

6 Streatley Place,  
London NW3 1HP

Basement Impact Assessment  
Audit

For  
London Borough of Camden

Project Number: 12727-97

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April 2019

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## Document Details

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## 1.0 NON-TECHNICAL SUMMARY

- 1.1. CampbellReith was instructed by London Borough of Camden, (LBC) to carry out an audit on the Basement Impact Assessment submitted as part of the Planning Submission documentation for 6 Streatley Place, London NW3 1HP, (Camden Reference 2018/2859/P). The basement is considered to fall within Category C as defined by the Terms of Reference.
- 1.2. The Audit reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development in accordance with LBC's policies and technical procedures.
- 1.3. CampbellReith was able to access LBC's Planning Portal and gain access to the latest revision of submitted documentation and reviewed it against an agreed audit check list.
- 1.4. The BIA has been prepared by Soil Consultants Ltd with supporting documents by Stephen Buss Environmental Consulting Ltd, Geofem Limited and Ian Harban Consulting Engineers. In the updated submissions, the qualifications of the authors are demonstrated to be in accordance with LBC guidance.
- 1.5. The site comprises an assortment of derelict one storey buildings with hardstanding. Erection of a four storey plus basement residential building comprising 4 flats is proposed. This is a revision of the previous scheme approved on 24/01/2018 (Camden Reference 2017/0183/P). Listed structures neighbour the site.
- 1.6. Whilst the site is generally level, Streatley Place is within a wider hillside setting. The slope is terraced by use of retaining wall structures. The bounding retaining walls to the site demark significant local changes in elevation.
- 1.7. The BIA includes the information required from a desk study in accordance with LBC guidance.
- 1.8. A site investigation was undertaken by Soil Consultants in March 2018. The BIA presents geotechnical interpretation and indicative design parameters for retaining wall and foundation design.
- 1.9. Groundwater was encountered during the investigation and monitoring indicates groundwater to be below the proposed basement formation level. There will be no impact to the wider hydrogeological environment. However, in considering the potential for groundwater / perched water to contribute to instability during construction, it is recommended that long term monitoring and additional investigation to be undertaken as part of a Basement Construction Plan (BCP).

- 1.10. The formation level of the new basement slab will be founded in the Bagshot Formation or Claygate Member. Piling and propping are required to form the proposed new site wide ground level, to maintain stability of the existing slopes / retaining walls. The basement will then be formed top down utilising underpinning techniques.
- 1.11. An outline construction methodology is provided in the Structural Feasibility Report (SFR). The BIA and SFR have been updated and consistently present and assess the impacts from the temporary works proposed. Additional information was requested in the previous audit to confirm the proposed temporary works, propping requirements, retaining wall deflections and bearing pressures. These have now been presented. Considering the complexity of the proposals, the final scheme design should be confirmed in a BCP.
- 1.12. In the previous audit it was requested that consideration be given of potential impacts to neighbouring structures / retaining walls as a result of removal of trees. The revised submissions confirm that the retaining walls within the influence of the trees will be underpinned, mitigating any long term swelling effects.
- 1.13. A ground movement assessment (GMA) is presented, indicating damage to neighbours to be maintained within Category 1 (Very Slight). The GMA has been updated, including a supporting structural sequencing and strategy method statement, and is accepted.
- 1.14. In the previous audit it was requested that a methodology and guidance for monitoring structural movements during construction be provided. An appropriate outline monitoring strategy is proposed, including trigger values and contingency actions, to demonstrate that damage to neighbouring structures will be limited to within policy requirements.
- 1.15. The proposed development will not increase the impermeable site area. The BIA notes that green roofs are being proposed which would provide a betterment over the existing run-off rate. A final drainage design should be agreed with Thames Water and LBC.
- 1.16. Streatley Place is within a Critical Drainage Area (Group 3-010) but is at very low risk of surface water flooding.
- 1.17. An outline construction programme is provided.
- 1.18. Non-technical summaries have been presented.
- 1.19. Queries and requests for further information are discussed in Section 4 and summarised in Appendix 2. Considering the additional information presented, the BIA meets the criteria of CPG Basements.

## 2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 30 July 2018 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 6 Streatley Place, London NW3 1HP, Camden Reference 2018/2859/P. At the time of instruction, not all the necessary assessment documents were available for review. The final document was submitted by the applicant on 19 September 2018.

2.2. The Audit was carried out in accordance with the Terms of Reference set by LBC. It reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development.

2.3. A BIA is required for all planning applications with basements in Camden in general accordance with policies and technical procedures contained within:

- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Camden Planning Guidance (CPG): Basements.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.
- The Local Plan (2017): Policy A5 (Basements).

2.4. The BIA should demonstrate that schemes:

- a) maintain the structural stability of the building and neighbouring properties;
- b) avoid adversely affecting drainage and run off or causing other damage to the water environment; and,
- c) avoid cumulative impacts upon structural stability or the water environment in the local area;

and evaluate the impacts of the proposed basement considering the issues of hydrology, hydrogeology and land stability via the process described by the GSD and to make recommendations for the detailed design.

2.5. LBC's planning portal describes the proposal as: *"Demolition of the existing workshops & stores and the erection of a 1-3 storey plus basement building with 1<sup>st</sup> and 2<sup>nd</sup> floor terraces comprising 4 flats. (This is a revision of the previous scheme approved on 24/01/2018 ref 2017/0183/P to incorporate a new basement level for additional habitable accommodation for 2 flats)".*

The planning portal also confirmed the site lies within the Hampstead Conservation Area. The site does not contain a listed building(s) but the neighbouring properties at 1-40 New Court (New Court flats) including the boundary retaining wall are Grade II listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal in September 2018 and gained access to the following relevant documents for audit purposes:

- Site Investigation Report and Basement Impact Assessment (ref 10219/AP/JRCB Rev 0) dated April 2018 by Soil Consultants.
- Structural Feasibility Report (ref 218075.100) dated June 2018 by Ian Harban Consulting Engineers.
- Existing and proposed elevations and plans dated June 2018 by Martin Evans Architects.
- Arboriculture Impact Assessment dated May 2018 by Tree Aware UK Ltd.
- Design and Access Statement dated June 2018 by Martin Evans Architects.
- Historic Environment Assessment (ref P18-105 Issue 5) dated April 2018 by MOLA.
- Construction Management Plan dated May 2018 by Martin Evans Architects.
- Hydrology and Sub-surface Flow Screening Basement Impact Assessment (ref 2018-003-046-003) dated April 2018 by Steven Buss Environmental Consulting Ltd.
- Ground Movement Analysis of Proposed Basement Construction (ref 2141/ASL/01) dated 17 September 2018 by Geofem Limited.

2.7. CampbellReith was presented with updated submissions between September 2018 and March 2019. Only the most recent submissions are included below, with previous versions of documents considered to be superseded:

- Site Investigation Report and Basement Impact Assessment (ref 10219/AP/JRCB Rev 3) dated January 2019 by Soil Consultants.
- Structural Feasibility Report (ref 218075.100 Rev C) dated March 2019 by Ian Harban Consulting Engineers including Appendix A (updated drawings) and Appendix B (Monitoring Statement)
- Ground Movement Report (ref 10219/JRCB/R1) dated 14 March 2019 by Soil Consultants.



### 3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Presented in updated submissions.
Is data required by Cl.233 of the GSD presented?	Yes	
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	
Are suitable plans/maps included?	Yes	
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Report, Section 7.1.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Report, Appendix C, Section 3.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Report, Appendix C, Section 4.
Is a conceptual model presented?	Yes	Within BIA text and hydrogeological assessment.



Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Report, Section 7.2.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Report, Appendix C, Section 5.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	N/A	No hydrology issues were identified at the screening stage.
Is factual ground investigation data provided?	Yes	BIA Report, Section 4, Section 5 and Appendix A.
Is monitoring data presented?	Yes	Limited information provided. Recommendation for long term monitoring and further investigation as part of BCP.
Is the ground investigation informed by a desk study?	Yes	BIA Report, Section 3.
Has a site walkover been undertaken?	Yes	BIA Report, Section 3.6.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Presented in updated submissions.
Is a geotechnical interpretation presented?	Yes	BIA Report, Section 6.
Does the geotechnical interpretation include information on retaining wall design?	Yes	BIA Report, Section 6.
Are reports on other investigations required by screening and scoping presented?	N/A	
Are baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	Presented in updated submissions.

Item	Yes/No/NA	Comment
Is an Impact Assessment provided?	Yes	BIA S7.4 is titled Land Stability – Impact Assessment and S7.5 Groundwater / hydrogeology Impact Assessment.  Further information to assess stability issues required, as Section 4. Groundwater related stability issues to be considered further within BCP.
Are estimates of ground movement and structural impact presented?	Yes	Presented in updated submissions.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	Presented in updated submissions.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Presented in updated submissions.
Has the need for monitoring during construction been considered?	Yes	Presented in updated submissions.
Have the residual (after mitigation) impacts been clearly identified?	Yes	Presented in updated submissions.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Presented in updated submissions.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Final drainage design to be approved by LBC / TW.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	Presented in updated submissions.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	However, GMA not accepted - as Section 4.

Item	Yes/No/NA	Comment
Are non-technical summaries provided?	Yes	Presented in updated submissions.

## 4.0 DISCUSSION

- 4.1. The BIA has been prepared by Soil Consultants Ltd with supporting documents by Stephen Buss Environmental Consulting Ltd, Geofem Limited and Ian Harban Consulting Engineers. In the updated submissions, the qualifications of the authors are demonstrated to be in accordance with LBC guidance.
- 4.2. The proposed site comprises an assortment of derelict one storey buildings with hardstanding. Erection of a four storey plus basement residential building comprising 4 flats is proposed. This is a revision of the previous scheme approved on 24/01/2018 (Camden Reference 2017/0183/P) to incorporate a new basement level for additional habitable accommodation for 2 flats. Listed structures neighbour the site.
- 4.3. Whilst the site is generally level, Streatley Place is within a wider hillside setting. The slope is terraced by use of retaining wall structures. The bounding retaining walls to the site demark significant local changes in elevation. It is reported within the consultation responses that the retaining wall with New Court is a Listed Structure.
- 4.4. The BIA includes the information required from a desk study in line with the GSD Appendix G1.
- 4.5. The BIA includes screening and scoping assessments.
- 4.6. A site investigation comprising a single borehole to a depth of 17.45m below ground level (bgl) was undertaken by Soil Consultants in March 2018. The ground conditions comprise Bagshot Formation over Claygate Member and London Clay.
- 4.7. Groundwater was encountered during the investigation at a depth of 7.70m bgl and limited monitoring (two visits) indicates groundwater at approximately 8.00m bgl. Groundwater was therefore encountered below the proposed basement elevation.
- 4.8. A single borehole gives information on groundwater elevation but not groundwater flow. It is good practice to calibrate groundwater flow direction from three points (boreholes) and monitor groundwater level over a sufficient period to identify seasonal fluctuation. This is stated in S7.7.2 of the Arup GSD.
- 4.9. The Bagshot Formation is designated a secondary A aquifer. However, the Bagshot Formation at the site comprises silty clay with limited aquifer potential, is unsaturated and above the groundwater table.
- 4.10. Springlines are known to form between the base of the Bagshot Formation and Claygate Member strata. Consultation responses allude to local knowledge in regards to springs / tributaries being present in the vicinity of the site. Of note is a reported tributary of the River Fleet rising at 7

Mansfield Place causing groundwater issues to local buildings, which are reported to be controlled by continuous pumping. The response indicates that Arup were involved in the assessment and mitigation of this issue. With reference to Arup's 'Redington - Frognal Sub-surface Water Features Mapping' (January 2016), no mapped tributaries of the Fleet, other springlines and wells are located within the immediate vicinity of the site (nor mapped at Mansfield Place), with the closest mapped feature downslope on Flask Walk, within approximately 50m to 100m.

- 4.11. The BIA states that considering the similarity between the Bagshot Formation and Claygate Member strata encountered at the site, a significant permeability contrast is unlikely and springlines at the contact are unlikely to form. The groundwater was encountered at such a depth below the proposed basement elevation that seasonal variability in water table is unlikely to bring groundwater into contact with the basement development.
- 4.12. It is noted that the hydrogeological assessment has been undertaken by Dr Stephen Buss, who is considered appropriately qualified and sufficiently experienced in regard to the conditions in Hampstead. Considering the points raised in 4.9 and 4.11, the assessment that the proposed development will not impact the wider hydrogeological environment is accepted.
- 4.13. However, in considering the potential for groundwater / perched water to contribute to instability during construction, it is recommended that long term monitoring and additional investigation is undertaken as part of a Basement Construction Plan (BCP). As underpinning is proposed, appropriate further investigation should include a full depth trial excavation to observe the ground / groundwater conditions.
- 4.14. Further to 4.13, groundwater issues during the construction of the adjacent basement at 7 Lakis Close were reported in the consultation responses. It is recommended that construction records from the site are obtained, if available, for review and consideration in the temporary works strategy.
- 4.15. The BIA presents geotechnical parameters for design of foundations and retaining walls. The formation level of the new basement slab will be founded in the Bagshot Formation or Claygate Member. Piling and propping are required to maintain stability of the existing slopes / retaining walls, installed from ground level. The basement will then be formed top down, utilising underpinning techniques to form retaining walls. The updated submissions provide further information on the planned sequencing and methodology of the works, including the use of active propping to control horizontal movements, demonstrating the feasibility of the scheme is required.
- 4.16. The BIA notes potential for shrink / swell movements in Bagshot Formation and Claygate Member strata in the basement slab formation, where it is the zone of influence of existing trees. It is stated that NHBC guidelines will be followed to mitigate these risks, assuming a high-volume

change potential soil, which could include digging out of desiccated clay within the zone of influence of trees and complete replacement with granular fill below the basement floor slab.

- 4.17. In the previous audit it was requested that consideration be given of potential impacts to neighbouring structures / retaining walls as a result of removal of trees. The revised submissions confirm that the retaining walls within the influence of the trees will be underpinned, mitigating any long term swelling effects.
- 4.18. An outline construction methodology is provided in the Structural Feasibility Report (SFR). The BIA and SFR have been updated and consistently present and assess the impacts from the temporary works proposed. Considering the complexity of the proposed scheme and sensitivity of neighbouring structures, additional information was requested in the previous audit to confirm the proposed temporary works, propping requirements, retaining wall deflections and bearing pressures. These have now been presented. The final scheme design should be confirmed in a BCP.
- 4.19. The site is bounded to the southwest by a dilapidated retaining wall supporting the garden of No. 3 Streatley Place which is at a higher elevation than the site. This structure is reported to be potentially failing in the southern corner, such that it is currently supported by a timber buttress located within the site. The proposed basement scheme includes underpinning of this wall. Suggestions for a design and construction methodology are given in the BIA. The updated ground movement assessment (as 4.21) indicates impact to retaining walls will be within accepted limits.
- 4.20. The adjacent property to the northeast is a Grade 2 Listed block of flats and the Listing includes the boundary retaining wall which will be underpinned. The updated ground movement assessment (as 4.21) indicates impact to retaining walls will be within accepted limits.
- 4.21. A ground movement assessment (GMA) is presented, indicating damage to neighbours to be maintained within Category 1 (Very Slight). The GMA has been updated, including a supporting structural sequencing and strategy method statement, and is accepted. The revised GMA considers movements generated during construction and movements will be controlled by use of active propping.
- 4.22. In the previous audit it was requested that a methodology and guidance for monitoring structural movements during construction be provided. An appropriate outline monitoring strategy is proposed, including trigger values and contingency actions, to demonstrate that damage to neighbouring structures will be limited to within policy requirements.
- 4.23. The proposed development will not increase the impermeable site area. The BIA notes that green roofs are being proposed which would provide a betterment over the existing run-off rate. Whilst there should be no impact to the hydrological environment, the drainage design must consider

potential impacts to stability, due to the general hillside environment. A final drainage design should be agreed with Thames Water and LBC.

- 4.24. Streatley Place is within a Critical Drainage Area (Group 3-010) but is at very low risk of surface water flooding.
- 4.25. An outline construction programme is provided.
- 4.26. Non-technical summaries have been presented.



## 5.0 CONCLUSIONS

- 5.1. Considering the revised submissions, the qualifications of the authors are in accordance with LBC guidance.
- 5.2. The site comprises an assortment of derelict one storey buildings with hardstanding. Erection of a four storey plus basement residential building comprising 4 flats is proposed. Listed structures neighbour the site.
- 5.3. The site slopes and is within a wider hillside setting. The ground conditions comprise Bagshot Formation over Claygate Member and London Clay.
- 5.4. Groundwater was encountered during the investigation below the proposed basement formation level. There will be no impact to the wider hydrogeological environment.
- 5.5. In considering the potential for groundwater / perched water to contribute to instability during construction, it is recommended that long term monitoring and additional investigation to be undertaken as part of a Basement Construction Plan (BCP).
- 5.6. The BIA and SFR have been updated and consistently present and assess the impacts from the temporary works proposed. The final scheme design should be confirmed in a BCP.
- 5.7. An updated ground movement assessment (GMA) is presented, which is accepted.
- 5.8. The revised submissions confirm that the retaining walls within the influence of the trees will be underpinned, mitigating any long term swelling effects.
- 5.9. An appropriate outline monitoring strategy is proposed, including trigger values and contingency actions, to demonstrate that damage to neighbouring structures will be limited to within policy requirements.
- 5.10. Streatley Place is within a Critical Drainage Area (Group 3-010) but is at very low risk of surface water flooding.
- 5.11. The proposed scheme will not increase the proportion of impermeable area. The final drainage scheme should be agreed with Thames Water and LBC.
- 5.12. An outline construction programme is provided
- 5.13. Non-technical summaries have been presented.
- 5.14. Queries and requests for further information are summarised in Appendix 2. Considering the additional submitted, and the requirement for a BCP, the BIA meets the criteria of CPG Basements.

## Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Randall	Not Provided	26 <sup>th</sup> July 2018	Issues raised not within scope of the audit.	-
Perton-Visman	New Court	29 <sup>th</sup> July 2018	Concerns related to groundwater flow, stability, structural damage and the impact of removing trees.	Section 4
Blackmore	Not Provided	25 <sup>th</sup> July 2018	Concerns related to stability / structural damage.	Section 4
Ruddick	1 Boades Mews	25 <sup>th</sup> July 2018	Concerns related to groundwater flow, stability and structural damage.	Section 4
Ashworth	Not Provided	29 <sup>th</sup> July 2018	Concerns related to groundwater flow.	Section 4
Harrison	Not Provided	25 <sup>th</sup> July 2018	Concerns related to groundwater flow.	Section 4
Harris	Not Provided	19 <sup>th</sup> Aug 2018	Concerns related to stability / structural damage and flooding.	Section 4
Terry	Redington Frogna Neighbourhood Forum	22 <sup>nd</sup> Aug 2018	Concerns related to the impact of removing trees.	Section 4
Robinson	New Court	Not Provided	<p>Concerns related to groundwater flow, flood risk, stability, structural damage and the impact of removing trees.</p> <p>The basements will also be directly in contact with a retaining wall that is Victorian, listed and anecdotally has no foundations.</p> <p>It is reported that an existing basement at numbers 30-31 New Court flooded with water.</p>	Section 4

Stark	Not provided	27 <sup>th</sup> July 2018	Concerns related to stability / structural damage.	Section 4
Colloms	Flask Walk Neighbourhood Association NW3	26 <sup>th</sup> July 2018	Issues raised not within scope of the audit.	-
Blume	Not provided	24 <sup>th</sup> July 2018	Reports apparent errors in the hydrology report:  “P11. Point 2. There is a water well at no 7 Mansfield Place, which is prevented from flooding by means of an electric pump. The River Fleet ran under no 1 and 2 Mansfield Place, and through to New End School. We had a problem with water running down the path of Mansfield Place (not a burst water pipe but a tributary of the River Fleet). Ove Arup Ltd were called in to solve the problem, and we had a special path laid.”	Section 4
Trautman	7 Lakis Close	24 <sup>th</sup> July 2018	Reports shallow groundwater and the requirement for pumping during the construction of a basement at 7 Lakis Close, adjacent.	Section 4
Wright		21 <sup>st</sup> July 2018	Concerns related to groundwater flow.	Section 4
Townsend	Not Provided	23 <sup>rd</sup> July 2018	Concerns related to groundwater flow.	Section 4
Griffis	14 Denning Road,	9 <sup>th</sup> July 2018	Concerns related to groundwater flow, stability and structural damage.	Section 4
Chung	Not Provided	13 <sup>th</sup> August 2018	Concerns related to flooding, stability and structural damage.	Section 4

## Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	BIA	The qualifications of the authors in regard to Land Stability should be stated and demonstrated to be in accordance with LBC guidance.	Closed	September 2018
2	BIA	Non-technical summaries should be presented.	Closed	September 2018
3	Stability	The BIA and SFR are not consistent on the temporary works proposed. Considering the complexity of the proposed scheme and sensitivity of neighbouring structures, additional information to confirm the proposed temporary works, propping requirements, retaining wall deflections and bearing pressures should be provided.	Closed – BCP recommended	March 2019
4	Stability	Consideration of potential impacts to neighbouring structures / retaining walls as a result of removal of trees should be assessed, with mitigation proposals provided as required.	Closed	December 2018
5	Stability	A ground movement assessment (GMA) is presented, indicating damage to neighbours to be maintained within Category 1. The GMA is not accepted, as detailed in Section 4, and additional assessment is required.	Closed	March 2019
6	Stability	Dependent upon the outcome of the GMA, an appropriate outline monitoring strategy should be proposed, including trigger values and contingency actions, to demonstrate that damage to neighbouring structures will be limited to within policy requirements.	Closed	March 2019
7	Hydrogeology / Stability	In considering the potential for groundwater / perched water to contribute to instability during construction, it is recommended that long term monitoring and additional investigation to be undertaken as part of a Basement Construction Plan (BCP).	BCP to be submitted prior to construction	N/A

## Appendix 3: Supplementary Supporting Documents

None



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