes held there is an important driver in the estates strategy. The National Archives, which awards Approved Status to institutions holding manuscript material deposited in lieu of death duties, requires significant improvements to the conditions provided in the New Bodleian in order to maintain its Approved Status.

- The proposed depository will:
  
  o be sited on land at Osney Mead owned by the University and adjacent to existing OULS operations in the Osney One building

  o use automated storage and retrieval (ASRS) technology to provide for sufficient storage for over 8 million volumes, giving 20 years growth.

  o provide growth space to be used to decant the 3.5 million volumes from the New Bodleian during refurbishment. This is the most cost- effective means of providing for continued book delivery to central Oxford during refurbishment

  o cost £29m, to be funded mainly from monies set aside by Oxford University Press
• Approval is now sought for work to begin on the development of the new depository.

**Part A** of this report sets out the overall estates strategy and identifies the role of the depository in that strategy. This is a reproduction of the text of the report to Congregation by the Curators of the University Libraries, printed in the Gazette issue of 22 September 2005.

**Part B** is a detailed business case for the depository.
Part A: A University Library for the 21st Century: a report to Congregation by the Curators of the University Libraries

(A) Introduction

1. Following the outline statement by the Curators in the Gazette of 24 June 2005, this is the first of a series of reports to Congregation on key strategic proposals for the future development and delivery of library services in the University. The aim of the proposals is to provide, over the next five to seven years, a greatly improved service, worthy of the collections which our libraries house, and fit for the students, scholars and researchers who require much better access to them. This report makes the case to Congregation for allocating space at Osney Mead for a new automated book depository, and relates this proposal to a broader, longer-term estates strategy for the University’s libraries.

2. The present report will be followed by publication on-line of the full business case for the depository, which is due to be considered by Council on 10 October after scrutiny by its Planning and Resource Allocation Committee. The business case includes financial, technical and logistical documentation and risk analysis and, subject to approval by Council, will be available electronically\(^1\) by 17 October. A display is also being mounted for members of the University to explain the need for the depository in the context of the overall proposals for the development of the library estate. The display will be in the Van Houten Room, University Offices, Wellington Square, on September 28 (10am-7pm), 29 (8am-7pm) and 30 (8am to 3pm). Staff will be on hand to answer questions. The display will be available electronically from 3 October\(^2\).

3. Submission to Congregation of a Resolution allocating space at Osney Mead for an automated depository has been rescheduled from 18 October to 15 November to allow sufficient time for Congregation to study the full business case after it is published.

4. The new depository is one element of a comprehensive library estates strategy that has been developed in successive editions of the OULS five-year strategic plan, the current version of which (Vision for 2010) was published as a Supplement to the 24 June 2005 Gazette and is available electronically\(^3\). The estates strategy is just one of a series of systematic and integrated plans - for collection development, electronic delivery, conservation and collection care, and human resources – that the creation of an integrated library system has made possible. One of the weaknesses identified by the 1995 Thomas Report\(^4\) was the absence of any ‘single focal point within the [library] sector from which a rounded view of who should provide what service, where and when, can be taken.’ The creation of the OULS has changed that, and is allowing the University to take a comprehensive and coordinated approach to the measures required to maintain and enhance the infrastructure for the delivery of library and information services that meet the developing needs of teaching and research.

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\(^1\) At http://www.ouls.ox.ac.uk/news/buildings
\(^2\) Also at http://www.ouls.ox.ac.uk/news/buildings
\(^3\) At http://www.admin.ox.ac.uk/lib/vision2010.pdf
\(^4\) Report of Council’s Working Party on Senior Library Posts (Supplement (1) to Gazette No. 4373, 21 September 1995).
5. The University’s central library services are having to respond to a number of key demands:
   - the need to increase the storage capacity for collections;
   - the need to improve the conditions in which collections are held;
   - the need to enhance services to users by providing better access to collections, including longer opening hours, browsable stock, increased lending and stack calls;
   - the need to expand electronic and digitised collections;
   - the need to make the most cost-effective use of resources.

What is being proposed in response to these demands is an integrated estates and collections strategy which is expected to take from five to seven years to implement fully. The investment (which would come from a mix of external funding and University resources) will provide significant improvements to the collections and associated services, which can be developed at lower recurrent cost through savings in staff, estate and other operating costs. The new depository is vital to this strategy, because it not only allows for essential and urgently needed growth space for collections, but also provides the decanting space required by some of the other developments. For that reason, this report places the case for the depository in the context of the wider picture. However, it is important to note that:
   - although the overall estates strategy relies on the construction of the new depository, the case to be made for the depository is independent of the wider strategy because of the existing chronic lack of space for collection growth;
   - acceptance of the case for the new depository is without prejudice to decisions by the University regarding those other elements of the estates strategy which, as pointed out in the Curators’ statement of 24 June, are being developed in detail and will be the subject of consideration in the first instance by the consultative groups that the Curators have established for the Central Bodleian site, the proposed Radcliffe Infirmary Humanities/Area Studies/Mathematics Library, and the Radcliffe Science Library redevelopment;
   - the depository itself will be built to meet standards designed to ensure the proper preservation of the collections stored there.

6. The present proposals set out a programme of works over the next five to seven years which together constitute a major renewal of the University’s library estate. The main benefit will be to the Humanities (whose principal ‘laboratory’ is to be found in the University’s central libraries and collections), but there are also proposed investments in a new medical information centre and a refurbished science library, and a major investment in electronic collections which will renew information support for scientific and other subjects. The cost of the entire capital programme would, over its five to seven year duration, amount to around £100m, with the funding coming both from the University and from external sources generated through the continuing Libraries Capital Campaign.

(B) Current situation and issues

7. This building programme is intended to address three major problems with the existing library estate:
The lack of space for growth of the collections. Council has recently reaffirmed the University’s 400-year commitment to the Bodleian continuing as a library of legal deposit. Stock growth is over 3 miles (5.2 km) per year, and shows no sign of declining. There is no space for growth in existing stores and central research libraries.

The poor quality of existing library storage. Specifically the stacks in the New Bodleian (now containing the equivalent of 3.5 million volumes) do not meet current requirements for Special Collections. The University’s licence from the National Archives has been extended only temporarily, and if improvements are not made quickly the University will lose its right to hold some existing deposit collections, and the privilege of receiving future collections on behalf of the nation, and grants to support them. The University currently has the second most important and extensive library collection in the UK, and one of the best university collections worldwide.

The University has a fragmented and costly library estate, operating on almost eighty sites and housed in many cases in old and, in some cases, cramped and poorly adapted premises. Some departmental libraries have inadequate space for readers and insufficient space for stock growth. Small libraries are not able to offer the range of services and longer opening hours now required by students to support their learning. Some larger historic libraries are badly in need of refurbishment or replacement to meet modern health and safety standards and to provide access for the disabled.

(C) The Twentieth Century achievement

8. In the first half of the 20th century there were two major building developments on what is now the Central Bodleian site to address the problem of rapidly expanding stock: the Radcliffe Camera underground bookstore (1912) and the New Bodleian Library (begun 1937, opened 1940). In terms of the engineering solutions adopted, these book storage projects were innovative in their time. The Camera underground bookstore (c. one million volumes equivalent capacity) introduced one of the first known examples of rolling stack, the design of which is attributed to W.E. Gladstone. Giles Gilbert Scott’s New Bodleian combined a core of half-height bookstack floors with perimeter full height reading rooms, and a ziggurat design with 60% of the stack floor area below ground. These floors (like the Camera underground bookstore) had to be tanked to avoid water penetration into the bookstack areas, since, on average, half of the stock held underground is below the surrounding water table at any time. The underground book conveyor, sunk in a new tunnel under Broad Street, linked the New Bodleian stacks, which were built to contain 2.7 million equivalent volumes, with the main reading spaces in the large reading rooms in the Old Bodleian. The conveyor was never extended through to the Camera. An earlier underground trackway, linking the Old Bodleian and the Camera, was removed when the conveyor was installed and was replaced by the system still used today of using book trolleys and manual handling of books up several stairways to deliver material to the large reading rooms in the Camera.

9. This early 20th century infrastructure is now in need of renewal. Oxford’s main library has not yet undergone a major upgrade on a scale equivalent to those from which a number of its peer institutions have benefited over the last 25 years, examples being
Harvard\textsuperscript{5}, Yale\textsuperscript{6}, Princeton, Columbia\textsuperscript{7}, Cambridge and Trinity College Dublin\textsuperscript{8}. A longer-term solution to growth of stock is required than can be provided by piecemeal enlargement of existing capacity. The book conveyor – which is crucial to the continuing use of the reading rooms in the Old Bodleian – needs to be completely overhauled. As already pointed out, the National Archives has recently given only temporary renewal to the Bodleian as an approved repository for material held on behalf of the nation because the conditions for storage and consultation of material in the New Bodleian do not meet modern standards. It is urgent that the University proceed with the refurbishment of this library so that its major collections can be properly stored and its Approved Status thereby retained.

\textbf{(D) New capital investment programme in library buildings}

10. The Curators of the University Libraries are making the case for a major capital investment programme with five main objectives:

- to increase the accessibility of library collections;
- to increase the storage capacity for the collections;
- to improve greatly the conditions in which collections are held;
- to bring together in a more cost-effective way currently dispersed activities;
- to expand very substantially the electronic content available to University members by purchase of more electronic journals and datasets (benefiting in particular, but not exclusively, science and medicine), and by digitising older material to improve access to historic collections (benefiting in particular, but not exclusively, the Humanities).

The estates objectives will be met by a buildings and refurbishment programme consisting of:

- a new depository;
- upgrading and developing the New Bodleian Library;
- a new Humanities and Area Studies Library on the Radcliffe Infirmary site;
- remodelling the Radcliffe Science and Hooke Libraries;
- building a new Medical Library on the Old Road site to complement existing provision at the Cairns John Radcliffe while replacing three existing libraries (ORC, Churchill and RI site medical library);
- a new conservation facility.

\textsuperscript{6} See \url{http://www.library.yale.edu/news/smlrenovation.html} for details of Yale’s upgrade.
\textsuperscript{7} See \url{http://www.columbia.edu/cu/lweb/indiv/butler/renovation/index.html} for details of Columbia’s upgrade.
\textsuperscript{8} See \url{http://www.tcd.ie/Library/LIRC/Photos/Photos.html} for details of Trinity College Dublin’s upgrade.
The proposed library estates plan will lead to an estimated net reduction in library space of up to 6,148 square metres through more condensed storage and more efficient use of library space, but at the same time delivering improved service levels, with a space cost saving of £154k pa. Over a five-year period, staffing costs are also estimated to reduce by up to £2m overall, with savings made through redeployment, staff turnover and voluntary severance. Such savings will arise from the more efficient deployment of staff in more modern buildings and by extensive use of automated storage and retrieval. It is important to stress, though, that service levels will themselves be enhanced.

(E) Book storage requirements and current provision

11. Though the New Bodleian stacks were intended to provide one hundred years’ growth, the additional storage lasted only sixty years and in the 1970s a remote store was developed at Nuneham Courtenay, 8 miles from Oxford, with the intention of providing up to forty years expansion. The New Bodleian is now 130% full (currently holding in excess of 3.5 million equivalent volumes), measured against its original design capacity, and the Nuneham Courtenay bookstore (built from 1974 onwards and holding 1.3 million equivalent volumes) also has no expansion space and cannot now be extended because planning permission has been refused for further storage modules.

12. Despite the advent of electronic full text, the growth of the physical collections within the OULS is not reducing. Council has recently (September 2004) examined the costs and benefits of accepting UK copyright material and has reaffirmed the University’s commitment to its status as a legal deposit institution.

13. With no space for growth in any of its stores or central library stacks, OULS has been forced over the last year to outhouse collections in temporary commercial storage in Wiltshire and Cheshire. This can only be a short-term expedient. It is expensive to maintain (of the order of £110k for 2005-6 and increasing thereafter at approximately £10k month by month), and a permanent solution is urgently needed so that a proper new permanent depository can be developed to house existing lesser-used stock in proper storage conditions, with capacity for stock growth over the next twenty years, and beyond if required.

(F) A new depository

14. The early commissioning of a new book depository is fundamental to the smooth day-to-day running of the library system since it will provide for the current shortfall in book storage and allow for future growth to 2026. In recent years lack of space at Nuneham Courtenay led to the accumulation of material in the New Bodleian stack which, in turn, inhibited access to certain parts of the stack for book fetching. Such serious interruptions to service have only been avoided subsequently by the expensive and short-term measure of transferring material into remote commercial storage. A new depository is also crucial for the decant of stock from the New Bodleian and the RSL/Hooke to allow those libraries to be upgraded and developed.

15. Research into types of library storage systems shows that an Automated Storage and Retrieval System (ASRS) is now the most cost-effective approach. This replaces conventional or rolling stack systems with robotic retrieval from high racking in order to achieve storage of up to ten times more density than conventional shelving, and six times...
more than rolling stack. It is a proven technology which has been used in storage and
distribution for forty years and which has been installed in national and university
libraries worldwide since 1991. There are now over fourteen such library systems in
operation, with eight more in construction and planning (see the appendix to this report),
including an eight-million equivalent volume depository being planned by the British
Library at Boston Spa. Sites inspected by OULS and other staff (including staff from the
Estates Directorate) are indicated in the appendix.

16. The proposed site for the new library depository is at Osney Mead, where the library
service is already basing its support operations (e.g. IT support, and, in the future, Technical Services) in the Osney One building. The University has land available on the existing site of the office and warehouse building that currently houses the OULS Systems and Electronic Services section (the SERS Building) and around the Osney One Building (formerly Blackwell’s Scientific). If required, there is room for future expansion of the depository on an adjacent site also owned by the University. Alternative sites in Oxford and beyond have been sought over a number of years by the University Land Agent and considered, but a careful search has revealed no currently available site capable of housing a depository of the capacity required and close enough to Oxford to ensure an effective and reliable book-delivery service to the reading rooms in central Oxford.

17. The depository, which it is proposed to build on the Osney Mead site using ASRS technology, would have a capacity of at least 8.25 million equivalent volumes, and would provide for the immediate permanent housing of 4.3 million equivalent volumes, with twenty years’ growth to 2026. The stock which would be permanently located at Osney is currently stored in the New Bodleian (c. 1-2 million equivalent volumes out of a total there of 3.5 million, depending on the scope of the New Bodleian project), at Nuneham Courtenay (1.3 million), in the Camera underground bookstore (0.6 million), in the Radcliffe Science Library (0.5 million) and in various other locations (0.4 million). The spare capacity would be used in the interim to decant the whole of the permanent New Bodleian stock to allow for the redevelopment of the stack. The consolidation of stock from the currently fragmented storage would allow reductions in recurrent staff and space costs. The Nuneham Courtenay modules would be released for alternative use, such as storage of secondary museum collections, and the Camera underground store would also be vacated. Space released in the New Bodleian stack will allow remodelling of this building to provide for more open shelf stock and enhanced reader facilities, with greatly improved storage for Special Collections stock.

18. The new depository would use a similar request method to the Automated Stack Request System already in use, with retrieval from the robotic store beginning in a matter of seconds. The current delivery standard of 80% within three hours will be maintained (or in the case of Nuneham Courtenay improved upon). Vans will run from Osney Mead up to twelve times a day to all major library sites. A regular and reliable van service already operates between the central library sites and the OULS and SERS offices at Osney Mead.

19. The new depository designs have already been discussed in outline with the planning authorities and there are believed to be no major problems with planning permissions. Most of the site is already above the designated floodplain (one in a hundred year flood contour), and engineering measures will be taken to raise the building further so that the risk of flood damage will be lower than for those levels of the New Bodleian stack and the Camera underground bookstore where the stock already lies below the water table.
Provision will also be made for alternative power generation in the event of power failure. The depository stock will be held in a low oxygen environment for fire prevention and improved stock conservation, and will meet the updated BS5454 standards for book storage (expected to be revised in 2006 to take account of ASRS). In short, there will be a much improved and safer environment than any current provision for book storage in central Oxford.

(G) New Bodleian upgrading and development

20. Development of the New Bodleian has been recognised for the past ten years as a key objective for the University, and it is a cornerstone of the current Libraries’ Capital Campaign. The existing mechanical and electrical systems in the New Bodleian have now passed the age when they can realistically continue to be maintained, and the building needs to be brought up to modern standards for collections storage, fire detection and suppression, and health and safety. Both readers’ facilities and staff working conditions need to be greatly improved. In a recent visitation to the Bodleian (February 2005), the National Archives was unable to provide a full period renewal for the Bodleian’s licence to hold collections for the nation. However, temporary renewal was approved in recognition of the work that has been done to improve conditions, and in acknowledgement of the fact that there are plans in hand to remedy deficiencies in storage measured against standard BS5454. The National Archives expectation in awarding the temporary renewal is that further significant improvements will be made within the next three years. In order to refurbish the New Bodleian it will be necessary to remove completely all the stock (3.5 million equivalent volumes) to expose the superstructure. It is planned to use the twenty-year growth space in the new depository to hold this closed access stock for the three-year refurbishment rather than rent commercial storage at what would be a prohibitive cost. Since a proportion of the collection is low-use, this can be left in the depository permanently in improved conditions and without reduction to the current delivery standard.

21. This gives the University the opportunity to upgrade and develop, rather than merely refurbish, the New Bodleian, and to provide a research facility based on the University’s Special Collections, with support facilities to rival the best available anywhere in the world. The vision for the New Bodleian includes a permanent exhibition space to display the Bodleian’s treasures, and a suite of seminar rooms where students can be taught ‘hands-on’ using Special Collections materials. Existing Special Collections reading rooms would be extended, and more open stack provided for direct browsing. Special Collections stock currently scattered around other libraries and held in inadequate conditions could be brought together in a more secure and appropriate environment. Offices could be provided for ‘Bodleian Visiting Scholars’ so that academic exploitation of the collections can be facilitated. If financially viable, a restaurant for university members and visitors could be installed on the ground floor, as envisaged in the Broad Street Plan. This remodelling, which might be phased, has an estimated cost, depending on its scope, of between £25m and £50m, with £10m already earmarked by the University and with the remainder in the process of being raised through the Libraries’ Capital Campaign and from other external sources. The refurbishment is expected to take up to five years to complete; so that if stock decanting and staged reading room improvements

\[9\] The letter from the National Archives can be seen at http://www.ouls.ox.ac.uk/news/buildings when this website is launched on 3 October.
were to begin in 2007-8 the major building works would be completed by 2012 at the latest. At this stage timing is necessarily flexible, however, and will depend partly on the completion of the Humanities/Area Studies Library on the RI site. During the main part of the New Bodleian works services such as the Oriental reading room, Modern Manuscripts, Maps and Music would move to alternative locations nearby so that consultation services were not disrupted. The Old Bodleian will remain substantially as it is at present, devoted to reading rooms in support of research in the Humanities.

(H) A new Humanities Library on the Radcliffe Infirmary Site

22. The University’s library provision has grown piecemeal since the Second World War, with numerous departments and faculties creating their own small libraries, largely uncoordinated with the major research collections in the Bodleian Library Group (Central Bodley, Radcliffe Science Library, Rhodes House, Law Library) and the Taylor Institution Library. Though some of these libraries were funded through the Libraries Board, it was not until the establishment of the Oxford University Library Services (OULS) in 2000 that there was a University-wide framework to allow these libraries to be organised as an integrated service for readers. Since 2000, some forty libraries have been merged organisationally into the OULS; and in 2003 the University Council accepted the recommendation of its working party to review the initial period of library integration that it was in the interest of library users overall that this integration process be accelerated and completed by 2007.\textsuperscript{10}

23. Whilst there have recently been some major advances in consolidating collections in new buildings (e.g. Social Science Library, Said Business School, Sackler Library), some departmental libraries remain in cramped accommodation lacking expansion for stock and adequate facilities for readers. This is particularly the case for a number of the Humanities/Area Studies departments, where the ambition is to provide a new purpose-built Humanities Library on the Radcliffe Infirmary site, alongside the new Humanities Centre housing the academic departments and teaching accommodation. The maximum advantage for library operations would be achieved if twelve existing Humanities and Area Studies libraries (plus Mathematics which plans to move to the RI site), could be merged into one large library on this site. However, the decision as to which libraries will transfer to the new building – and thus its size – is one that will be determined by academic requirements. Nevertheless, the new library will certainly be very much larger than the successful Social Science Library, and will similarly result in an improved service for faculties and students. The site is available in late 2007, and the Humanities Library would take two years to build. Consideration will also need to be given to the refurbishment or upgrading and development of any of the humanities libraries it is eventually decided are not to merge into the Radcliffe Infirmary site library.

24. Decisions yet to be taken on the content of the Humanities Library on the RI site may well have implications for the future use of the Radcliffe Camera, which currently houses materials for subjects including History, Theology and English. Recognizing the Camera’s history and its architectural status, the Curators intend that the building should be retained for library purposes and its reading rooms as reading rooms. When decisions have been

made about the Humanities Library, the Curators will consult on options for library uses of the Camera.

(I) Science and Medicine provision

25. As part of the examination of the University’s central library space requirements and information needs a consultative study called ELISO (Electronic Library and Information Service for Oxford) was undertaken with the support of all the academic divisions, and this reported in March 2005\(^\text{11}\). The finding was that Oxford University was under-spending on electronic provision by £1m p.a., and that over a five year period expenditure on subscriptions should be raised from the current £750k p.a. to £1.75m p.a., with an immediate injection of £450k in capital spending to increase the number of electronic journal back-sets. Additional capital investment in IT equipment and in support staff was also found to be required.

26. ELISO proposed a business case to fund electronic expansion by consolidating the existing departmental library system in science, using the Radcliffe Science Library as a major hub. The business plan shows an initial investment balanced by a reduction in space, staff and materials costs over five years, with a break-even point after five years and cost recovery after ten years.

27. Over the next two to three years the Radcliffe Science Library and the Hooke Library will be combined to create an integrated lending and reference Science Library. The collections will be rearranged and the building will be altered to cater for this change in function and to accommodate the collections of those departmental libraries being incorporated. Enhanced electronic provision and extended opening hours will accompany these changes, which have been broadly welcomed by the three science divisions. Provision for science will therefore be through a modern centralised library service based on the RSL, backed by delivery of research material from the new depository and supported by a much enhanced electronic provision of journals and databases, available twenty-four hours a day across the University network. Similarly, in medicine, the existing four libraries will be concentrated onto two sites, the present Cairns Library at the John Radcliffe site and a new Medical Research and Information Centre on the Old Road site, combining services currently delivered through the Churchill, Radcliffe Infirmary and Old Road site libraries. The Medical Research and Information Centre, expected to open in 2008, will cost £1.9m and will be funded through the Libraries Capital Campaign.

(J) A new Conservation Centre

28. The final strand in the OULS estates strategy is to rehouse the library’s conservation facilities, currently inadequately accommodated across scattered sites in Central Bodley, Nuneham Courtenay and Osney Mead, into a purpose-built centre. This initiative, funded through the Libraries Capital Campaign, will provide a modern facility for conservation work, including training facilities for staff, apprentices, interns and others.

(K) Summary of principal capital proposals for the University library estate

29. The table below shows the expected capital costs of the four major proposals for the

\(^{11}\) See http://www.admin.ox.ac.uk/lib/oxonly/eliso/eliso.shtml for the report.
library estate, which total between £80.9m and £115.9m. Part of the funding of these costs (£11.8m) has already been earmarked by the University. The remainder is expected to come from the Libraries Capital Campaign, which is currently underway, and from the Oxford University Press, whose Delegates have agreed in principle that a substantial sum should be transferred to the University over the next five years towards capital projects in the University’s libraries and other purposes. With the exception of the depository, costs depend on decisions still to be taken about the size of the developments.

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<thead>
<tr>
<th>Proposed Project</th>
<th>Expected Cost</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>Depository</td>
<td>£29m</td>
<td>£2m of expected cost is for initial loading of Depository</td>
</tr>
<tr>
<td>RI site Human Studies/Mathematics library</td>
<td>£25m-£35m?</td>
<td>Costs depend on size.</td>
</tr>
<tr>
<td>New Bodleian</td>
<td>£25m-£50m?</td>
<td>Costs depend on scope of refit.</td>
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<tr>
<td>Medical Research and Information Centre</td>
<td>£1.9m</td>
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**L. Conclusion**

30. This report has set out the case for the new depository in the context of other strategic proposals being developed for the future of the University’s library services. As stated earlier, the detailed business case specifically for the depository is due to be considered by Council on 10 October after scrutiny by its Planning and Resource Allocation Committee and will be available on-line after the meeting of Council. There will be further reports from the Curators to Congregation on the other proposals with respect to particular sites when they have been developed in detail. The development of proposals for the Central Bodleian, the RSL/Hooke, and the Humanities and Area Studies Library will be taken forward in consultation with the representative groups established by the Curators to liaise with divisions and faculties, beginning in Michaelmas Term. Members of Congregation will therefore have opportunity to consider these at a later stage. The only issue for immediate decision concerns the automated depository at Osney Mead.

31. A depository is required urgently to meet immediate storage requirements. It is also the vital provision which will enable other developments necessary to provide an up-to-date library service for the University; but it does not dictate their shape or content, on which detailed planning and consultation will continue. It makes change for the better possible. Without it, significant improvement is impossible. The Curators hope that members of Congregation will agree with them that the strategic case for a new automated depository sited at Osney Mead is persuasive and that its development should be approved.

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12 At http://www.ouls.ox.ac.uk/news/buildings.
Appendix

Library depositories with ASRS installed

[Libraries marked with an asterisk have been visited by OULS staff]

CSUN Oviatt Library, Northridge, California*
Bruce T. Halle Library, Eastern Michigan Univ., Ypsilanti, Michigan
Grand Valley State University, Allendale, Michigan*
Sonoma State University, Sonoma, California*
Lied Library, Las Vegas, Nevada*
Mildred Topp Othmer Library, Tokyo, Japan
Meiji University, New central Library, Tokyo, Japan
Kansai-Kan, National Diet Library, Tokyo, Japan
National Library of Norway, Mo - I - Rana, Norway*
Valparaiso University, Valparaiso, Indiana
Merrill Library, Utah State University, Logan, Utah*
Church of the Latter Day Saints Library, Salt Lake City, Utah
National Library of Spain, Barcelona
King County Library System, Preston, Washington (State)*

Libraries currently building ASRS systems:

Chicago State University, Chicago, Illinois
Ekstrom Library, Univ. of Louisville, Louisville, Kentucky
Irving K. Barber Learning Centre, British Columbia, Canada
Santa Clara University, Santa Clara, California

Libraries planning ASRS systems:

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Simon Fraser University, British Columbia, Canada
Long Beach, California State Univ., Long Beach, California.
National Library of Slovenia
Part B: The Business Case for an OULS Depository

1. Executive Summary

1.1. This paper makes the business case for the construction of a large offsite depository at Osney Mead to provide cost-effective high-density storage.

1.2. This depository is a vital component of the OULS Estates Strategy Development Programme and is the key initial project without which the other major capital projects in the programme cannot be carried out.

1.3. Specifically, the project will allow OULS to achieve a number of strategic goals:

- To provide growth space for OULS collections to 2026;
- To scale back or close operations at the existing repository at Nuneham Courtenay which is much less efficient to operate than the proposed depository and which cannot be expanded;
- To accommodate a large amount of stock permanently transferred from the New Bodleian Bookstack and the Bodleian’s Underground Bookstore to allow early improvements in operational efficiency;
- To house further stock temporarily decanted from the New Bodleian Bookstack to allow the building to undergo the extensive refurbishment and remodelling required to ensure it meets current standards and maintains its Approved Status as a repository for material held on behalf of the nation;
- To enable the transfer of Humanities faculty libraries to the Radcliffe Infirmary site through the decanting of lower use stock to the depository;
- To enable the remodelling and rearrangement of the Radcliffe Science Library and Hooke Library and the physical consolidation on that site of departmental science libraries collections.

1.4. The depository will use the high-bay Automated Storage and Retrieval Systems (ASRS) commonplace in the distribution industry and which has been installed in national and university libraries worldwide since 1991.

1.5. It will cost an estimated £29 million to construct and charge with the first 4.3 million volumes of existing stock. This cost includes VAT and a 10% contingency. The capital cost per volume stored equates to 93% of the cost of storing a volume at Nuneham Courtenay repository.

1.6. The recurrent cost of operating the facility is estimated at £1.228 m per annum including staffing and space-related and system maintenance costs. Per volume, this is just 55% of the costs at Nuneham.
1.7. These changes will generate recurrent savings of approximately £422K pa. These savings will contribute to the improvement of library services, including an increase in access to electronic resources.

1.8. The time taken to deliver books from the depository to the Bodleian reading rooms would be equal to or quicker than that achieved from the New Bodleian Bookstack and considerably less than that taken to deliver from Nuneham Courtenay.

1.9. The depository is required as soon as possible and could be delivered during 2007.

1.10. Planning for the depository is at an advanced stage. Recent work has included a comparison with the design of the new British Library at Boston Spa near Leeds, further refinement of the content and timing requirements, and more detailed studies concerning the positioning of the building on the Osney Mead site. The project team has drawn up a risk register to identify and allow for factors that may affect the cost, deliverability or operational performance of the depository, and has consulted with the City Council Planning Department and with the Environment Agency in preparation for a planning application. These developments are considered in this appraisal.

1.11. The proposed depository compares favourably with that under development for the British Library. Both will cost some £25-£27 million to construct. While carrying a different cost structure because of the limit in building height, the OULS proposal provides for substantially greater throughput with an average of some 2,800 picks per day compared with 4-500 at the British Library. The conditions of storage, risks and building services are broadly comparable. Advantage has also been taken of the knowledge and experience gained by a number of University and national facilities in the US and Europe, following site visits by OULS and Estates Directorate staff.

2. **Strategic Needs Driving the Requirement for a Depository**

A large-scale, high-capacity library depository is required in order to accommodate growth in collections, to hold temporarily extensive collections that need to be decanted ahead of major library building refurbishment and to enable OULS to consolidate its libraries and estate by providing expanded storage for lower-use stock.

2.1. **Accommodating growth in collections**

2.1.1. OULS collections grow at a rate of approximately 175,000 volumes\(^{13}\) (5.2 km or 3.25 miles of shelving) each year. Approximately 52% of this comprises the Bodleian’s intake of material received through Legal Deposit. There is now insufficient space in OULS to accommodate this growth. The New Bodleian Library Bookstack, OULS’s

\(^{13}\) In this document, ‘volume’ is used to mean a standard ‘nominal’ volume, equating to a Bodleian Nicholson ‘d’ size book which can be shelved at 34 books to the metre. Measuring in nominal volumes allows a fair comparison of spaces and storage options in terms of theoretical capacity. The numbers of actual volumes that can be stored in a space will vary, depending on the size of the books selected. In the case of periodical parts, pamphlets or music scores, for example, the number of actual items that can be stored in a given space will greatly exceed its capacity in nominal volumes.
single largest book store, now contains 30% more stock than it was designed to hold (3.5 million volumes as opposed to a design capacity of 2,700,000). The Radcliffe Science Library and Bodleian Law Libraries are full. The Nuneham Courtenay Book repository is full and an application for planning permission to develop a second phase of storage modules that would have provided approximately 50km of additional storage was rejected in December 2003 because the facility is considered by the planning authority to have reached its maximum operational size on this rural site. No further development is possible here due to these major planning constraints.

2.1.2. In 2004-5 OULS has had to transfer lower use stock from Nuneham Courtenay to commercial stores in Cheshire and Wiltshire in order to create space for new acquisitions. At present, approximately 150,000 volumes (4.2 km) are held there at a cost of some £110K pa. Material currently stored commercially is low use (Foreign Dissertations and non-academic Bod X class material) and retrieval rates are low, costing around £20K pa. The selected Bod X material is not currently retrieved for readers. OULS will transfer further stock to commercial storage during 2005 and will have to continue to outhouse lower use stock like this until the new depository is completed. An increase in expenditure on retrieval will be needed as more heavily used stock has to be out-housed. By mid 2007, OULS expects to have spent approximately £500 K on commercial storage and retrieval, without the creation of any capital asset.

2.1.2. Constant growth has been a feature of Oxford’s major libraries and has been a major driver in the development of the library estate. The Underground Bookstore (UB) in Radcliffe Square was constructed in 1912 to provide some 1,000,000 volumes worth of additional storage for collections which had outgrown the Old Bodleian Library. As currently shelved out, the UB provides capacity for 626,000 volumes. Again, in 1937-39, the New Bodleian was built to provide 100 years of storage for continuing collection growth, but it was full in less than 60 years. The most recent phase of storage construction began in 1974 with the development of low level storage modules at Nuneham Courtenay, some 8 miles from the city centre. This latest increase in capacity has been used up and a new high-capacity store is now required.

2.2. Deteriorating conditions

2.2.1. Much of OULS’s estate comprises older buildings which are expensive to operate and which, in many cases, fail to provide adequate storage conditions for stock as well as appropriate conditions for users. In particular, the New Bodleian, OULS’s principal store and the second largest book repository in the UK, fails to meet current standards for the storage of library
material (BS 5454:2000). The building has no inherent fire protection and no fire suppression system. Its construction is inherently unsafe due to the air gaps between its floors, which would create the effect of a chimney in the event of a fire. Its air conditioning system, which serves only 60% of its storage areas, is over 20 years old, overdue for replacement and fails to provide the required carefully controlled levels of temperature and relative humidity. As a result, the New Bodleian’s collections are deteriorating. The building’s basic services are old, at risk of failing and in urgent need of replacement. Some 30% of the building’s contents, approximately 1 million volumes, are stored below the water table. Regular water leaks through the bitumen tanking are causing localized damage to stock. The Paternoster Book Conveyor which forms a vital link between the Old and New Bodleian is now over 60 years old and frequently breaks down, resulting in interrupted services to readers. It badly needs a major refurbishment including the replacement of its monitoring equipment.

2.2.2. The National Archives, which awards Approved Status to institutions holding manuscript material deposited in lieu of Death Duty, requires the Bodleian to make significant improvements to the conditions provided in the New Bodleian in order to maintain its approval. A temporary extension of its approval has been awarded but this expires in 2008. The loss of National Archives Approved Status would have far-reaching consequences for the Bodleian and its ability to attract important collections would be diminished. The loss of reputation to the University of Oxford would have a significant effect on its ability to attract both faculty and students. The National Archives’ letter of 1st June 2005, setting out their requirements for the Bodleian, forms Appendix D.

2.2.3. Major refurbishment work in the New Bodleian would require the temporary decanting of all the 3.5 million volumes it contains, for a period of up to three years. As part of this refurbishment it is proposed that the New Bodleian should undergo a major transformation to become a Special Collections library (see below) and a major part of its current stock would be permanently transferred to the depository and to the Radcliffe Infirmary site. However, at least 1.2 million volumes of Special Collections material would need to be stored temporarily before being returned to the New Bodleian Bookstack following the completion of works. The most cost-effective way of doing this would be to use the empty growth space within the new depository.

2.3. **Consolidation of the OULS estate**

2.3.1. OULS is at present a highly distributed library system with 40 libraries and support services operating on 45 sites. Together, OULS’s many sites house over 11,000,000 volumes and are managed by a staff of 600 FTEs. Owing to the large number of sites, recurrent costs are relatively high - OULS’s operating budget for 2005-6 is over £28.7 million and staff costs are £14.6 million of this total.

2.3.2. Following a review of library integration by a panel chaired by Sir Brian Follett, the Council of the University confirmed its policy of library integration in February 2003, indicating its wish that the integration of libraries into the OULS be accelerated, with the process complete by the end of 2007. Led by this policy, OULS estate strategy has focused on moving to a more concentrated, integrated system where library services
are delivered on a reduced number of sites, with a reduced number of staff and making greatly increased use of electronic resources and open access to hard-copy library resources.

2.3.3. OULS estate and collections management policy is based on the provision of library services centred on subject ‘hub’ sites reflecting the divisional structure of the University’s teaching:

<table>
<thead>
<tr>
<th>Sciences</th>
<th>The Radcliffe Science Library</th>
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<tr>
<td>Social Sciences</td>
<td>The Social Science Library and the St. Cross Building</td>
</tr>
<tr>
<td>Medicine</td>
<td>The Cairns JR and the Old Road Campus</td>
</tr>
<tr>
<td>Humanities</td>
<td>The Bodleian Central Site: Research/Special Collections</td>
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<td>The proposed Radcliffe Infirmary Humanities Library: Teaching Collections/Research</td>
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<tr>
<td>Library Support</td>
<td>Osney Mead</td>
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<td>Functions</td>
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A proposed timetable and the interrelationships governing these developments are shown in Appendix C.

2.3.4. The current division between offsite and city centre storage does not reflect patterns of usage. At present 89% of the Library Services’ 11 million volumes is stored in the city-centre libraries, yet evidence from circulation data suggests that a far smaller percentage of stock is used regularly. For instance, in the science collections the proportion of hard-copy borrowing collections that has been consulted within the last three years is as low as 20% in some subjects.

2.3.5. Relocating lower-use material to the proposed offsite depository would reduce the space required by city-centre collections and the cost of storage. It would allow better presentation of the remaining material on open access, together with better targeted local stack storage, on a reduced number of sites.

2.4. To meet these strategic needs, OULS is proposing that a new library depository be constructed at Osney Mead on the site of the existing SERS Building.
3. **Strategic Options**

3.1. **Do nothing**

Without the provision of large-scale additional storage, OULS would be unable to continue its current operations. Without growth space it would be forced to become steady state, discarding older material in order to acquire new stock and the Bodleian’s role as a national library of Legal Deposit could not be sustained. Without growth space for special collections or space for the temporary decanting of stock from the New Bodleian during refurbishment, the Bodleian would lose its National Archives Approved Status and the deposited collections it currently holds. OULS would be unable to achieve the efficiency gains engendered in its estate strategy and funding could not be released to extend or improve its services.

3.2. **Use Commercial storage**

Commercial storage is too expensive. Using commercial storage to house the 8.3 million volumes OULS wishes to store remotely by 2026 is likely to cost £3.4 million per annum (at current day prices). This excludes the initial delivery and final withdrawal of stock. Any increase in desired retrieval rates for the out-housed stock is likely to result in paying a commercial organization to develop just the kind of storage and retrieval facility that is proposed here.

3.3. **Construct additional onsite storage**

Constructing additional storage within existing library buildings would be too expensive and does not deliver the efficiencies possible in a new development using high-density industrial methods. A proposal for a two story extension to the Radcliffe Science Library basement, providing storage for a further 355,000 volumes, was costed at £5.45 million in 2001. Projected to 2007, this figure (becoming £6.5 million at 3% pa) equates to more than £17 per volume, some 5 times the cost of high-density offsite storage. Even if practical proposals could be identified, planning permission and listed building consents would be required to carry out most extensions and storage systems would be constrained as a result. OULS storage would continue to be distributed inefficiently across the system and staffing costs would remain high. The high costs of providing and operating such onsite extensions (for example to the Taylor Institution Library or the basement of the Radcliffe Science Library) could not be justified for low use stock. Additional city centre book storage can only be justified for higher use material, such as stock identified for the proposed Humanities Library on the Radcliffe Infirmary Site.

3.4. **Construct additional offsite storage**

Constructing a depository offsite gives the greatest scope for large-scale, high-density storage and allows OULS to take maximum advantage of industrial technologies to improve retrieval times, reduce costs and transfer funds to other uses. Capital and recurrent costs can be brought to the lowest level, appropriate for less-used stock. By
designing a single new-build facility, staffing levels can be kept low and appropriate storage conditions and security can be provided at a cost-effective rate per book. To enable the University to maximize the efficiency savings across the OULS system an offsite depository needs to be a single building capable of storing existing lesser used material and providing growth space for at least 15 to 20 years as required by BS5454. The depository needs to be sited close enough to allow rapid delivery without major transport cost or disruption from traffic congestion.

The University has considered locations within the Oxford Ring Road and beyond at Swindon, in Hertfordshire, in the West Midlands, at Bicester, Buckingham and Kidlington. Land prices have not been found to be significantly lower at these distances. An appreciable fall-off only occurs as far north as Derbyshire and delivery times from this distance would be too long for the scale of storage required. The further a site is from central Oxford the greater would be the cost in terms of transport and delivery times. Delivery from any sites outside the Oxford Ring Road would suffer from serious traffic congestion that would cause major disruption and delay to service.

The University Land Agent has carried out a search for suitable alternative sites within the Ring Road but, at this time, none is available. If an alternative site were found, the purchase price, which can be estimated at £3 million, would add considerably to project costs. Sites within the Oxford Ring Road would be subject to similar or more restrictive planning restrictions on building height and mass. The Land Agent has concluded that Osney Mead offers the nearest and only immediately available and therefore practicable location for the required depository.

4. Design Options

The recommendations for the depository result from the evaluation of options for

- Type of storage
- Size and phasing

4.1. Desktop Study of Storage System options

A specialist logistics consultancy, Total Logistics, was tasked with determining the nature of storage system needed to meet the desired operating characteristics and provide the densest storage medium. The warehouse operation was modelled for each of the options, taking into account the total costs of construction, storage of equipment, and operation, and the pattern of demand for the proposed material, according to data provided by OULS. The study was non-site specific and assumed a green-field site and straight-forward build. The options considered, and the conclusions, were as follows;
a. Multi-storey building with mobile shelving
b. Multi-storey standard open shelving (as used in the New Bodleian)

Both these options were rejected due to the high building cost coupled with long term higher staffing levels. In addition, the cost of services needed to maintain environmental conditions over some 5 floors would be considerably more expensive than in a normal warehouse configuration.

c. Staffed cranes operating in high-bay storage (as used by Harvard University)
The ‘man-up’ solution, using high-bay racking and semi-automated picking, was rejected because ‘man-up’ cranes need to be significantly wider and thus storage density is much lower. ‘Man-up’ storage requires a greater volume and, in the Osney Mead context, a much larger footprint.

d. Automated cranes operating in high-bay storage (as first used by California State University Library, Northridge)
The review concluded that an Automated Storage and Retrieval System (ASRS) would be the most cost efficient option, because of its high bay configuration coupled with lower staffing levels. In addition this configuration allows the maximum density of storage. In unstaffed storage spaces it is easier and cheaper to maintain control of environmental conditions and better systems for fire safety can be provided.

ASRS is commonplace in the warehousing and distribution sectors and is described in Appendix E. The technology has been in use since the early 1960s and there are now estimated to be some 5,000 commercial ASRS facilities worldwide, running some 15,000 cranes. Since 1980, approximately 2,400 ASRS cranes have been installed on some 300 sites in the UK and there are a number of ASRS suppliers serving the UK with maintenance support provided locally.

ASRS has been in use by libraries since 1991. There are now some fourteen library stores in existence worldwide that use this technology and another nine are under development. The British Library has received funding to develop a major high-bay ASRS store at Boston Spa, of similar scale to that proposed here, by late 2008. A list of library ASRS depositories is given in Appendix F.

4.2. Study findings

The key findings of Total Logistics’s study appears in table form in Appendix G. Capital and Operating costs of ASRS were judged to be 13% and 30% respectively lower than those of mobile shelving, the next most cost-effective solution.
For further cost comparison, OULS has drawn up twenty year Investment Appraisals for Total Logistics’ ASRS and mobile shelving options and for a third option, that of outsourcing storage with a commercial archives operator. These cashflows (attached as Appendix H) show that, over a twenty year period, the costs of constructing and operating an 8.25 million volume ASRS facility would have a Net Present Value (NPV) of £39.1 million. A mobile shelving solution would have an NPV of £46.3 million, while outsourcing would have an NPV of £48.4 million. On this basis, ASRS costs would be 84% of mobile shelving costs and 80% of outsourcing costs.

On the basis of these margins it was concluded that ASRS offered the most cost-effective solution for OULS and should be taken forward as the preferred option for further development by the feasibility study team. This included the identification of a range of layout and configuration options for an ASRS warehouse and the drawing up of an outline specification and site-specific cost estimates for building and services.

4.3. Phasing options

a) Phased building construction

The volumes planned for storage in the depository, and key aspects of demand, are detailed in Appendix I. The size of the depository should ideally allow for future growth in collections, for at least 20 years (BS5454). The site plan and layouts for a building proposed to meet these requirements appears in Appendix J.

Some 60% of the building’s capacity would be needed on occupation in 2007, rising to 87% as early as 2010, to allow for decanting the New Bodleian collections. Phasing construction has been considered but it would not be cost effective or practical to build-on in these small increments. The cost of constructing the shell of the building is £7.3M or 31% of the total project cost (excluding VAT).

b) Phased fit-out

It would be feasible to consider equipping the depository incrementally but the cost penalty incurred by doing this, and the difficulty of protecting stock already in the system during the later installation of the deferred aisles, has led the project team to reject this option. Appendix K shows the number of cranes and aisles required, calculated from the storage requirements and demand. This shows that three cranes and aisles could be deferred until the beginning of 2010, along with the associated storage bins (totes) and racking. The later installation would require provision for access into the building, and temporary screening to protect existing material. Appendix L shows the cost savings attributable to the phasing of equipment installation.

This would have an initial capital saving of £2.4M for three years, on racking, cranes, and totes (see Appendix L) at a penalty of £346,000 for the following costs:

A Mini-load crane and racking at California State University Library Northridge
Building access £ 50,000
Temporary screening £150,000
Inflation at 3% per annum £146,000
Total £346,000

4.4.  Parameters for depository design

4.4.1. Usage data
Total Logistics carried out an analysis of existing OULS book storage and retrieval operations, using data from user requests and retrievals and replacements in the central Bodleian system for 2003-2004 to project likely patterns and levels of demand over a twenty year period. The basic data governing the design parameters is tabulated in Appendix I. Total Logistics calculated that, at peak, the depository would receive 4,611 requests for retrievals a day, with average weekday demand at approximately 2,700 requests a day. A key assumption behind this figure was that overall user demand would increase by 30% by 2026. Total Logistics consider that expected growth in OULS collections would not in itself result in increased demand. The proposed system will be able to handle the peak retrieval load.

4.4.2. Assumptions for storage requirements
The assumptions made to determine the storage requirements detailed in Appendix I are:

- The RI site will become available in July 2007, with the Humanities Library building programme beginning in January 2008, and taking 2 years
- The New Bodleian refurbishment would require decanting of stock and service departments for a 3 year period – obtaining planning approval and feasibility studies are estimated will probably need at least 2 yrs, allowing a possible start in June 2007
- The new Humanities and Area Studies Library, to be constructed at the Radcliffe Infirmary (RI) site, must be completed before stock, currently located in the New Bodleian, can be decanted to it, to facilitate the New Bodleian refurbishment
- The depository should release existing, expensive, commercial storage by spring 2007;
- A number of library collections need to be reorganised (e.g. the RSL) and space made available for consolidating material.

4.4.3. Staffing Calculation
The basic picking operation has been estimated at approximately 60 seconds per item. The depository staffing would be up to 11 picking staff at the outset rising to 12.9 by 2026, plus a superintendent, a part time maintenance engineer and two drivers. This staffing would be spread over two shifts. This small size of workforce, much smaller than the current staffing attributable to handling the same quantity of stock, is possible because automation removes the non-productive walking time involved in picking from conventional shelving. The cost saving against the existing staff budget for
storage is calculated as at least £250,000 pa. The depository staffing plan appears in Appendix M.

4.4.4. Cranes calculation
The base data for collection size, and demand for retrievals, has been provided by OULS. The crane cycle is estimated at 51 seconds per pick, based upon industry standard design parameters. This figure has been used to calculate the number of cranes required and estimate the cost. The design will be fully detailed when suppliers have been short-listed and their proposals rigorously tested.

The required number of cranes is determined by the peak hour demand. The peak hour demand is 461 in 2007 rising to 591 during the New Bodleian decant. This demand determines that 13 cranes would be required, assuming an equal workload for each. Additionally, one crane would be needed, dedicated to maps. The number of cranes has been minimised by restricting operations during peak hours to picking only, and not replacing returned stock until quieter parts of the day.

5. Proposal
OULS proposes that an Automated Storage and Retrieval System book depository be built on the site presently occupied by the SERS building, on Osney Mead. This would allow a maximum footprint of c. 6,350 sqm. A prevailing height restriction of 15 metres internally would permit a building capable of holding some 8.25 million volumes, sufficient to provide growth space for a 20 year period.

5.1. Comparison with the British Library Depository

5.1.1. The depository design has been compared with the available details for the new British Library depository. The primary differences are attributable to:

- the eaves height of 25m allowed to the British Library at Boston Spa by the planning authority;
- the far greater throughput demanded of the OULS depository (which determines the number of cranes);
- the redundancy (duplication) that the British Library has introduced into its mechanical services.

These differences are dealt with in more detail in Appendix N.

5.1.2. In discussions with the British Library it has been advised that joint procurement of cranes and racking would not provide a cost saving because suppliers would already have ‘bundled together’ requirements from a number of customers in order to generate
such savings. The tooling design for the storage tote to be used for the British Library has been especially developed for their requirements, which do not address some of OULS needs (e.g. newspapers). The British Library advises that it is unlikely that moulds could be made available to OULS due to the long production runs and clash of timescales involved. Subject to a design study on tote construction, OULS needs to own its own tools in order to control costs and risks involved in purchasing additional or replacement totes over the full lifetime of the depository.

5.2. Site Planning

5.2.1. Architects Scott-Brownrigg have carried out a site planning exercise based on data provided by Total Logistics’ study. The aim of this planning has been to identify the maximum footprint and the best placement of the depository on the site given the likely constraints imposed by the site and by local council planning restrictions and the relationship with neighbouring University buildings. A number of layout options have been developed, as the planned size and phasing of the depository have changed during the course of value engineering.

5.2.2. Scott Brownrigg’s proposal, Scheme 11, is for a depository of some 8,134 sqm on a footprint of 7,102 sqm, constructed in a single phase. The depository would be fitted out with 15 m high steel racking arranged in 13 aisles measuring 83 m long. This system would contain some 129,000 plastic storage bins or totes, each with a footprint of 800 mm x 600 mm and of one of four heights, and would have a nominal capacity of 7,936,000 volumes. In addition to this tote store, the depository would contain a fourteenth aisle comprising a pallet based storage system for maps, equivalent in capacity to 500,000 nominal volumes (Appendix O).

5.2.3. OUED and OULS have held three initial meetings with Oxford City Council Planning Department to discuss issues affecting site planning and building design on Osney Mead. Planning has advised that a building of up to 18.2 m height would be allowed, providing the length of any one section of ridge did not exceed 25 m (the design would need to incorporate breaks and raised sections in the roof-line in order visually to break up the overall mass of the building). A 15 m high rack is therefore assumed, resulting in the current planned capacity of some 8.3 million equivalent volumes.

5.2.4. The depository could be further developed in a modular way and could be further extended onto adjacent sites owned by the University. The overall size of an extended depository would be subject to planning permission and may be restricted to a further separate storage building, linked by conveyor to a common handling area.
5.3. **Charging the Depository**

5.3.2. OULS proposes to transfer up to 4.3 million volumes from existing sites. These transfers are tabulated in Appendix O.

5.3.3. OULS proposes to decant permanently into the depository at least 1 million volumes from the New Bodleian Bookstack and to temporarily decant to there up to a further 2 million volumes from the bookstack, during remodelling works. The details of this depend on the OULS collections management strategy and the approach to be taken for the refurbishment of the New Bodleian Library.

5.3.4. **The Nuneham Courtenay Book Repository**

OULS needs a highly efficient storage and distribution system in order to minimise ongoing operational costs. Rather than operate remote stores at both Nuneham Courtenay and Osney Mead, OULS proposes to vacate the current Nuneham facility and transfer its 1.3 million volumes to the proposed Osney Mead depository. Maintaining a single site at Osney Mead would streamline the logistics of operating remote storage and minimise the recurrent costs involved. The Nuneham Courtenay repository could be reallocated to meet storage needs in the University museums.

5.3.5. OULS proposes to relocate some 500,000 low-use volumes from the Radcliffe Science Library and departmental science libraries within OULS to allow the concentration of more heavily used science collections within the RSL and the subsequent consolidation of science departmental libraries.

5.4. **Environmental control**

5.4.1. British Standards 5454:2000 lays down requirements for the storage of library and archive material. Meeting this standard is desirable for all library stores, but is considered mandatory for the storage of Special Collections. OULS will focus on providing the best conditions in the New Bodleian Bookstack, where its Special Collections will be permanently stored, but will use the depository to house temporarily Special Collections material during the refurbishment of that building.

5.4.2. The design team has considered what savings could be achieved if the specification of the depository were to be reduced so that it did not comply with BS5454. The main cost elements imposed by BS5454 would be the building envelope and air handling equipment, specified to protect the contents from damage from external causes and to maintain an acceptable internal environment. However, reducing the specification of the shell and air handling plant would lead to high recurrent energy costs which, over time, would exceed the capital savings achieved. The project team takes the view that the cost-effectiveness and overall benefit of the depository would be reduced excessively for a relatively small capital saving, reckoned at approximately £250-350K. The depository will therefore be designed to comply with BS5454:2000, except in the area of fire compartmentalization: the standard has been written to suit buildings with conventional floor heights and volumes and requires compartment sizes that cannot be achieved in large-volume, high-bay ASRS warehouses.
5.4.3. BS5454:2000 applies to conventional library storage facilities and, in its current form, is difficult to apply to larger, single volume industrial warehouses of the type considered for Osney Mead. A revision of BS5454 is expected in 2006. The British Library has approached the Chair of the British Standards 5454 Committee to raise high-bay ASRS design issues so that the lessons it has learnt during its design phase can be taken into account during the development of the new standard. Oxford University’s design team has also made an approach to the BSI and, as the new standard emerges, OULS will ensure that the Osney depository complies with it by modifying the design, as necessary.

5.4.4. OULS will continue to discuss the Special Collections storage requirements with the National Archives in order to ensure their support for satisfactory interim arrangement for Special Collection storage in the depository until the New Bodleian refurbishment is delivered. Further value engineering exercises will also be undertaken by the design team, and the final design specification and cost will be determined from these inputs.

5.5. The advance ordering of stock held in the depository

The present Automated Stack Request module of OLIS, the Library Management System (LMS), already allows users to select, request and track material remotely over the internet, from anywhere in the world. The depository’s Warehouse Management System (WMS) will interface with OLIS and its successors, to continue to provide this facility. The transit barcodes of requested items will be scanned at key points in transit and the LMS will be constantly updated with the location of stock on the move. A reader will be able to check the current status of their order online and will see messages such as ‘retrieved at depository’, ‘in transit’, ‘received at library’ or ‘available in the Upper Reading Room’.

5.6. Delivery from the depository

Delivery will be via a number of regular, pre-determined van journeys to the designated hubs and will ensure that requested items are delivered to reading rooms normally within 100 minutes of an order being placed, during depository operating times. In the case of the Bodleian, this is quicker than achieved at present from the New Bodleian Bookstack. Service delivery from the depository is discussed in Appendix P.

6. Costs

6.1. Capital Costs

6.1.1 The capital cost of constructing and loading the depository is estimated at £29 million including a 10% contingency and VAT. Costs are based on a construction programme completing in the first quarter of 2007.
6.1.2. This figure includes £1.54 million to load the first 4.3 million volumes into the depository, from Nuneham Courtenay, the New Bodleian and the OULS science libraries. The costs of subsequent transfers, for example from libraries relocating to the RI site, are not included here and allowance would need to be made in future project budgets, as required.

6.1.3. Increasing the height of the depositories flood defence wall by 400 mm to provide additional protection against a 1 in 300 year flood event (see section 8.2.2.b below) would increase the construction cost by £250 K.

6.1.4 VAT
OULS and OUED have met with Andy Hallsworth of the University Taxation Office and have discussed the scope for reducing the level of VAT payable within the project budget. In order to qualify for zero-rating of VAT, the depository would need to contain at least 90% Legal Deposit stock, a category recognised by Customs and Excise as relating to the University’s non-core business activity. Typically, Legal Deposit stock forms approximately only 50-60% of Bodleian holdings and it would not be possible to separate out Legal Deposit stock and concentrate it in a distinct and separate part of the depository in order to clear the required threshold for zero-rating - the depository would be a single enclosed storage space and the automated storage and retrieval system would sort and move the contents around within the racking to reflect levels of usage. As is the case for any expenditure under the Capital Goods Scheme, the University would be able to claim back 18% of VAT. In effect, this would mean that a rate of VAT of 14.35% would be charged on all project capital expenditure.

6.1.5. The full cost estimate for the depository is given in Appendix Q.

6.2. Recurrent costs

6.2.1. It is estimated that the completed facility will cost £1.228 m pa to operate on opening (excluding depreciation).

6.2.2. The proposed facility would have a Gross Internal Floor Area (GIFA) of 8,134 sqm. Space-related costings have been estimated at £431 k for the Premises Maintenance & Overhead Costs (£53 per sqm), and £357 k for Premises Occupancy Costs (£44 per sqm).

6.2.3. The new depository would require a staff of up to sixteen FTEs operating in shifts on opening, at peak times, at a cost of £268K. This includes a Superintendent, drivers and a maintenance engineer. The transfer of low-use stock to the Osney Mead depository will enable staff savings elsewhere in the OULS system. To avoid compulsory redundancies existing staff from the New Bodleian Bookstack and Nuneham Courtenay will transfer or relocate to other jobs in OULS or the wider University, or may opt for early retirement or voluntary severance packages.

6.2.4. Two additional vehicles are allowed for, to be dedicated to delivering stock between the depository and the city centre-libraries. Electric or gas-powered vehicles will be
specified to minimise environmental impact. It is anticipated that these two vans will together make twelve delivery and collection runs a day. Vehicles are expected to cost £8K pa to run.

6.2.5. Maintenance support for the ASRS system is estimated to cost £153,000 per annum.

6.2.6. The annual recurrent costs and major equipment renewal costs for depository are given in Appendix R.

6.2.7. **Useful Expected Life**
The Depository Building and the ASRS system will need to undergo periods of refurbishment and renewal during their operating life. Appendix R includes a presentation of likely costs relating to ASRS equipment and software renewal over a 50 year period. These costs could be treated as high, since established library ASRS depositories such as the Oviatt Library at CSU Northridge, have found components to have a longer life than assumed here. The renewal of building systems and components has not been costed yet. Instead, this paper applies the University’s standard 10 year expected life for M&E installations and 50 years for the building structure. OULS and OUED will produce a full refurbishment/renewal cost estimate in the next phase of the project once the system provider has been identified.

7. **Benefits**

7.1. **Non-financial**
The depository would:

- Provide approximately 126 linear km of decanting space into which some 4,300,000 volumes of existing holdings can be decanted;
- Provide 99 linear km of growth space for future acquisitions, sufficient to last approximately 20 years (at 5.2 km per year);
- Enable the rationalisation and physical integration of libraries within Oxford;
- Provide good standards of fire safety and environmental conditions for its contents;
- Allow the implementation of the New Bodleian Library Development Project;
- Allow an improvement in storage conditions for stock remaining in other, currently overcrowded library stacks.
- Provide the means for delivering the requirements of the Follett Report (2003).

7.2. **Financial**

7.2.1 **Savings directly attributable to the depository**

a) The net annual savings in operational costs which would be directly attributable to the depository are:
Staffing efficiencies £250,000
Premises Occupancy Costs savings £303,000
Total £553,000 annually

In addition, a reduction of some £365,000 in Premises Maintenance and Overhead Costs (Infrastructure Charge) will be achieved.

b) These savings are discussed in OULS budget papers to be submitted independently to PRAC.

c) Staff efficiency savings are based on a reduction in the existing 38-strong workforce in OULS principal storage operations, achieved as a result of automation in the new depository. It is anticipated that some £250K pa can be released, equivalent to approximately 14 posts.

d) The £303,000 and £365,600 pa space cost savings result from the net reduction of storage area by some 6,882 sqm (excluding depository growth space) through the release of existing space at Nuneham Courtenay, in the Underground Bookstore in Radcliffe Square and in the New Bodleian Library Bookstack (which could be reduced in size through the proposed remodelling works). This space carries a premises cost of £99 per sqm per annum.

e) Additionally, the cost of commercially rented space would increase with growth and inflation in future years. The alternate costs of space required for the consolidation of libraries are not considered here but a Nuneham Courtenay module would cost £600K and provide storage for 13 months of growth.

7.2.2. Reallocating the Nuneham Courtenay book repository to museum storage or other activity, rather than constructing new bespoke storage, could allow a University saving of perhaps £4.5 million (the estimated construction cost of Nuneham Courtenay).

7.2.3. OULS proposes to release back to the University the Underground Bookstore in Radcliffe Square.

7.3. Analysis

7.3.1. The depository would cost £29 million to construct and fit-out, including £1.54 million to load with the first 4.3 million volumes.

7.3.2. The estimated capital cost of the development equates to £3.25 per volume, when full (£27 million/8.3 million volumes). This compares with £3.46 per volume for the Nuneham Courtenay repository (£4.5 million/1.3 million volumes).

7.3.3. The estimated recurrent cost of operating the depository, when full, would equate to 14.79p per volume per annum (£1.228M/8.3 million volumes) compared with 27p per volume per annum for Nuneham Courtenay (£353K/1.3 million volumes).
7.3.4. The Investment Appraisal for the depository, covering the first 10 years of operation is given in Appendix S.

In order to allow a like-for-like comparison of estimated costs with current costs, Appendix S1 has been structured to show the notional space costs attributable to existing volumes only (i.e. excluding the storage of future growth).

8. Risks

The Project Team has produced a Risk Register calculating the likelihood and impact of key risks and identifying measures that can be employed to mitigate these. This is attached as Appendix T. Key risks are discussed here.

8.1 ASRS System Failure

8.1.1. The chief risk to the successful operation of the depository is a failure in the mechanical systems and software control of the ASRS plant itself.

8.1.2. The technology of ASRS is not in itself new, having been widely used worldwide in the distribution and warehousing industries since the 1960s. It has been applied to library storage since 1991 and there are now more than fourteen working library ASRS stores, with a similar number under development. Existing sites visited by members of the Oxford project team have not reported major technical problems with the systems and, in general, have found reliability and ease of maintenance to be better than anticipated.

8.1.3. The principal system risk lies in the interface between the Warehouse Management System (WMS) provided with the ASRS and the Library Management System (LMS), whose request module will need to be customized to provide the functionality required for Oxford’s libraries. The LMS will become operational approximately one year before the completion of the depository and early trialing of the WMS and LMS interface will be carried out to identify any likely problem areas. The design of the WMS will be kept as simple as possible with most of the functionality residing in the LMS. The experience of other ASRS libraries suggests that any system interface problems can normally be resolved speedily.

8.1.4. The project has allowed for the appointment of a Commissioning Manager to oversee the final completion, testing and startup of the system. This process will involve carefully controlled performance tests using actual library holdings before the system is brought into full operational use. The contract with the ASRS supplier will allow for repeat tests to ensure that, following any modification and changes to the system, the original user specification and performance targets are still met.

8.1.5. The conveyor delivering storage totes from the cranes to the picking stations serves the whole system and any conveyor failure could affect the whole ASRS. This risk will be minimised through careful design. The conveyor will be of roller and twin belt design. It will be constructed from standard mechanical elements, for example,
rollers, motors, belts, sensors. Availability of the conveyor system has been specified as 99% in the User Requirements Specification. Designs and layouts are being considered with built-in resilience, such as split and two or three zone conveyors. The detailed design stage will address resilience and provide a cost effective solution with high availability. In-house, on site, engineering expertise and a large spare parts store on site will minimise the time to fix problems. Whilst the conveyor will go down from time to time for short periods OULS will keep this to a minimum through planned and reactive maintenance. Down time is not expected to be significant as conveyor technology is well tried and tested.

8.1.6. During operation, the ASRS will be covered by full planned and reactive maintenance support agreements with the supplier and OULS will employ an on-site maintenance engineer to provide front-line support.

8.2. Flooding

8.2.1. Site levels and flood risk

a) The proposed depository site is low-lying and could be vulnerable to flooding. The Environment Agency Flood Risk website shows the depository site (along with most of West Oxford) as lying below the 1% annual probability (1-in-100 year) flood ‘contour’ used to mark the upper limit of the Flood Plain. The risk of a site within the boundary of this contour line flooding in any one year would be judged to be 1% (1-in-100) or less, giving a probability of flooding for the site based on the website map of less than 1.3% (or once in every 75 years) but more than 0.5% (once in every 200 years). The Environment Agency mapping is known to be inaccurate, however, and OUED commissioned Peter Brett Associates (PBA) to carry out a level survey in order to provide more reliable level data. This survey has shown that, in fact, only a small portion of the proposed footprint of the depository lies below the 1-in-100 flood contour (on a level of 56.6 m/185.7 ft Above Ordnance Datum [AOD]) and a small area of adjacent land (currently above the 1 in 100-year contour) would need to be lowered to provide compensatory volume for displaced floodwater. PBA have also carried out an analysis using river cross section data provided from the Environment Agency’s hydraulic model adjacent to the Osney Mead site. The Executive Summary of Peter Brett Associates’ Flood Risk Assessment is given in Appendix U.

b) Flood protection measures in this area of the Thames have been progressively improved. During the 1700s only rudimentary controls existed which were designed to maintain a head of water for the local water mills. More effective control mechanisms were introduced in 1790 when the Oxford Canal and the Thames-Severn canal were constructed and connected to the Thames. Floods in the 1870s led to an inquiry resulting in further improvements to weir structures along the length of the river, including up and downstream of Oxford. Since that time there have been further continual improvements, including enhanced dredging schemes, to provide improved river control mechanisms. The landmark Land Drainage Act of 1930, in particular, allowed for modern comprehensive land drainage/flood alleviation schemes. The overall result of these river management measures is to improve flood conveyance through Oxford. The nature and magnitude of these changes make historic flood data
unreliable as a basis for prediction. Historic accounts of flooding before the 1870s indicate that fields were frequently flooded for many weeks each winter, and this problem has now been greatly reduced. However, flood control measures are only effective under normal flow conditions. During an infrequent event, such as a 1 in 100 year flood, the river effectively acts as a natural watercourse (as the control mechanisms are bypassed or overtopped), and the hydraulic model provides data on flood levels in these circumstances.

c) The highest recent recorded flood levels occurred in 1947, before the development of the Osney Mead Industrial Estate. At that time the whole of the Osney area was under water. In the 1950s the developers of the Industrial Estate raised the ground surface above the level of the surrounding flood-meadows. Since then, occasional floods have affected the estate but the sites now owned by the University are believed to have remained dry. In the winter of 2001-2 and 2002-3, water levels rose to flood the western end of the estate road, at the junction with the Botley Road, at the estate roundabout and along the western half of the Osney Mead road itself. At the east end, the Bulstake Stream flooded part of the lawn to the rear of the Osney One Building and the ground-water drains in the car park overflowed causing puddles. Neither the Osney One Building nor the neighbouring SERS Building was directly affected.

d) Members of the project team met with the Environment Agency to discuss a possible depository development. The Agency advised that the accuracy of their flooding models was such that a margin of error of +/- 300 mm (1 ft) should be applied to the 1-in-100 year flood level of 56.6 m (185.7 ft AOD).

8.2.2. Measures for mitigation of flood risk

The depository storage area will be constructed to the highest standards to ensure that it is impenetrable to water from any source.

a) During construction, the floor of the proposed depository will be raised significantly to reduce the risk of the facility flooding. Scott-Brownrigg’s feasibility study made an allowance of an increase in floor level of 300 mm (1 ft) above the 1 in 100 year contour. To reflect the potential effects of climate the project’s consultants advise that a further 300 mm (1 ft) of protection be given in the form of a continuous flood defence wall, upstand or ‘bund’ constructed on the perimeter of the floor slab. The depository would therefore be protected to a level of 600 mm (2 ft) above the Environment Agency’s stated 1 in 100-year flood level and 300 mm (1 ft) above upper limit of the 1 in 100-year flood margin of error. The contents of the racking will be stored at least 500 mm (1.6 ft) above the warehouse floor, as is dictated by the use of rail-based robot cranes. Together these measures will raise the lowest books within the depository to a level of at least 800 mm (2.6 ft) above the 56.6 m (185.7 ft) AOD level.

Summary:

- The design and engineering for the site provides protection for a flood event based on an estimated 1 in 300 flood event (57.1m/187.3 AOD), using an extrapolation of the results from the Environment Agency’s hydraulic model.
• 1 in 100 year flood level: 56.6m (185.7 ft) Above Ordnance Datum (AOD).

• Depository floor level 300mm (1 ft) above average 1 in 100 year flood level to provide maximum protection against effect of climate change increasing 1 in 100 year flood risk.

• Reinforced concrete and tanked upstand to provide a continuous flood defence wall a further 300mm (1 ft) above floor level at 57.2 m (187.6 ft) AOD to provide protection against an estimated 1 in 300 year flood (57.1 m/187.3 ft AOD).

• Books held in racking 500mm (1.6 ft) above floor at 57.4 m (188.3 ft) AOD.

b) Concerns have been expressed about flood risk since the publication of the Curators of University Libraries statement in the University Gazette on 22 September 2005. In order to further reassure the University on this issue OULS would now advise that the height of the flood defence wall be increased to give protection to the upper limit of a 1 in 300 year flood range, although the project consultants maintain that this is not necessary. PBA have estimated the 1 in 300 year flood contour to be at 57.1 m/187.3 ft AOD (i.e. 100 mm / 0.3 ft below the designed height of the upstand) with a tolerance of +/- 500 mm (1.6 ft), based on extrapolation from the Environment Agency’s hydraulic modelling. The depository’s flood defence wall would therefore need to be raised by a further 400 mm (1.3 ft), to a level of 57.6 m (189 ft) AOD to provide complete protection for a 1 in 300 year flood event. This further protection would add approximately £250K to the capital cost of the construction.

Raising the bund still further is not recommended. Whilst PBA have suggested an estimated 1 in 1000 year flood contour at 57.6 mm +/- 500 mm (189 ft +/- 1.6 ft) AOD, the assessment is not based on a rigorous hydraulic analysis. Raising the flood defence wall by 900 mm (2.95 ft), from 57.2 to 58.1 m (187.6 ft to 190.6 ft) AOD would cost an additional £1m and require substantial upgrading to the pilings and slab as well as a major redesign of ancillary block floor levels and openings.

c) Services will be designed to remain fully operational even if the land surrounding the building becomes waterlogged or flooded, with an Uninterrupted Power Supply (UPS) provided to allow key equipment to safely shut down if the site becomes isolated from the mains. Back-up power for the full operation of the depository could be provided from vehicle-mounted generators brought to site. The environmental control systems will be specified to maintain target levels of Relative Humidity even in times of flooding. In the longer term, it may be desirable to raise the level of the estate road at its lowest point to ensure continuity of service for all businesses on the estate.

d) Material stored in the basement of the New Bodleian Bookstack is currently at risk from flooding. Its two largest floors are below the water table and its present bitumen tanking is ageing. Combined with the lack of fire protection and poor environmental control, this places the stock at considerable risk of damage or loss. Transferring this stock to the Osney Mead depository would significantly reduce this risk.
8.2.3. **Access to the Site during Flooding**

Disruption of deliveries to central libraries from the Osney Mead depository due to flooding is not seen as a high risk. Any disruption during a major flood event, such as a 1 in 100 year flood, is likely to have greater effect on libraries through staff being unable to reach work to provide service in libraries. Reader demand would also be reduced through similar difficulty for users in reaching central Oxford.

Peter Brett Associates (PBA) have analysed the flood risk, based on the current data from the Environment Agency, along the whole route between the Osney Mead depository site and libraries in Central Oxford (see report at Appendix U). Within the Osney Mead Estate the access road during a 1 in 100 year flood event would be flooded to a depth of 300mm to 500mm, with one isolated spot to a depth of 800mm. There are four possible points of flooding along the route outside the Osney Mead estate, but all are above the 1 in 100 year flood level, though they can be affected by poor localized road drainage when high water levels occur in normal watercourse outfalls at these points. The greatest risk of flooding is at the Botley Road railway bridge. This has been impassable due to flooding in recent years, but not since improvements have been made to pumps and outfalls. If Botley Road is blocked, then alternative delivery routes to Central Oxford can be obtained by using the A34 north or southbound.

OULS has occupied the SERS building on the Depository site since July 2002, and runs a scheduled minibus for staff between Osney and central Oxford 18 times a day. The 2002-3 flood disrupted this service to site for one day due to flooding at the lowest point on the access road, but Osney remained accessible to high wheeled vehicles of the type that will be used for book deliveries.

8.3. **Other risks**

8.3.1. **Failure to secure Planning Permission**

Oxford City Council’s Planning Department has indicated that there would be a restriction on building height, overall mass and visual impact, as well as traffic and parking. These issues have been considered at the earliest stages of design and will be carefully addressed during ongoing detailed design and the preparation of the planning application.

8.3.2 **Fire**

The risk of fire would be mitigated by installing an oxygen depletion system (i.e. increasing the nitrogen content to a level where combustion cannot occur). The system would be backed up by alarm and manned systems during maintenance or other system outage.

8.3.3. **Building systems failure**
The building would have multiple connections to power supply. There would be backup UPS systems for software and emergency services, but crane operation would not be possible at times of power failure.

8.3.4. Data connectivity
The site has a single connection to the University data backbone and would be isolated if this is severed. A second connection is being planned, to provide continuity of service in the event of a single connection failure.

8.3.5. Design Purpose
The depository is itself a risk management exercise and will provide improved environmental conditions for OULS holdings, reducing the risk of damage and promoting preservation.

8.4. Risks and Project Management

8.4.1. OULS and OUED are working closely with a team of highly experienced specialist consultants appointed to provide expert advice during the feasibility study, design construction and commissioning phases. This team is being project managed by Mace Limited’s Neil Thompson (FICE), who acted as Chief Engineer for the British Airways London Eye, Design Coordination Manager for the Terminal Building at Hong Kong Airport and Design Manager for the main building at Heathrow Terminal 5 (including its automated baggage handling system).

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<td>Architect</td>
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<td>Flood Risk Assessment</td>
<td>Peter Brett Associates</td>
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<td>Mechanical &amp; Electrical Consulting Engineers</td>
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8.4.2. The project’s Sponsors will carefully monitor the progress of the project during all stages, receiving regular reports from the appointed project manager, and from OUED and OULS Project Officers. Sponsors will in turn report regularly to the Curators of the University Libraries, the Buildings and Estates Sub-Committee and the Planning and Resource Allocation Committee.
8.4.3. The University has specified the use of the I-Chem-E form of contract for the procurement of the Automated Storage and Retrieval System which is extensively used for the procurement of engineering plant. This has been heavily modified to suite the University’s requirements, with advice from Total Logistics, who are managing the selection of the ASRS supplier.
9. Appendices

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