

12 Pilgrims Lane  
London, NW3 1SN

Basement Impact Assessment  
Audit

For  
London Borough of Camden

Project Number: 13693-71  
Revision: F1

September 2022

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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 12 Pilgrim's Lane (planning reference 2022/2398/P). The basement is considered to fall within Category B as defined by the Terms of Reference.
- 1.2. The Audit reviewed the Basement Impact Assessment (BIA) 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 proposal includes the extension of the existing lower ground floor level beneath the majority of the footprint of the house and constructing a swimming pool, as part of significant alterations to the house.
- 1.5. The qualifications of the individuals involved in the production of the BIA are in accordance with LBC guidance.
- 1.6. Screening and scoping assessments are presented, supported by desk study information.
- 1.7. A site investigation has been undertaken indicating the basement will be founded in London Clay.
- 1.8. Appropriate geotechnical parameters to inform design have been provided.
- 1.9. The basement is to be formed using mass concrete underpinning. Additional information has been provided to clarify the basement construction sequence and methodologies.
- 1.10. The revised submission confirms that no trees are to be removed as part of the development.
- 1.11. A Ground Movement Assessment (GMA) and damage assessment have been undertaken and confirm that damage to neighbouring properties is limited to Burland Category 1 (Very Slight) in accordance with LBC policy.
- 1.12. Based on the additional information provided it can be confirmed that the BIA meets the requirements of Camden Planning Guidance: Basements.

## 2.0 INTRODUCTION

- 2.1. CampbellReith was instructed by London Borough of Camden (LBC) on the 19<sup>th</sup> of July 2022 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 12 Pilgrim's Lane, London, NW3 1SN, planning reference 2022/2398/P.
- 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:
- Camden Local Plan 2017 - Policy A5 Basements.
  - Camden Planning Guidance (CPG): Basements. January 2021.
  - Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- 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;
  - 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 Audit Instruction described the planning proposal as *"Removal of existing two storey part including garage on northern side (next to no. 14) and replacement with a single storey garage extension, extending to rear and including a garage. Erection of lower ground/basement and ground floor extensions, extending to side and rear. Erection of two storey side extension (on southern side). Erection of roof extension to front two storey part and installation of three dormer windows at front and three dormer windows at rear"*.
- 2.6. CampbellReith accessed LBC's Planning Portal on the 27<sup>th</sup> of July 2022 and gained access to the following relevant documents for audit purposes:
- Site Investigation & Basement Impact Assessment Report by Geotechnical & Environmental Associates Limited, ref: J21282 Rev 1, dated June 2022.

- Sustainable Drainage Strategy by Elliott Wood Partnership Ltd, ref: 2210419, dated 29 June 2022.
- Arboriculturist Report by Arboricultural Design & Consultancy, ref: AR/MF/033/22, dated March 2022.
- Flood Risk Assessment by Elliott Wood Partnership Ltd, ref: 2210419, dated 29 June 2022.
- Construction Method Statement by Elliott Wood Partnership Ltd, ref: 2210419, dated June 2022.
- Proposed Structural Drawings and Preliminary Calculations by Elliott Wood Partnership Ltd, ref: 2210419, dated June 2022.
- Proposed and Existing Architectural Drawings by WOLFF ARCHITECTS:
  - Proposed Site Plan, ref: 216-PL-011 Rev 0, dated 01/23/07;
  - Proposed Lower Ground Floor Plan, ref: 2160-PL-201 Rev 0, dated 11/19/21;
  - Proposed Ground Floor Plan, ref: 2160-PL-202 Rev 0, dated 01/21/22;
  - Proposed First Floor Plan, ref: 2160-PL-203 Rev 0, dated 01/21/22;
  - Proposed Second Floor Plan, ref: 2160-PL-204 Rev 0, dated 01/21/22;
  - Proposed Roof Plan, ref: 2160-PL-205 Rev 0, dated 01/21/22;
  - Proposed Front & Rear Elevations, ref: 2160-PL-300 Rev 0, dated 11/19/21;
  - Proposed Side Elevations, ref: 2160-PL-301 Rev 0, dated 01/25/22;
  - Proposed Sections 1, ref: 2160-PL-310 Rev 0, dated 11/19/21;
  - Existing Site Plan, ref: 2160-PL-010 Rev 0, dated 02/02/22;
  - Existing Lower Ground Floor Plan, ref: 2160-PL-151 Rev 0, dated 11/18/21;
  - Existing Ground Floor Plan, ref: 2160-PL-152 Rev 0, dated 01/21/22;
  - Existing First Floor Plan, ref: 2160-PL-153 Rev 0, dated 01/21/22;
  - Existing Roof Plan, ref: 2160-PL-154 Rev 0, dated 01/21/22;
  - Existing Front & Rear Elevations ref: 2160-PL-160 Rev 0, dated 11/19/21;
  - Existing Side Elevations, ref: 2160-PL-161 Rev 0, dated 01/24/22;
  - Existing Sections 1, ref: 2160-PL-170 Rev 0, dated 01/24/22;
  - Existing Sections 2, ref: 2160-PL-171 Rev 0, dated 01/24/22.
- Survey Drawings by Target Surveys Limited, ref: 4858, dated September 2021.
- Consultation responses.

2.7. The following additional information was provided in response to queries raised in the D1 issue of Campbellreith's audit:

- Site Investigation & Basement Impact Assessment Report by Geotechnical & Environmental Associates Limited, ref: J21282 Rev 2, dated 14 September 2022.
- Outline Construction Method Statement – Sections through Pool drawing by Elliott Wood, ref. 2210419-EWP-ZZ-XX-SK-S-0051, rev P1, dated 14 September 2022.
- Proposed Architectural Drawings by WOLFF ARCHITECTS:
  - Proposed Site Plan, ref: 216-PL-011 Rev A, dated 02/08/22;
  - Proposed Lower Ground Floor Plan, ref: 2160-PL-201 Rev B, dated 02/08/22;
  - Proposed Ground Floor Plan, ref: 2160-PL-202 Rev B, dated 02/08/22;
  - Proposed First Floor Plan, ref: 2160-PL-203 Rev B, dated 02/08/22;
  - Proposed Front & Rear Elevations, ref: 2160-PL-300 Rev B, dated 02/08/22;
  - Proposed Side Elevations, ref: 2160-PL-301 Rev B, dated 02/08/22; and,
  - Proposed Sections 1, ref: 2160-PL-310 Rev B, dated 02/08/22.
- E-mail correspondence (provided in Appendix 3).

### 3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Section 1.3.2 of the BIA.
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 plan/maps included?	Yes	All maps to support screening are included in the BIA.
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	Section 3.2 of the BIA.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.1 of the BIA.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.3 of the BIA.
Is a conceptual model presented?	Yes	Sections 7.0 of the BIA.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.1 of the BIA.



Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.1 of the BIA.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.1 of the BIA.
Is factual ground investigation data provided?	Yes	Appendix A of the BIA.
Is monitoring data presented?	Yes	Section 5.3 of the BIA. Single monitoring visit was undertaken, further monitoring visits will be undertaken prior to construction.
Is the ground investigation informed by a desk study?	Yes	Section 2.0 and Appendix C of the BIA.
Has a site walkover been undertaken?	Yes	Sections 1.3 and 2.1 of the BIA.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Sections 5.5 and 9.1 of the BIA. Foundations of 14 Pilgrims Lane have been determined. However, foundations of 16 Pilgrims Lane and 10 Pilgrims Lane have not been determined and have been assumed to not have a basement.
Is a geotechnical interpretation presented?	Yes	Sections 8.1.1 and 10.2.1 of the BIA.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 8.1.1 of the BIA.
Are reports on other investigations required by screening and scoping presented?	Yes	Ground Movement Assessment; Desk Study and Ground Investigation Report; Arboricultural Survey & Impact Assessment; Suggested Sequence of work; Proposed structural calculations and drawings; Flood Risk Assessment (FRA); and

Item	Yes/No/NA	Comment
		Sustainable Drainage Strategy;
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	Sections 5.5 and 9.1 of the BIA. Foundations of 14 Pilgrims Lane have been determined. However, foundations of 16 Pilgrims Lane and 10 Pilgrims Lane have not been determined and have been assumed to not have a basement.
Is an Impact Assessment provided?	Yes	Section 13 of the BIA.
Are estimates of ground movement and structural impact presented?	Yes	Sections 10, 11 & 12 of the BIA.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	Sections 10, 11, 12 & 13 of the BIA.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Sections 11.2 & 13.1 of the BIA.
Has the need for monitoring during construction been considered?	Yes	Section 11.2 of the BIA. The precise monitoring strategy will be developed at a later stage, and it will be subject to discussions and agreements with the owners of the adjacent properties and structures.
Have the residual (after mitigation) impacts been clearly identified?	Yes	
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Section 10,11 & 12 of the revised BIA submission.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Section 13.1 of the BIA.

Item	Yes/No/NA	Comment
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Section 11 of the BIA.
Are non-technical summaries provided	Yes	Executive Summary of the BIA.

## 4.0 DISCUSSION

- 4.1. The BIA has been carried out by Geotechnical and Environmental Associates Limited (GEA) and the individuals concerned in its production have suitable qualifications.
- 4.2. The site is triangular, measuring roughly 25m northwest to southeast by 30m northeast to southwest at its maximum extent. The site is occupied by a split level two/three-storey house with a paved front garden and soft landscaped rear garden. It fronts onto Pilgrims Lane to the northwest and southwest and is bounded to the southeast by rear gardens of properties on the northwest side of Downshire Hill, and by adjoining 14 Pilgrims Lane to the northeast.
- 4.3. The proposals include the extension and deepening of the existing lower ground floor level beneath the majority of the footprint of the house and the construction of a swimming pool. Formation level for the proposed lower ground floor level is approximately 3.50m below the existing ground floor level, which is 1.20m below the existing lower ground floor level. The formation level of swimming pool is at circa 5m below the existing ground floor level, and excavation depths are not anticipated to exceed c. 2.70m.
- 4.4. Screening and scoping assessments are presented and informed by desk study information. Most relevant figures/maps from the ARUP GSD and other guidance documents are referenced within the BIA to support responses to screening questions.
- 4.5. The BIA states that the site is at low probability of flooding from all sources. The site is located in a critical drainage area, and as such a Flood Risk Assessment (FRA) and a Sustainable Drainage Strategy (SuDS) have been produced. The FRA and SuDS indicate that the development can be constructed and operated safely without increasing the flood risk elsewhere.
- 4.6. The BIA states that the proposed development will increase the overall proportion of hardstanding areas. The SuDS mentions that the surface water run-off from the proposed development will be managed using permeable paving and below ground geo-cellular attenuation such that there will be not an increase in surface water flooding in the area due to the proposed development.
- 4.7. A site investigation was undertaken by GEA. Site works comprised two boreholes to a depth of 8.00m bgl using a combination of rotary augering and percussive sampling techniques, two window sampler boreholes to a depth of 4.00m bgl, ten foundation inspection trial pits to depths between 0.75m and 1.40m bgl. Made Ground was encountered to depths of 0.60m to 2.00m bgl and the London Clay was proved to full depth of the investigation (8.00m bgl). The new basement will extend to a depth of c. 3.50m bgl and will be founded within the London Clay. A localised deeper excavation will extend to a level of 5.00m bgl to form the swimming pool.

- 4.8. Groundwater was not generally encountered during the investigation, but perched water was encountered within the Made Ground in one of the trial pits. A single monitoring visit during summer has been recorded in the BIA and the depth to water in the boreholes is between 1.86m and 2.80m bgl.
- 4.9. The BIA indicated that the neighbouring buildings do not have basements and states that there are no impacts on the wider hydrogeological environment.
- 4.10. The BIA states that due to the cohesive nature of the London Clay the rate of any inflow will be relatively slow such that any potential inflows are unlikely to be significant and should be dealt with through sump pumping and advises that the selected contractor should have a contingency plan in place to deal with more significant or prolonged inflows as a precautionary measure if a watertight scheme is not adopted. In Section 14 of the BIA it is recommended that additional groundwater monitoring is undertaken before construction to inform the temporary works design and dewatering strategy. Subsequent correspondence confirms that additional monitoring visits will be undertaken prior to construction (see Appendix 3).
- 4.11. The geotechnical parameters to be adopted in retaining wall and settlement calculations are presented. The original BIA submission indicated a friction angle,  $\phi$ , of  $27^\circ$  for the Made Ground, however, the retaining wall calculation adopted a value of  $20^\circ$  for the retained soil. The latter value is considered more realistic for the soil parameters encountered. The revised BIA submission has updated this value to reflect the values used in the retaining wall calculation.
- 4.12. The undrained shear strength of London Clay has been estimated from SPT results using a correlation of  $C_u=4.5N$ , with an initial strength of  $30\text{kN/m}^2$  and an increase in cohesion of  $7.5\text{kN/m}^2$  for each meter depth. The undrained vertical Young's Modulus has been estimated by multiplying  $C_u$  by 500, and the drained Modulus with a ratio of 0.6 to  $E_u$  has been adopted.
- 4.13. Structural information including a proposed construction sequence for the basement is presented in the BIA. The underpinning of the existing perimeter walls will take place in a 'hit and miss' sequence. The BIA states that the new retaining walls will not be cantilevered at any stage during the construction process and adequate temporary propping, particularly at the top level, will occur at all times prior to the construction of the permanent concrete floor slabs. The retaining wall calculations adopt a bearing capacity of  $125\text{kPa}$  and Section 8.2 of the revised BIA submission discusses how this value was derived.
- 4.14. It is understood that a new swimming pool will be constructed as part of the proposed development. The revised submission includes construction sequence sections through the pool area.
- 4.15. A Ground Movement Assessment (GMA) and damage assessment are provided to demonstrate that ground movements and consequential damage to neighbouring properties will be within the LBC's policy requirements. Nearby sensitive structures comprise the adjoining 14 and 16 Pilgrims Lane to the northeast and 10 Pilgrims Lane to the south.

- 4.16. Ground movements due to underpinning, excavation and basement redevelopment have been modelled by applying the CIRIA C760 curves using X-Disp software. Whilst the CIRIA approach is intended for embedded retaining walls, it is accepted that the predicted ground movements, which dictate the likely damage, can be within the range typically anticipated for underpinning techniques carried out with good control of workmanship. It is noted that, while excavation depths to form the basement and pool will range from 1.20m to 3.50m, a standard excavation depth of 3.50m is considered in the XDisp model, to provide a conservative analysis.
- 4.17. The revised BIA no longer refers to the potential use of a contiguous pile wall to form the basement. If the proposed construction sequence changes to include piling, a revision of the GMA will be required.
- 4.18. PDisp software has been used to model vertical movements based on anticipated changes in vertical loading. Additional information has been provided to show the load distribution used in the PDisp model. Full input and output data from the XDisp and PDisp analyses have been provided as part of the revised submission.
- 4.19. The results of the GMA indicate damage to neighbouring buildings will not exceed Category 1 (Very Slight).
- 4.20. The BIA indicates that a monitoring strategy will be developed at a later stage and will be subject to discussions and agreements with the owners of the adjacent properties and structures. Contingency measures will be implemented if movements of the adjacent structures exceed the predefined trigger levels.
- 4.21. Clarification regarding the Arboricultural Survey & Impact Assessment indicates that no trees are going to be removed as part of the development. Root Protection Areas and trial excavation areas to identify root zones will be undertaken as part of the works.

## 5.0 CONCLUSIONS

- 5.1. The qualifications of the individuals involved in the production of the BIA are in accordance with LBC guidance.
- 5.2. The proposal includes the extension of the existing lower ground floor level beneath the majority of the footprint of the house and constructing a swimming pool, as part of significant alterations to the house.
- 5.3. Screening and scoping assessments are presented, supported by desk study information.
- 5.4. A site investigation has been undertaken indicating the basement will be founded in London Clay.
- 5.5. Geotechnical parameters to inform design have been provided and are accepted.
- 5.6. The basement is to be formed using mass concrete underpinning. Additional information has been provided to clarify the basement construction sequence and methodologies.
- 5.7. No trees are to be removed as part of the development.
- 5.8. The revised Ground Movement Assessment (GMA) and damage assessment indicates that damage to adjacent properties will not exceed Burland Category 1 (Very Slight).
- 5.9. Based on the revised submissions it can be confirmed that the BIA meets the requirements of Camden Planning Guidance: Basements.

## Appendix 1: Residents' Consultation Comment



Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Axel Nicoll - Hampstead Neighbourhood Forum	Redacted	08/08/22	<ul style="list-style-type: none"> <li>Groundwater Flow</li> <li>Flooding concerns</li> <li>Tree Removal</li> </ul>	<ul style="list-style-type: none"> <li>See Section 4.8, 4.9 &amp; 4.10</li> <li>See Section 4.6</li> <li>See Section 4.19</li> </ul>
Oliver Froment	Redacted	11/08/22	<ul style="list-style-type: none"> <li>Flooding Concerns</li> <li>Groundwater monitoring</li> <li>Tree Removal</li> </ul>	<ul style="list-style-type: none"> <li>See Section 4.6</li> <li>See Section 4.8</li> <li>See Section 4.19</li> </ul>
Meg Weston Smith	14 Pilgrim's Lane, London, NW3 1SN	Redacted	<ul style="list-style-type: none"> <li>Ground Movement concerns</li> <li>Tree Removal</li> </ul>	<ul style="list-style-type: none"> <li>See Sections 4.14 to 4.18</li> <li>See Section 4.19</li> </ul>
Andrew Neale	Redacted	08/08/22	<ul style="list-style-type: none"> <li>Impact on wider hydrology and hydrogeology</li> </ul>	<ul style="list-style-type: none"> <li>See Section 4.5, 4.8, 4.9 &amp; 4.10</li> </ul>
Mary Hersov	Redacted	08/08/22	<ul style="list-style-type: none"> <li>Flooding Concerns</li> <li>Ground Movement concerns</li> <li>Impact of tree removal</li> </ul>	<ul style="list-style-type: none"> <li>See Section 4.6</li> <li>See Sections 4.14 to 4.18</li> <li>See Section 4.19</li> </ul>

## Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Hydrology	Additional groundwater monitoring visits, as recommended in the BIA.	Closed	15/09/2022
2	Land Stability	Geotechnical parameters to be reviewed.	Closed	15/09/2022
3	Land Stability	GMA PDisp & XDisp input and output requested.	Closed	15/09/2022
4	Land Stability	Plan showing the loaded areas is requested.	Closed	15/09/2022
5	Land Stability	Clarifications regarding removal of trees	Closed	15/09/2022
6	Land Stability	Clarification regarding bearing capacity value.	Closed	15/09/2022
7	Land Stability	A new swimming pool will be constructed as part of the proposed development. The structural proposal does not indicate how the excavation will take place and be supported. Clarifications are requested.	Closed	15/09/2022
8	Land Stability	The BIA mentions in section 8.1 the potential installation of contiguous piled wall as part of the temporary works. However, all the structural information as well as the GMA are associated with underpinning. If the proposed scheme is going to change to include a contiguous piled wall, a revision of all the structural information and the GMA will be required.	Note Only - Closed	

## Appendix 3: Supplementary Supporting Documents

E-mail correspondence responding to queries.



12 Pilgrims Lane Updated BIA  
 Louis Brewer to LizBrown@campbellreith.com,  
 MarittaElias@campbellreith.com, KatharineBarker@campbellreith.com, Cameron  
 Banks-Murray 15/09/2022 14:10  
 Cc "Adam Greenhalgh", "Fergus Wong", "Stuart Minty", "Ian Pickup"

## 5 Attachments



Appendix B - Sequence of Construction by pool.pdf



12 Pilgrims Lane\_AIA TREE REPORT\_010622.pdf



J21282 - 12 Pilgrims Lane Rev 2 complete\_Part2.pdf



J21282 - 12 Pilgrims Lane Rev 2 complete\_Part3.pdf



J21282 - 12 Pilgrims Lane Rev 2 complete\_Part1.pdf

Hi all,

Please find the attached, which responds to your queries raised in the audit.

Due to the file sizes, I will send the remaining documents in a following email.

[@Cameron Banks-Murray](#) please note the updated AIA to coincide with the updated BIA.

For completeness I have noted the queries down below.

Query No 1: Additional groundwater monitoring visits are to be completed ahead of construction to monitor for seasonal variations in groundwater level. The BIA recommends that the basement is designed with a water level assumed to be at 1.0 m below ground level, which is conservatively above the levels recorded to date.

Query No 2: Geotechnical parameters in the BIA have been updated to match the retaining wall calculations (p18 of BIA)

Query No 3: XDISP and PDISP input and outputs included in appendix of BIA (see BIA appendix)

Query No 4: Plan showing raft loading areas is included in BIA appendix (see BIA appendix)

Query No 5: Both the BIA and the Arboricultural Impact Assessment confirm that no trees will be removed

Query No 6: Clarifications regarding the bearing capacity have been provided (p 19)

Query No 7: Refer to additional sequence section drawing included in attachment relating to area around the pool.

Query No 8: Section 8.1 of the BIA included a paragraph in which a contiguous bored pile wall was suggested as a possible alternative foundation solution. This was simply to provide different options, and did not indicate a change in the scheme, but the paragraph has now been removed from the BIA to avoid any confusion.

We are aiming to reach members briefing next week therefore your early attention would be greatly appreciated.

If you have any questions, please don't hesitate to ask.

Kind regards,

Louis Brewer  
Planner

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