

Digital Surveying Assignment

Introduction to Surveying

The importance of a building survey is to provide a client with a detailed evaluation of a building, this will help the client to make reasoned and informed decisions on the purchase of a property or the planning of maintenance or upgrading of a building. The role of digital technology in building surveying is to increase the amount of information a surveyor can provide as well as providing more accurate information. Digital technology also increases the efficiency of surveying, with traditional methods often being time consuming, this decreases the time for a client to receive a report and allows a surveyor to undertake more surveys.

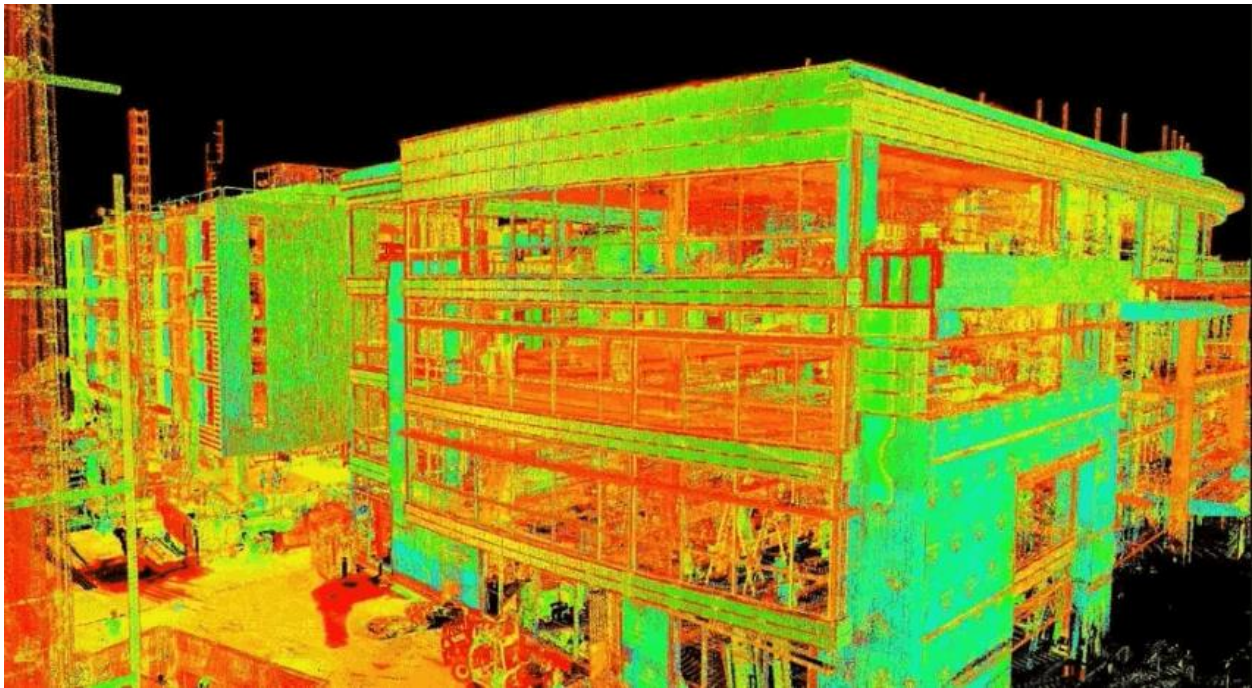


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This report aims to identify the benefits of modern technology in surveying and the scope depending on the building type, location and areas requiring assessment. This will be done by providing a plan for a comprehensive building survey utilizing modern methods of surveying and applying them to a real-world scenario.

Survey Objectives and Scope

The main objective of a building survey is to document its current condition, done by highlighting areas of concern or failure. A survey is not only to identify current areas of disrepair, but also important for identifying potential future issues. A survey should also provide recommendations of remedial works to resolve areas of concern and estimated costs of any works required. Surveys can also provide information on the building through 3D scans to provide a digital virtual scan of the building, this can be utilized for future works or surveys.



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To determine the scope of a survey you need to understand the clients' requirements to identify which survey type is required. A level 1 survey is basic and meant for new or nearly new buildings in good condition. Level 2 and 3 surveys are more thorough and inspect the entire building both internally and externally. Before undertaking a survey, it is important to identify the type of building, which would entail knowing the construction methods and the building's purpose. The building we are proposing to survey is the Y Fforwm which is a university library and is reinforced concrete frames at low level with steel frames for the upper levels. Due to the buildings' use certain elements may be obstructed and therefore would not be given a condition report. Location is also an important consideration, as this will help to identify any hazards or limitations due to location. The key areas of focus should be the condition of the walls, floors, windows, rainwater goods, services, and the roof structure. This is because these elements of the building are most important to provide a weathertight and warm structure. Cost and future Maintenance could also be other key areas of a survey; this will allow the client to make an informed decision on any remedial or maintenance works that may be highlighted during the survey. Energy performance may also be considered when performing a survey, this

is important with a building as large as the Y Fforwm, as increasing energy performance can reduce the running costs of the building and help to make it more sustainable.

SERVICE FEATURES	LEVEL 1 SURVEY (FORMERLY KNOWN AS CONDITION REPORT)	LEVEL 2 SURVEY (FORMERLY KNOWN AS HOMEBUYER SURVEY)	LEVEL 3 SURVEY (FORMERLY KNOWN AS BUILDING OR STRUCTURAL SURVEY)
Describes the construction and condition of the property on the date of the inspection	✓	✓	✓
Aims to identify any problems that need urgent attention or are serious	✓	✓	✓
Aims to identify things that need to be investigated further to prevent serious damage	✓	✓	✓
Aims to tell you about problems that may be dangerous	✓	✓	✓
Aims to show up potential issues and defects, before any transaction takes place	✓	✓	✓
Aims to help you decide whether you need extra advice before committing to purchase		✓	✓
Aims to enable you to budget for any repairs or restoration		✓	✓
Aims to advise you on the amount of ongoing maintenance required in the future		✓	✓
Aims to establish how the property is built, what materials are used and how these will perform in the future			✓
Aims to describe visible defects, plus exposing potential problems posed by hidden defects			✓
Aims to outline the repair options and give you a repair timeline, whilst explaining the consequences of not acting			✓
Provides specific comments on energy efficiency			✓
Where practical and agreed beforehand at an additional cost, provides an estimate of costs for identified repairs			

Digital Tools and Technologies In Construction



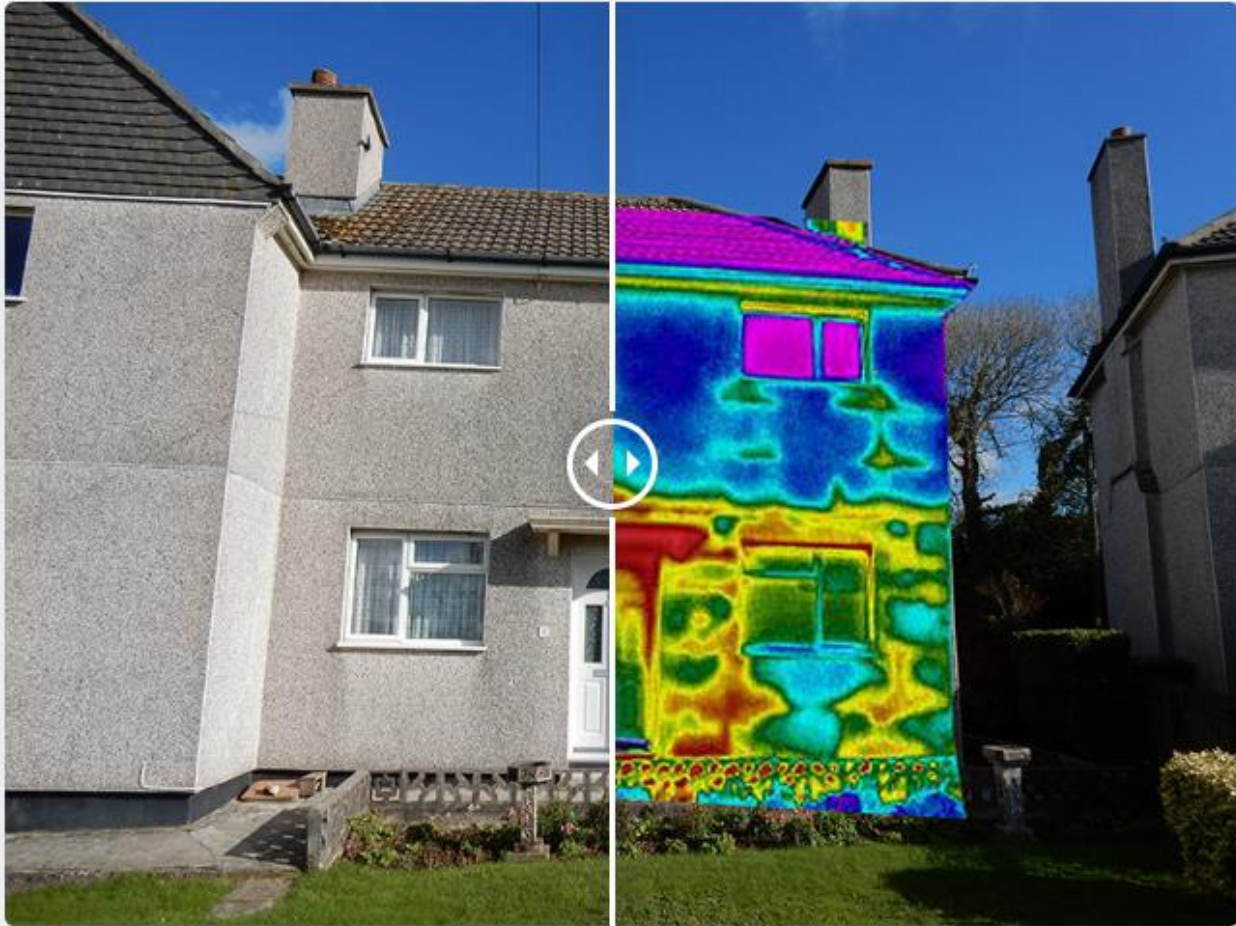
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To undertake a thorough survey on the Y Fforwm a LIDAR scanner can be used to map out the building this can later be opened in CAD software for future surveys or future works. A major advantage of using LIDAR Scanners is the ability to collect data quickly with complex detail that can be revisited using modelling software. These scans can be used for future renovations or upgrades to the building, it also provides all measurements removing the need for multiple site visits to confirm measurements and removes the requirements for measured surveys. Due to the scanner capturing all elements of a building should the client's specifications change the scan data can be revisited to extract the additional information as required. This has been chosen because an objective of the survey is to produce a 3D model that can be used to plan future maintenance or can be used for future works on the building.



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Another piece of digital technology in surveying that can be used in a survey of Y Fforwm could be drones. These allow for a surveyor to inspect high areas of the building like the roof, walls and rainwater goods that would normally require scaffolding to inspect, this is beneficial as it allows the surveyor to produce a more thorough survey and removes both the costs of scaffolding and the risks of working at height. Drones are also beneficial for surveying due to the speed at which they can survey, this includes both surveying high hard to reach areas as well as the accompanying land surrounding the building. Drones can capture images allowing for more data/evidence to be provided for the surveyor's report. They can also be outfitted with LIDAR scanners, this allows for the building and surrounding land to be scanned and viewed in modelling software, this could be used for further works to the building, or a development nearby as the LIDAR scanner is able to capture topographical data. Drones can also be outfitted with thermal imaging cameras which can identify high moisture levels and heat loss, this can help a surveyor to identify whether there is a leak due to a defective detail or insufficient insulation to an area causing excessive heat loss. Handheld thermal imaging cameras can also be used independently to identify cold spots, leaks and defective details to the building envelope without intrusive inspection. Drones have been chosen because the objectives of the survey are to assess the condition of the walls, roof, windows and rainwater goods of the building, a drone allows for a surveyor to assess the high-level elements and report back the condition, another objective was to assess the energy performance of the property this can be assessed using a thermal camera to identify heat loss on the building.

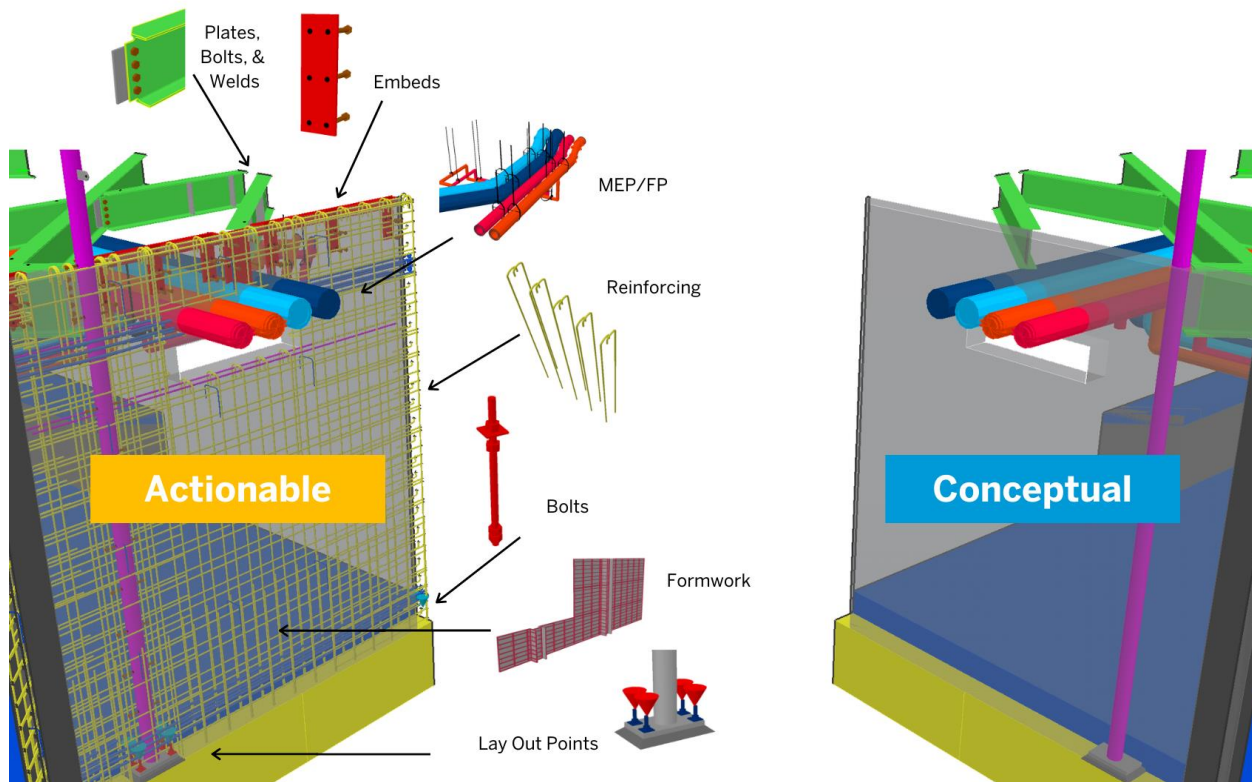


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Another form of digital technology in construction is Building Information Modeling (BIM). BIM is a process to ensure that planning, design and construction of buildings is highly efficient and collaborative. This is done by having a complete 3D model of the building that includes all aspects of the building. An advantage of BIM is that the models can store data. This means that changes to an element will cause the model to update and reflect the change. Although BIM is most advantageous during the planning and construction phase, it still has benefits for existing structures. BIM can be used for maintenance or repairs on a structure, it helps by storing all inventory for maintenance. For example, it will show the boiler connections as well as the size and standard of pipework. BIM can also be used for existing structures if the building requires renovation or a change in use, this will provide an advantage to the building owner as all measurements and information on the building has already been collated and design works can start sooner. It would also provide the client with a more accurate costing for the start of the project. The biggest advantage of BIM is the ability to plan works, this in-turn improves safety during construction as hazards and risks can be easily identified when viewing the 3D model, this then provides more time to

ensure that risks can be reduced or removed prior to the construction phase. This has been chosen as an objective of the survey was to identify possible future maintenance, BIM can be used to design and plan future maintenance in the building and provide more accurate costs for the required works.

A good BIM model can include part- and material-based information, as well as geospatial, financial, procurement, and logistical information.



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Survey Planning

To ensure that the correct survey is undertaken the surveyor will need to understand the client's requirements. This could be a measured survey, condition report, schedule of condition or advise on repairs. In this situation the surveyor would undertake a condition report, structural survey and measured survey, this would be undertaken using the above digital technologies.

The surveyor would prepare for a survey by arranging access to the building, informing others where and when they are surveying in case of an emergency and identify the equipment required for the survey including PPE.

A desktop survey would be required ahead of the survey being undertaken. This would entail examining all the relevant documents and information relevant to the building. These documents would include as built plans, ordinance surveys and geological maps. These documents would be vital to the surveyor as they would provide information on the construction methods used as well as the surrounding land with regards to both other developments or buildings and the elevation difference in the surrounding land. Depending on the client's requirements existing building control applications may be relevant to identify previous schemes undertaken, this may also help to identify previous issues raised with previous developments to the building.

The surveyor would have to undertake on-site reconnaissance to understand the use of the building. After this the surveyor would need to undertake an inspection to the surrounding land, this would help to determine subsidence to the property or any obstacles or natural formations that could cause problems with the building's stability or use. The surveyor should also consider whether the building can be expanded laterally if the survey pertains to an extension.

A surveyor should start with an external overview, this would commonly be undertaken with a top-down approach, starting the inspection at the highest points and working down to identify any disrepair or future issues with the building. The surveyor will then move onto the internal inspection, this would be done room by room working around the building clockwise to remain consistent. Any issues relating to the use or condition of the building as well as the severity of the disrepair should be documented and recorded. The surveyor should articulate their findings in a building survey report, it is imperative that the report is comprehensive and states any limitations to the survey to avoid a negligence claim.

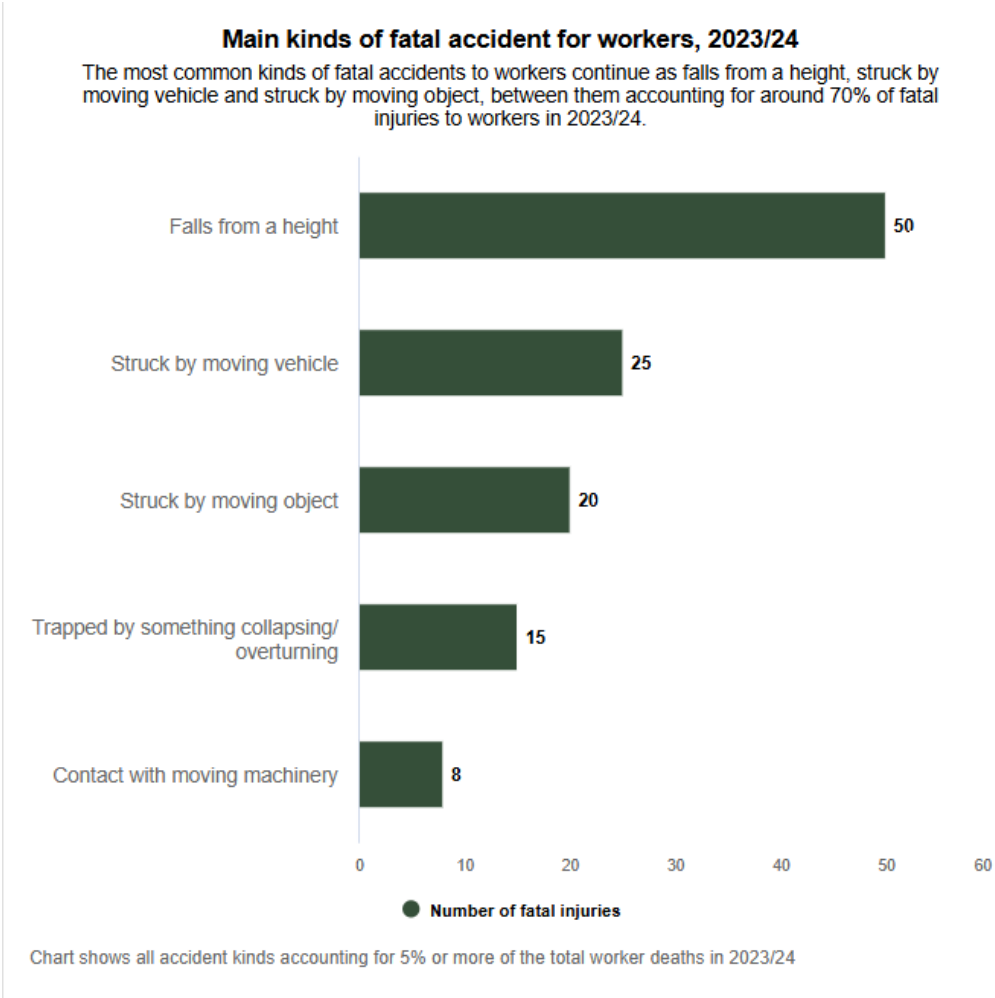
To efficiently undertake a LIDAR scan of the building the surveyor should use a handheld LIDAR scanner, this would not have the same fidelity of a larger scanner on a tripod however it would reduce the surveying time. The information gained from this can then be used to help gain more accurate costings for remedial or future works to the building as well as having a BIM model for future surveys or works.

The surveyor should use the thermal imaging camera on the external elements as well as the internal elements, this can be done alongside the condition survey going room to room clockwise around the building to ensure all elements are evaluated. The camera can also

be used on the drone to identify any issues to the roof and rainwater goods. These images can be saved and used in the building condition report as evidence.

The drone should be used on the exterior overview, this should be used to gain information on the high-level elements of the building I.E, roof, rainwater goods, lead details and high-level walls. These images can be saved and used in the building condition report as evidence.

Challenges and Solutions



The Y Fforwm does have a road at the front, the traffic would be a hazard for the surveyor this risk can be reduced by wearing a Hi-Visibility vest this would make the surveyor easier to identify. Another consideration could be the risk of asbestos, however due to the building being built after 2000 there will be no risk of asbestos. Working at height could also be a risk when inspecting the elements at high level, this risk can be removed by using a drone to undertake the high-level survey. Slips, trips & falls are a possible hazard when surveying, this can be reduced by ensuring care is taken when walking on uneven ground and cluttered areas. Weather is another possible hazard when surveying, during summer it is important to remain hydrated and use sunscreen to protect against the sun.

Conclusion and Recommendations

The main points the surveyor should ensure that they meet is ensuring that all risks and hazards are considered ahead of undertaking the survey, this ensures that all control measures are in place ahead of the survey. The surveyor should also have a strong understanding of the client's specification to ensure the survey is relevant. The surveyor should also ensure that they have enough time to ensure that they can be thorough with their survey and can confirm the condition of all elements of the building, this is important to avoid a negligence claim.

References:

1. BSI Group, 2024. *7 benefits of BIM construction*. [online] Available at: <https://www.bsigroup.com/en-CA/blog/built-environment-blog/7-benefits-of-bim-construction/> [Accessed 16 November 2024].
2. CADS Online, 2024. *How technology is disrupting building surveying*. [online] Available at: <https://cadsonline.com/insights/survey/how-technology-is-disrupting-building-surveying/#:~:text=The%20value%20is%20in%20the,cost%20savings%20can%20be%20realised> [Accessed 16 November 2024].
3. Constructible, 2024. *What is BIM (Building Information Modeling)?*. [online] Available at: <https://constructible.trimble.com/construction-industry/what-is-bim-building-information-modeling> [Accessed 16 November 2024].
4. GoReport, 2024. *Five reasons why digitisation is the future of surveying*. [online] Available at: <https://goreport.com/five-reasons-why-digitisation-is-the-future-of-surveying/> [Accessed 16 November 2024].
5. Health and Safety Executive (HSE), 2024. *Fatalities statistics*. [online] Available at: <https://www.hse.gov.uk/statistics/fatals.htm> [Accessed 16 November 2024].

6. Hexagon, 2024. *Laser scanning*. [online] Available at: <https://hexagon.com/products/product-groups/laser-scanning> [Accessed 16 November 2024].
7. IRT Surveys, 2024. *Thermal imaging surveys*. [online] Available at: <https://irtsurveys.co.uk/services/thermal-imaging-surveys> [Accessed 16 November 2024].
8. Modelical, 2024. *BIM management in existing buildings*. [online] Available at: <https://www.modelical.com/en/bim-management-in-existing-buildings/> [Accessed 16 November 2024].
9. National Business Crime Centre (NBCC), 2024. *Surveying equipment theft prevention advice*. [online] Available at: <https://nbcc.police.uk/crime-prevention/business-security/surveying-equipment-theft-prevention-advice> [Accessed 16 November 2024].
10. NBS, 2024. *What is building information modelling (BIM)?*. [online] Available at: <https://www.thenbs.com/knowledge/what-is-building-information-modelling-bim#:~:text=BIM%20is%20a%20process%20for,a%20set%20of%20appropriate%20technology> [Accessed 16 November 2024].
11. RICS Firms, 2024. *How have drones impacted building surveying?*. [online] Available at: <https://www.ricsfirms.com/residential/moving-home/surveys/how-have-drones-impacted-building-surveying/> [Accessed 16 November 2024].
12. Survey Solutions, 2024. *Building survey: Laser scanning*. [online] Available at: <https://www.survey-solutions.co.uk/building-survey/laser-scanning/> [Accessed 16 November 2024].
13. The Cad Room, 2024. *How does BIM benefit architects and surveyors?*. [online] Available at: <https://www.thecadroom.com/blog/how-does-bim-benefit-architects-and-surveyors/> [Accessed 16 November 2024].
14. Thermascan, 2024. *Building inspection thermal imaging cameras*. [online] Available at: <https://www.thermascan.co.uk/building-inspection-thermal-imaging-cameras> [Accessed 16 November 2024].
15. Trimble, 2024. *What is BIM (Building Information Modeling)?*. [online] Available at: <https://constructible.trimble.com/construction-industry/what-is-bim-building-information-modeling> [Accessed 16 November 2024].
16. University of Wales Trinity Saint David, 2024. *Swansea Libraries*. [online] Available at: <https://www.uwtsd.ac.uk/library/swansea-libraries> [Accessed 16 November 2024].
17. Vertex Access, 2024. *Drone thermal imaging*. [online] Available at: <https://vertexaccess.co.uk/drone-thermal-imaging#:~:text=The%20benefits%20of%20using%20a,areas%20such%20as%20rural%20Oland> [Accessed 16 November 2024].

18. Virtual Building Studio, 2024. *LIDAR scanning and BIM: A perfect combination*. [online] Available at: <https://www.virtualbuildingstudio.com/blog/lidar-scanning-and-bim-a-perfect-combination/> [Accessed 16 November 2024].
19. Websters Surveyors, 2024. *Level 3 building structural survey: Surveyor London*. [online] Available at: <https://websterssurveyors.co.uk/home-surveys-london-surveyors/level-3-building-structural-survey-surveyor-london/> [Accessed 16 November 2024].
20. Yopa, 2024. *What do surveyors look for during a house survey?*. [online] Available at: <https://www.yopa.co.uk/homeowners-hub/what-do-surveyors-look-for-during-a-house-survey/> [Accessed 16 November 2024].
21. HomeOwners Alliance, 2024. *Building survey*. [online] Available at: <https://hoa.org.uk/advice/guides-for-homeowners/i-am-buying/building-survey/> [Accessed 16 November 2024].