

AMBI^{ENT}AL

ENVIRONMENTAL ASSESSMENT

Flood Risk Assessment

Tuscany,
Oak Glade,
Northwood,
Hillingdon,
HA6 2TY

Document Issue Record

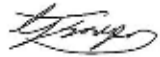
Project: Phase 1 Flood Risk Assessment

Prepared for: Bimal Ruparelia

Reference: 5564

Site Location: Tuscany, Oak Glade, Northwood, Hillingdon, HA6 2TY

Proposed Development: It is understood that the development is for the demolition of the existing residential dwelling and construction of a larger replacement residential dwelling.

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1. Summary

- 1.1 Ambient Environmental Assessment has been appointed by Bimal Ruparelia to undertake a National Planning Policy Framework (NPPF) compliant Flood Risk Assessment (FRA) for the proposed development at Tuscany, Oak Glade, Northwood, Hillingdon, HA6 2TY.
- 1.2 The site is currently a residential dwelling. It is understood that the development is for the demolition of the existing residential dwelling and construction of a larger replacement residential dwelling.
- 1.3 With reference to the Environment Agency (EA) Flood Map for Planning, the proposed development is located wholly within Flood Zone 1. The closest fluvial flood zone to the site is an area of Flood Zone 2 located approximately 1.25km southeast of the site, associated with Ruislip Lido. The closest watercourse to the site is an unknown drain located approximately 385m south of the site.
- 1.4 Given its existing residential use, the site can subsequently be considered as 'More Vulnerable' under the National Planning Policy Framework (NPPF) vulnerability classification guidance. The proposed development is for the construction of a larger replacement dwelling and so the vulnerability classification will remain unchanged compared to the existing scenario.
- 1.5 With reference to the West London Strategic Flood Risk Assessment (2018), the site is located outside of all Critical Drainage Areas. Additionally, the entire redline site boundary is located outside of the 1:30 year and 1:100 year pluvial flood extents as modelled by the EA Risk of Flooding from Surface Water (RoFSW) dataset. These are deemed to be representative of Flood Zone 3b and 3a by the West London SFRA (2018). Similarly, the site is located wholly outside of the 1:1000 year pluvial flood extent.
- 1.6 The existing residential building has a built footprint of approximately 87.3m². The proposed development is for the demolition of the existing building and following this the construction of a larger replacement residential dwelling. The proposed building will have a built footprint of approximately 322m². Subsequently, there will be an increase in built footprint of approximately 234.7m² as a result of the proposed development. Given the increase in built footprint and associated hardstanding area, there will likely be an increase in surface water runoff generation onsite post-development.
- 1.7 As part of the development works, a basement has been proposed at the site. Policy DMHD 3 of the London Borough of Hillingdon Local Plan (2012) states that "the council will not permit basement schemes which include habitable rooms and other sensitive uses in areas prone to flooding". The basement is proposed for additional rooms associated with the proposed dwelling (swimming pool, gym, changing rooms etc) and will not be self-contained. No bedrooms will be proposed at basement level. The site is considered to be at **low** risk of flooding from fluvial, surface water, groundwater and sewer sources.
- 1.8 To comply with the West London SFRA (2018) and Policy 5.13 of the London Plan, surface water runoff rates should be restricted to as close to greenfield as practical. Ambiental have subsequently produced post-development calculations with site runoff rates restricted from the existing rate of 4.4l/s for the 1:100 year event to 1l/s for the 1:100 year +40% critical storm event.
- 1.9 As such and given that:
 - The proposed development is for the construction of a larger replacement residential dwelling;
 - The site is located wholly in Flood Zone 1 and is located outside of the 1:30, 1:100 and 1:1000 year surface water flood events;

- The proposed basement will not feature sensitive rooms such as sleeping accommodation and will not be self-contained. Given that the risk of flooding to the site is low, the development complies with Policy DMHD 3 of the London Borough of Hillingdon Local Plan (2012);
- Post-development there will be an increase in built footprint and impermeable hardstanding area at the site. To comply with the West London SFRA (2018) and Policy 5.13 of the London Plan, it is recommended that sustainable drainage systems are installed on site to restrict site runoff rates to 1l/s for the 1:100 year +40% design event.

Following the guidelines contained within the NPPF, the proposed development is considered to be suitable assuming appropriate mitigation (including adequate warning procedures) can be maintained for the lifetime of the development.

Development Description	Existing	Proposed
Development Type:	Residential dwelling	Construction of a larger replacement residential dwelling
Number of Bedrooms:	4	6
EA Vulnerability Classification:	More Vulnerable	No change
Ground Floor Level:	Elevations on site vary between approximately 78.13mAOD and 83.51mAOD (2m LIDAR data).	No change
Level of Sleeping Accommodation:	Ground floor	First floor and above
Impermeable Surface Area:	N/A ¹	Increase in built footprint and impermeable surface area post-development.
Surface Water Drainage:	N/A ¹	To comply with the West London SFRA (2018) and London Plan, it is recommended that sustainable drainage systems are installed to restrict runoff rates to as close to greenfield as practical.
Site Size:	Approx. 2,353m ²	No change
Risk to Development	Summary	Comment
EA Flood Zone:	1	The nearest extent of Flood Zone 2 is located approximately 1.25km southeast of the site.
Flood Source:	Pluvial	Site is located outside of the 1:30, 1:100 and 1:1000 year surface water events.
1:100 Year Flood Level	N/A ²	Site is located in Flood Zone 1
1:100 Year Flood Level & Climate Change	N/A ²	
1:1000 Year Flood Level	N/A ²	
Recorded Flood Events in Area:	No	Neither the Environment Agency nor the London Borough of Hillingdon have provided any evidence to suggest that the site or wider area has historically flooded.
Recorded Flood Events at Site:	No	
SFRA Available:	Yes	West London SFRA (2018)
Management Measures	Summary	Comment
Ground floor level above extreme flood levels:	Yes	Site is located in Flood Zone 1 and is located topographically above the nearest extent of Flood Zones 2 and 3.
Safe Access/Egress Route:	Yes	Site is located in Flood Zone 1
Flood Resilient Design:	N/A	Site is at low risk of flooding from fluvial, surface water, groundwater and sewer sources.
Site Drainage Plan:	N/A ¹	To comply with the West London SFRA (2018) and London Plan, it is recommended that sustainable drainage systems are installed to restrict runoff rates to as close to greenfield as practical.
Flood Warning & Evacuation Plan:	Yes	EA Flood Alert and Warning Service
Offsite Impacts	Summary	Comment
Displacement of floodwater:	None	Site is located in Flood Zone 1
Increase in surface run-off generation:	Yes	Increase in built footprint and impermeable surface area post-development. It is recommended that sustainable drainage systems are installed on site to restrict runoff rates to 1.0l/s in accordance with local policy.
Impact on hydraulic performance of channels:	None	Does not affect channel

Table 1 Summary of flood risks, impacts and proposed flood mitigation measures.

N/A¹ not required for this assessment; N/A² data not available.

2. Development Description and Site Area

Proposed Development and Location

- 2.1 The proposed development is located at Tuscany, Oak Glade, Northwood, Hillingdon, HA6 2TY (Figures 1 and 2).
- 2.2 The site is currently a residential dwelling. It is understood that the development is for the demolition of the existing residential dwelling and construction of a larger replacement residential dwelling.

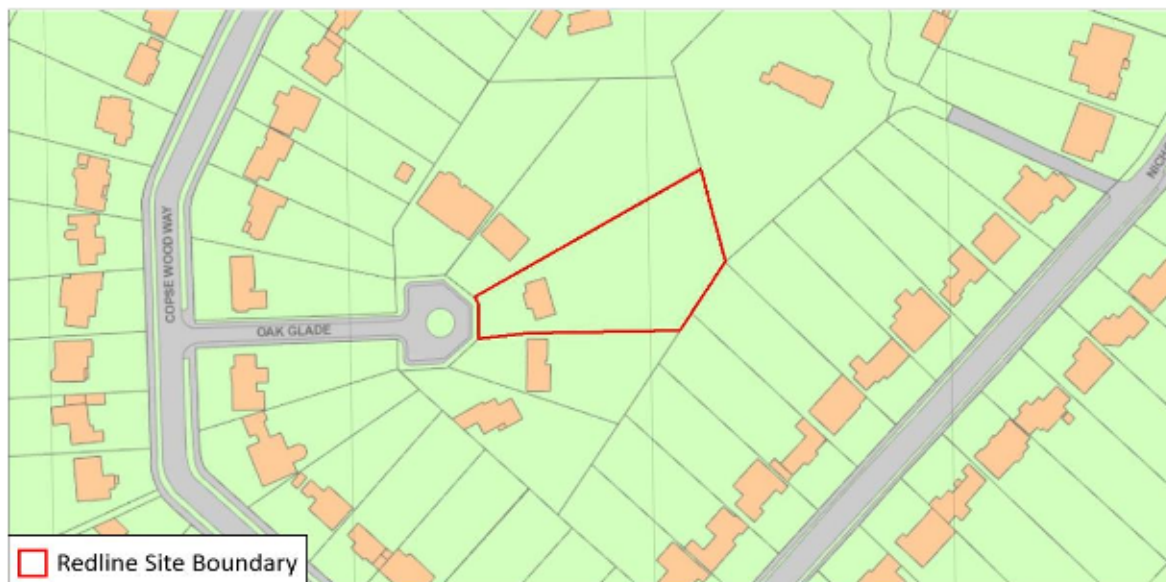


Figure 1 Location Map, identifying the location of the proposed development



Figure 2 Satellite Imagery of Site Location (Source: Google)

- 2.3 With reference to the Environment Agency's 2m resolution LiDAR data, topographic levels have been assessed to vary between approximately 78.13mAOD and 83.51mAOD at the site. Analysis of the topographic levels indicates that levels generally fall away from the existing and proposed dwelling both towards the road at Oak Glade and towards the rear of the site (Figure 3).

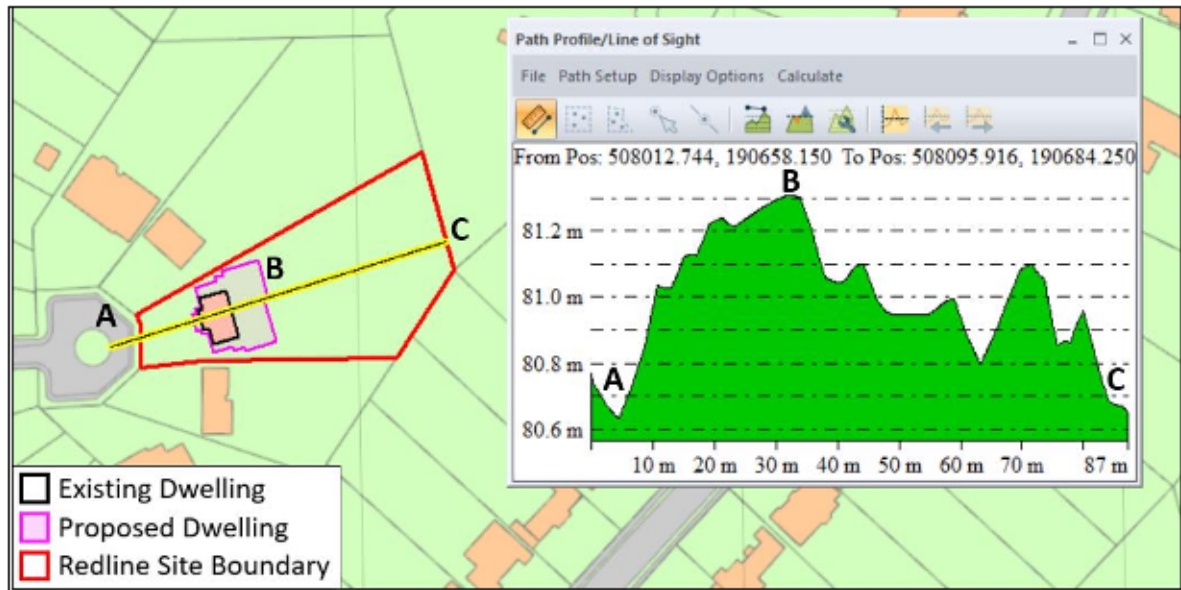


Figure 3 Topographic Profile Across the Site (Source: EA LiDAR Data)

Environment Agency Flood Map for Planning

2.4 The EA Flood Map for Planning demonstrates that both the redline site boundary and proposed development is located wholly within Flood Zone 1 (Figure 4). The Environment Agency's Flood Zones are defined as follows:

- Flood Zone 1 = Land at less than a 0.1% annual risk of river or sea flooding in any given year;
- Flood Zone 2 = Land at greater than a 0.1% annual risk, but less than a 1% annual risk of flooding from river sources in any year, and/or less than a 0.5% annual risk of flooding from seas in any given year;
- Flood Zone 3 = Land at greater than a 1% annual risk of flooding from river sources or greater than a 0.5% annual risk of flooding from seas in any given year.

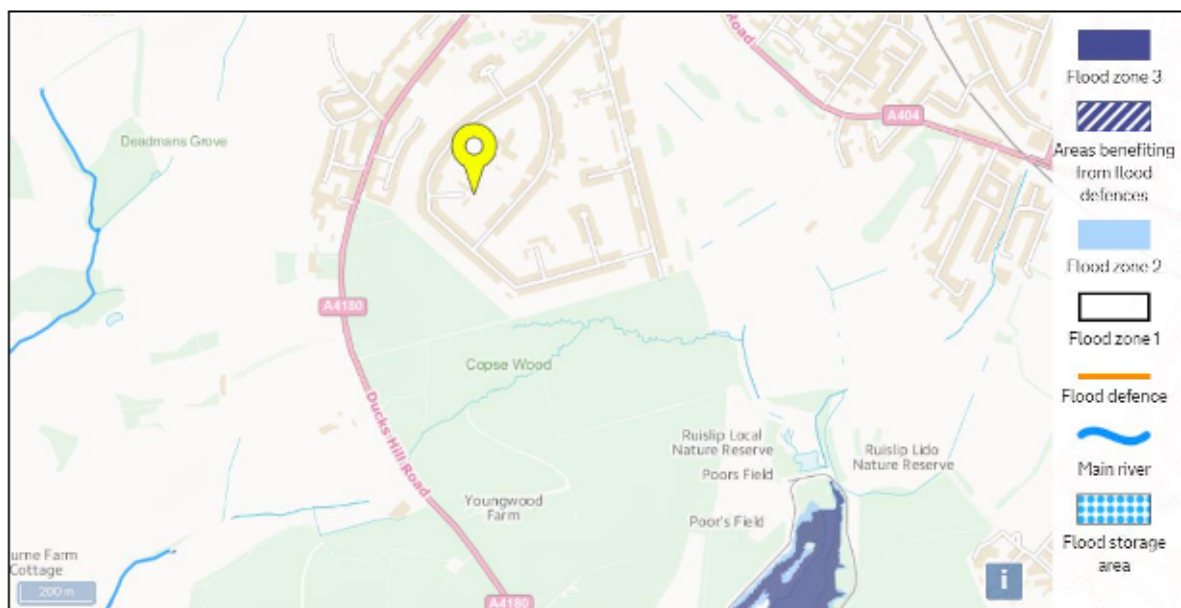


Figure 2 EA Flood Map for Planning

- 2.5 The closest fluvial flood zone to the site is an area of Flood Zone 2 located approximately 1.25km southeast of the site, associated with Ruislip Lido. The closest watercourse to the site is an unknown drain located approximately 385m south of the site. The nearest EA Main River to the site is the Newyears Green Bourne which is located approximately 880m west of the site.

Vulnerability Classification

- 2.6 The existing site has a residential use and subsequently, the site could be considered as 'More Vulnerable' under the National Planning Policy Framework (NPPF) vulnerability classification guidance.
- 2.7 The proposed development is for the construction of a larger replacement dwelling and so the vulnerability classification will therefore remain unchanged compared to the existing scenario.

Geology

- 2.8 The British Geological Survey (BGS) Geology of Britain Viewer indicates that the bedrock underlying the site is part of the London Clay Formation. This is a sedimentary bedrock comprised of clay, silt and sand (Figure 5). In addition, there have been no superficial deposits identified beneath the site.

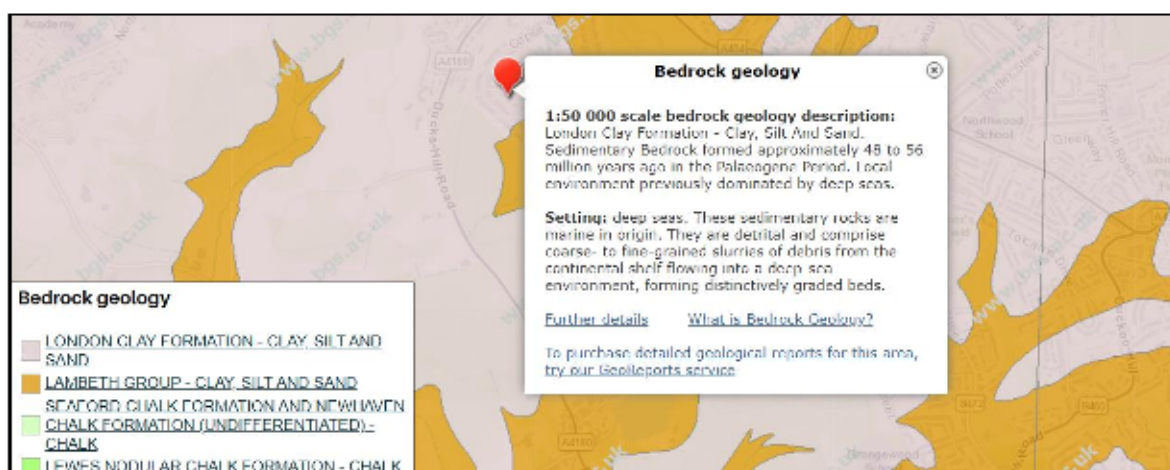


Figure 5 Underlying Bedrock Geology (Source: BGS)

- 2.9 Soil information from the SoilsCapes website indicates that the soils are slowly permeable, seasonally wet loamy and clayey soils. Subsequently, these are characterised as having 'impeded drainage'. Soils of this nature have a tight and compact subsoil that impedes downward water movement and can become waterlogged during the winter, particularly after heavy rainfall (Figure 6).

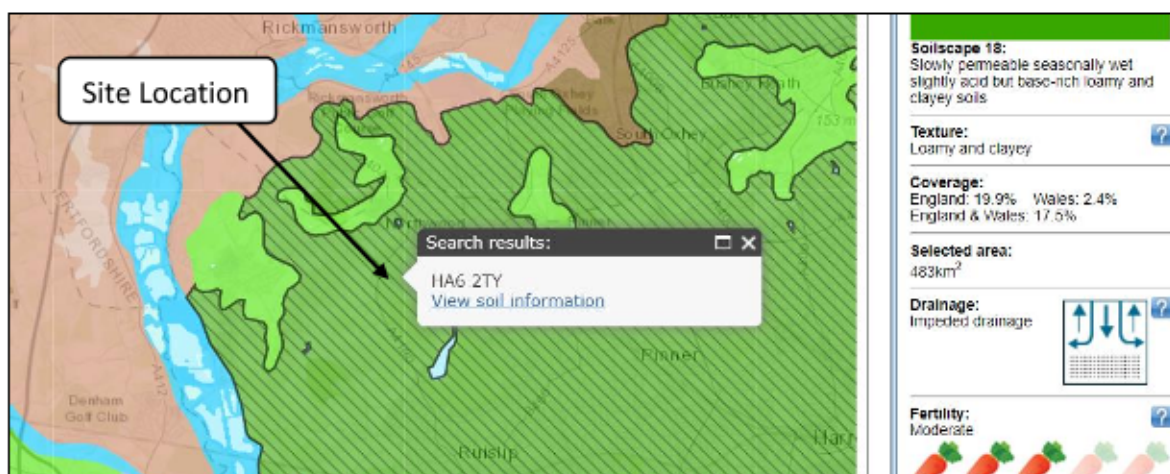


Figure 6 Underlying Soil Groups at the Site (Source: SoilsCapes)

3. Sequential Test/Exception Test

- 3.1 Under the NPPF, all new planning applications should undergo a *Sequential Test*. This test should be implemented by local planning authorities with a view to locating particularly vulnerable new developments (e.g. residential, hospitals, mobile homes etc.) outside of the floodplain.
- 3.2 The NPPF *Sequential Test: Flood Risk Vulnerability and Flood Zone 'Compatibility' Table* is reproduced below;

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test Required	✓	✓
	Zone 3a	Exception Test Required	✓	✗	Exception Test Required	✓
	Zone 3b Functional Floodplain	Exception Test Required	✓	✗	✗	✗

Table 2 The Sequential Test: Flood Risk Vulnerability and Flood Zone 'Compatibility' Table as specified by NPPF.
 Please note: ✓ means development is appropriate; ✗ means the development should not be permitted.

- 3.3 Using the principles of the Sequential Test outlined above, the proposed development is "More Vulnerable". The site is sequentially located within Flood Zone 1 (as defined by the EA) and therefore, under the NPPF, does not require the application of the Exception Test.
- 3.4 As part of the development works, a basement has been proposed at the site. Policy DMHD 3 of the London Borough of Hillingdon Local Plan (2012) states that "the council will not permit basement schemes which include habitable rooms and other sensitive uses in areas prone to flooding". The basement is proposed for additional rooms associated with the proposed dwelling (swimming pool, gym, changing rooms etc) and will not be self-contained. No bedrooms will be proposed at basement level. The site is located in Flood Zone 1 and is therefore considered to be at **low** risk of flooding from fluvial sources.
- 3.5 A Flood Risk Assessment has subsequently been produced to demonstrate that the development adheres to Policy DMHD 3 of the London Borough of Hillingdon Local Plan (2012), can be achieved in a sustainable manner, whilst also promoting an overall reduction of flood risk to the site and the surrounding area.

4. Site Flood Hazards

Sources of Flooding

- 4.1 The proposed development is located wholly within Flood Zone 1 (low risk of flooding) and is considered to be “More Vulnerable” according to NPPF guidelines. Table 3 summarises the potential sources of flooding to the site:

Source	Description
Fluvial	Site is located wholly in Flood Zone 1.
Surface	Very low risk to proposed development.
Groundwater	In area
Sewer	N/A

Table 3 Summary of flood sources.

Mechanisms and History of Flooding

- 4.2 The EA Flood Map for Planning demonstrates the site to be located within Flood Zone 1 (low risk of flooding). It is important to note that the EA Flood Map for Planning shows only the potential floodplain; the mitigating effects of any flood defences currently in place are not considered.

Fluvial

- 4.3 The site is currently a residential dwelling. It is understood that the development is for the demolition of the existing residential dwelling and construction of a larger replacement residential dwelling.
- 4.4 With reference to the Environment Agency (EA) Flood Map for Planning, the proposed development is located wholly within Flood Zone 1. The closest fluvial flood zone to the site is an area of Flood Zone 2 located approximately 1.25km southeast of the site, associated with Ruislip Lido.
- 4.5 As such, the risk of fluvial flooding to the site could be considered **low**.

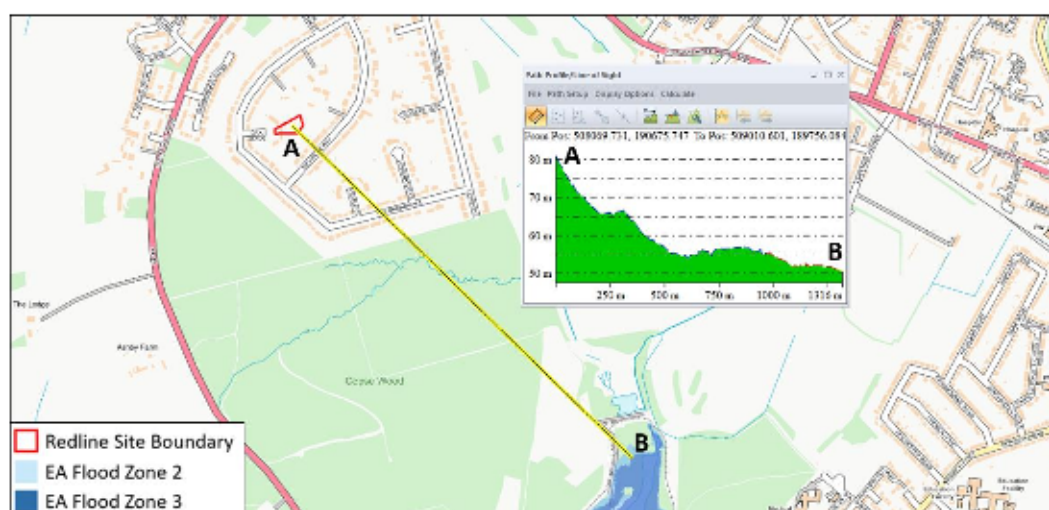


Figure 7 Topographic Profile Between the Site and the Closest Extent of Flood Zones 2 and 3 (Source: EA / OS)

Surface Water (Pluvial)

- 4.6 The Environment Agency Flood Risk from Surface Water website shows the proposed development to be within an area of 'Very Low' risk of flooding from surface water (Figure 8). Areas identified to be at 'Very Low' risk have a less than 0.1% annual risk of flooding from this source.

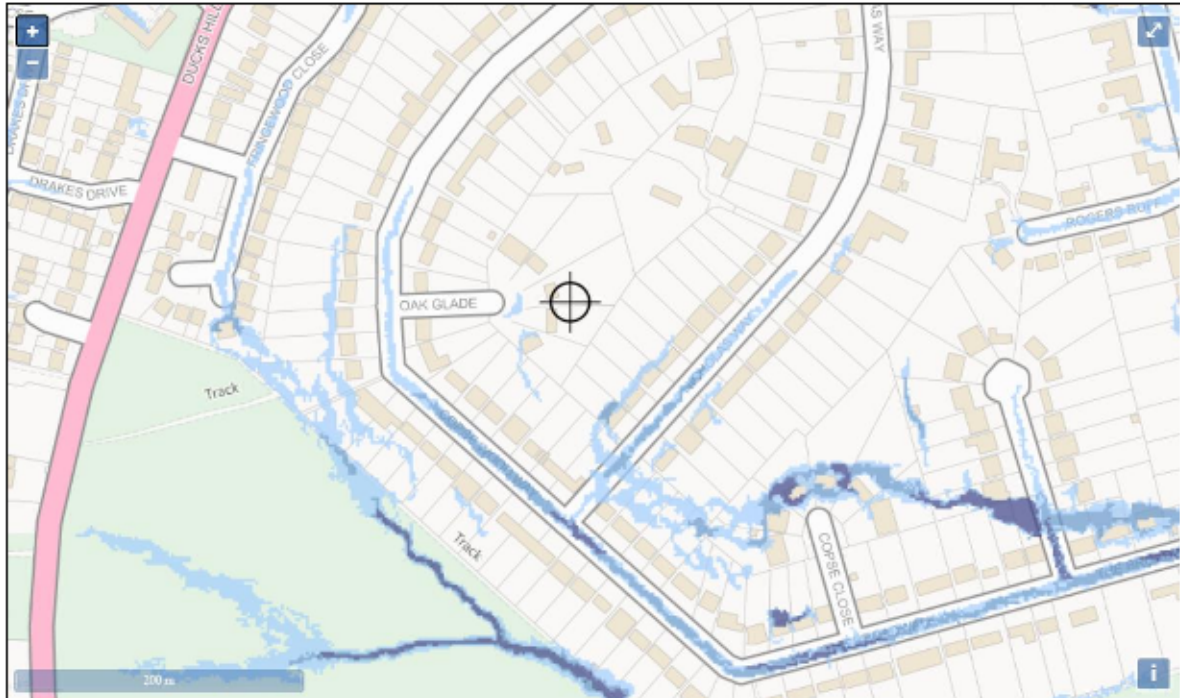


Figure 8 EA Surface Water Flood Risk Map. (Source: EA)

- 4.7 Ambiental have undertaken a detailed assessment of the EA's RoFSW 1 in 1,000 year dataset. This event is indicative of the Low Risk Scenario on the Environment Agency Flood Risk from Surface Water website. During this more extreme event, depths of up to 300mm are predicted at the end of Oak Glade immediately adjacent to the site. Topographic levels rise from Oak Glade road towards the proposed dwelling and subsequently the redline site boundary and proposed development remain wholly unaffected during this event (Figure 9).



Figure 9 EA 1 in 1,000 Year RoFSW Dataset (Source: EA)

- 4.8 With reference to the West London Strategic Flood Risk Assessment (2018), the site is located outside of all Critical Drainage Areas.
- 4.9 Furthermore, neither the Environment Agency nor the West London SFRA (2018) have provided any historical evidence to suggest that the site has previously flooded from surface water sources.
- 4.10 As such, the risk of surface water flooding to the proposed development could be considered **very low**.

Groundwater

- 4.11 Given the presence of London Clays and clayey soils that impede downward water movement, the Magic Map online resource tool identifies the site as being 'Unproductive' with regards to its Groundwater Vulnerability Map (Figure 10). These areas are typically comprised of rocks that have negligible significance for water supply or base flows to rivers, lakes and wetlands. They consist of bedrock/superficial deposits with lower permeability that naturally offer protection to any aquifers that may be present beneath. This is because the ground is less able to intake any pollutants from the surface and convey these to groundwater bodies below the surface.

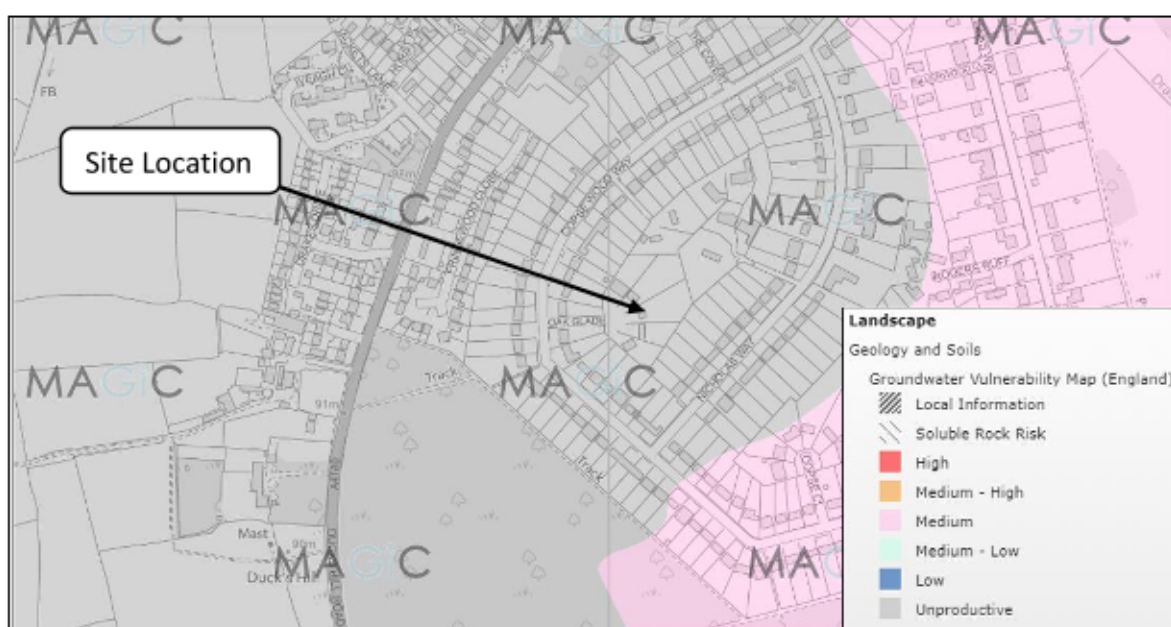


Figure 10 Groundwater Vulnerability Map (Source: DEFRA Magic Maps)

- 4.12 Given the protection offered to the groundwater below the site, this subsequently makes the water more suitable for abstraction. Following the review of the EA Groundwater Source Protection Zone mapping, the site is shown to be located within a Zone II – Outer Protection Zone (Figure 11). Source protection zones are defined around large potable groundwater abstraction sites, and indicate the risk of contamination from activities in the vicinity of the abstraction site. There is a predicted travel-time of 400 days for pollutants below the water table to reach the abstraction point.

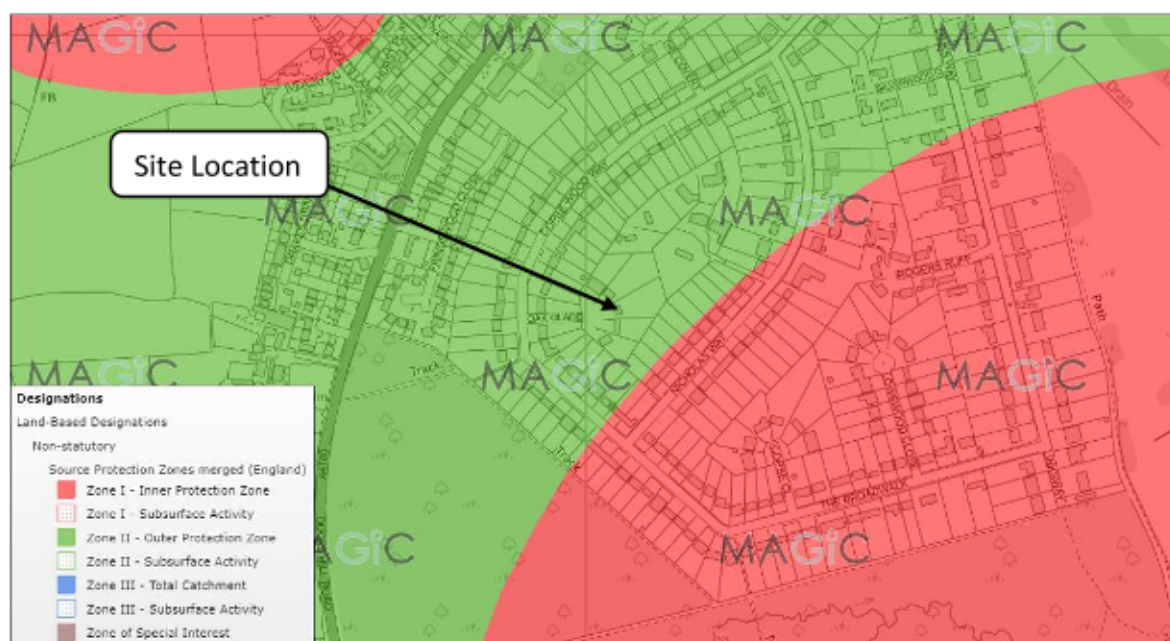


Figure 11 Groundwater Source Protection Zones (Source: DEFRA Magic Maps)

- 4.13 The West London SFRA (2018) provides mapping of the EA Susceptibility to Groundwater Flooding dataset. The London Borough of Hillingdon is divided into 1km² grid tiles. Each grid tile is given a rating based on the area of the tile that is considered to be susceptible to groundwater flooding. The site is located within a 1km² grid tile whereby <25% of the area is considered to be susceptible to groundwater flooding (Figure 12). Given the underlying geological properties beneath the site, it is likely that the site falls within the area of the grid tile that is not susceptible, however there is no data to confirm the susceptibility to the site specifically.

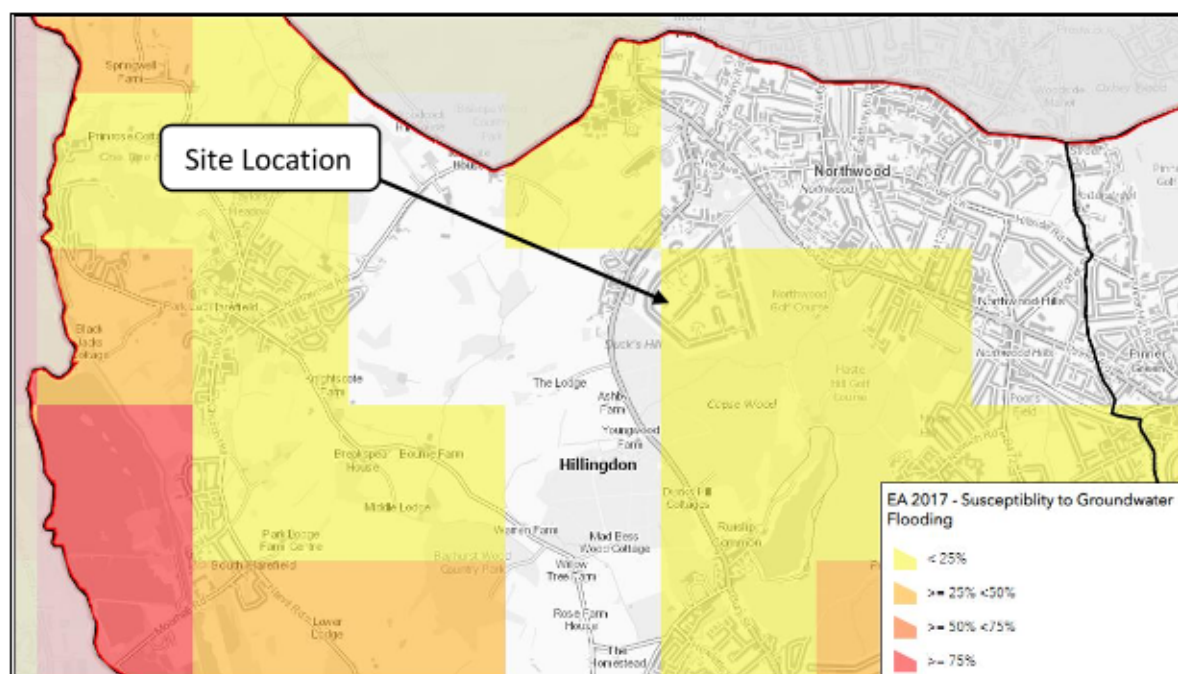


Figure 12 Susceptibility to Groundwater Flooding Map (Source: West London SFRA 2018)

- 4.14 Ambiental have also assessed the “Increased Potential for Elevated Groundwater” dataset within the West London SFRA (2018). The site is located outside of all identified areas that have the potential for elevated groundwater to occur (Figure 13).

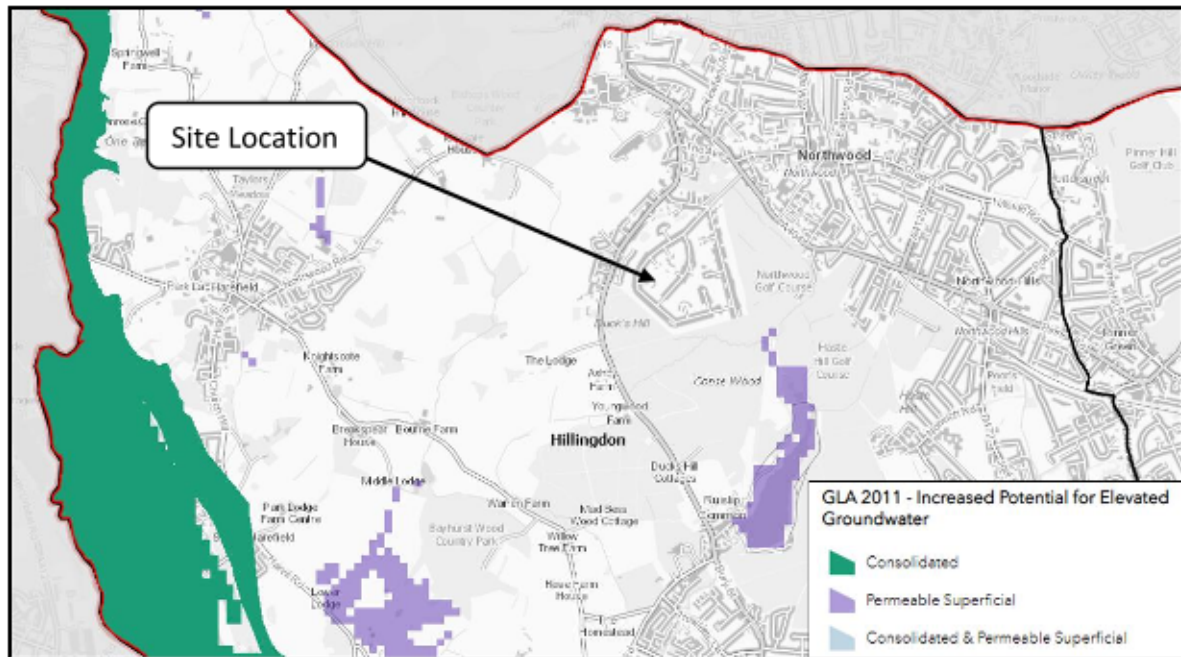


Figure 13 Increased Potential for Elevated Groundwater (Source: West London SFRA 2018)

4.15 Furthermore, neither the Environment Agency nor the West London SFRA (2018) have provided any historical evidence to suggest that the site has previously flooded from groundwater sources.

4.16 As such, the risk of groundwater flooding to the proposed development could be considered **very low**.

Sewer

4.17 Thames Water Services is the sewerage undertaker for the Local Plan area. Historical incidents of flooding are detailed by Thames Water through their DG5 register. Historical incidents of sewer flooding are reported on a postal basis. The incidents in the London Borough of Hillingdon are displayed within the West London SFRA Map which is reproduced in Figure 14.

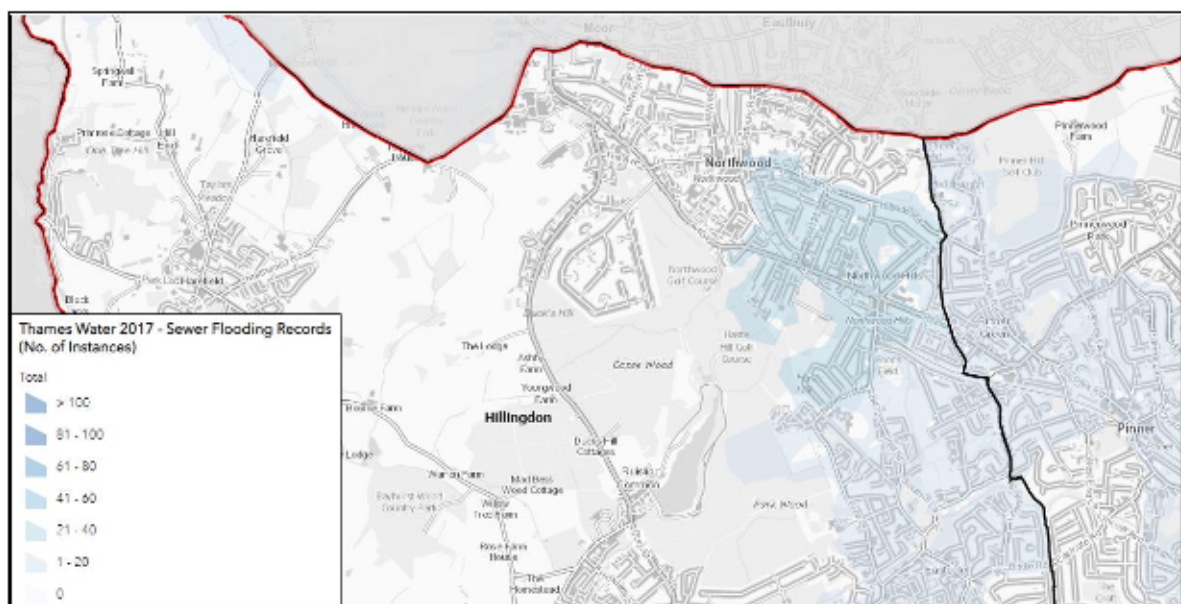


Figure 14 Sewer Flooding Records (Source: West London SFRA 2018)

4.18 With reference to Figure 14, the site is located within a region of 0 incidents of sewer flooding records.

4.19 As such, the risk of flooding from sewer sources could be considered **low**.

Surface Water Drainage Strategy

4.20 The site is currently a residential dwelling. It is understood that the development is for the demolition of the existing residential dwelling and construction of a larger replacement residential dwelling.

4.21 The existing residential building has a built footprint of approximately 87.3m². The proposed development is for the demolition of the existing building and following this, the construction of a larger replacement residential dwelling. The proposed building will have a built footprint of approximately 322m². Subsequently, there will be an increase in built footprint of approximately 234.7m² as a result of the proposed development.

4.22 Given the increase in built footprint and associated hardstanding area, there will likely be an increase in surface water runoff generation onsite post-development.

4.23 Table 4-1 of the West London SFRA states that information of the proposed SuDS and surface water runoff discharge destination should be in line with Policy 5.13 of the London Plan. Policy 5.13 of the London Plan states that:

"A development should utilise sustainable urban drainage systems (SuDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible."

4.24 As such, SuDS components should be designed to accommodate and dispose of runoff from storms up to and including the 1:100 year +40% climate change event without flooding.

4.25 Analysis has shown that the existing runoff rate from the site for the 1:100 year critical storm event is 4.4l/s. The proposed development will result in an increase in built footprint of approximately 234.7m². Post-development, calculations have shown that the proposed (unrestricted) runoff rate from the site for the same 1:100 year critical storm event is 15.7l/s.

4.26 The design life of a residential dwelling is 100 years, and an allowance for climate change should be considered in accordance with published guidance within the NPPF 2019. The proposed surface water drainage system should therefore be designed to accommodate the 1:100 year +40%CC storm event on site.

4.27 The increase between the existing and proposed runoff rates for the 1:100 year critical storm event is approximately 11.3l/s (4.4l/s as existing compared to 15.7l/s for proposed). As such, the maximum predicted discharge volume increases from 1.7m³ to 6.1m³ post-development for the 15 min summer storm event as per the MicroDrainage Calculations displayed in Appendix II.

4.28 The non-statutory technical guidance for SuDS identifies that an allowance for urban creep (10% increase in area), should be accounted for.

4.29 In accordance with Policy 5.13 of the London Plan, runoff rates for the whole site should be restricted to as close to greenfield as practical (1l/s). Ambiental have produced post-development calculations with site runoff rates restricted to 1l/s. These calculations indicate a storage requirement of 18.5m³ for the 1:100 year +40%CC critical storm event.

4.30 For the purposes of our model this has been achieved through a geocellular storage tank. The developer could aim to collect surface water runoff through installing lined Type C permeable paving on site. This in

turn could direct flows to a sub-surface storage tank which would offer the required volume of attenuation before discharging to the existing sewer network at the restricted rate.

- 4.31 The developer could also introduce water butts connected to the downpipes of the proposed building which provide an additional means of attenuation whilst also offering a form of rainwater harvesting. The excess water could be conveyed to the sub-surface storage tank or to nearby rain gardens.
- 4.32 A 1l/s restriction is based on the theoretical greenfield discharge rate, however the requirements of the Final Sewers for Adoption 8, indicate that an aperture size of no less than 50mm should be used in the management of surface water to reduce the risk of blockage. During detailed design this should be considered, and a suitable surface water flow control specified in agreement with Thames Water, the Lead Local Flood Authority, and Building Control.
- 4.33 Ambiental requested a sewer asset location plan for the site from Thames Water. The review of the asset plan displays a surface water sewer network to be located immediately south of the site at 'Cobwebs' (Figure 17). There is potential that there is a private connection between the site at Tuscany and Cobwebs. Should this be the case, it is recommended that the developer continues to discharge via this surface water network at a restricted rate. No topographic survey has been provided at the time of writing this report and therefore this cannot be confirmed. All existing connections and the depths and locations of the pipes are currently unknown and are to be confirmed at detailed phase.

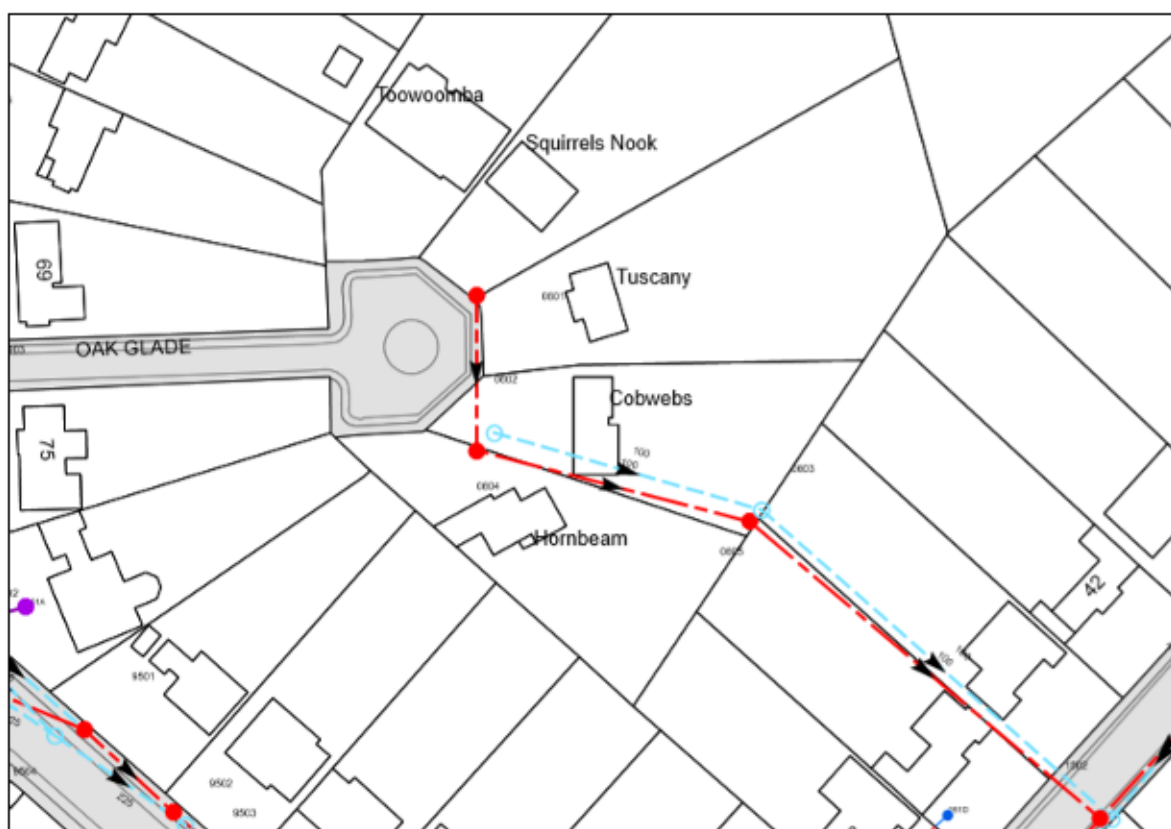


Figure 15 Extract of Thames Water Sewer Asset Plan at the Site (Source: Thames Water)

Records of Historical Flooding

- 4.34 Neither the Environment Agency nor the West London SFRA (2018) have provided any evidence to suggest that either the site or the surrounding area has historically flooded from fluvial, surface water, groundwater or sewer sources of flooding.

5. Probability of Flooding

Flood Zones

- 5.1 According to the EA Flood Map for Planning, the site is located within Flood Zone 1 (low risk of flooding).
- 5.2 The EA Flood Map for Planning has been produced in part using a relatively coarse, national scale flood modelling strategy, and in part by detailed modelling. It is important to note that only the potential floodplain is modelled; **the mitigating effects of any flood defences currently in place are not considered.** For reference, the definition of the NPPF flood risk zones is included below.

Zone	Description
1	Low Probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).
2	Medium Probability. This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.
3a	High Probability. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
3b	The Functional Floodplain. This zone comprises land where water has to flow or be stored in times of flood. SFRA's should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the EA, including water conveyance routes).

Table 4 Definition of the NPPF Flood Zones. (Source: EA)

Climate Change on Site

- 5.3 The design lifetime of a residential site is 100 years and an allowance for climate change should be considered in accordance with published guidance within the NPPF 2019. The climate change criteria are reproduced below, and it is likely that the 'upper end' allowance for 2070 to 2115 is deemed suitable for the proposed development. To provide a worst-case scenario, the 'upper end' 40% climate change allowance will be used (Table 5).

PEAK RAINFALL INTENSITY ALLOWANCE IN SMALL AND URBAN CATCHMENTS			
Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper End	10%	20%	40%
Central	5%	10%	20%

Table 5: Peak rainfall intensity allowance in small and urban catchments

- 5.4 Climate change is likely to raise storm intensity and as such impact on surface water flooding. The proposed surface water drainage system should therefore be designed to accommodate the 1:100 year +40%CC storm event on site.

6. Residual Risks

Identification of Residual Risks

- 6.1 Residual risks are those remaining after applying the sequential approach to the location of development and taking mitigating actions. Examples of residual flood risk include:
- the failure of flood management infrastructure such as a breach of a raised flood defence, blockage of a surface water conveyance system, overtopping of an upstream storage area, or failure of a pumped drainage system;
 - failure of a reservoir; and,
 - a severe flood event that exceeds a flood management design standard, such as a flood that overtops a raised flood defence, or an intense rainfall event which the drainage system cannot cope with.

Defence Breach

- 6.2 The EA have not provided evidence to suggest that the site benefits from the presence of fluvial defences. Furthermore, the EA Flood Map for Planning indicates that the proposed development site is located in an area that does not benefit from defences. As such there is no residual risk of defence failure.

Reservoir Failure

- 6.3 The EA Risk from Reservoir Flooding Map demonstrates that the site is outside flood extents in the event of reservoir flooding.

Drainage Exceedance

- 6.4 In the event of drainage exceedance, overland flows will be dictated by external topography. An assessment of 2m LiDAR data at the site shows that levels fall away from the proposed dwelling towards both the rear of the site (east) and Oak Glade road to the west. As such, flood waters would drain away from the proposed development during a drainage exceedance event.

7. Flood Risk Management Measures

Flood Risks

- 7.1 The site is currently a residential dwelling. It is understood that the development is for the demolition of the existing residential dwelling and construction of a larger replacement residential dwelling.
- 7.2 With reference to the Environment Agency (EA) Flood Map for Planning, the proposed development is located wholly within Flood Zone 1. The closest fluvial flood zone to the site is an area of Flood Zone 2 located approximately 1.25km southeast of the site.
- 7.3 The site can subsequently be considered safe for its lifetime from fluvial flooding and any increase in flood water displacement as a result of the proposed development could therefore be deemed negligible. The risk of flooding from fluvial sources could be deemed **low**.
- 7.4 Additionally, the entire redline site boundary is located outside of the 1:30 year and 1:100 year pluvial flood extents as modelled by the EA Risk of Flooding from Surface Water (RoFSW) dataset. These are deemed to be representative of Flood Zone 3b and 3a by the West London SFRA (2018). Similarly, the site is located wholly outside of the 1:1000 year pluvial flood extent. The site could therefore be considered to be at **low** risk of surface water flooding.

- 7.5 The underlying geological properties at the site are largely comprised of clays which inhibit downward water movement. No historical evidence has been provided to suggest the site or wider area has previously flooded from this source. Subsequently, the risk of groundwater flooding at the site could be deemed to be **low**.
- 7.6 Likewise, the Thames Water DG5 record does not report any incidents of sewer flooding at the site or wider area and therefore the risk of flooding from sewer sources could also be considered **low**.
- 7.7 As part of the development works, a basement has been proposed at the site. Policy DMHD 3 of the London Borough of Hillingdon Local Plan (2012) states that “the council will not permit basement schemes which include habitable rooms and other sensitive uses in areas prone to flooding”. The basement is proposed for additional rooms associated with the proposed dwelling (swimming pool, gym, changing rooms etc) and will not be self-contained. No bedrooms will be proposed at basement level. The site is considered to be at **low** risk of flooding from fluvial, surface water, groundwater and sewer sources.
- 7.8 Following the construction of a larger replacement dwelling, there will be an increase in built footprint of approximately 234.7m² on site. Given the increase in built footprint and associated hardstanding area, there will likely be an increase in surface water runoff generation onsite post-development.
- 7.9 To comply with the West London SFRA (2018) and Policy 5.13 of the London Plan, surface water runoff rates should be restricted to as close to greenfield as practical. Ambiental have subsequently produced post-development calculations with site runoff rates restricted from the existing rate of 4.4l/s for the 1:100 year event to 1l/s for the 1:100 year +40% critical storm event.
- 7.10 It is recommended that the developer installs sustainable drainage systems on site to provide the calculated attenuation volume of 18.5m³ that is needed to discharge from the site at a restricted rate of 1.0l/s.

Flood Alert and Flood Warning Services

- 7.11 The site is located wholly in Flood Zone 1 and the nearest extent of Flood Zone 2 is approximately 1.25km southeast of the site and at topographic levels that are roughly 30m lower. Subsequently, the site is considered to be located outside of the Environment Agency’s Flood Alert and Flood Warning Service areas.
- 7.12 The EA operates a 24-hour telephone service on 0345 988 1188 that provides frequently updated flood warnings and associated floodplain information. Further information can be found on www.environment-agency.gov.uk/floodline. Floodline Warnings Direct is a free service operated by the EA that provides flood warnings direct to occupants by telephone, mobile phone, fax or pager.

8. Off Site Impacts

Flood Water Displacement

- 8.1 The site is currently a residential dwelling. It is understood that the development is for the demolition of the existing residential dwelling and construction of a larger replacement residential dwelling.
- 8.2 With reference to the Environment Agency (EA) Flood Map for Planning, the proposed development is located wholly within Flood Zone 1. The closest fluvial flood zone to the site is an area of Flood Zone 2 located approximately 1.25km southeast of the site.
- 8.3 Ambiental have assessed the topography between the site and the nearest Flood Zone at Ruislip Lido. Levels at the site are at approximately 80mAOD. The levels at the closest extent of Flood Zone 2 to the site has been assessed to be at land that is approximately 30m lower than the site at approximately 50mAOD (Figure 7). Therefore, it can be assumed that the proposed development would remain safe for its lifetime from fluvial sources of flooding.
- 8.4 As such, any flood water displacement as a result of the proposed development could be considered negligible.

Generation of Runoff

- 8.5 The site is currently a residential dwelling. It is understood that the development is for the demolition of the existing residential dwelling and construction of a larger replacement residential dwelling.
- 8.6 The existing residential building has a built footprint of approximately 87.3m². The proposed development is for the demolition of the existing building and following this, the construction of a larger replacement residential dwelling. The proposed building will have a built footprint of approximately 322m². Subsequently, there will be an increase in built footprint of approximately 234.7m² as a result of the proposed development.
- 8.7 Given the increase in built footprint and associated hardstanding area there will likely be an increase in surface water runoff generation onsite post-development.
- 8.8 Table 4-1 of the West London SFRA states that information of the proposed SuDS and surface water runoff discharge destination should be in line with Policy 5.13 of the London Plan. Policy 5.13 of the London Plan states that:

"A development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible."
- 8.9 As discussed previously with the Surface Water Drainage Strategy section within Section 4 SuDS components should be designed to accommodate and dispose of runoff from storms up to and including the 1:100 year +40% climate change event without flooding.
- 8.10 In accordance with Policy 5.13 of the London Plan, runoff rates for the whole site should be restricted to as close to greenfield as practical (1l/s). Ambiental have produced post-development calculations with site runoff rates restricted to 1l/s. These calculations indicate a storage requirement of 18.5m³ for the 1:100 year +40%CC critical storm event.

9. Conclusion

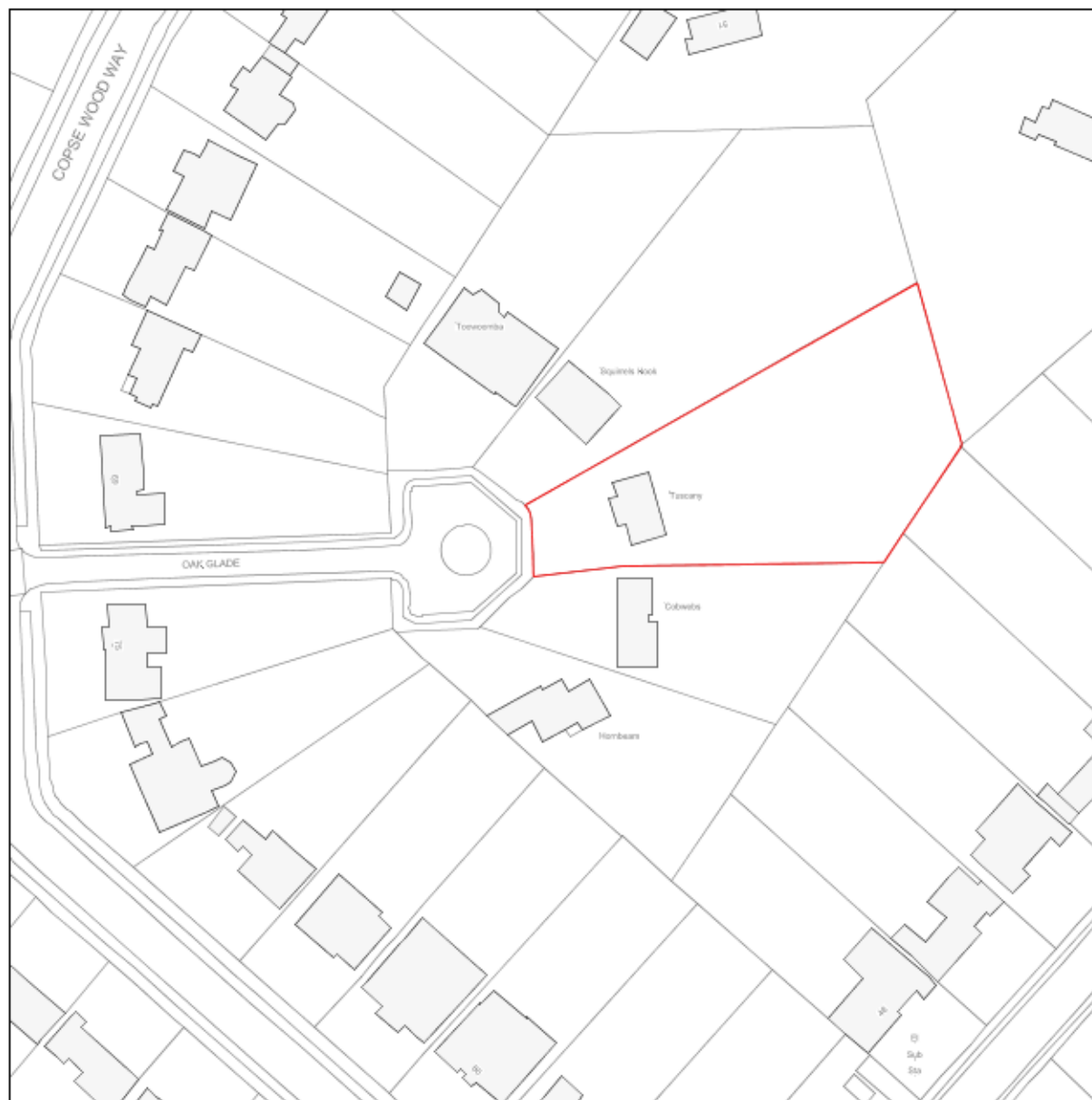
- 9.1 Ambient Environmental Assessment has been appointed by Bimal Ruparelia to undertake a National Planning Policy Framework (NPPF) compliant Flood Risk Assessment (FRA) for the proposed development at Tuscany, Oak Glade, Northwood, Hillingdon, HA6 2TY.
- 9.2 The site is currently a residential dwelling. It is understood that the development is for the demolition of the existing residential dwelling and construction of a larger replacement residential dwelling.
- 9.3 With reference to the Environment Agency (EA) Flood Map for Planning, the proposed development is located wholly within Flood Zone 1. The closest fluvial flood zone to the site is an area of Flood Zone 2 located approximately 1.25km southeast of the site, associated with Ruislip Lido. The closest watercourse to the site is an unknown drain located approximately 385m south of the site.
- 9.4 Given its existing residential use, the site can subsequently be considered as 'More Vulnerable' under the National Planning Policy Framework (NPPF) vulnerability classification guidance. The proposed development is for the construction of a larger replacement dwelling and so the vulnerability classification will remain unchanged compared to the existing scenario.
- 9.5 With reference to the West London Strategic Flood Risk Assessment (2018), the site is located outside of all Critical Drainage Areas. Additionally, the entire redline site boundary is located outside of the 1:30 year and 1:100 year pluvial flood extents as modelled by the EA Risk of Flooding from Surface Water (RoFSW) dataset. These are deemed to be representative of Flood Zone 3b and 3a by the West London SFRA (2018). Similarly, the site is located wholly outside of the 1:1000 year pluvial flood extent.
- 9.6 The existing residential building has a built footprint of approximately 87.3m². The proposed development is for the demolition of the existing building and following this the construction of a larger replacement residential dwelling. The proposed building will have a built footprint of approximately 322m². Subsequently, there will be an increase in built footprint of approximately 234.7m² as a result of the proposed development. Given the increase in built footprint and associated hardstanding area, there will likely be an increase in surface water runoff generation onsite post-development.
- 9.7 As part of the development works, a basement has been proposed at the site. Policy DMHD 3 of the London Borough of Hillingdon Local Plan (2012) states that "the council will not permit basement schemes which include habitable rooms and other sensitive uses in areas prone to flooding". The basement is proposed for additional rooms associated with the proposed dwelling (swimming pool, gym, changing rooms etc) and will not be self-contained. No bedrooms will be proposed at basement level. The site is considered to be at **low** risk of flooding from fluvial, surface water, groundwater and sewer sources.
- 9.8 To comply with the West London SFRA (2018) and Policy 5.13 of the London Plan, surface water runoff rates should be restricted to as close to greenfield as practical. Ambient have subsequently produced post-development calculations with site runoff rates restricted from the existing rate of 4.4l/s for the 1:100 year event to 1l/s for the 1:100 year +40% critical storm event.
- 9.9 As such and given that:
- The proposed development is for the construction of a larger replacement residential dwelling;
 - The site is located wholly in Flood Zone 1 and is located outside of the 1:30, 1:100 and 1:1000 year surface water flood events;

- The proposed basement will not feature sensitive rooms such as sleeping accommodation and will not be self-contained. Given that the risk of flooding to the site is low, the development complies with Policy DMHD 3 of the London Borough of Hillingdon Local Plan (2012);
- Post-development there will be an increase in built footprint and impermeable hardstanding area at the site. To comply with the West London SFRA (2018) and Policy 5.13 of the London Plan, it is recommended that sustainable drainage systems are installed on site to restrict site runoff rates to 1l/s for the 1:100 year +40% design event.

Following the guidelines contained within the NPPF, the proposed development is considered to be suitable assuming appropriate mitigation (including adequate warning procedures) can be maintained for the lifetime of the development.

Appendix I - Site Plans

NORTH



Rev	Date	Description	Init
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Client

KARANIOS LTD

Project Title
PROPOSED 6 BEDROOM DETACHED DWELLING

TUSCANY, OAK GLADE, NORTHWOOD, HA6 2TY

Drawing Title

LOCATION PLAN

Code	Sheet Size	Scale
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Drawn by	Drawing Date	Approved by
BR	1-MAY 2020	NJ
Project No.	Drawing No.	Revision
1764	P101	-

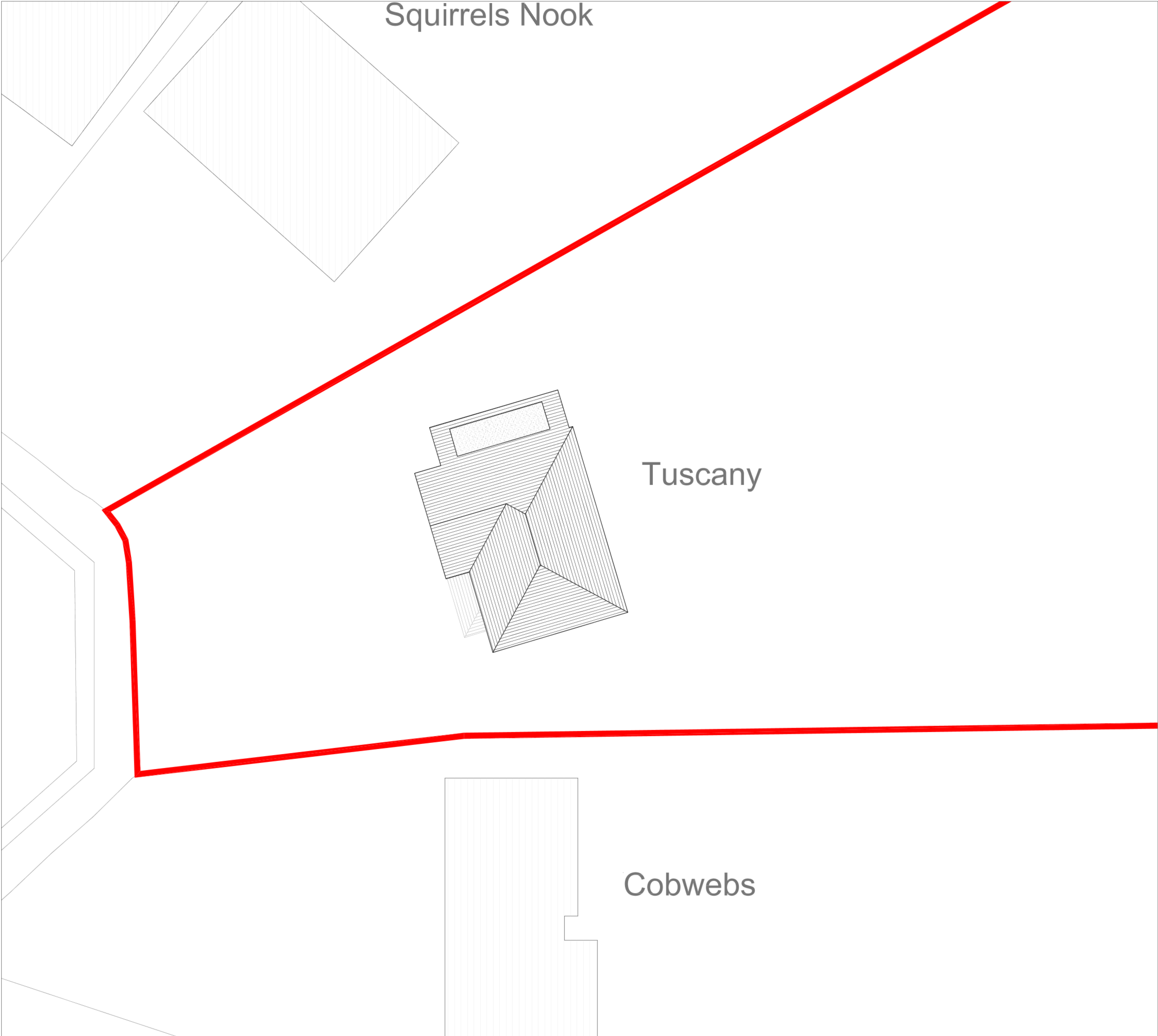


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EXISTING BLOCK PLAN
SCALE 1:100

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Rev	Date	Description	Init.

Client

KARANIOS LTD

Project Title
PROPOSED 6 BEDROOM DETACHED DWELLING

TUSCANY, OAK GLADE, NORTHWOOD, HA6 2TY

Drawing Title

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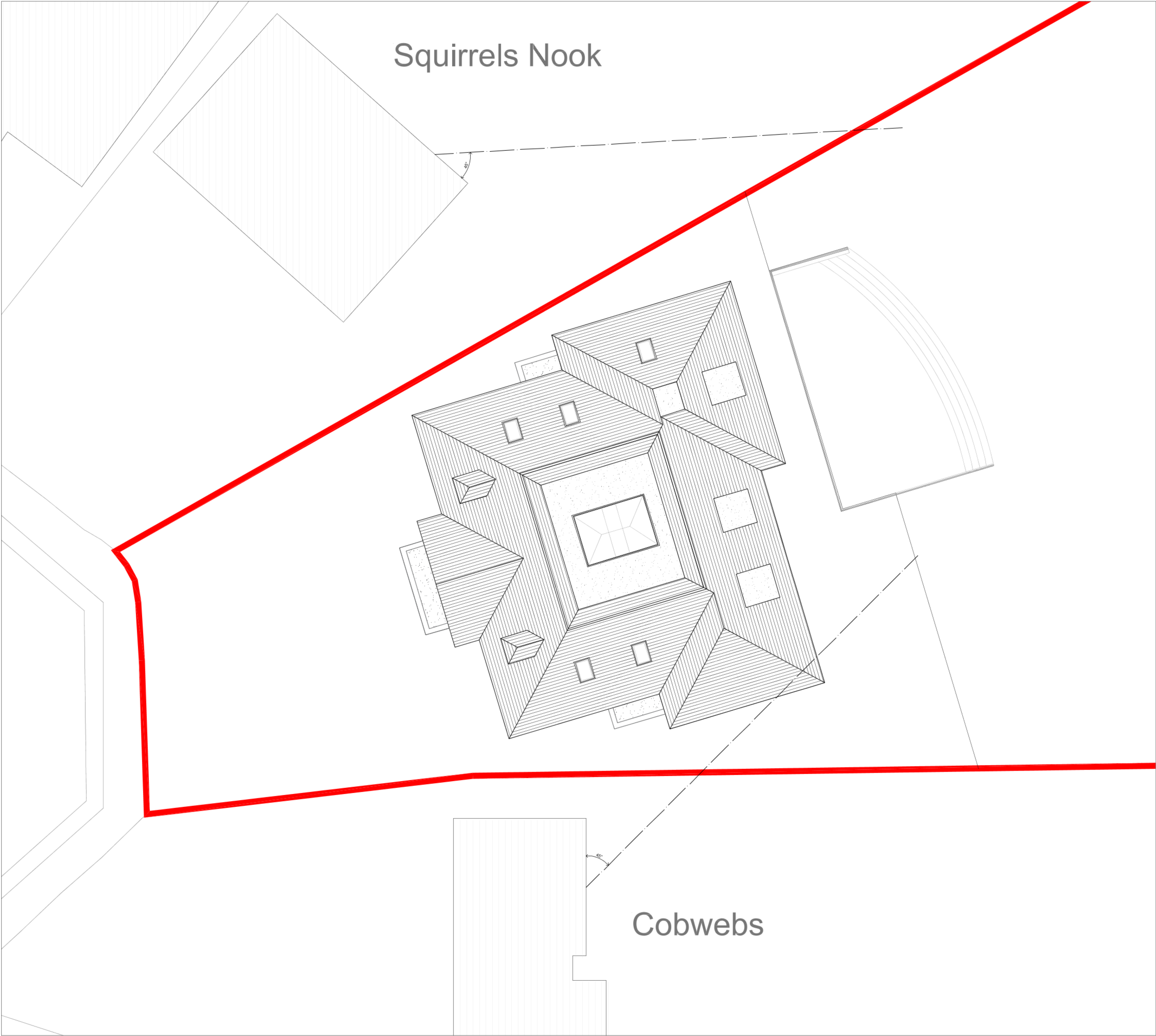
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Project No.	Drawing No.	Revision
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PROPOSED BLOCK PLAN
SCALE 1:100

Rev	Date	Description	Init.
Client			

KARANIOS LTD

Project Title
PROPOSED 6 BEDROOM DETACHED DWELLING

TUSCANY, OAK GLADE, NORTHWOOD, HA6 2TY

Drawing Title

PROPOSED BLOCK PLAN

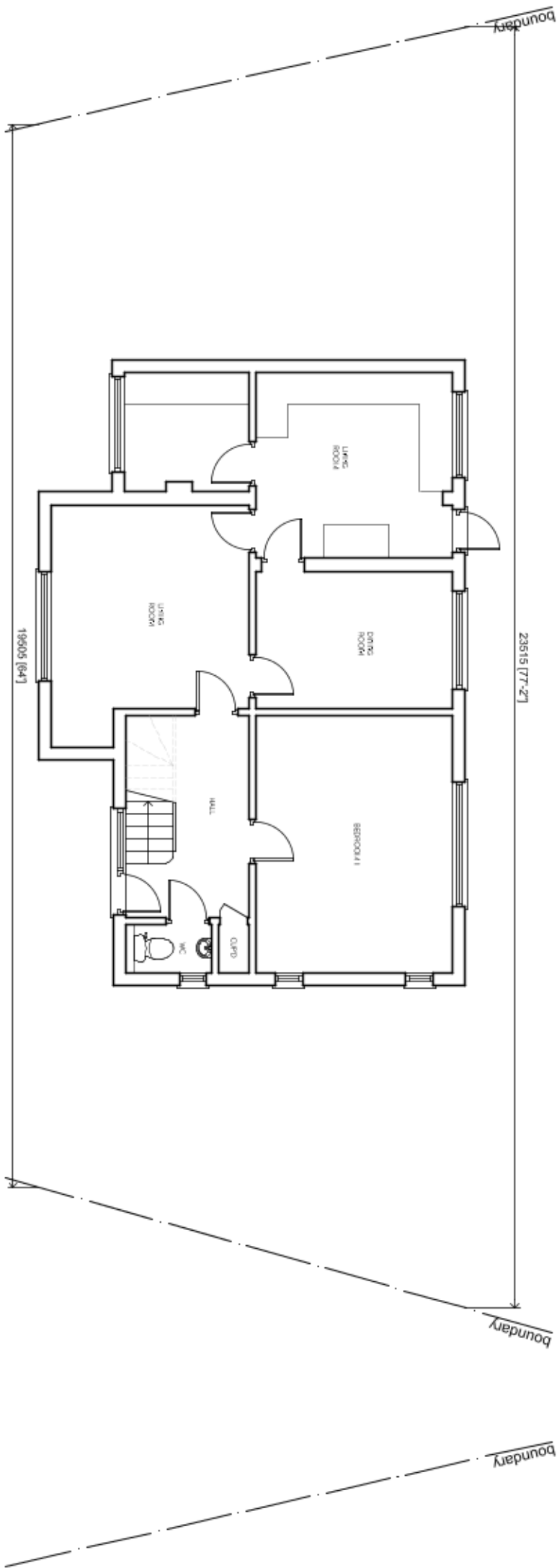
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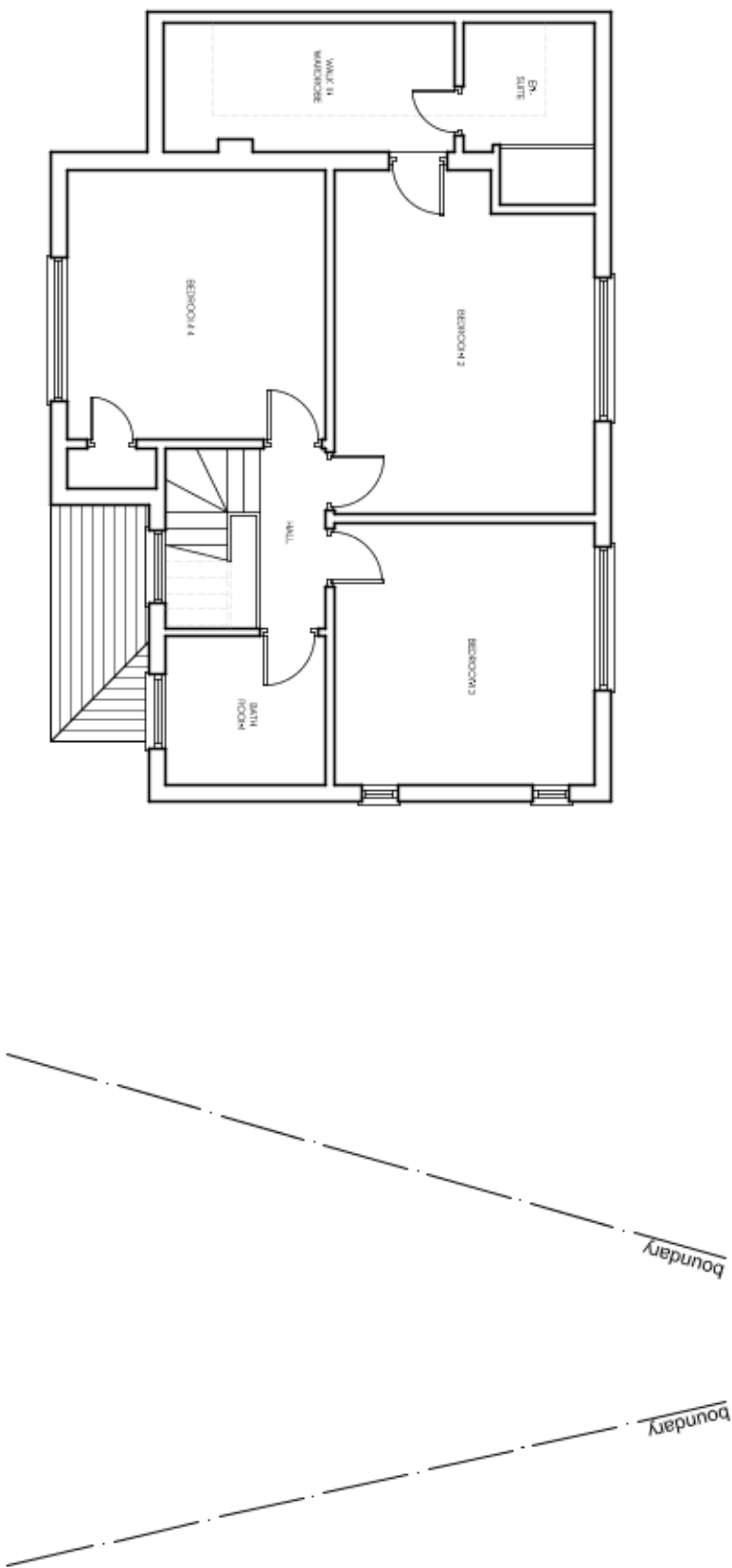
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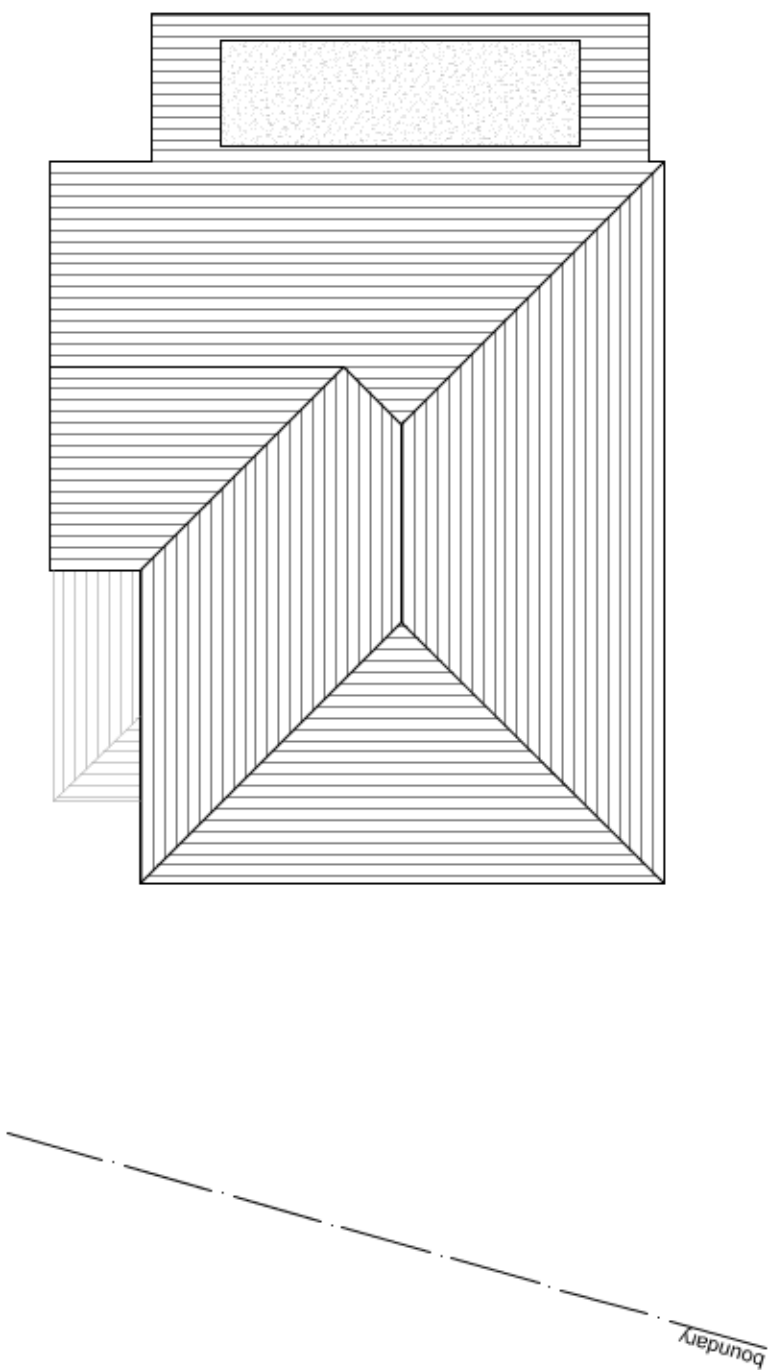
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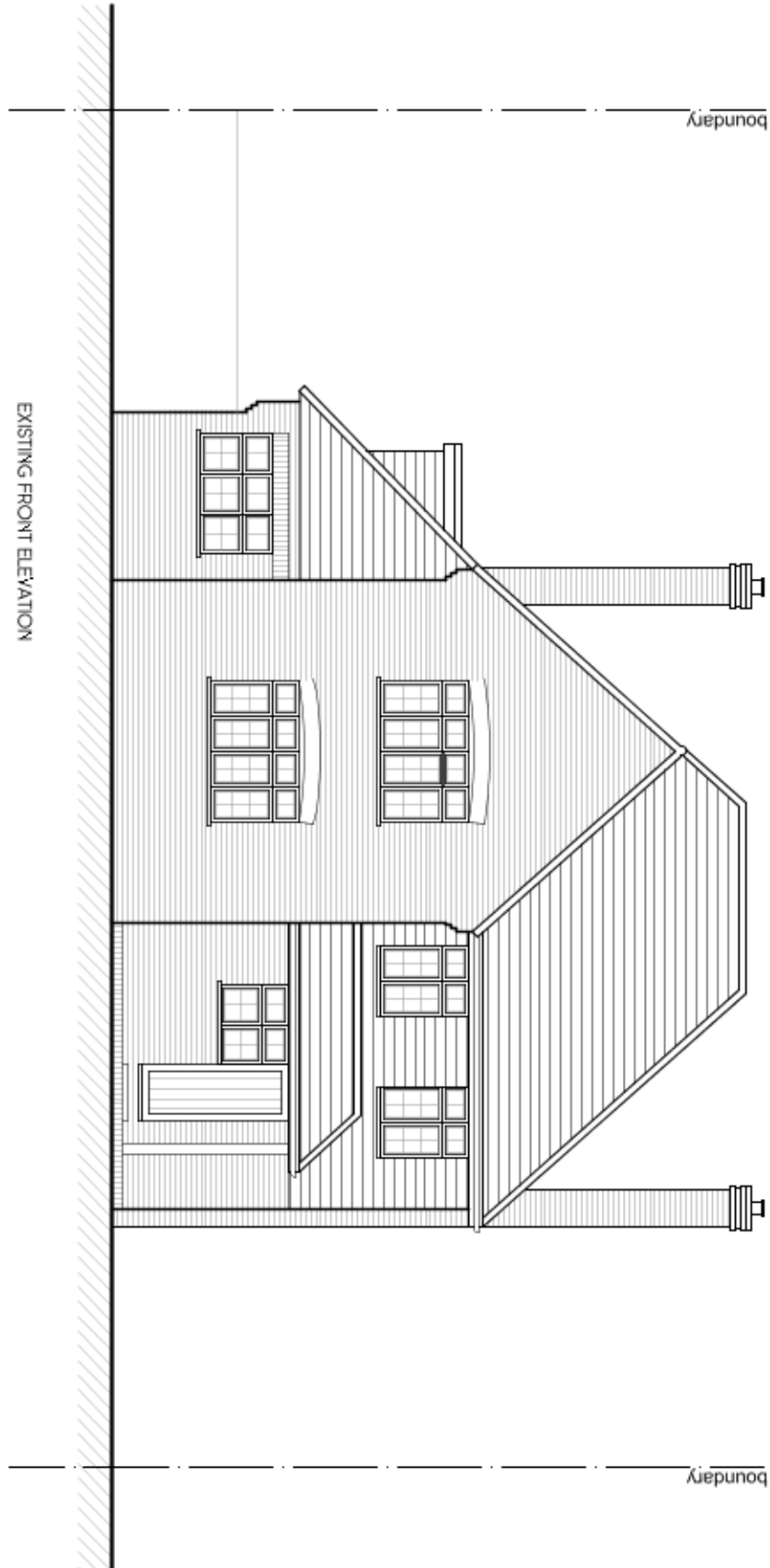
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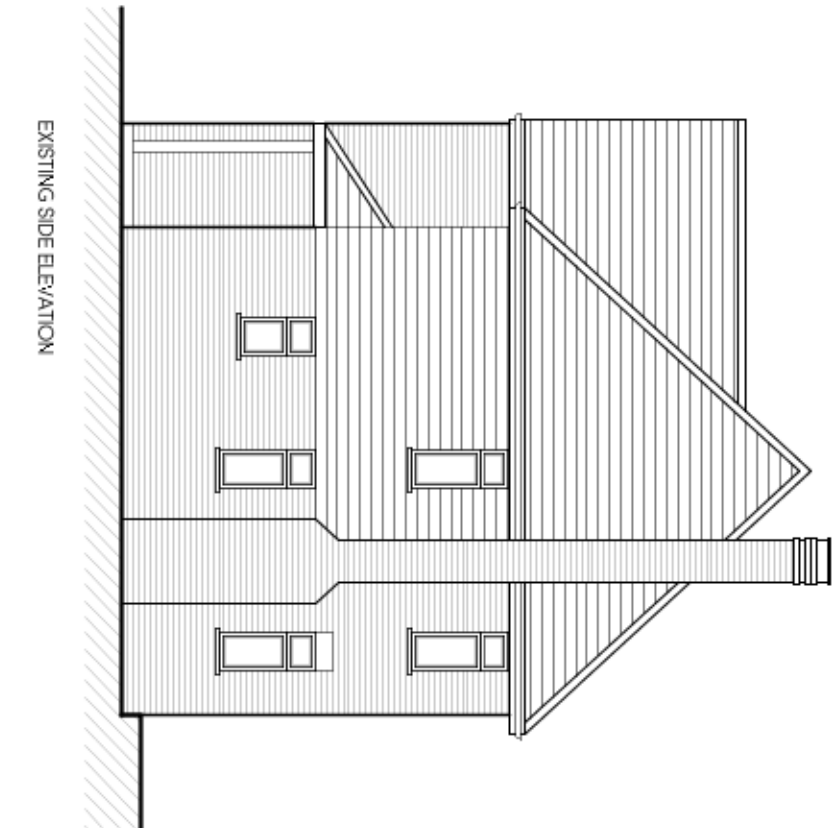
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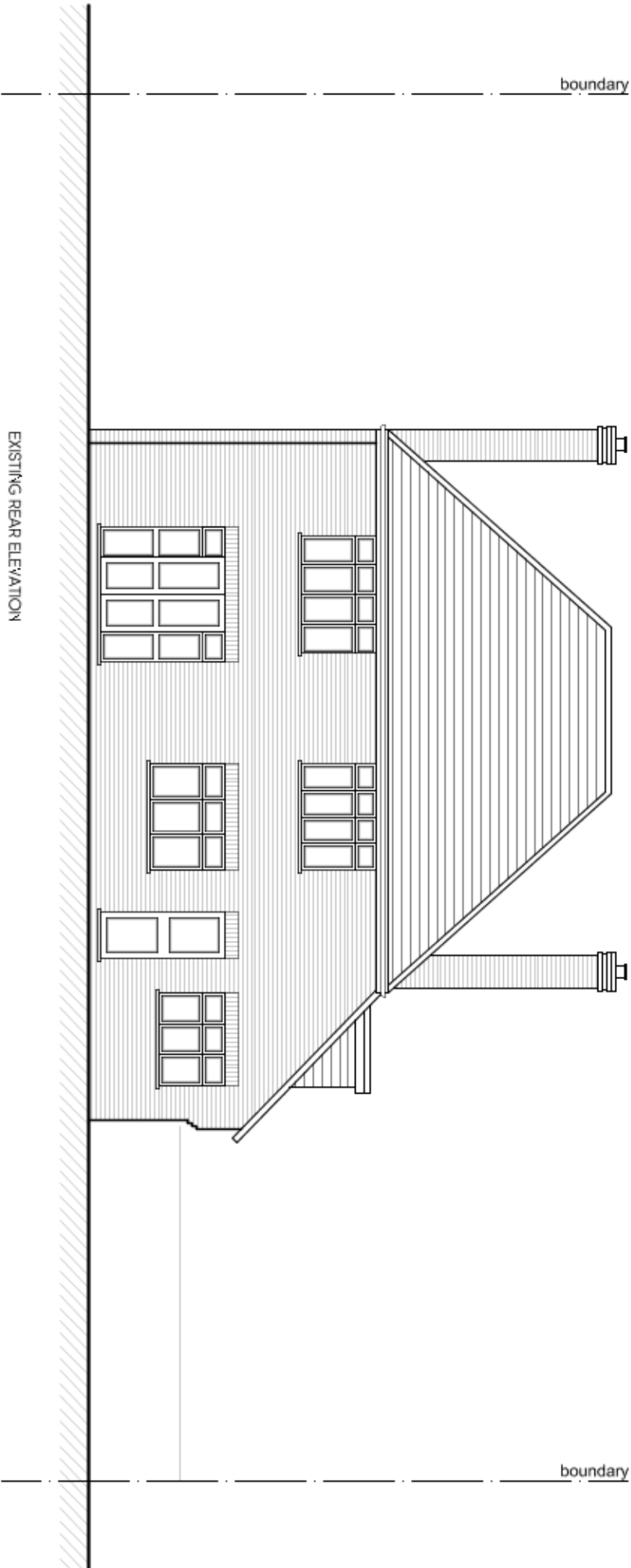
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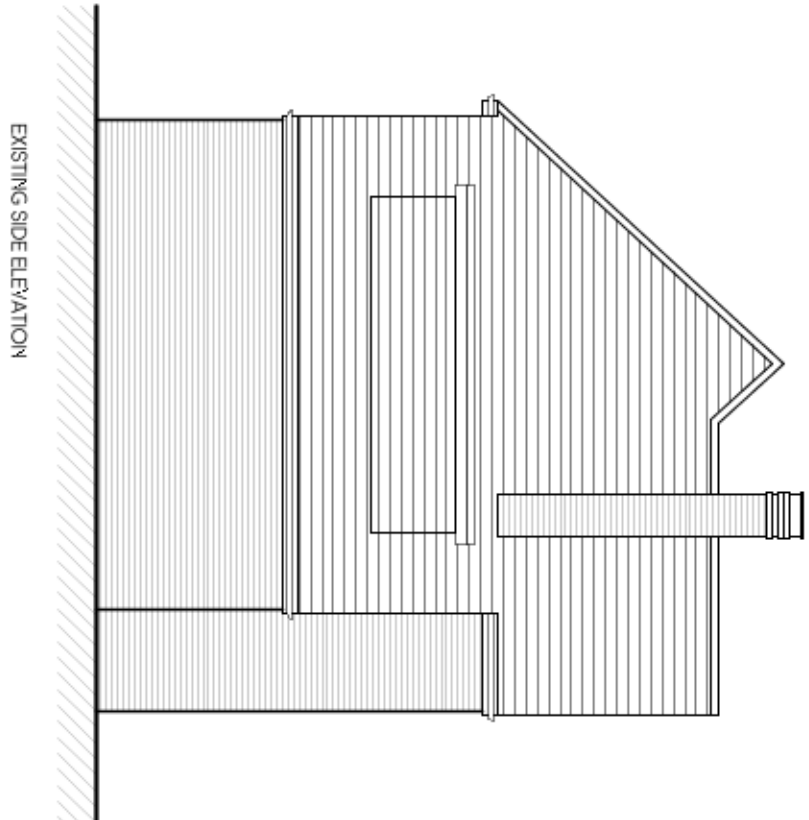
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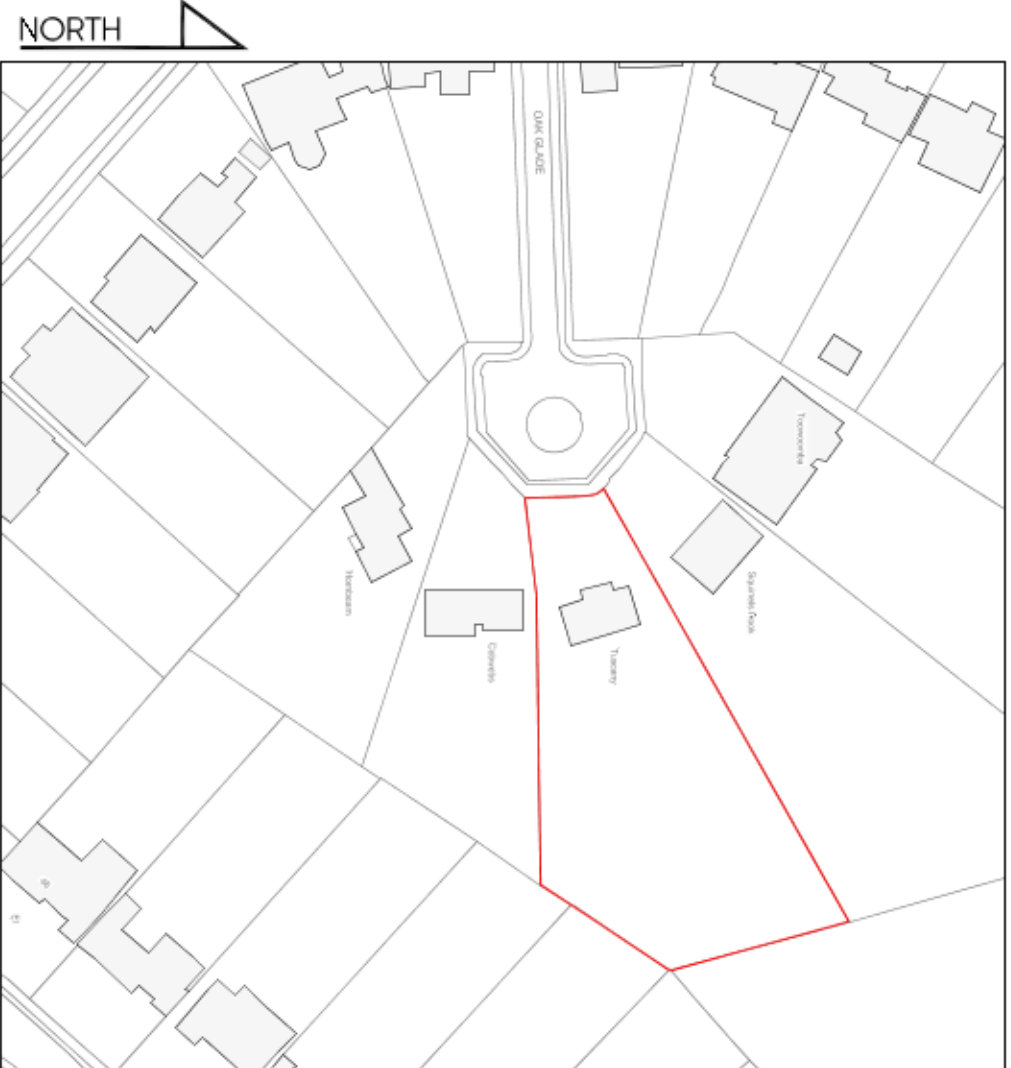
EXISTING SIDE ELEVATION



EXISTING REAR ELEVATION



EXISTING SIDE ELEVATION



LOCATION PLAN
SCALE 1:1250

Rev	Date	Description	Init.
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2	10/02/20	Revised Design	JS
3	10/02/20	Final Design	JS

KARANIOS LTD

Project Title
PROPOSED 6 BEDROOM DETACHED DWELLING
TUSCANY, OAK GLADE, NORTHWOOD, HA6 2TY

Drawing Title
EXISTING FLOOR PLANS & ELEVATIONS

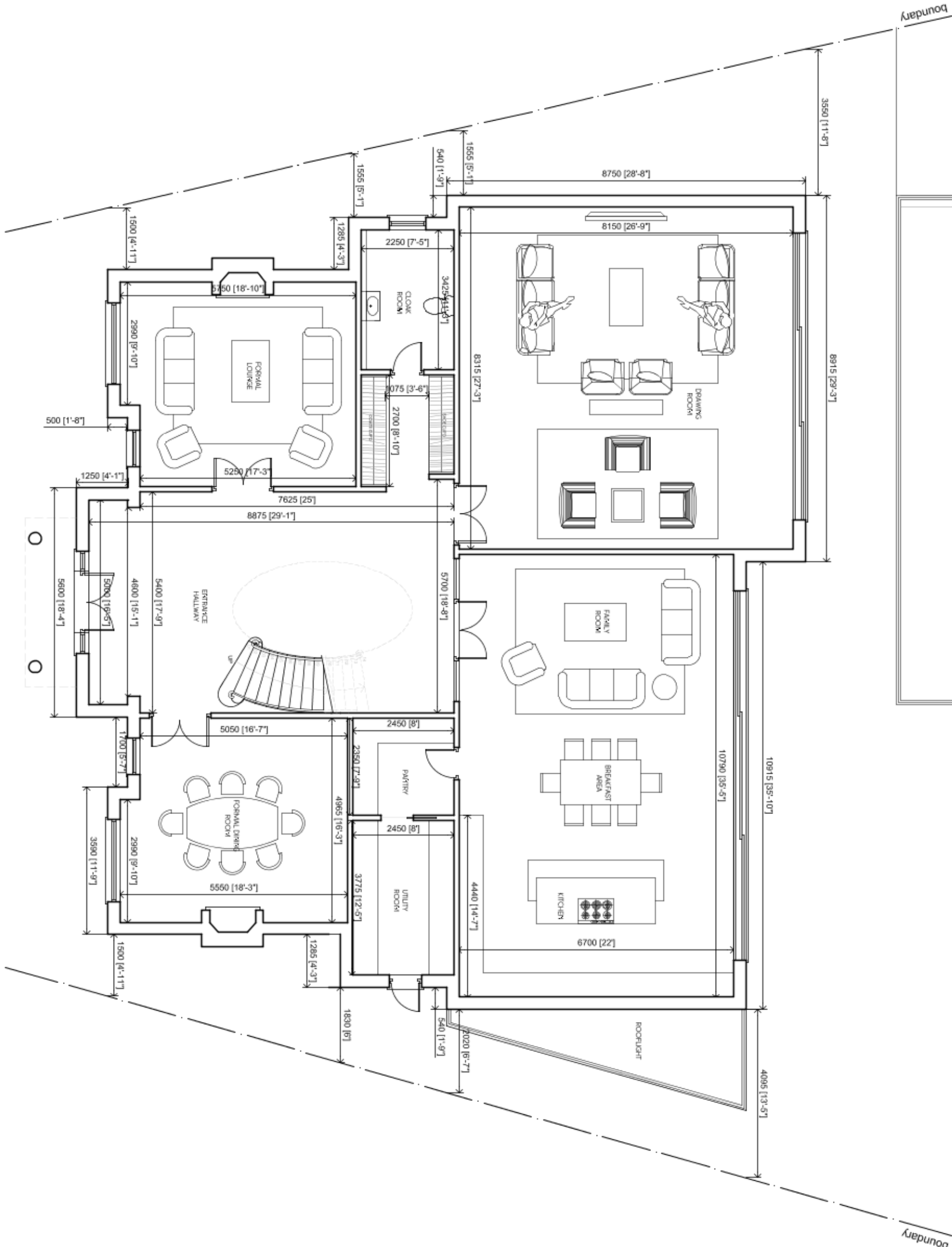
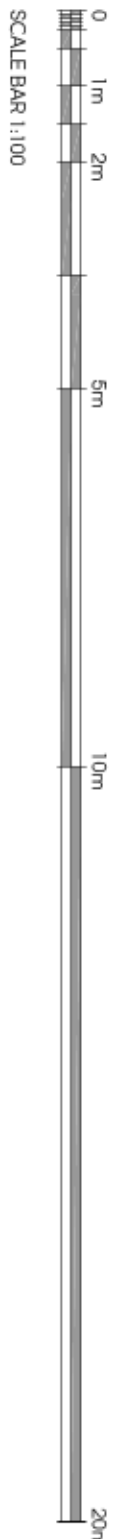
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Project No.	Drawing No.	Revision
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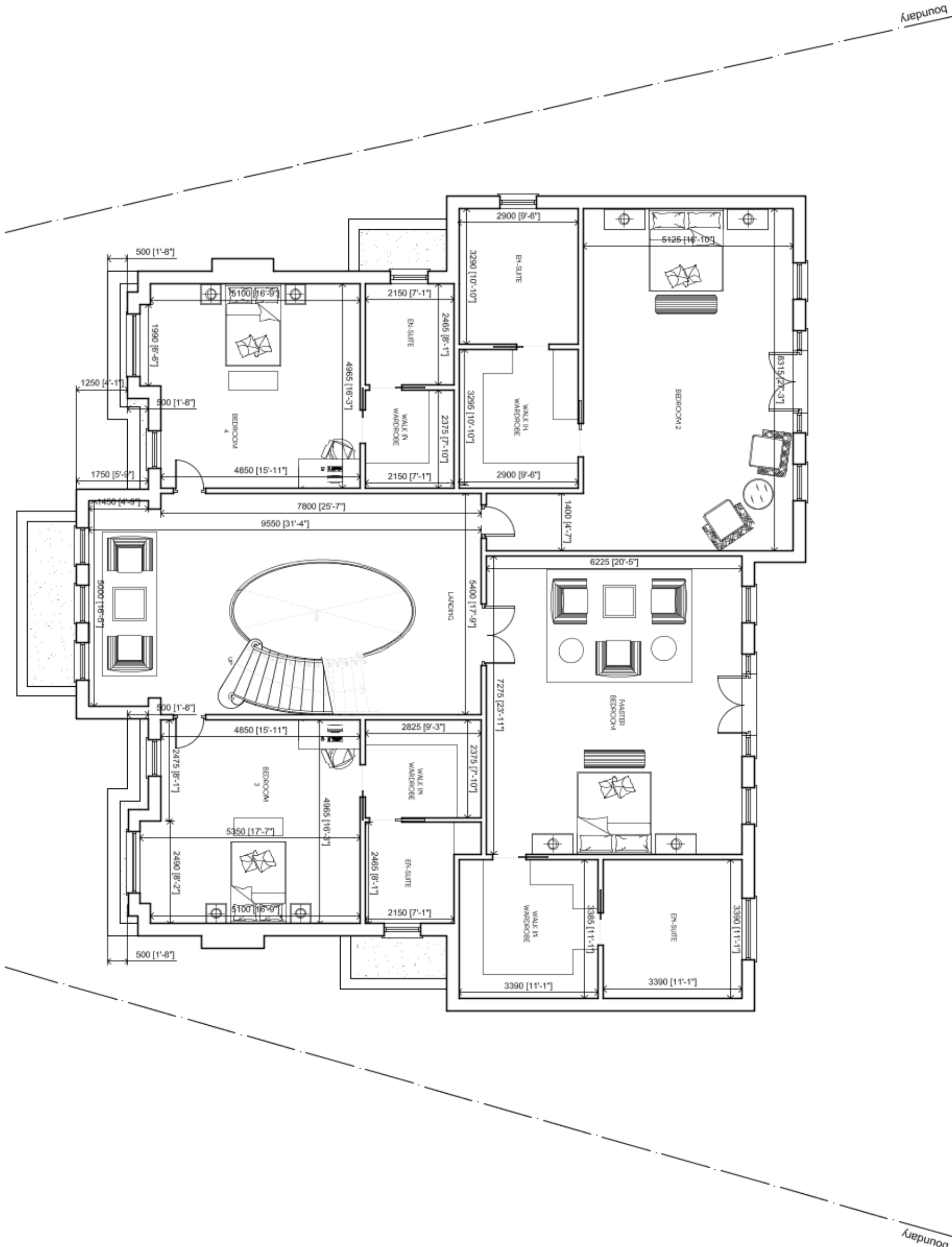
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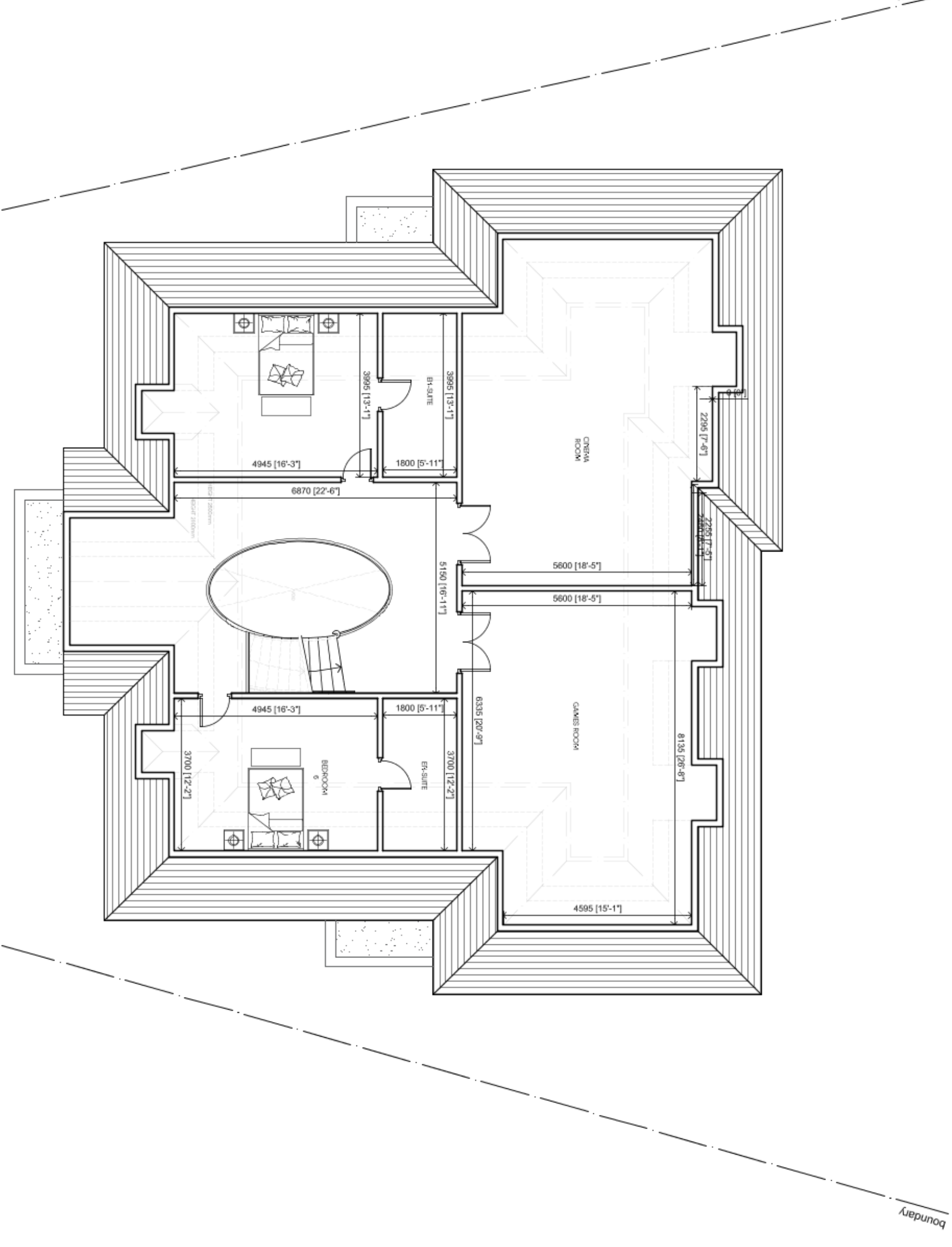
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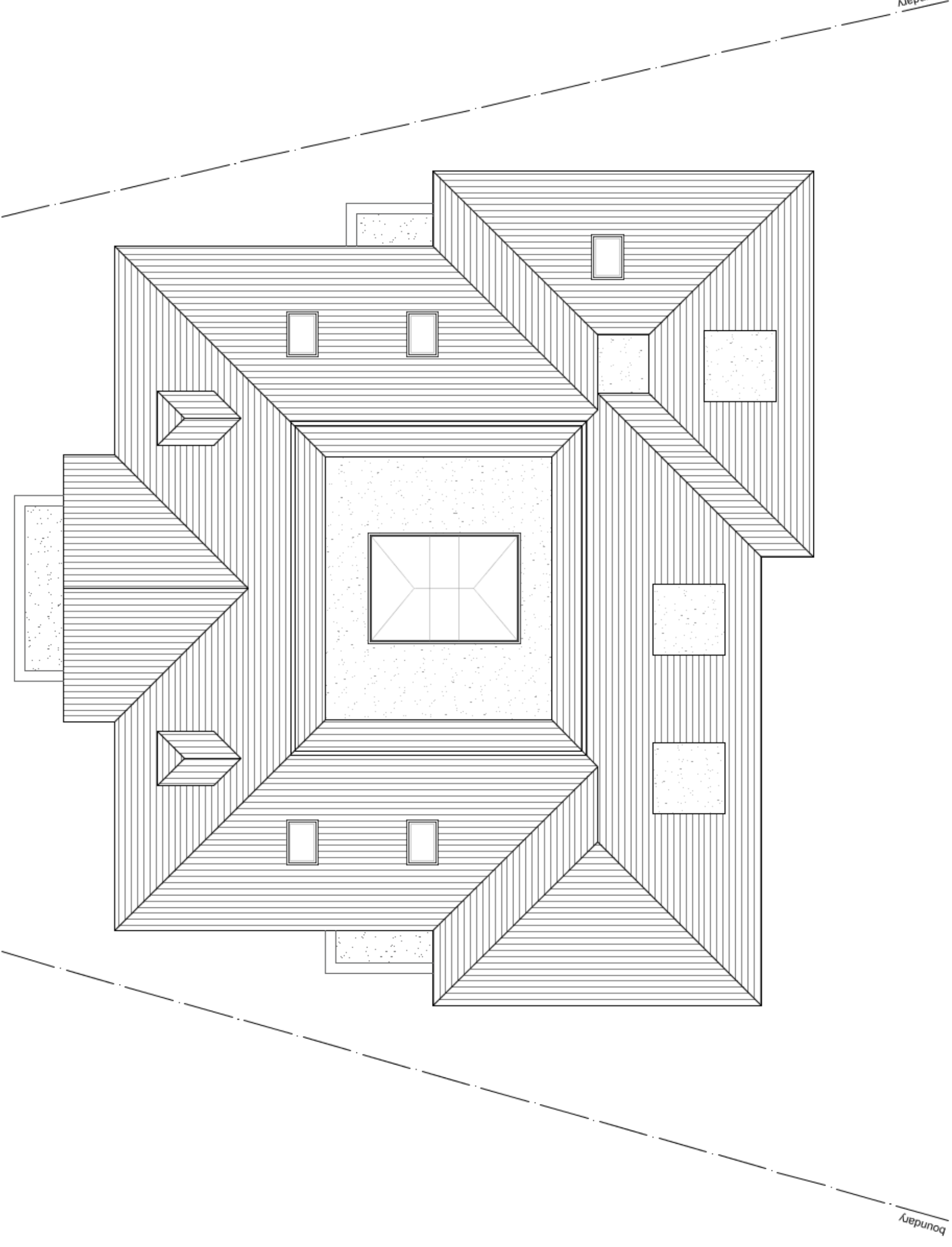
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TOTAL FLOOR COVERING



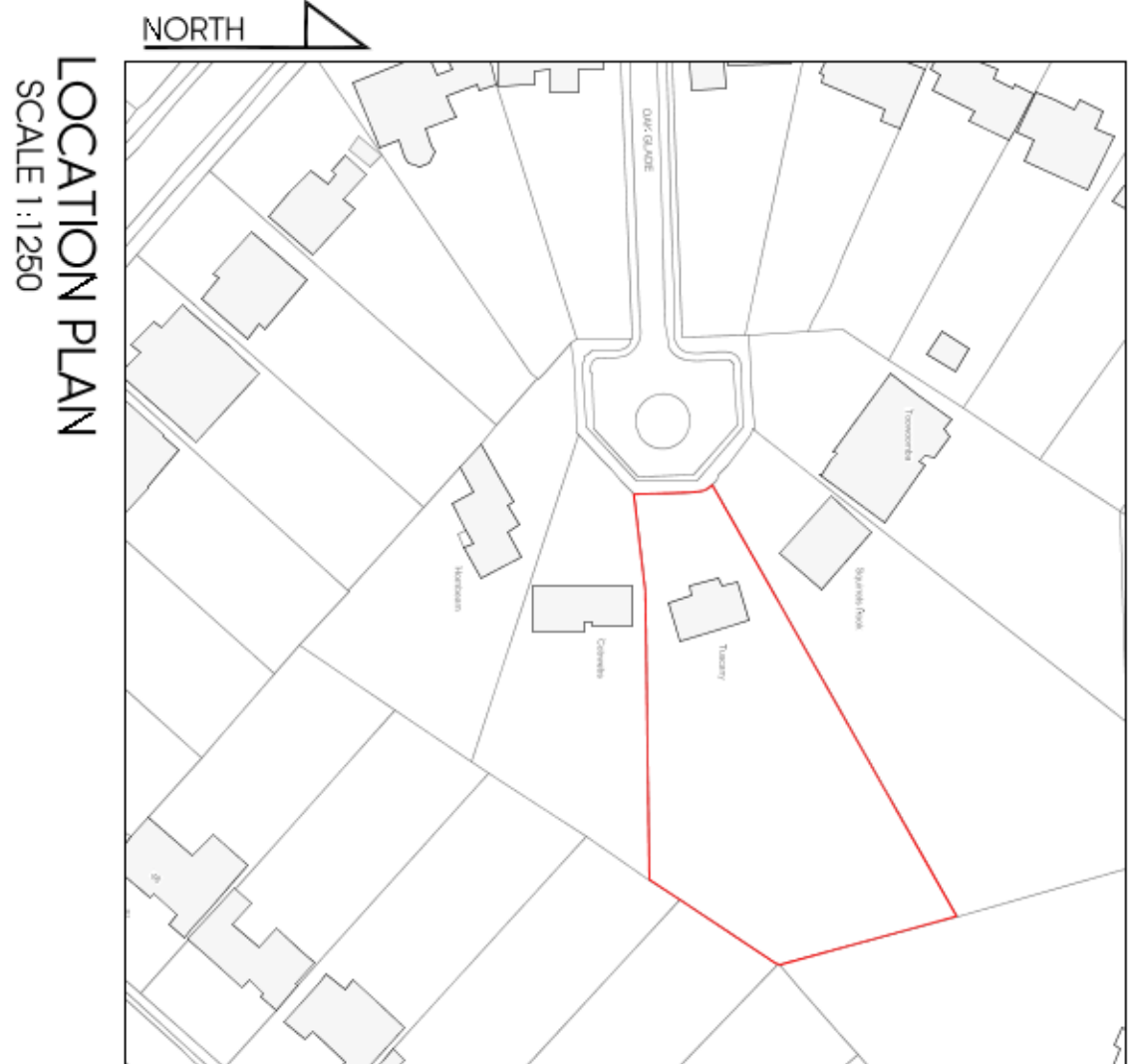
PROPOSED FIRST FLOOR PLAN
257m² / 2764m²
TOTAL FLOOR COVERING



PROPOSED SECOND FLOOR PLAN
196m² / 2119m²
TOTAL FLOOR COVERING



PROPOSED ROOF PLAN



LOCATION PLAN
SCALE 1:1250

Rev	Date	Description	Init.
-	-	-	-

Client

KARANOS LTD

Project Title
PROPOSED 6 BEDROOM DETACHED DWELLING
TUSCANY, OAK GLADE, NORTHWOOD, HA6 2TY

Drawing Title

PROPOSED FLOOR PLANS

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Project No.	P202	Revision
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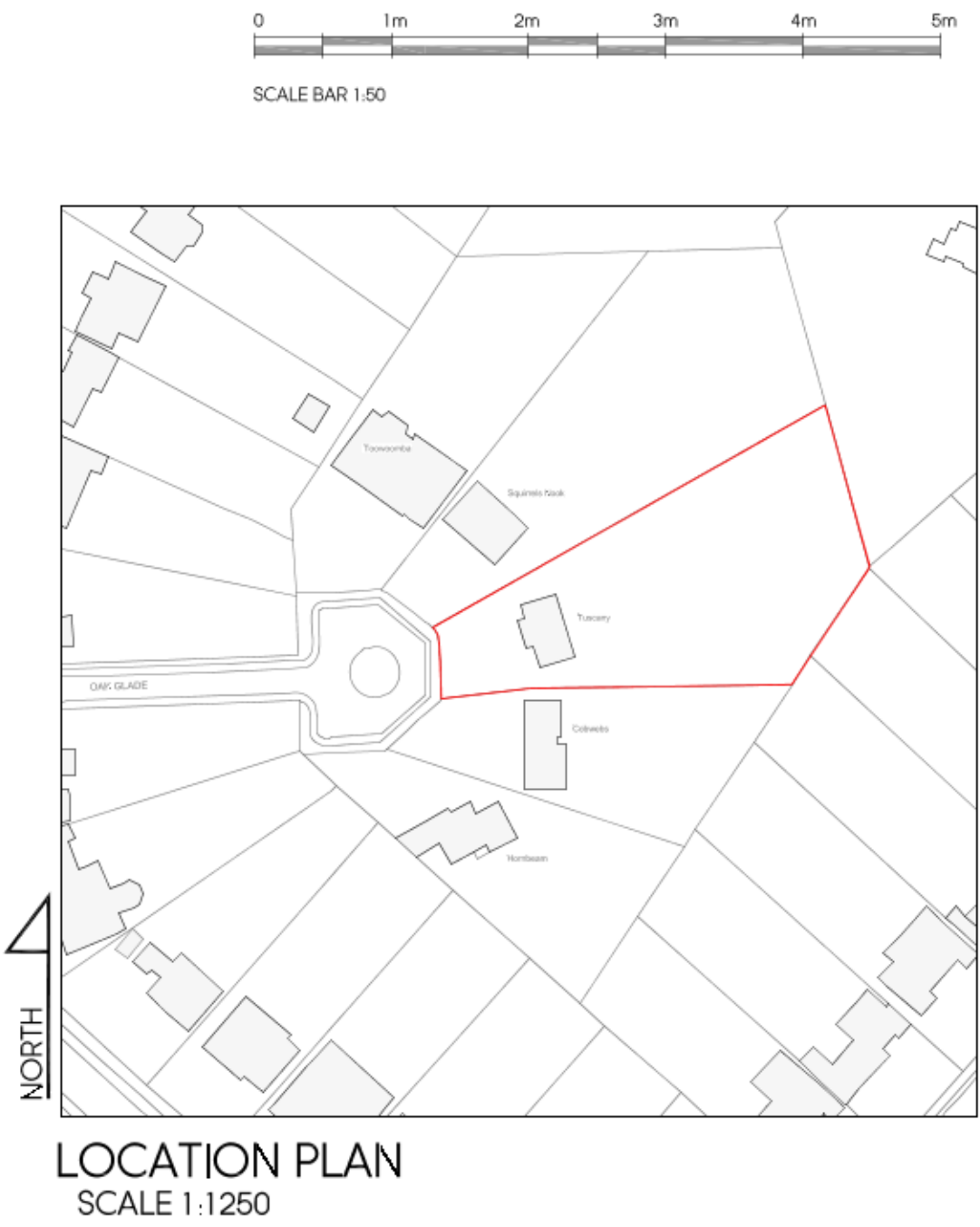
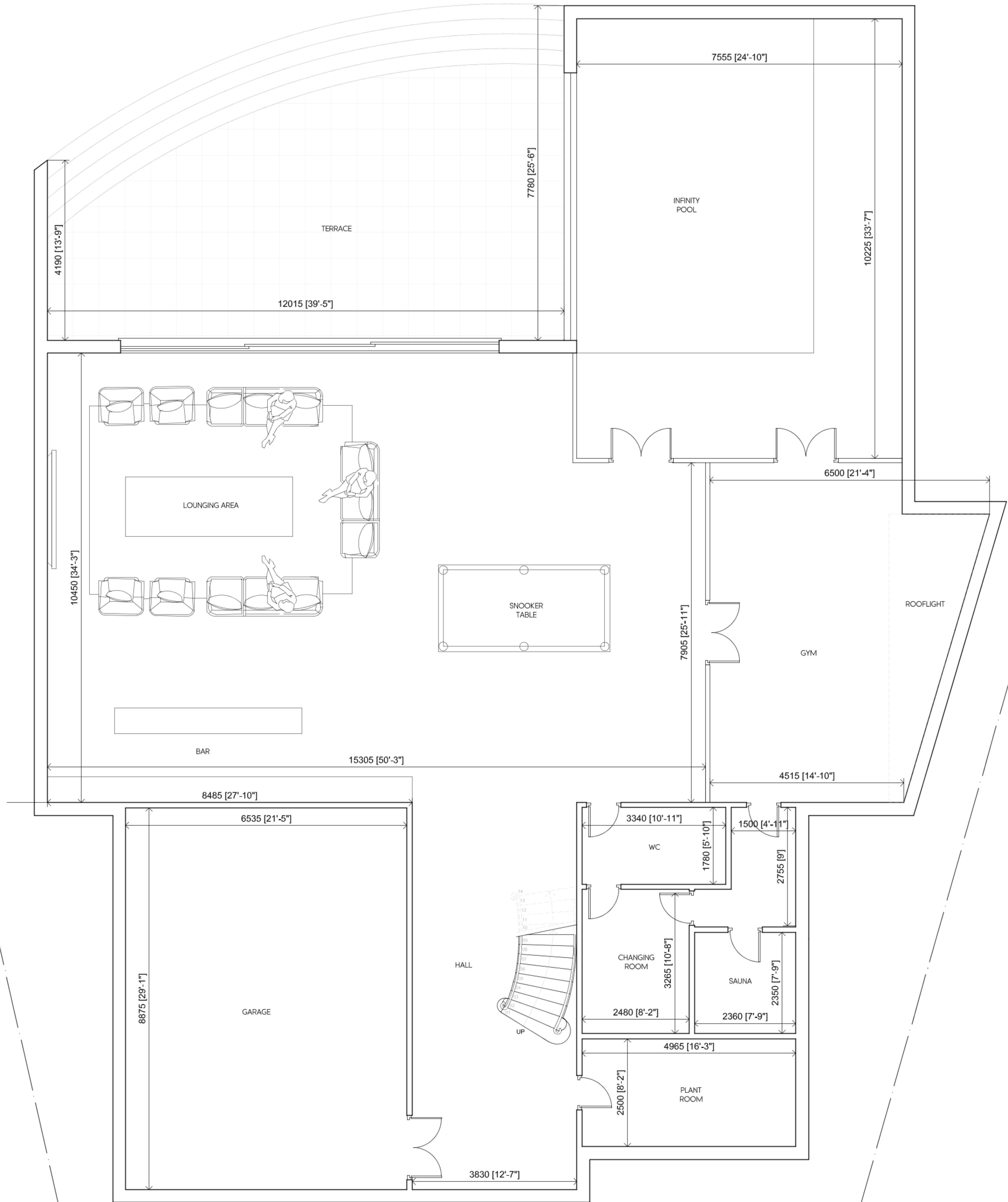
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Project Title			
PROPOSED 6 BEDROOM DETACHED DWELLING			
TUSCANY, OAK GLADE, NORTHWOOD, HA6 2TY			
Drawing Title			
PROPOSED BASEMENT PLAN			
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Project No.	Drawing No.	Revision	
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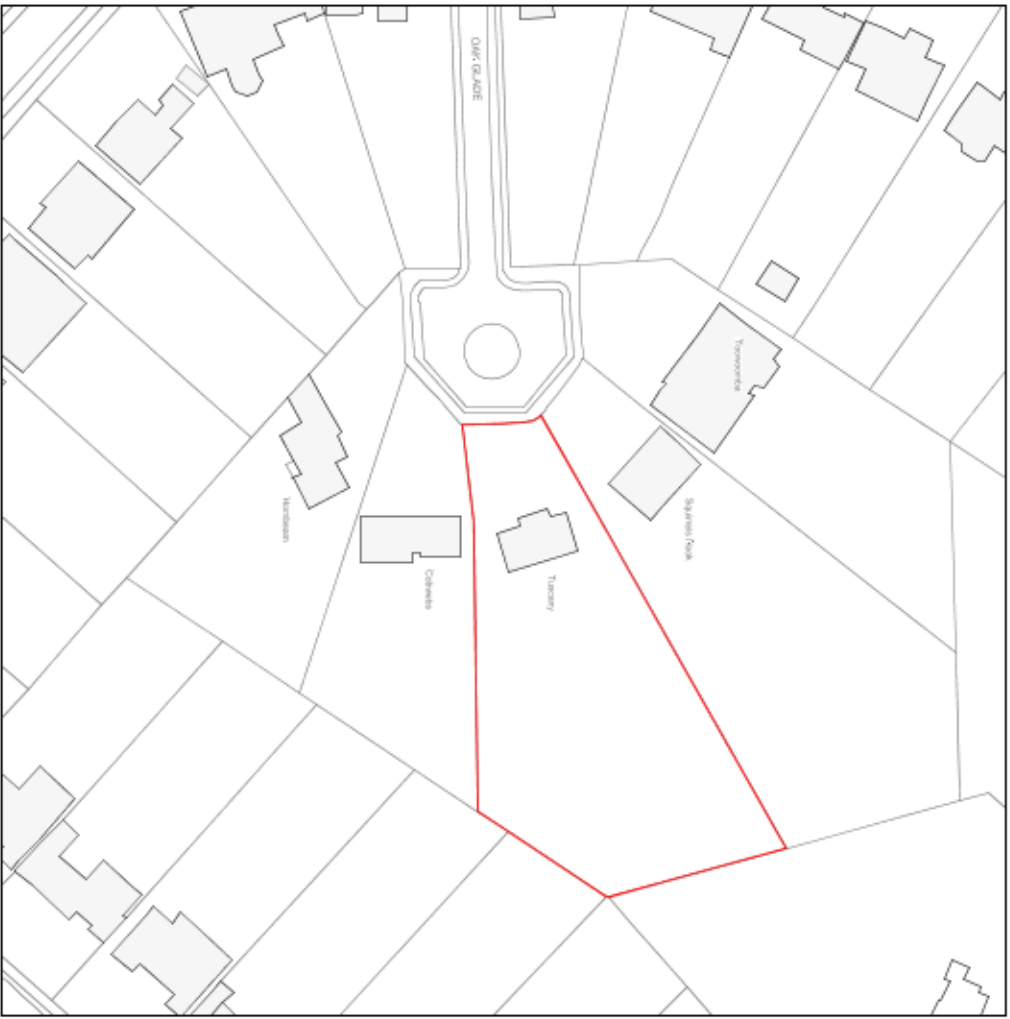
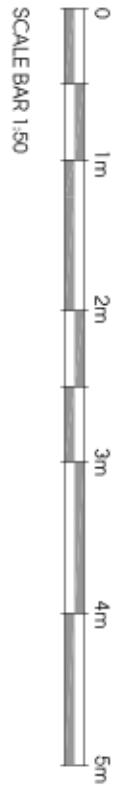


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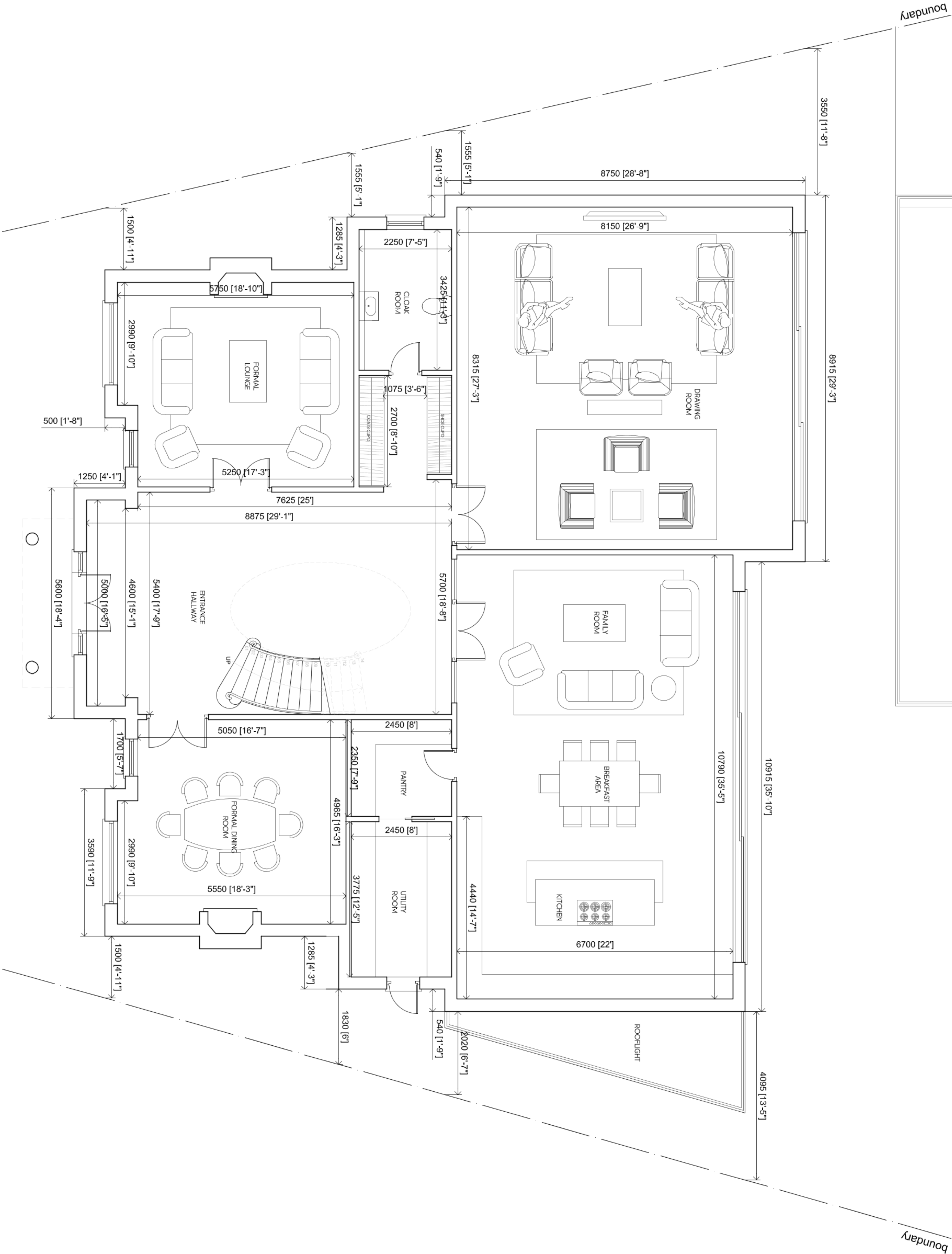
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LOCATION PLAN
SCALE 1:1250



Rev	Date	Description	Init.
-	-	-	-

KARANIOS LTD

Project Title
PROPOSED 6 BEDROOM DETACHED DWELLING
TUSCANY, OAK GLADE, NORTHWOOD, HA6 2TY

Drawing Title
PROPOSED GROUND FLOOR PLAN

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BR	MAR 2020	Approved by
Project No.	1764	Drawing No.
	P301	Revision
	-	

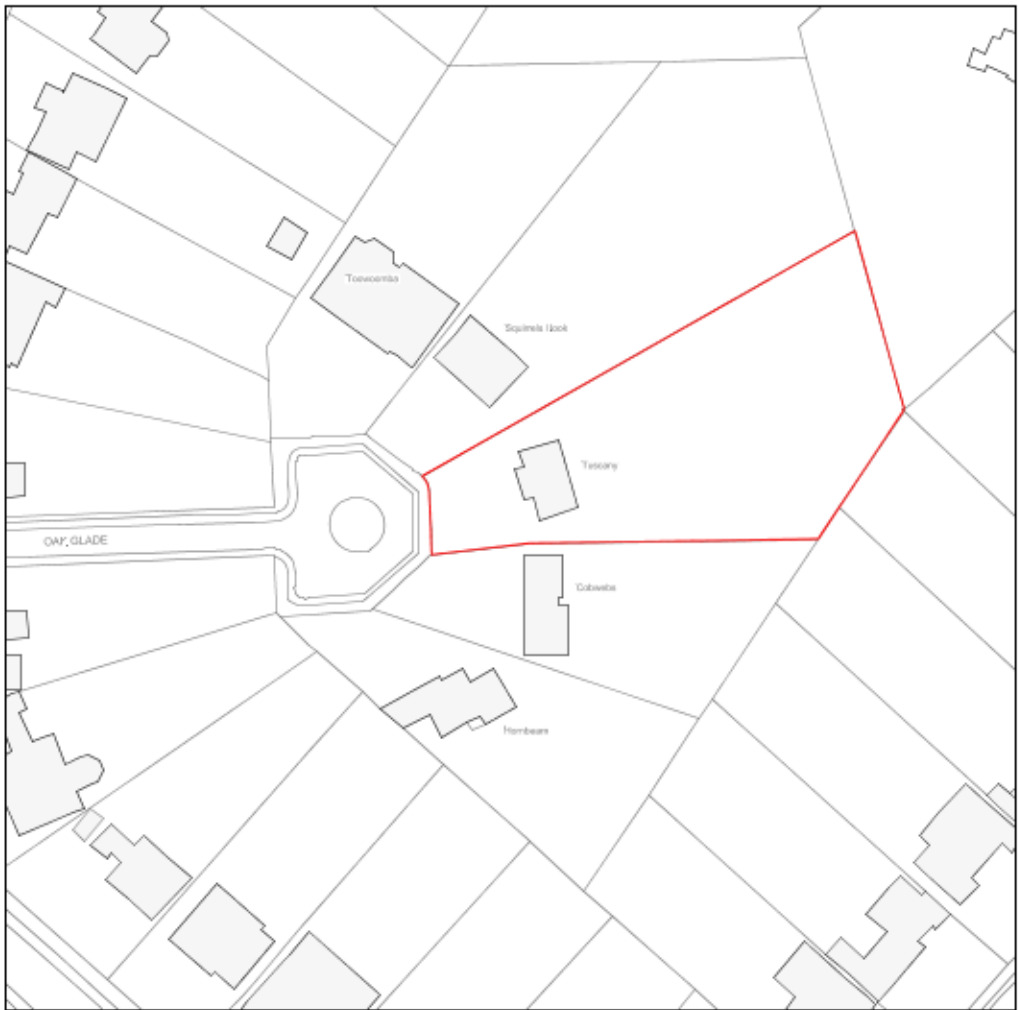
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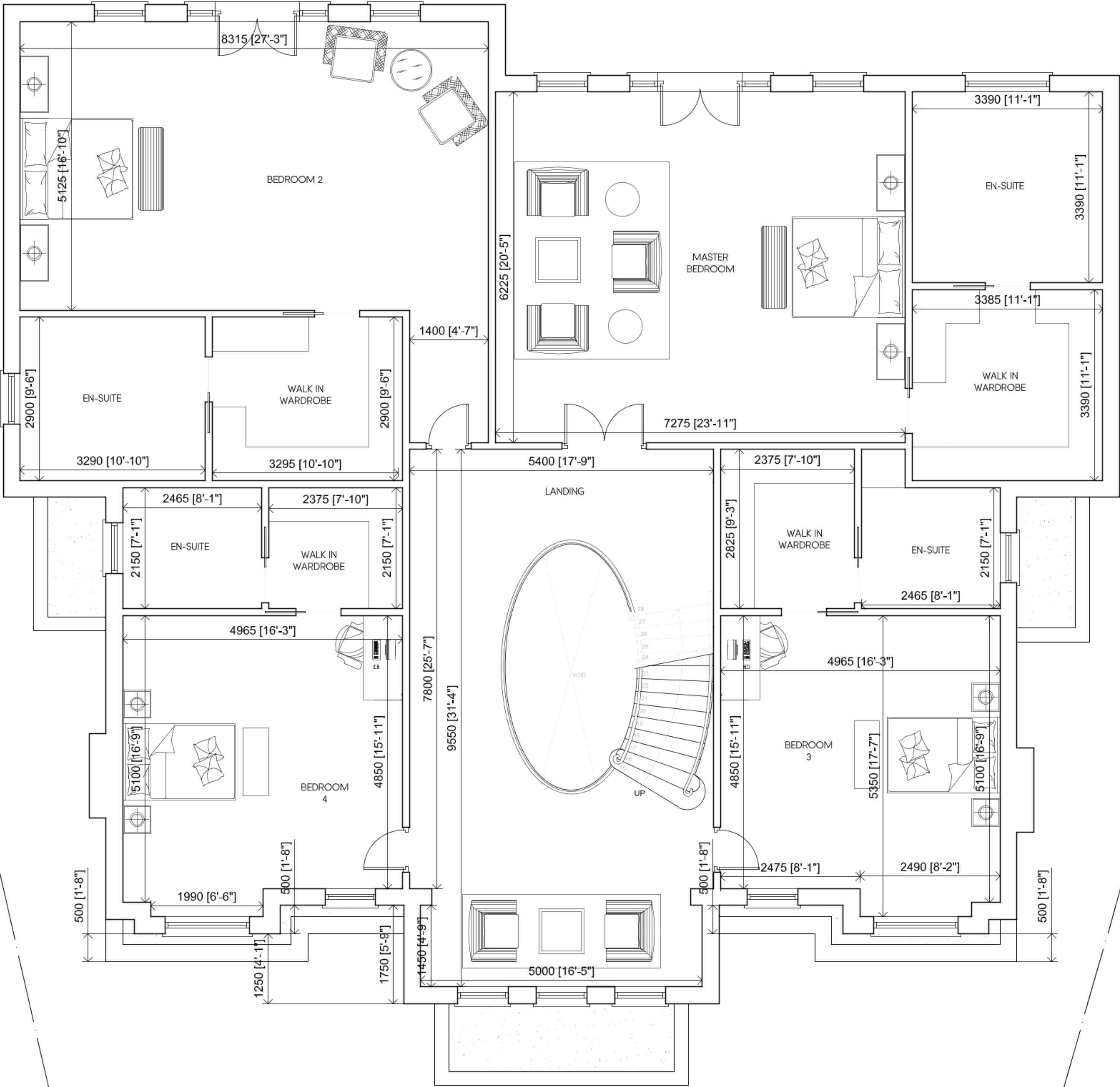
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PLANNING ISSUE

PROPOSED GROUND FLOOR PLAN
27m2 / 2962ft2
TOTAL: 1148m2 / 12357ft2



LOCATION PLAN
SCALE 1:1250



PROPOSED FIRST FLOOR PLAN
267m2 / 2874ft2
TOTAL: 1148m2 / 12357ft2

Rev	Date	Description	Init.

Client
KARANIOS LTD

Project Title
PROPOSED 6 BEDROOM DETACHED DWELLING

TUSCANY, OAK GLADE, NORTHWOOD, HA6 2TY
Drawing Title

PROPOSED FIRST FLOOR PLAN

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Drawn by	Drawing Date	Approved by
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Project No.	Drawing No.	Revision
1764	P302	-



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PLANNING ISSUE

Appendix II - Calculations

AEA - Ambiental				Page 1	
Science Park Square		Tuscany			
Brighton		Oak Glade			
East Sussex		Northwood			
Date 22/07/2020		Designed by MB			
File		Checked by SB			
XP Solutions		Source Control 2018.1			
<u>Summary of Results for 100 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	79.079	0.079	4.4	0.1	O K
30 min Summer	79.073	0.073	3.8	0.1	O K
60 min Summer	79.061	0.061	2.7	0.1	O K
120 min Summer	79.049	0.049	1.7	0.1	O K
180 min Summer	79.042	0.042	1.3	0.0	O K
240 min Summer	79.038	0.038	1.1	0.0	O K
360 min Summer	79.032	0.032	0.8	0.0	O K
480 min Summer	79.027	0.027	0.6	0.0	O K
600 min Summer	79.025	0.025	0.5	0.0	O K
720 min Summer	79.023	0.023	0.4	0.0	O K
960 min Summer	79.020	0.020	0.3	0.0	O K
1440 min Summer	79.017	0.017	0.3	0.0	O K
2160 min Summer	79.015	0.015	0.2	0.0	O K
2880 min Summer	79.014	0.014	0.2	0.0	O K
4320 min Summer	79.012	0.012	0.1	0.0	O K
5760 min Summer	79.010	0.010	0.1	0.0	O K
7200 min Summer	79.009	0.009	0.1	0.0	O K
8640 min Summer	79.009	0.009	0.1	0.0	O K
10080 min Summer	79.008	0.008	0.1	0.0	O K
15 min Winter	79.079	0.079	4.4	0.1	O K
30 min Winter	79.068	0.068	3.3	0.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	100.883	0.0	1.7	10	
30 min Summer	65.860	0.0	2.2	17	
60 min Summer	40.926	0.0	2.8	32	
120 min Summer	24.564	0.0	3.3	62	
180 min Summer	17.981	0.0	3.6	92	
240 min Summer	14.326	0.0	3.9	122	
360 min Summer	10.376	0.0	4.2	182	
480 min Summer	8.252	0.0	4.5	244	
600 min Summer	6.904	0.0	4.7	300	
720 min Summer	5.965	0.0	4.8	362	
960 min Summer	4.733	0.0	5.1	488	
1440 min Summer	3.411	0.0	5.5	734	
2160 min Summer	2.454	0.0	6.0	1084	
2880 min Summer	1.941	0.0	6.3	1416	
4320 min Summer	1.393	0.0	6.8	2152	
5760 min Summer	1.100	0.0	7.1	2856	
7200 min Summer	0.915	0.0	7.4	3672	
8640 min Summer	0.787	0.0	7.7	4352	
10080 min Summer	0.693	0.0	7.9	4848	
15 min Winter	100.883	0.0	1.9	10	
30 min Winter	65.860	0.0	2.5	17	
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Science Park Square		Tuscany			
Brighton		Oak Glade			
East Sussex		Northwood			
Date 22/07/2020		Designed by MB			
File		Checked by SB			
XP Solutions		Source Control 2018.1			
<u>Summary of Results for 100 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	79.054	0.054	2.1	0.1	O K
120 min Winter	79.042	0.042	1.3	0.0	O K
180 min Winter	79.036	0.036	1.0	0.0	O K
240 min Winter	79.032	0.032	0.8	0.0	O K
360 min Winter	79.026	0.026	0.6	0.0	O K
480 min Winter	79.023	0.023	0.4	0.0	O K
600 min Winter	79.021	0.021	0.4	0.0	O K
720 min Winter	79.019	0.019	0.3	0.0	O K
960 min Winter	79.017	0.017	0.3	0.0	O K
1440 min Winter	79.015	0.015	0.2	0.0	O K
2160 min Winter	79.014	0.014	0.1	0.0	O K
2880 min Winter	79.012	0.012	0.1	0.0	O K
4320 min Winter	79.010	0.010	0.1	0.0	O K
5760 min Winter	79.009	0.009	0.1	0.0	O K
7200 min Winter	79.008	0.008	0.1	0.0	O K
8640 min Winter	79.008	0.008	0.0	0.0	O K
10080 min Winter	79.007	0.007	0.0	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	40.926	0.0	3.1	32	
120 min Winter	24.564	0.0	3.7	62	
180 min Winter	17.981	0.0	4.1	92	
240 min Winter	14.326	0.0	4.3	122	
360 min Winter	10.376	0.0	4.7	186	
480 min Winter	8.252	0.0	5.0	248	
600 min Winter	6.904	0.0	5.2	300	
720 min Winter	5.965	0.0	5.4	364	
960 min Winter	4.733	0.0	5.7	482	
1440 min Winter	3.411	0.0	6.2	764	
2160 min Winter	2.454	0.0	6.7	1112	
2880 min Winter	1.941	0.0	7.0	1468	
4320 min Winter	1.393	0.0	7.6	2088	
5760 min Winter	1.100	0.0	8.0	2928	
7200 min Winter	0.915	0.0	8.3	3776	
8640 min Winter	0.787	0.0	8.6	4296	
10080 min Winter	0.693	0.0	8.8	4800	
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Science Park Square	Tuscany	
Brighton	Oak Glade	
East Sussex	Northwood	
Date 22/07/2020	Designed by MB	
File	Checked by SB	
XP Solutions	Source Control 2018.1	
<u>Model Details</u> Storage is Online Cover Level (m) 80.000 <u>Pipe Structure</u> Diameter (m) 0.225 Length (m) 5.000 Slope (1:X) 80.000 Invert Level (m) 79.000 <u>Pipe Outflow Control</u> Diameter (m) 0.225 Entry Loss Coefficient 0.500 Slope (1:X) 80.0 Coefficient of Contraction 0.600 Length (m) 5.000 Upstream Invert Level (m) 79.000 Roughness k (mm) 0.600		
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Date 22/07/2020		Designed by MB			
File Existing BF.SRCX		Checked by SB			
XP Solutions		Source Control 2018.1			
<u>Summary of Results for 100 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	79.154	0.154	15.7	0.3	O K
30 min Summer	79.138	0.138	13.5	0.2	O K
60 min Summer	79.117	0.117	9.7	0.2	O K
120 min Summer	79.095	0.095	6.2	0.1	O K
180 min Summer	79.081	0.081	4.6	0.1	O K
240 min Summer	79.073	0.073	3.7	0.1	O K
360 min Summer	79.061	0.061	2.7	0.1	O K
480 min Summer	79.055	0.055	2.2	0.1	O K
600 min Summer	79.050	0.050	1.8	0.1	O K
720 min Summer	79.047	0.047	1.6	0.1	O K
960 min Summer	79.041	0.041	1.3	0.0	O K
1440 min Summer	79.035	0.035	0.9	0.0	O K
2160 min Summer	79.029	0.029	0.7	0.0	O K
2880 min Summer	79.025	0.025	0.5	0.0	O K
4320 min Summer	79.021	0.021	0.4	0.0	O K
5760 min Summer	79.019	0.019	0.3	0.0	O K
7200 min Summer	79.018	0.018	0.3	0.0	O K
8640 min Summer	79.017	0.017	0.2	0.0	O K
10080 min Summer	79.016	0.016	0.2	0.0	O K
15 min Winter	79.154	0.154	15.7	0.3	O K
30 min Winter	79.127	0.127	11.6	0.2	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	100.883	0.0	6.1	10	
30 min Summer	65.860	0.0	7.9	17	
60 min Summer	40.926	0.0	9.8	32	
120 min Summer	24.564	0.0	11.8	62	
180 min Summer	17.981	0.0	12.9	92	
240 min Summer	14.326	0.0	13.8	122	
360 min Summer	10.376	0.0	14.9	184	
480 min Summer	8.252	0.0	15.8	242	
600 min Summer	6.904	0.0	16.6	306	
720 min Summer	5.965	0.0	17.2	362	
960 min Summer	4.733	0.0	18.2	486	
1440 min Summer	3.411	0.0	19.6	716	
2160 min Summer	2.454	0.0	21.2	1072	
2880 min Summer	1.941	0.0	22.4	1460	
4320 min Summer	1.393	0.0	24.1	2180	
5760 min Summer	1.100	0.0	25.3	2864	
7200 min Summer	0.915	0.0	26.4	3648	
8640 min Summer	0.787	0.0	27.2	4360	
10080 min Summer	0.693	0.0	28.0	5096	
15 min Winter	100.883	0.0	6.8	10	
30 min Winter	65.860	0.0	8.9	17	
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Date 22/07/2020		Designed by MB			
File Existing BF.SRCX		Checked by SB			
XP Solutions		Source Control 2018.1			
<u>Summary of Results for 100 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	79.106	0.106	7.6	0.2	O K
120 min Winter	79.081	0.081	4.6	0.1	O K
180 min Winter	79.070	0.070	3.4	0.1	O K
240 min Winter	79.061	0.061	2.7	0.1	O K
360 min Winter	79.052	0.052	2.0	0.1	O K
480 min Winter	79.047	0.047	1.6	0.1	O K
600 min Winter	79.042	0.042	1.3	0.1	O K
720 min Winter	79.039	0.039	1.1	0.0	O K
960 min Winter	79.035	0.035	0.9	0.0	O K
1440 min Winter	79.029	0.029	0.7	0.0	O K
2160 min Winter	79.024	0.024	0.5	0.0	O K
2880 min Winter	79.021	0.021	0.4	0.0	O K
4320 min Winter	79.018	0.018	0.3	0.0	O K
5760 min Winter	79.017	0.017	0.2	0.0	O K
7200 min Winter	79.016	0.016	0.2	0.0	O K
8640 min Winter	79.014	0.014	0.2	0.0	O K
10080 min Winter	79.014	0.014	0.1	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	40.926	0.0	11.0	32	
120 min Winter	24.564	0.0	13.2	64	
180 min Winter	17.981	0.0	14.5	96	
240 min Winter	14.326	0.0	15.4	124	
360 min Winter	10.376	0.0	16.7	180	
480 min Winter	8.252	0.0	17.7	246	
600 min Winter	6.904	0.0	18.6	302	
720 min Winter	5.965	0.0	19.2	366	
960 min Winter	4.733	0.0	20.4	474	
1440 min Winter	3.411	0.0	22.0	726	
2160 min Winter	2.454	0.0	23.8	1056	
2880 min Winter	1.941	0.0	25.0	1424	
4320 min Winter	1.393	0.0	27.0	2072	
5760 min Winter	1.100	0.0	28.4	3024	
7200 min Winter	0.915	0.0	29.5	3816	
8640 min Winter	0.787	0.0	30.5	4664	
10080 min Winter	0.693	0.0	31.3	5320	
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Date 22/07/2020	Designed by MB	
File Existing BF.SRCX	Checked by SB	
XP Solutions		Source Control 2018.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.200	Shortest Storm (mins)	15
Ratio R	0.413	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.032

Time (mins)	Area
From: To:	(ha)
0 4	0.032

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0 4	0.000

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0 4	0.000

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Science Park Square	Tuscany	
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Date 22/07/2020	Designed by MB	
File Existing BF.SRCX	Checked by SB	
XP Solutions	Source Control 2018.1	
<u>Model Details</u> Storage is Online Cover Level (m) 80.000 <u>Pipe Structure</u> Diameter (m) 0.225 Length (m) 5.000 Slope (1:X) 80.000 Invert Level (m) 79.000 <u>Pipe Outflow Control</u> Diameter (m) 0.225 Entry Loss Coefficient 0.500 Slope (1:X) 80.0 Coefficient of Contraction 0.600 Length (m) 5.000 Upstream Invert Level (m) 79.000 Roughness k (mm) 0.600		
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Date 22/07/2020	Designed by MB	
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XP Solutions	Source Control 2018.1	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 137 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	79.438	0.638	0.0	0.8	0.8	7.9	O K
30 min Summer	79.598	0.798	0.0	0.8	0.8	9.8	O K
60 min Summer	79.711	0.911	0.0	0.9	0.9	11.2	O K
120 min Summer	79.735	0.935	0.0	0.9	0.9	11.5	O K
180 min Summer	79.710	0.910	0.0	0.9	0.9	11.2	O K
240 min Summer	79.675	0.875	0.0	0.9	0.9	10.8	O K
360 min Summer	79.607	0.807	0.0	0.8	0.8	9.9	O K
480 min Summer	79.545	0.745	0.0	0.8	0.8	9.2	O K
600 min Summer	79.487	0.687	0.0	0.8	0.8	8.5	O K
720 min Summer	79.433	0.633	0.0	0.8	0.8	7.8	O K
960 min Summer	79.332	0.532	0.0	0.7	0.7	6.6	O K
1440 min Summer	79.119	0.319	0.0	0.7	0.7	3.9	O K
2160 min Summer	78.947	0.147	0.0	0.7	0.7	1.8	O K
2880 min Summer	78.884	0.084	0.0	0.7	0.7	1.0	O K
4320 min Summer	78.853	0.053	0.0	0.5	0.5	0.7	O K
5760 min Summer	78.842	0.042	0.0	0.4	0.4	0.5	O K
7200 min Summer	78.836	0.036	0.0	0.3	0.3	0.4	O K
8640 min Summer	78.832	0.032	0.0	0.3	0.3	0.4	O K
10080 min Summer	78.830	0.030	0.0	0.3	0.3	0.4	O K
15 min Winter	79.519	0.719	0.0	0.8	0.8	8.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	141.236	0.0	8.5	18
30 min Summer	92.203	0.0	11.1	32
60 min Summer	57.296	0.0	13.7	62
120 min Summer	34.389	0.0	16.5	106
180 min Summer	25.173	0.0	18.1	138
240 min Summer	20.057	0.0	19.2	170
360 min Summer	14.527	0.0	20.9	240
480 min Summer	11.553	0.0	22.2	308
600 min Summer	9.666	0.0	23.2	378
720 min Summer	8.351	0.0	24.0	446
960 min Summer	6.626	0.0	25.4	578
1440 min Summer	4.775	0.0	27.5	822
2160 min Summer	3.436	0.0	29.7	1144
2880 min Summer	2.718	0.0	31.3	1472
4320 min Summer	1.951	0.0	33.7	2192
5760 min Summer	1.540	0.0	35.5	2880
7200 min Summer	1.281	0.0	36.9	3656
8640 min Summer	1.102	0.0	38.1	4400
10080 min Summer	0.970	0.0	39.1	5120
15 min Winter	141.236	0.0	9.5	18

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East Sussex	Northwood	
Date 22/07/2020	Designed by MB	
File Existing BF.SRCX	Checked by SB	
XP Solutions		Source Control 2018.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.200	Shortest Storm (mins)	15
Ratio R	0.413	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.032

Time (mins)	Area
From: To:	(ha)
0	4 0.032

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

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Science Park Square	Tuscany																																																																																																																																
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<u>Model Details</u> Storage is Online Cover Level (m) 80.000 <u>Cellular Storage Structure</u> Invert Level (m) 78.800 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>13.0</td><td>13.0</td><td>1.201</td><td>0.0</td><td>30.2</td></tr><tr><td>1.200</td><td>13.0</td><td>30.2</td><td></td><td></td><td></td></tr></table> <u>Hydro-Brake® Optimum Outflow Control</u> <table><tr><td>Unit Reference</td><td>MD-SHE-0045-1000-1200-1000</td></tr><tr><td>Design Head (m)</td><td>1.200</td></tr><tr><td>Design Flow (l/s)</td><td>1.0</td></tr><tr><td>Flush-Flo™</td><td>Calculated</td></tr><tr><td>Objective</td><td>Minimise upstream storage</td></tr><tr><td>Application</td><td>Surface</td></tr><tr><td>Sump Available</td><td>Yes</td></tr><tr><td>Diameter (mm)</td><td>45</td></tr><tr><td>Invert Level (m)</td><td>78.800</td></tr><tr><td>Minimum Outlet Pipe Diameter (mm)</td><td>75</td></tr><tr><td>Suggested Manhole Diameter (mm)</td><td>1200</td></tr></table> <table><tr><th>Control Points</th><th>Head (m)</th><th>Flow (l/s)</th></tr><tr><td>Design Point (Calculated)</td><td>1.200</td><td>1.0</td></tr><tr><td>Flush-Flo™</td><td>0.196</td><td>0.7</td></tr><tr><td>Kick-Flo®</td><td>0.398</td><td>0.6</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>0.8</td></tr></table> The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated <table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>0.100</td><td>0.7</td><td>1.200</td><td>1.0</td><td>3.000</td><td>1.5</td><td>7.000</td><td>2.2</td></tr><tr><td>0.200</td><td>0.7</td><td>1.400</td><td>1.1</td><td>3.500</td><td>1.6</td><td>7.500</td><td>2.3</td></tr><tr><td>0.300</td><td>0.7</td><td>1.600</td><td>1.1</td><td>4.000</td><td>1.7</td><td>8.000</td><td>2.4</td></tr><tr><td>0.400</td><td>0.6</td><td>1.800</td><td>1.2</td><td>4.500</td><td>1.8</td><td>8.500</td><td>2.4</td></tr><tr><td>0.500</td><td>0.7</td><td>2.000</td><td>1.3</td><td>5.000</td><td>1.9</td><td>9.000</td><td>2.5</td></tr><tr><td>0.600</td><td>0.7</td><td>2.200</td><td>1.3</td><td>5.500</td><td>2.0</td><td>9.500</td><td>2.6</td></tr><tr><td>0.800</td><td>0.8</td><td>2.400</td><td>1.4</td><td>6.000</td><td>2.1</td><td></td><td></td></tr><tr><td>1.000</td><td>0.9</td><td>2.600</td><td>1.4</td><td>6.500</td><td>2.2</td><td></td><td></td></tr></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	13.0	13.0	1.201	0.0	30.2	1.200	13.0	30.2				Unit Reference	MD-SHE-0045-1000-1200-1000	Design Head (m)	1.200	Design Flow (l/s)	1.0	Flush-Flo™	Calculated	Objective	Minimise upstream storage	Application	Surface	Sump Available	Yes	Diameter (mm)	45	Invert Level (m)	78.800	Minimum Outlet Pipe Diameter (mm)	75	Suggested Manhole Diameter (mm)	1200	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	1.200	1.0	Flush-Flo™	0.196	0.7	Kick-Flo®	0.398	0.6	Mean Flow over Head Range	-	0.8	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	0.7	1.200	1.0	3.000	1.5	7.000	2.2	0.200	0.7	1.400	1.1	3.500	1.6	7.500	2.3	0.300	0.7	1.600	1.1	4.000	1.7	8.000	2.4	0.400	0.6	1.800	1.2	4.500	1.8	8.500	2.4	0.500	0.7	2.000	1.3	5.000	1.9	9.000	2.5	0.600	0.7	2.200	1.3	5.500	2.0	9.500	2.6	0.800	0.8	2.400	1.4	6.000	2.1			1.000	0.9	2.600	1.4	6.500	2.2		
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Appendix III - Thames Water Sewer Asset Plan

Asset location search



Property Searches

Ambiental
Sussex Innovation Centre
Science Park Square
BRIGHTON
BN1 9SB

Search address supplied Tuscany
Oak Glade
Northwood
HA6 2TY

Your reference 5564

Our reference ALS/ALS Standard/2020_4207630

Search date 2 July 2020

Knowledge of features below the surface is essential for every development

The benefits of this knowledge not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility of any development.

Did you know that Thames Water Property Searches can also provide a variety of utility searches including a more comprehensive view of utility providers' assets (across up to 35-45 different providers), as well as more focused searches relating to specific major utility companies such as National Grid (gas and electric).

Contact us to find out more.



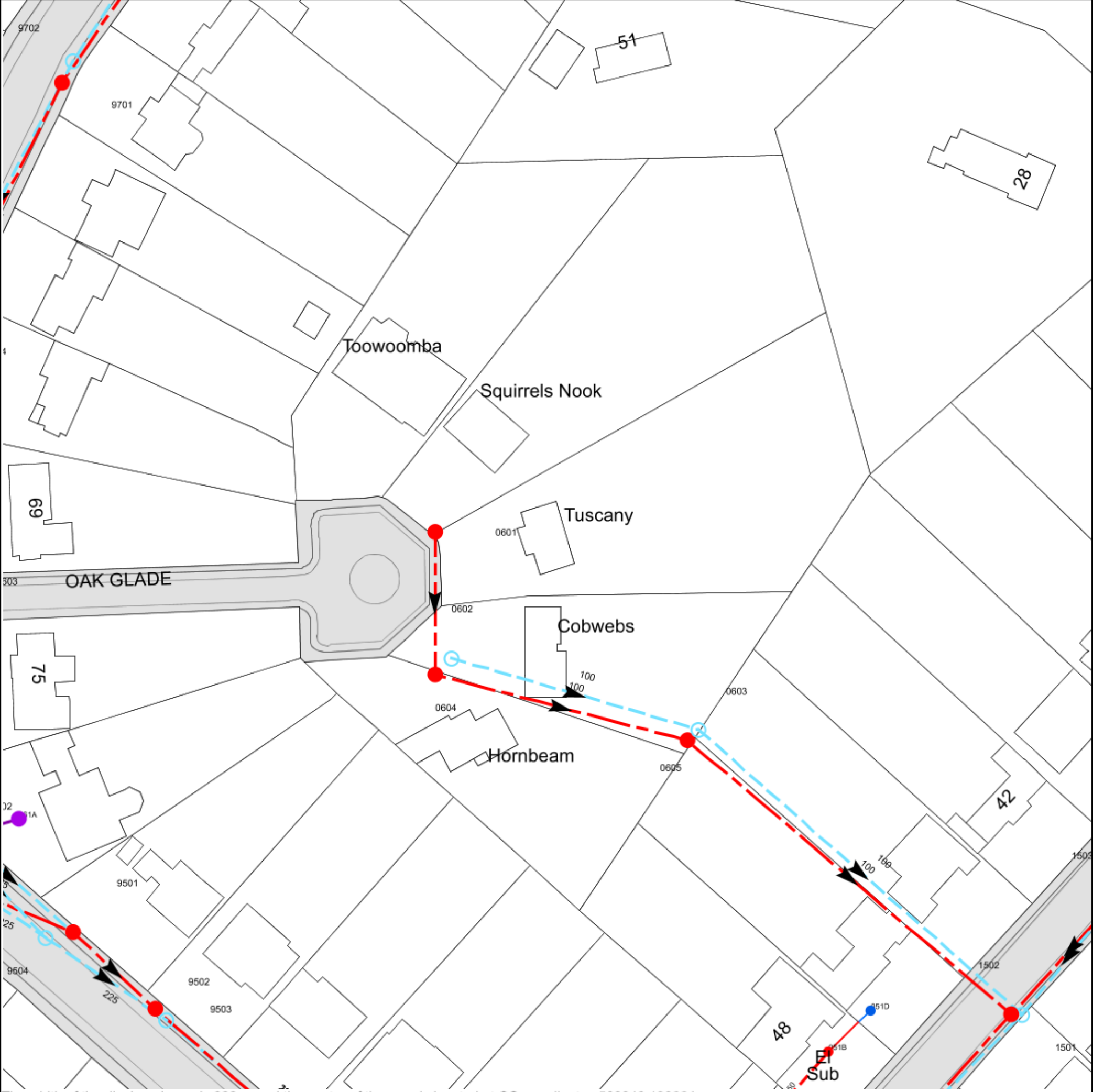
Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13



searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk



0845 070 9148

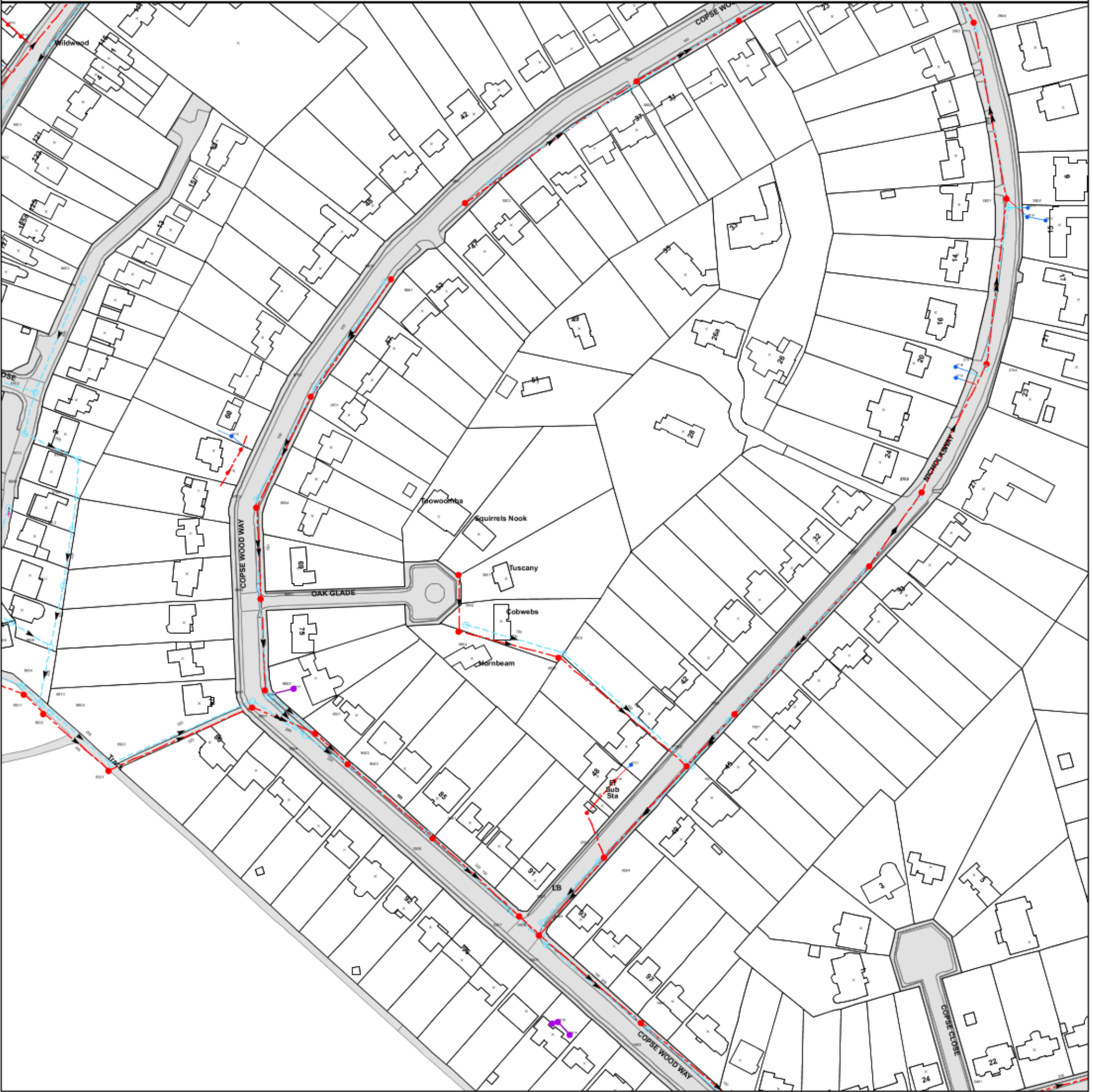


The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 508040,190664
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
0604	n/a	n/a
0601	n/a	n/a
9701	93.26	91.32
9702	93.38	91.66
961A	n/a	n/a
9504	77.71	76.57
9501	77.72	76.36
9502	76.26	74.74
9503	76.16	74.85
0602	n/a	n/a
0603	n/a	n/a
0605	n/a	n/a
051B	n/a	n/a
051D	n/a	n/a
1501	n/a	n/a
1502	n/a	n/a
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.		



The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified before any works are undertaken. Crown copyright Reserved

Scale: 1:1792
Width: 500m
Printed By: G1KANAGA
Print Date: 02/07/2020
Map Centre: 508058,190679
Grid Reference: TQ0890NW

Comments:

ALS/ALS Standard/2020_4207630

NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

REFERENCE	COVER LEVEL	INVERT LEVEL
2703	74.03	71.26
9607	79.5	76.87
9703	88.95	87.2
9801	97.13	91.84
9501	77.72	76.36
0602		
0604		
9603	84.12	82.78
0501	72.94	71.59
2601	73.7	70.79
9503	76.16	74.85
0802	87.9	86.54
0502	70.19	67.05
1502		
2802	74.27	70.66
2904	72.79	70.11
1501		
1601	71.42	69.06
0506	69.86	66.58
0603		
1401	67.92	65.28
0504	70.3	67.2
8602	83.67	80.57
8609		
8701		
8608		
8612		
8703		
8611		
051B		
051D		
281B	73.99	71.92
9606	80.03	78.69
0508	72.72	71.59
1801	82.42	78.4
041C		
1503	71.37	69.32
041B		
1901	77.35	74.96
891A		
971A		
971C		
271A		

REFERENCE	COVER LEVEL	INVERT LEVEL
2702	74.06	70.61
9604	88.67	86.92
9605	84.49	83.16
9701	93.26	91.32
9702	93.38	91.66
0601		
0801	90.04	86.16
9602	80.22	78.56
2602	73.6	71.1
9502	76.26	74.74
9802	99.04	93.75
0507	70.34	67.35
2903	72.76	69.46
2801	74.76	70.57
0505	70.3	67.41
2701	74.3	70.32
1902	77.43	75.22
0503	69.67	66.2
0401	67.38	64.41
0605		
1403	67.92	65.65
8610		
8603	83.51	80.59
8601	85.02	81.13
8702		
8605		
8704		
8802		
8502	78.89	78.19
051C		
281A	73.96	71.59
281C	73.75	71.72
9504	77.71	76.57
8604	84.99	81.24
9601	79.48	76.62
8501	79.04	78.07
041A		
961A		
0803	82.59	78.8
891B		
971B		
2704	74.28	70.94
271B		



ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

	Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.		Trunk Foul
	Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.		Trunk Surface Water
	Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.		Trunk Combined
	Storm Relief		Bio-solids (Sludge)
	Vent Pipe		Proposed Thames Water Foul Sewer
	Proposed Thames Surface Water Sewer		Proposed Thames Water Foul Sewer
	Gallery		Foul Rising Main
	Surface Water Rising Main		Combined Rising Main
	Sludge Rising Main		Proposed Thames Water Rising Main
	Vacuum		

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plans are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
- 5) 'na' or '0' on a manhole level indicates that data is unavailable.

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

	Air Valve
	Dam Chase
	Fitting
	Meter
	Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

	Control Valve
	Drop Pipe
	Ancillary
	Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

	Outfall
	Undefined End
	Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

	Public/Private Pumping Station
	Change of characteristic indicator (C.O.C.I.)
	Invert Level
	Summit

Areas

Lines denoting areas of underground surveys, etc.

	Agreement
	Operational Site
	Chamber
	Tunnel
	Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

	Foul Sewer		Surface Water Sewer
	Combined Sewer		Gully
	Culverted Watercourse		Proposed
			Abandoned Sewer

- 6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

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6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

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Ways to pay your bill

Credit Card	BACS Payment	Telephone Banking	Cheque
Call 0845 070 9148 quoting your invoice number starting CBA or ADS / OSS	Account number 90478703 Sort code 60-00-01 A remittance advice must be sent to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW. or email ps.billing@thameswater.co.uk	By calling your bank and quoting: Account number 90478703 Sort code 60-00-01 and your invoice number	Made payable to ' Thames Water Utilities Ltd ' Write your Thames Water account number on the back. Send to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW or by DX to 151280 Slough 13

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