

24th August 2023

Damian Irvine
Northfleet Central 1 Limited
Kuflink Stadium
Stonebridge Road
Northfleet
Kent
DA11 9GN

Via email

Our Ref: RMA/LC2402g_1 – EA Response Letter August

Dear Damian Irvine,

RE: PROPOSED REDEVELOPMENT OF LAND AT GROVE ROAD IN NORTHFLEET, KENT, DA11 9AX – ENVIRONMENT AGENCY RESPONSE LETTER (AUGUST 2023)

RMA recently prepared a Flood Risk Assessment (FRA) and drainage strategy for an outline planning application for a proposed redevelopment scheme on land at Grove Road in Northfleet, Kent. The application was submitted under planning reference (Gravesend Borough Council: 20221064) and consultation has been on-going with the Environment Agency (EA).

The EA objected to the proposals in their letter dated 7th March 2023 (EA Reference KT/2022129955/04-L01). Following this, RMA responded to their comments through a letter and a meeting with the EA in June 2023 (refer to Appendix A). The EA's further comments and the meeting's minutes are included Appendix A. This response letter summarises the EA's comments and provides additional information with the aim of reaching an agreement with the EA to remove their objections.

The four main objections from the EA are quoted in *italics* below, followed by our response.

Flood Defences and Upgrades

A River Wall Impact Assessment has been undertaken by Walsh (March 2023) and this is included as Appendix B of this letter. The report is preliminary design advice and includes an assessment of the river wall and the impact it may have on the development and shows that a new wall is sustainable and does not pose an unacceptable flood risk on the development or wider area.

The EA's comments on the River Wall Impact Assessment are as follows:

"Please note that the development must not prevent future maintenance and management of the flood defences, including any retreated defence".

With the submission of the River Wall Impact Assessment, it is considered that no further work is required at this outline planning stage and further detailed design of the river wall can be conditioned.

Culvert Realignment and Daylighting

"It should be noted that we are seeking for the entirety of the Main River Ebbsfleet to be de-culverted (allowing for free spanning bridges and short sections of culvert as required). We understand that a section of culvert runs next to the A226 which is within the site boundary, and this should be included in any de-culverting proposals. Any section of culverted main river would need to have a 100-year design life as part of the proposed development. This is to ensure that the lifetime of the culvert is

commensurate with that of the proposed development and thus safe for its lifetime from flooding, in line with the requirements on the NPPF (paragraph 164).

We also highlighted Policy CS06: Ebbsfleet (Gravesham) Opportunity Area at this stage of the meeting, which requires the improvement and management of the Ebbsfleet stream corridor”.

An above ground topographical survey of the area surrounding the culvert has been undertaken and, where possible, manholes have been lifted to measure the depth of the culvert at points where access was possible. The survey results are included as Appendix C. The surveyed information confirms that the culvert is at significant depth and, at a minimum, the water level is 1.71 m below ground level in the south-eastern part of the site and at a maximum 3.29 m deep in the north-east.

HLM Architects prepared a Proposed River Daylighting Sections plan and Proposed Daylighting Zone plan which shows the indicative daylighted river location and cross-sections within the site (refer to Appendix D). These plans show that the majority of the River Ebbsfleet within the site is proposed to be daylighted, there is a small section of the channel to the south of B2175 that will remain within the existing culvert. It will be ensured that the culverted section within the site will be maintained throughout the operational lifetime of the development and if required the culvert will be increased in size to accommodate the flows during the design flood flows, subject to the results from the flood modelling.

The buildings adjacent to the watercourse have been moved to the east to provide space for daylighting the culvert and the indicative daylighted sections will comprise of landscaped banks, stepped banks and walls in order to accommodate the daylighted section within the layout. A minimum easement of 3.5 m from the top of the banks of the watercourse to the buildings would be provided in line with the EA's suggestion during the meeting that *‘the maintenance buffer of 8 m could be reduced if the river is daylighted’*. A maintenance access of over 8 m can be provided on the western side of the daylighted culvert which includes the boulevard and, therefore, the River Ebbsfleet can be maintained from this side. Additionally, sections of the proposed buildings to the east of the daylighted culvert will comprise of public walkways at ground level which will provide an increased easement from the watercourse in these areas and will be open across two levels, which can allow for vehicles to enter from the east should this be necessary (refer to the indicative cross sections shown within Appendix D). The details of the deculverting is subject to the flood modelling results to ensure that the proposed works will not increase flood risk within the site or elsewhere.

“Whilst the option of a cantilevered path was discussed with our biodiversity officer during the meeting, we would like to highlight that we would likely oppose a cantilevered path from a flood risk perspective given this would significantly negatively impact future maintenance and management of assets required for flood risk management.

It was queried at this stage of the meeting what level of detail would be required in order for us to request a condition on the outline application detailing the design of a deculverted channel. Whilst it is difficult to say at this stage of the design, we stated that any condition we request would need to pass the 6 tests for planning conditions as outlined in the National Planning Policy Framework (NPPF) <https://www.gov.uk/guidance/use-of-planning-conditions>. A sufficient level of detail needs to be provided for us to be request conditions that pass these tests”.

It is not proposed to include a cantilevered path within the proposed layout. The Proposed River Daylighting Sections plan and Proposed Daylighting Zone plan have been submitted to provide details on the deculverted channel and it is considered that for this outline application any further details could be conditioned.

Flood Modelling

“In the first instance, we would like to highlight the opportunity to link up with Ebbsfleet Development Corporation and their flood risk consultants Stantec, given they are also modelling the Ebbsfleet also as part of the Ebbsfleet Central development. We strongly recommend a joined-up approach, as this would likely provide cost and time efficiencies for all parties.

Given the limited available data, we accept the proposed pre-development modelling method with the caveat that our Evidence and Risk (flood modelling) team will have the final say on suitability when they are consulted on the full flood model. Their review would be either as part of the statutory consultation on any application, or outside the statutory process through our cost recovery service.

Our Evidence and Risk team are also able to review detailed methodologies and provide a written response, also as part of our cost recovery service – please contact us for further information. Due to our Evidence and Risk team’s national workload, we carry out an internal consultation process and we would not be able to pass on individual contact details.

Where there are uncertainties regarding modelled flood outputs on site, we would typically require a greater freeboard to mitigate risk”.

Flood modelling is currently being undertaken and the final modelling and report will be issued when it has been completed. This will include the data provided from the survey of the culvert and will include the new daylighting scenario, the potential managed realignment of defences along Robins Creek and the climate change scenarios for the site. Due to instability issues within the baseline model, the daylighting scenario is not currently available however, is expected to be available in the coming weeks. The current modelling work has been included in the dropbox link below for initial review.

 [JKL-JBAU-XX-XX-M2-0001-S3-P01-Northfleet Baseline Model-REVA.zip](#)

This includes the following:

- FEH calculation record;
- River channel survey;
- Topographical survey;
- FM-TUFLOW model; and
- Baseline flood depth mapping.

The following work has been completed at this stage:

- Rebuilt the model from the upstream extent to Robins Creek. The River Thames outflow boundary configuration from the original EA model has been retained;
- Completed a new hydrological assessment and applied new inflow hydrographs to the model;
- Completed storm duration testing which has shown that the 31-hour duration is critical for the study area. This has been used for the final design event simulations;
- Produced new tidal boundary conditions using the Mean High-Water Spring (MHWS) tide curve from the nearby Tilbury gauge;

- We have produced new climate change scenarios using the latest EA climate change allowance guidance. Simulated the 1% AEP event with 27%, 37%, and 62% climate change uplifts; and
- For the climate change scenarios, we have applied climate change to the tidal boundary MHWS tide curve. The previous EA model did not apply climate change to the tidal boundary.

Finished Floor Levels

“Please send us drawings outlining what “more vulnerable” uses are below the flood level and we’d be happy to provide clarification on the above point”.

The majority of the ‘more vulnerable’ land uses will be located on the first floor or above to ensure that they are located above the design breach flood levels, this includes all sleeping accommodation. Although some of the ‘more vulnerable’ land uses are located below the design flood level, these will include ancillary uses such as entrances and service rooms for the ‘more vulnerable’ land uses located above (refer to Figure 1). The proposed entrances will not include waiting rooms and all of the ‘more vulnerable’ land uses at the ground floor will have access to internal staircases which lead to the second floor (i.e. above the design flood level).

I trust that the information supplied in this letter provides you with sufficient information to allow you to remove the above objections. It is noted that further information is required to be provided on the modelling including the daylighting scenario, as soon as this is available this will be provided for review. However, it is hoped that the above provides enough information for the remaining objections to be removed at this stage. In the meantime should you have any further questions or comments, please do not hesitate to contact me.

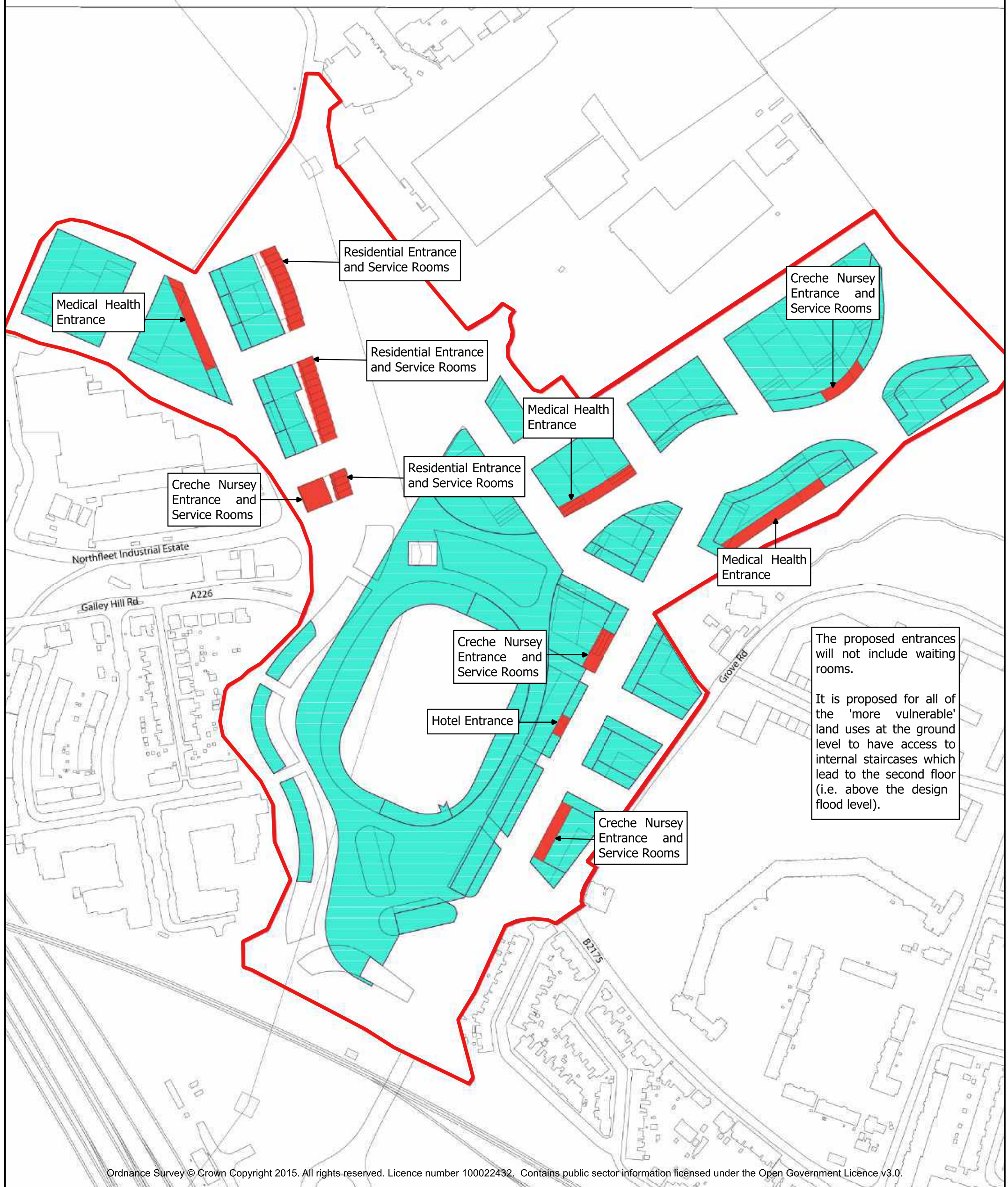
Yours sincerely



Melissa Seymour
Senior Consultant

Encs: Figure 1 – More Vulnerable Land Uses on Ground Floor
Appendix A – EA Response Letter and EA Consultation
Appendix B - River Wall Impact Assessment (Walsh 2023)
Appendix C – Culvert Survey (Reed Geomatics 2023)
Appendix D – Proposed Daylighting Plans (HLM Architects 2023)

Figures



Key

-  Red Line Boundary
- Land Use Classification
 -  Less Vulnerable
 -  More Vulnerable

Figure 1: **More Vulnerable Land Uses on Ground Floor**

Client: **Northfleet Central 1 Ltd**

Project: **Northfleet Harbourside, Gravesham**

Project No.: **C2402**



Drawn:
RW

Checked:
MS

Date:
09/08/2023

Scale:
1:2,500@A3

***Appendix A:
EA Response Letter and EA Consultation***

26th May 2023

Sustainable Places
Environment Agency

Via email

Our Ref: RMA/LC2402g_2– EA Response Letter

Dear KSL Planning,

**RE: PROPOSED REDEVELOPMENT OF LAND AT GROVE ROAD IN NORTHFLEET, KENT,
DA11 9AX – ENVIRONMENT AGENCY RESPONSE LETTER**

RMA recently prepared a Flood Risk Assessment (FRA) and drainage strategy for an outline planning application for a proposed redevelopment scheme on land at Grove Road in Northfleet, Kent. The application was submitted under planning reference (Gravesend Borough Council: 20221064) and consultation has been on-going with the Environment Agency (EA).

The EA have objected to the proposals in their letter dated 7th March 2023 (EA Reference KT/2022129955/04-L01). This response letter summarises the EA's objections and provides additional information with the aim of reaching an agreement with the EA to move their objections. As well as the additional information set out in this letter, a follow up meeting will be requested with the EA to discuss the responses that have been provided in this letter.

The four main objections from the EA are quoted in italics below, followed by our response.

Tidal Defence Upgrades

“We understand that the information is submitted to support an outline plan. However, we require further information to demonstrate buildability. In particular, the supplied section drawings do not include buried elements such as tie rods. It is very likely that these would be required to support the raised defence. Currently, the proposed drawings would indicate that there would be minimal offset between at least one of the proposed buildings and the likely position of ground anchors. Please provide an initial design for the tidal defences”.

A River Wall Impact Assessment has been undertaken by Walsh (March 2023) and this is included as Appendix A of this letter. The report is preliminary design advice and includes an assessment of the river wall and the impact it may have on the development and shows that a new wall is sustainable and does not pose an unacceptable flood risk on the development or wider area. The report provides information on the existing flood wall as well as options for enhancing and improving flood defences at the site. The solutions provided include opportunity to incorporate an area of inter-tidal zone to boost biodiversity and marine ecology. Although the actual details of the riparian public realm and details are not the subject of the proposed outline planning application and will be a reserved matter, the assessment within this report is focused on seeing that the strategy can be delivered and maintained and further designs and investigations will form part of any subsequent submission.

De-culverting and Proximity to the River Ebbsfleet Watercourse

“The development is required, by the National Planning Policy Framework, to demonstrate flood risk would not be increased to the surrounding area for the development's 100-year design life. The Planning Practice Guidance expands on this requirement. To comply with these requirements, the River Ebbsfleet should be de-culverted. This would enhance the site in addition to enabling increased channel capacity to meet the challenge of climate challenge.

The proposal includes buildings directly over the culverted main river. This not only conflicts with national and area policy/strategy but would also pose a risk to life due to the culvert likely having a residual life much less than the proposed buildings. We could not support this proposal if buildings are proposed over the main river. We would likely object to any building construction within 8 metres of the main river as measured from the flood defence/main river asset and the nearest part of the development. The proposal should include de-culverting, as previously stated. In which case, a small encroachment within 8 metres may be allowed due to the reduced effort required to monitor and maintain such an asset and the reduced need to preserve additional space to account for climate change”.

It is understood that the EA aspire that 100% of the culvert that runs through the site is daylighted and, therefore, the applicant has been working alongside surveyors to undertake a detailed survey of the culvert to gather sufficient information to establish the feasibility of deculverting. The EA hold no information in relation to the dimensions of the culverted watercourse.

The applicant has worked alongside London Drainage Facility to investigate surveying the culvert. Following multiple site visits and attempts, it was deemed unsafe to access the culvert due to the considerably high water levels meaning that the survey equipment would become submerged and information unable to be obtained. The applicant explored a number of options and looked into getting a ‘walk through’ survey undertaken in order to gain survey information. However, it was determined that this would require a full rescue team, breathing apparatus and confined space equipment including gas monitors and radios. After much consideration, this option would result in exorbitant requirements for ‘pre-planning’ survey work and the applicant was unable to commit to this type of assessment at this stage of planning.

The fall-back position was therefore to undertake an above ground topographical survey of the area surrounding the culvert and, where possible, to lift manholes and measure the depth of the culvert at points where access was possible. The survey results are included as Appendix B. The surveyed information confirms that the culvert is at significant depth and, at a minimum, the water level is 1.71 m below ground level in the south-eastern part of the site and at a maximum 3.29 m deep in the north-east.

HLM Architects prepared a Culvert Design Options document which has been included as Appendix C of this letter. This document illustrates the design work that has been carried out to determine the feasibility of de-culverting, it looks at concepts for providing both stepped access to the de-culverted watercourse and a vegetative sloped access to the de-culverted watercourse. Due to the significant depth of the culvert, a 2.4 m to 4.2 m easement either side of the culvert would be required should the culvert be daylighted with a stepped access and a 5.13 m to 8.88 m easement either side of the culvert would be required should the culvert be daylighted with a vegetative access. This would mean that daylighting the culvert would require up to an 18.67 m strip of land running the full length of the channel, thus sterilising a significant part of the site.

The layout has been designed to ensure the reuse and redevelopment of previously developed brownfield land within a highly accessible location benefitting from excellent local, regional and international transport links. The site is allocated within an Opportunity Area for growth and regeneration and the majority of the application boundary is within a sub-area where residential led development has also been identified on one of the key sites. Ebbsfleet United Football Club is retained within the scheme and forms a core component of the proposals. These new facilities not only present an enhanced offer for the club but also the community. The scheme will provide a stable financial future for the club, which itself forms a key component of the local community and its identity. Daylighting the full extent of the culvert would result in a significant portion of the eastern part of the site being sterilised from development, thus making the development and regeneration of the football club commercially unviable.

In addition to the above. Kent County Council have raised that any excavation associated with deculverting or realignment of the existing culvert would have significant archaeological impacts.

When considering flood risk, the primary mechanism impacting the area is flood locking at Robins Creek during a high tide event which prevents the watercourse from discharging into the River Thames. To prevent out of bank flooding from the deculverted channel, the bank / wall heights would need to be raised high enough to prevent high water levels within the new open channel from spilling into the newly developed areas. Due to the low invert levels of the existing culvert and the buffer zone requirements, this could mean that any daylighting option would be limited to a deep, potentially wall lined watercourse that would not align with the primary environmental and ecological benefits associated with culvert daylighting.

For the reasoning highlighted above and taking into consideration of the adverse impacts that daylighting would have on transport, archaeology and potentially flood risk at the site, from the information that has been gathered and feasibility assessments that have been undertaken, it is concluded that de-culverting the River Ebbsfleet through the site.

The existing brownfield site shows that a number of existing buildings are located above the culvert. Where possible, the redevelopment project will ensure that an 8 m easement either side of the culvert is provided that is free from any built development. However, due to design constraints, the outline masterplan includes three blocks in the eastern part of the site that are located over the route of the culvert. In order to ensure there is suitable access for future management of the culvert, it is proposed to provide additional manholes either side of the proposed buildings to allow for access for maintenance and inspection. As well as this, the scheme will commit to a management regime of the culvert which will include regular inspection of the culvert, repairs and removal of any debris where required.

Flood Modelling

“We have recently re-reviewed the existing River Ebbsfleet model (2015). The model was designed for our usage and, although it is accessible to determine flood risk for development, it is not considered to accurately represent the flood risk at this development or for the development's design life. We currently have uncertainties regarding the groundwater inputs to this model which would likely have a significant impact on modelled outputs. The model is now eight years old and a new model, with updated input data and practises, is a proportionate requirement considering the scale of the proposed development”.

JBA Consulting have been instructed and are in the process of updating the Ebbsfleet 2015 Model with the recent up to date culvert survey information as provided within Appendix B. The scope of the model update includes the following:

- updating the existing EA hydraulic model to make better use of the 2013 river channel survey data including an improved representation of the long culvert structure;
- updating a large proportion of the 1D domain to remove simplified LIDAR based cross sections that were originally developed in the 2005 model;
- updating the model to make use of the latest available hydraulic modelling software;
- developing new tidal boundary conditions that will be applied to the downstream boundary of the hydraulic model;
- updating the 2D domain topography by incorporating the latest available LIDAR data; and
- incorporating new hydrological assessment into the hydraulic model.

With regard to the groundwater element of the model updates, the methodology adopted during the previous study in 2015 was comprehensive, typically beyond what would be expected for a flood mapping study. It is proposed to adopt the same approach but to update this using the latest available data. This will include using the EA's catchment data explorer to extract the latest borehole data for the Springhead Road station to include groundwater levels up to present day.

This data will be used to reproduce the Groundwater-Level Frequency Analysis and from here determine an appropriate groundwater level to be used in the hydraulic model.

The model updates are not proposing to revisit the London Basin Aquifer model that was discussed in Section 3.6 of the 2015 flood modelling report. It appears from the report that this model was only used to gain an appreciation of the catchment response with regard to the groundwater analysis. It does not appear that the information from the aquifer model was used in the development of the Ebbsfleet fluvial hydraulic model. Therefore, even if there is an improved version of the aquifer model, there would be little merit in revisiting it for our analysis.

It is considered that the above scope is acceptable to the EA and this information will be provided as soon as it is available.

Finished Floor Levels

"We would object to any more vulnerable development being situated lower than the year 2100 tidal breach level plus 600mm freeboard. However, we would not object to the principle of less vulnerable usage being set below this level although this would not be considered a sustainable way of approaching flood risk management. Some parts of more vulnerable development may be accepted at ground floor levels where the usage could be considered less vulnerable".

It is proposed that the residential uses will be located at the first floor level and above (i.e. a minimum floor level of approximately 6.82 mAOD). Therefore, all of the proposed residential units will be raised at least 300 mm above the design breach levels.

Appendix D shows a number of blocks where 'more vulnerable' land uses, which may comprise nursery/creche or medical facilities given the flexible use (Use Class E) sought for approval for some development plots and hotel located at ground level and below the breach level. Although these areas will be below the design flood level, these land uses will include internal safe access/egress to an area above the flood level should a breach flood event occur. The hotel will locate all of the sleeping accommodation above the design flood level and the parts below the flood level will comprise of entrances and ancillary spaces only. Similarly, for the medical facilities and nursery/creche facilities, those parts below the design flood level will be used for ancillary space and entrances.

Where possible, the ground floor Finished Floor Levels (FFLs) will be raised 300 mm above the breach levels. However, given that significant flood depths may occur in some areas of the site (refer to Appendix D), it will not be possible to raise the ground floor FFLs 300 mm above the breach levels in all areas. As such, in the lower parts of the site, where it is not possible to raise the ground floor 300 mm above the breach levels, it is proposed to incorporate flood resilience measures with the aim of providing additional protection.

The EA's Thames Tidal Breach Hazard Mapping indicates that the safe access/egress route along Stonebridge Road to the east has a 'very low hazard' rating, the route along Galley Hill Road has a maximum hazard rating of a 'danger for most' and the route along Thames Way and Lower Road has a maximum hazard rating of a 'danger for all' (refer to Appendix D). However, should sufficient flood warning be given, it would be possible to evacuate occupants of the site to land located outside of the breach zone, which is situated adjacent to the eastern boundary along Stonebridge Road, approximately 35 m to the west of the site along Galley Hill Road, approximately 150 m to the south-east of the site along Thames Way and approximately 650 m to the north-west of the site.

Should sufficient flood warning not be possible, then an internal safe refuge would be available within each unit with a floor level at least 300 mm above the 0.5% breach flood levels in the year 2115. Additionally, safe refuge areas would be available on the podium levels. On this basis, it is concluded that future occupants of the development would be safe in the event of a tidal breach flood event for the operational lifetime of the development.

I trust that the information supplied in this letter provides you with sufficient information to allow you to remove the above objections; however, should you have any further questions or comments, please do not hesitate to contact me.

Yours sincerely

A handwritten signature in dark ink, appearing to read 'M Seymour', is positioned above the printed name.

Melissa Seymour
Senior Consultant

Encs: Appendix A – River Wall Impact Assessment (Walsh 2023)
Appendix B – Culvert Survey (Reed Geomatics 2023)
Appendix C – Culvert Design Options (HLM Architects 2023)
Appendix D – Finished Floor Levels Figures

Melissa Seymour
RMA Environmental Limited
78 York Street
London
W1H 1DP

Our ref: KT/2022/129955/05-L01
Charged agreement ref:
ENVPAC/1/KSL/00566
Date: 29 June 2023

Dear Melissa,

Redevelopment of the site including phased demolition and redevelopment of 3,500 residential units, leisure facilities, football club facilities for Ebbsfleet football club, retail and employment uses, community uses, creation of new public spaces, landscaping and associated works.

Land at Grove Road in Northfleet, Kent, DA11 9AX.

Thank you for requesting pre-application advice regarding the above site, and for meeting with us on 12 June 2023.

As part of this consultation, we have also reviewed the following document:

- “Response to Environment Agency”, dated 26 May 2023, ref: MA/LC2402g_2– EA Response Letter

Please see below our additions and amendments to the meeting minutes sent by yourselves. We have also added additional points of clarification not raised in the meeting itself, where we feel this is necessary.

Meeting minutes review

Flood Defences and Upgrades

- The EA seemed positive on the options provided in the River Wall Impact Assessment. It was confirmed that the intertidal terrace could be below the Mean High Water Springs levels and further details will be determined at the detailed design stage;
- We discussed the tie-in features to the adjacent defence levels within the red line boundary and further details can be provided at a later stage. It will be ensured that the proposed defences will not inhibit development elsewhere;
- Walsh confirmed that new defence would be independent of the existing defence and it is proposed to reduce the levels behind the defence to reduce the stress on the wall. The new defence and any residual element of the existing wall will have a 100 year lifetime;
- The EA noted that the distance from the proposed flood defense to the building on one of the sections was 3m and that this would not provide sufficient maintenance space. Walsh noted that the wall would be cantilevered

(and thus would not have tie rods) and that the IA notes that the new defense would be maintained from the riverside of the defense and that access was provided thus. Walsh also noted that if the EA required a greater distance between defense and building the wall would need to be moved not the building. The EA appeared to be receptive of this.

- The EA noted that they would like for concrete to be excluded from the intertidal terrace to increase the ecological habitat within the river however Walsh noted that they may have misinterpreted the drainage and it was not the intention for the inter-tidal terrace to be concreted. Walsh noted that there were three nominal levels proposed, a tidal terrace which would flood daily but have minimal access, a lower terrace which would flood occasionally and be accessible for most and an upper terrace which would flood rarely and be accessible to all. The EA were in agreement with his and asked if the terraces could be linked with a “zig-zag” terrace which Walsh noted was definitely feasible and would be considered.

Environment Agency Comments

Please note that the development must not prevent future maintenance and management of the flood defences, including any retreated defence.

Culvert Realignment and Daylighting

- The EA stipulated the importance of daylighting the River Ebbsfleet as much as practicable. The culvert would need to be replaced over the lifetime of the development, be a 100 year asset, include an allowance for climate change and have a 8 m maintenance buffer either side of the culvert and, therefore, work on the Ebbsfleet will be required over the lifetime of the development and the deculverting option is preferred by the EA. Therefore, the buildings over the culvert are recommended to be moved or the river diverted to achieve these stipulations. The development may be considered a keystone development if the Ebbsfleet is exposed allowing users of the site to appreciate the natural environment and sport. The 10% biodiversity net gain is required to include the river system and this determines the minimum stretch of channel to be deculverted subject to the EA's agreement that no further areas could be reasonably daylighted.
- The maintenance buffer of 8 m could be reduced if the river is daylighted. The EA suggested that if there is limited space once the river is deculverted the intertidal frontage could be reduced within the layout subject to further discussions and evidence provided by the developer.

Environment Agency Comments

It should be noted that we are seeking for the entirety of the Main River Ebbsfleet to be de-culverted (allowing for free spanning bridges and short sections of culvert as required). We understand that a section of culvert runs

next to the A226 which is within the site boundary, and this should be included in any de-culverting proposals.

Any section of culverted main river would need to have a 100-year design life as part of the proposed development. This is to ensure that the lifetime of the culvert is commensurate with that of the proposed development and thus safe for its lifetime from flooding, in line with the requirements on the NPPF (paragraph 164).

We also highlighted Policy CS06: Ebbsfleet (Gravesham) Opportunity Area at this stage of the meeting, which requires the improvement and management of the Ebbsfleet stream corridor.

- It was discussed if the deculverted channel could be meandered by locating it on the west side of the road however, this is unlikely to be feasible due to the steps leading to the stadium but should be considered by the design team. The EA suggested that a cantilevered path could be utilized to create this meandering channel.

Environment Agency Comment

Whilst the option of a cantilevered path was discussed with our biodiversity officer during the meeting, we would like to highlight that we would likely oppose a cantilevered path from a flood risk perspective given this would significantly negatively impact future maintenance and management of assets required for flood risk management

It was queried at this stage of the meeting what level of detail would be required in order for us to request a condition on the outline application detailing the design of a deculverted channel. Whilst it is difficult to say at this stage of the design, we stated that any condition we request would need to pass the 6 tests for planning conditions as outlined in the National Planning Policy Framework (NPPF) <https://www.gov.uk/guidance/use-of-planning-conditions>. A sufficient level of detail needs to be provided for us to be request conditions that pass these tests.

- The EA suggested that a discussion with the Council's Archaeology Team, themselves and the client's advisors could be undertaken to discuss the balance of deculverting the Ebbsfleet and the archaeological sensitives within the site.
- The suitability of deculverting the Ebbsfleet is also subject to the results from the flood modelling as the tidal locking in Robins Creek could result in the need for a substantial channel. Once we have received the modelling and confirmation on if the buildings over the watercourse can be removed, this should be discussed with the Team.
- **Next Steps/Actions:**

- Design Team to relook into the daylighting design considering there is potentially some compromise on buffers/setback.
- Run the flood model with any daylighting scenario.

Flood Modelling

- The EA discussed that groundwater would be useful to include within the modelling as there has been changes to the extraction volumes as the area has been developed. However, JBA identified that there are significant limitations to trying to include a groundwater input to the hydraulic model. This includes uncertainty regarding the location of the borehole used in the previous study and that, regardless of this, the borehole is not located at the location where the groundwater level is being applied to the model. This means that there cannot be confidence that the level being applied to the model (and converted to flow within the model) is representative of the actual groundwater level at the upstream model extent. Analysis of data from two boreholes for which data is available on the EA's Hydrology Data Explorer suggests that there is large variation in peak levels across the area.

The way the groundwater level is converted to flow in the model is dependent only on the level provided, it does not account for spatial variation, so flow is very dependent on the borehole used for the analysis. There is no groundwater flow data for this area and no river flow data against which to compare the groundwater response. This means that flow generated from groundwater level is highly uncertain as there is no data against which to verify it.

Due to these and several other limitations, there is substantial uncertainty in the results of the groundwater level analysis and how representative the groundwater level being applied to the model is. It therefore offers no benefit to the study in terms of understanding the groundwater input and impact on flood risk and does not increase confidence in the model predictions of flood extent and depth. In contrast to the 2015 study, JBA propose to apply a fluvial-only flow to the upstream extent of the model. This is a more standard approach, can more easily be justified, and offers no greater uncertainty than the previous approach.

- JBA enquired what the uncertainties within the model are, regarding the groundwater input, that the EA has referred to, for example, is the 2015 study input thought to be an overestimate or an underestimate?. The EA said they would try and talk to their modelling team and forward contact details to JBA to see if any further information is available on the uncertainties within the model and provide thoughts on the identified limitations (above) and the proposed approach.

Environment Agency Comment

In the first instance, we would like to highlight the opportunity to link up with Ebbsfleet Development Corporation and their flood risk consultants Stantec, given they are also modelling the Ebbsfleet also as part of the Ebbsfleet Central development. We strongly recommend a joined-up approach, as this would likely provide cost and time efficiencies for all parties.

Given the limited available data, we accept the proposed pre-development modelling method with the caveat that our Evidence and Risk (flood modelling) team will have the final say on suitability when they are consulted on the full flood model. Their review would be either as part of the statutory consultation on any application, or outside the statutory process through our cost recovery service.

Our Evidence and Risk team are also able to review detailed methodologies and provide a written response, also as part of our cost recovery service – please contact us for further information. Due to our Evidence and Risk team's national workload, we carry out an internal consultation process and we would not be able to pass on individual contact details.

Where there are uncertainties regarding modelled flood outputs on site, we would typically require a greater freeboard to mitigate risk.

Tidal Flood Levels and Floor Levels

- The EA have confirmed that it is acceptable to have the entrances and ancillary uses for the 'more vulnerable' development below the breach level. They clarified that these ancillary uses should not result in 'more vulnerable' users spending a long time below the flood level (i.e. waiting rooms) as it is possible a breach of the defences surrounding the site could occur.
- **Next Steps/Actions:**
 - Design Team to provide some drawings clarifying what 'more vulnerable' uses are below the flood level.
 - Confirmation from the EA that these uses below the flood level are acceptable.

Environment Agency Comments

Please send us drawings outlining what "more vulnerable" uses are below the flood level and we'd be happy to provide clarification on the above point.

Advice to Applicant

Pre-app enquiry caveat

Please note that the view expressed in this letter is a response to a pre application enquiry and does not represent our final view in relation to any future planning application made in relation to this site. We reserve the right to change our position in relation to any such application. You should seek your own expert advice in

relation to technical matters relevant to any planning application before submission.

Should you have any queries regarding this response, please contact me.

Yours sincerely,

George Goodby
Sustainable Places Planning Specialist

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***Appendix B:
River Wall Impact Assessment
(Walsh 2023)***



RIVER WALL IMPACT ASSESSMENT NORTHFLEET HARBOURSIDE

March 2023

Document Reference: \\192.168.1.176\walsh\Projects\5848\Documents\Reports\River Wall Impact Assessment\5848-WAL-ZZ-XX-RP-C-6700.docx

Revision: 01



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RIVER WALL IMPACT ASSESSMENT

NORTHFLEET HARBOURSIDE

Walsh have prepared this report in accordance with the instruction of our client Landmarque Properties.

The report is for the sole and specific use of the client, and Walsh shall not be responsible for any use of the report or its contents for any purpose other than that for which it was prepared and provided. Should the Client require to pass copies of the report to other parties for information, then no professional liability or warranty shall be extended to other parties by Walsh in this connection without the explicit agreement thereto by Walsh.

Revision	Date	Notes	Prepared by	Checked by	Approved by
1	12/09/14	First Issue	FM	AS	AS

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1. Introduction

Walsh are appointed by Landmarque Properties to advise on river wall matters related to the development of the Northfleet Harbourside site in Kent. Given the site is riparian consideration is being given to the river wall with respect to flood risk, flood protection, maintenance and general longevity.

As part of the riparian works Walsh have been requested to undertake an assessment of the river wall and the impact it may have on the development and show that the proposals are sustainable and do not pose a unacceptable flood risk on the development or wider area. This report documents this study and we understand that this will form part of the sitewide flood risk assessment being undertaken by others.

2. Scope and Limitations

This note is prepared under the auspices of our appointment by Landmarque Properties.

The scope of the report as agreed with the wider team and EIA consultants is as follows;

- Desktop overview of the existing river wall
- Overview proposals for any river wall replacement of enhancement
- Commentary on flood risk and compliance
- Commentary on the impact of climate change and the need to raise defences.
- Assess the impact of the development on river wall and the flood defence maintenance and inspection.

3. Background

3.1. General

The proposed site at Grove Road in Northfleet, Kent is a mixed-used redevelopment consisting of residential units, retail, food and beverage, office spaces as well as a multi-use stadium with associated business and leisure facilities. The proposed extent of the development is shown in figure 1 below.

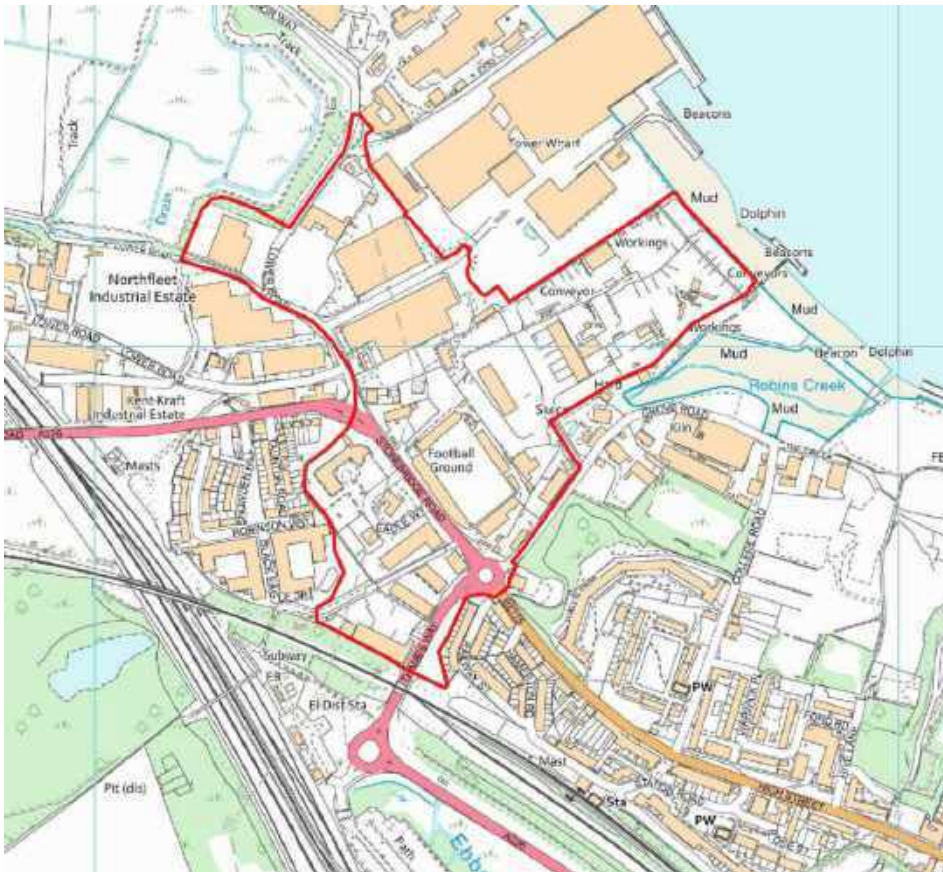


Figure 1: Proposed "redlined" planning boundary of development.

At the northeast boundary of the site there is an existing river wall which fronts the tidal River Thames estuary as shown in figure 2. The current river wall runs along the bank of the river Thames continuously from north west to south west. The south-eastern boundary of the site is formed by Robins Creek. Robins Creek is a basin area surrounded by river wall defences and forms the estuary of the River Ebbsfleet as it discharges into the Thames. Based on desktop information we believe that the tidal defence extends across the mouth of Robin's Creek and as such Robins Creek is not tidally influenced completely by the Thames however this does not fundamentally impact the assessment and proposals as the river wall forming Robins Creek is outside the scope of the application.

The section of river wall under consideration is shown in figure 3 below.



Figure 3 – Extent of river wall under consideration

3.2. River Levels

Table 1 below shows the relevant levels associated with the river and site adjacent to the river.

Table 1 - River Levels

Level Definition	Level (mAOD)
Mean Low Water Spring	-2.56
Riverbed Level at river wall	1.10
Mean High Water Spring	3.44
Highest Astronomical Tide	3.93
Site ground level by river (Based on LiDAR data)	Approx. 4.77
Current Defence Crest Level	6.70-6.90
Required Future Defence Level (as advised by EA)	8.00

3.3. Existing River Wall

Figure 4 below outlines the anticipated current river wall construction based on the investigations done into the levels of the area using EA data and LiDAR data. This is to be confirmed on site.

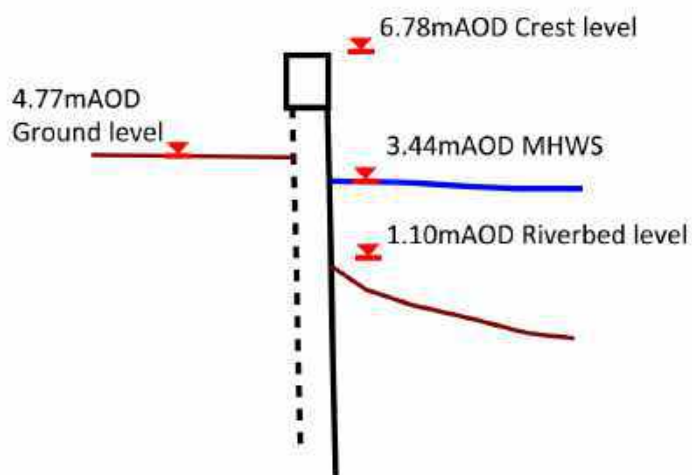


Figure 4 - Anticipated Existing River Wall construction

Figures 5 and Table 2 below outline the information taken from the EA's Asset Management Map. As shown the sections of the river wall along the site have crest levels of between 6.70m AOD and 6.90m AOD. This information also outlines that the condition of these sections of wall are 'Fair'. It is understood that the definition of this condition is 'Defects that could reduce performance of asset'. The condition ratings are not linked to design life however a rating of fair is likely to indicate that whilst there are no immediate concerns with the defences condition it is unlikely to have a residual life >20-30 years or have the ability to be raised significantly.

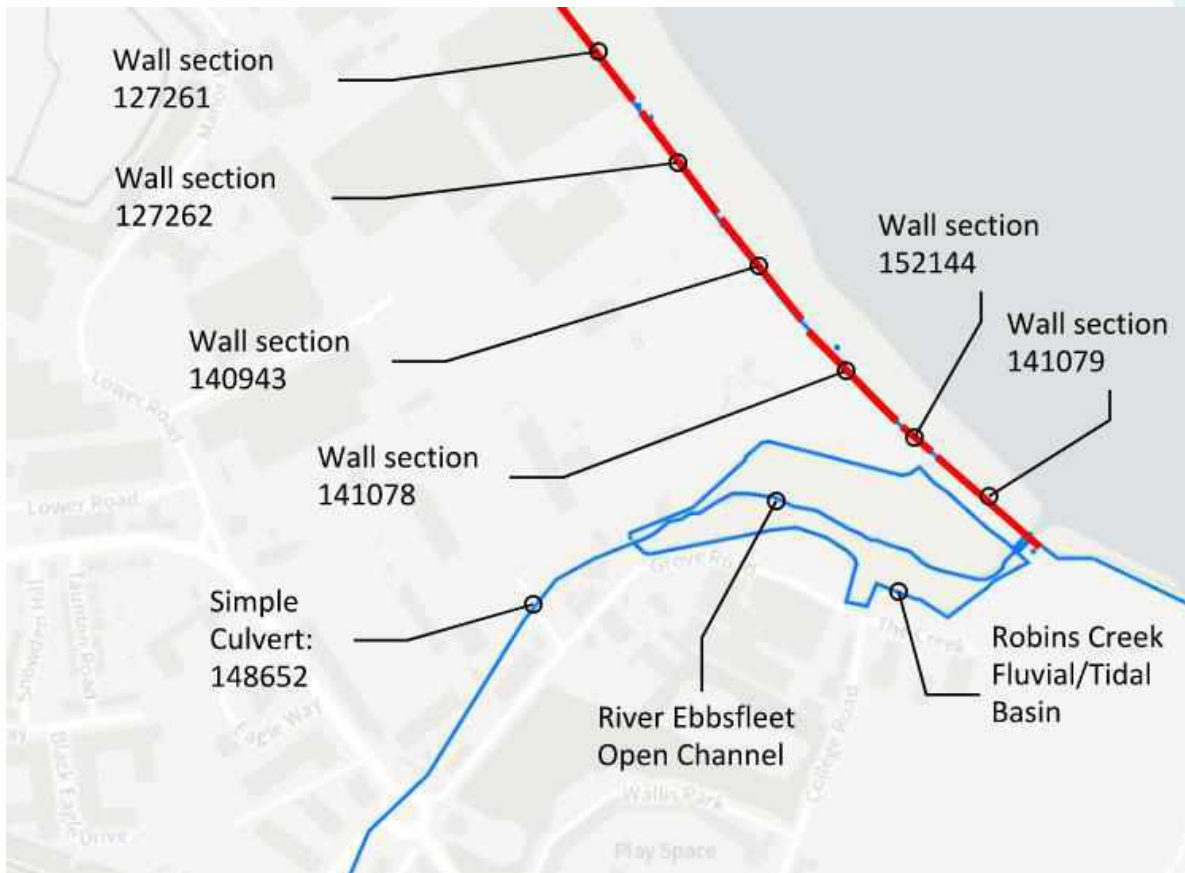


Figure 5 - Extract from EA Asset Management (AIMS) database

Table 2 - EA Asset Details (from AIMS database)

Asset Reference	Asset Type	Asset Condition	Defence Crest Level (mAOD)
127261	Wall	Fair	6.70
127262	Wall	Fair	6.85
140943	Wall	Fair	6.78
141078	Wall	Fair	6.80
152144	Wall	Fair	6.91
141079	Wall	Fair	6.86
Robins Creek Fluvial/Tidal Basin	Wall	Fair	5.66-5.27
Simple Culvert 148652	Simple Culvert	Not Known	N/A

4. Proposed Enhancements

4.1. General

Through consultation with the EA it has established that the development proposals will include a 16m “set back”. It has also been noted by the EA that the development will need to include a new tidal defense structure or mechanism with a defense level of 8mAOD to account for climate change impacts and see that the development is sustainable from a flood defense perspective for the next 100 years.

These proposals have been incorporated into the landscape strategy (see Appendix A) although the actual details of the riparian public realm and details are not the subject of the proposed outline planning application and will be a reserved matter. In this regard the assessment within this report is focused on seeing that the strategy can be delivered and maintained and further detail will form part of subsequent submissions.

4.2. New Tidal Defence

To demonstrate that the proposals are achievable and sustainable we have developed a number of options and sections that could be implemented for the new river wall and they all have the following common key design features;

- Riparian area 16m from waterfront to be free from development.
- Top of defence level set at 8.00mAOD,
- Edges to tie into defences on either end of the wall to ensure continuous defence,
- Access provided for maintenance vehicles,
- 100-year design life,
- Existing river wall considered sacrificial from a flood defence perspective.

Given that the detailed design will focus on the “terracing” of the riparian land we have outlined below several options that will form a “design code” for the development of the detailed design.

As noted above, the existing river wall will be considered “sacrificial” form a flood defence perspective it will still be subject to detailed assessment to see that it has sufficient residual life to see that it is maintainable and does not pose a risk of collapse which could impact the river and shipping. The parameters of this assessment will be the subject of further discussion with the EA and PLA.

Given that the river wall is believed to be a cantilevered sheet pile wall, lowering the wall will reduce the stress and thus increase its residual life. In this regard the lowering of the existing wall in some way is likely to form a fundamental part of the proposals as this not only has structural benefits but it is in line with the EA desire to make the river more accessible. Should the need arise additional tie rods will be installed to enhance the residual design life.

It should be noted that whilst three options are proposed it is likely the detailed design will combine all three options as a “hybrid” approach so the proposal should not be taken literally and they are described to set out the principles of the riparian development.

4.2.1. Option 1 – Single Terrace.

The first option of a single terrace utilises the new defence wall to form a single terrace.

The level of the terrace will be reviewed but is likely to be at least 4.5m at the river slope upwards as one goes inland. This will set it at least 500mm above HAT and thus have a very low risk of flooding from tidal waters and be very accessible.

The terrace will be landscaped but access to both the set back defence wall and the existing river wall will be maintained in line with the proposals set out in section 5.

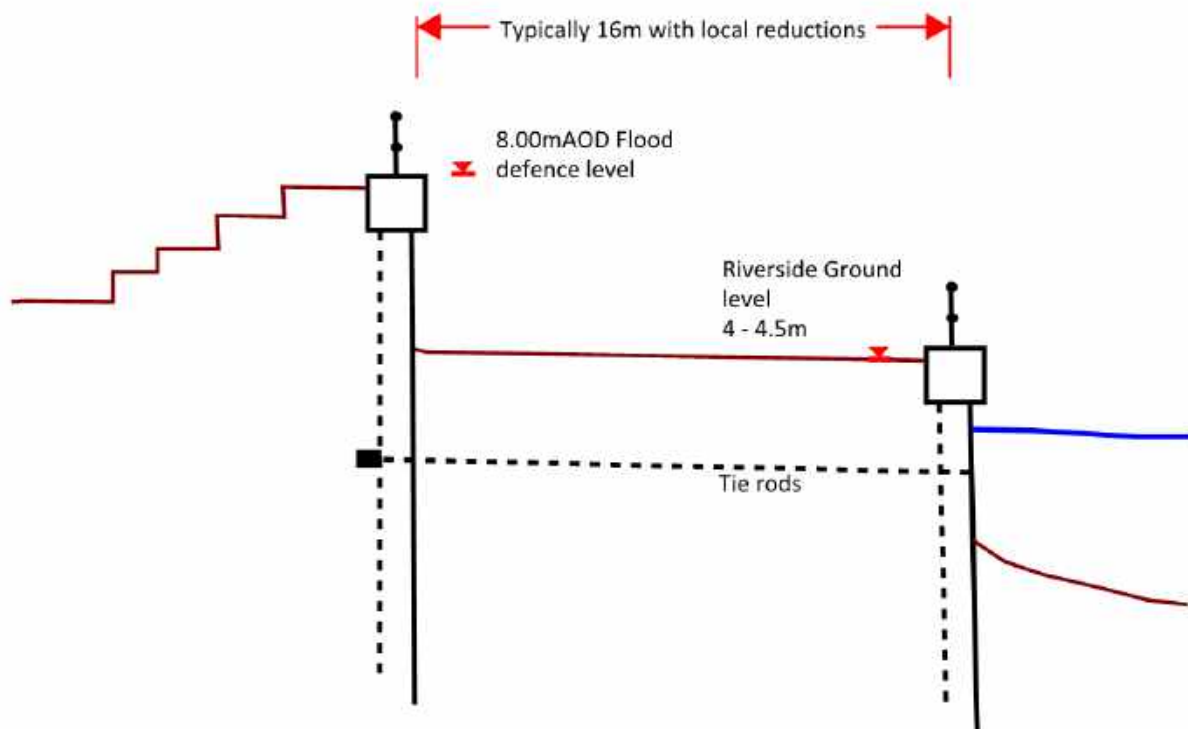


Figure 6 - Option 1 Single Terrace

4.2.2. Option 2 – Double Terrace.

The second proposed option is for a double terraced arrangement. This will consist of two levels staggering down from the proposed flood defence level to the existing ground level. This will be achieved with the use of an addition gravity retaining wall.

The level of the terraces will be reviewed but consideration could be given to a riparian terrace slightly lower than that shown in option 1. A Terrace set 4-4.5mAOD would be slightly less accessible than option 1 due to the slightly increased risk of tidal influence (albeit at 4mAOD it would still be above HAT and therefore still have a low risk of flooding) but would make the river more visible.

The upper terrace will be set above 4.5mAOD and thus at least 500mm above HAT and therefore have a very low risk of flooding from tidal waters and be very accessible.

The terrace will be landscaped and the widths of each level will accommodate the access for major maintenance at the top level and emergency and periodic access at the bottom level. This will see that the appropriate level of maintenance, as set out in the proposals set out in section 5, are provided.

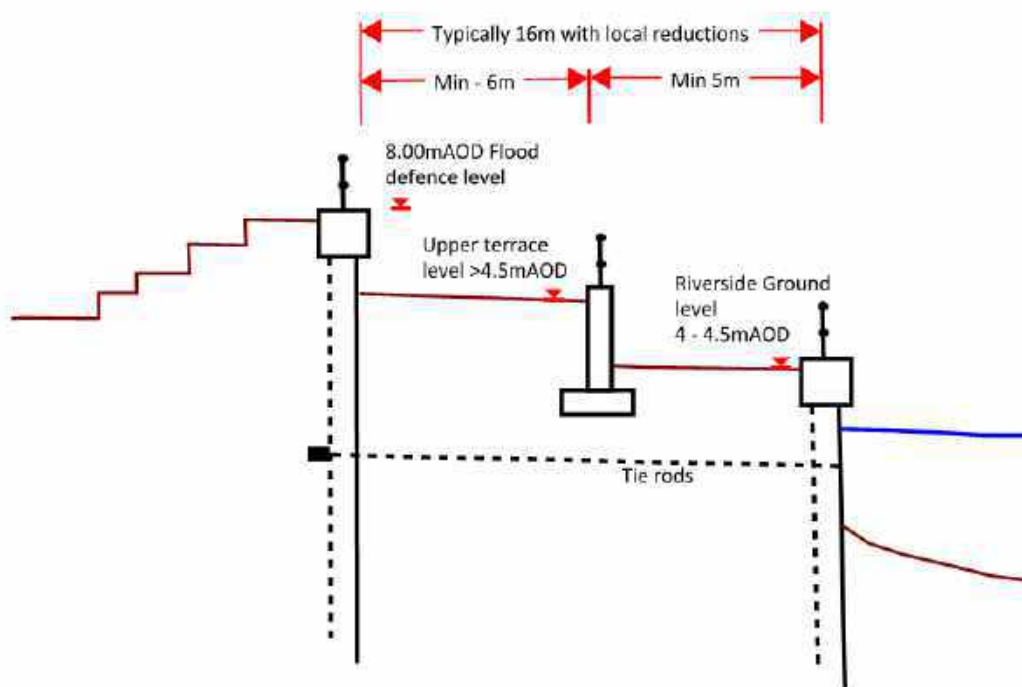


Figure 7 – Option 2 Double Terrace

4. 2. 3. Option 3 – Double Terrace with additional tidal terrace.

This enhanced option is similar to option 2 however it gives provision for a tidal terrace at the lowest level. A tidal terrace is set in the inter-tidal zone between MHWN and MHWS and thus regularly floods. The terrace would create an inter-tidal habitat planted with marine and aquatic flora such as common reeds (*phragmites australis*) which provides significant positive biodiversity benefits.

The tidal terrace would typically not be publicly accessible although if safety measures are incorporated it can be somewhat accessible at low tide.

The tidal terrace would be formed by cutting the existing wall down to below the MHWS level and installing an additional gravity retaining wall.

The level of the upper terraces will be reviewed but similar consideration to the lower terrace of Option 2 would be followed.

The upper terrace will be set above 4.5mAOD and thus at least 500mm above HAT and therefore have a very low risk of flooding from tidal waters and be very accessible.

The terraces will be landscaped and the widths of each level will accommodate the access for major maintenance at the top level and emergency and periodic access at the bottom level. This will see that the appropriate level of maintenance, as set out in the proposals set out in section 5, are provided.

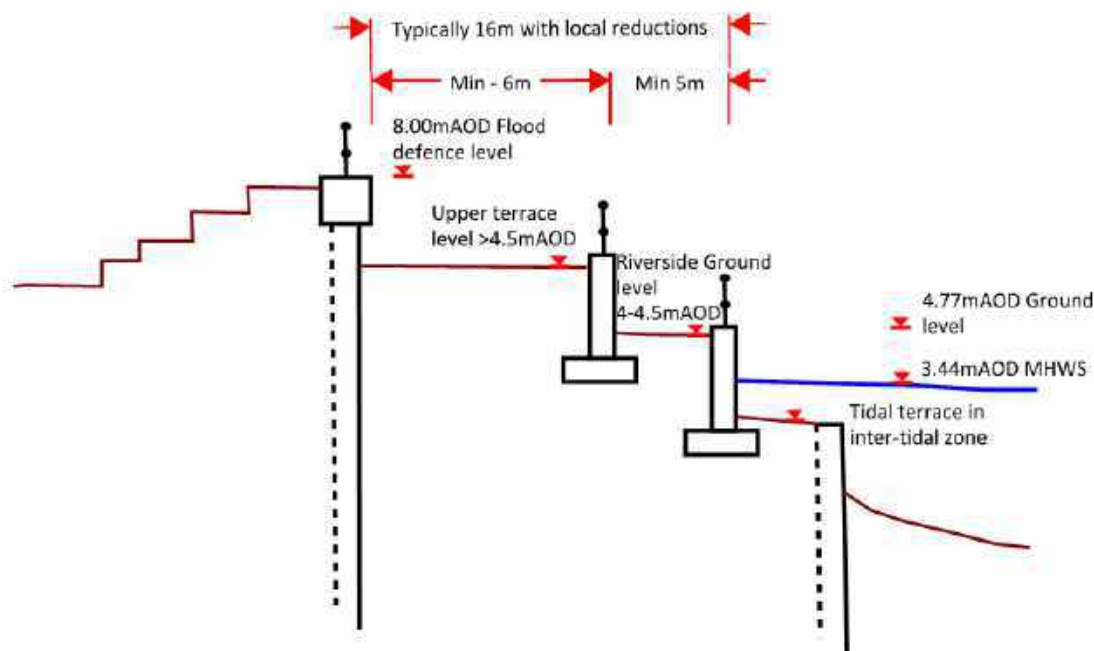


Figure 8 – Option 3 Double Terrace with tidal terrace

4.3. Links to Adjoining Tidal Defence

For each of the river wall options put forward consideration has been given to the connection to the tidal defence at either end of the wall. It is anticipated that these connection points will provide a wall at the existing flood defence level (6.85mAOD at either end). This will facilitate the upgrading of the adjoining defences to be brought forward as the adjoining sites are developed or when climate change requirements dictate otherwise.

4.4. General Access to River

With all the river wall options access needs to be provided for inspections and maintenance. As per Figure 7 below it is proposed that the main vehicular access is provided from the access road in the north of the site with further pedestrian access to be from the centre landscaped areas further south.

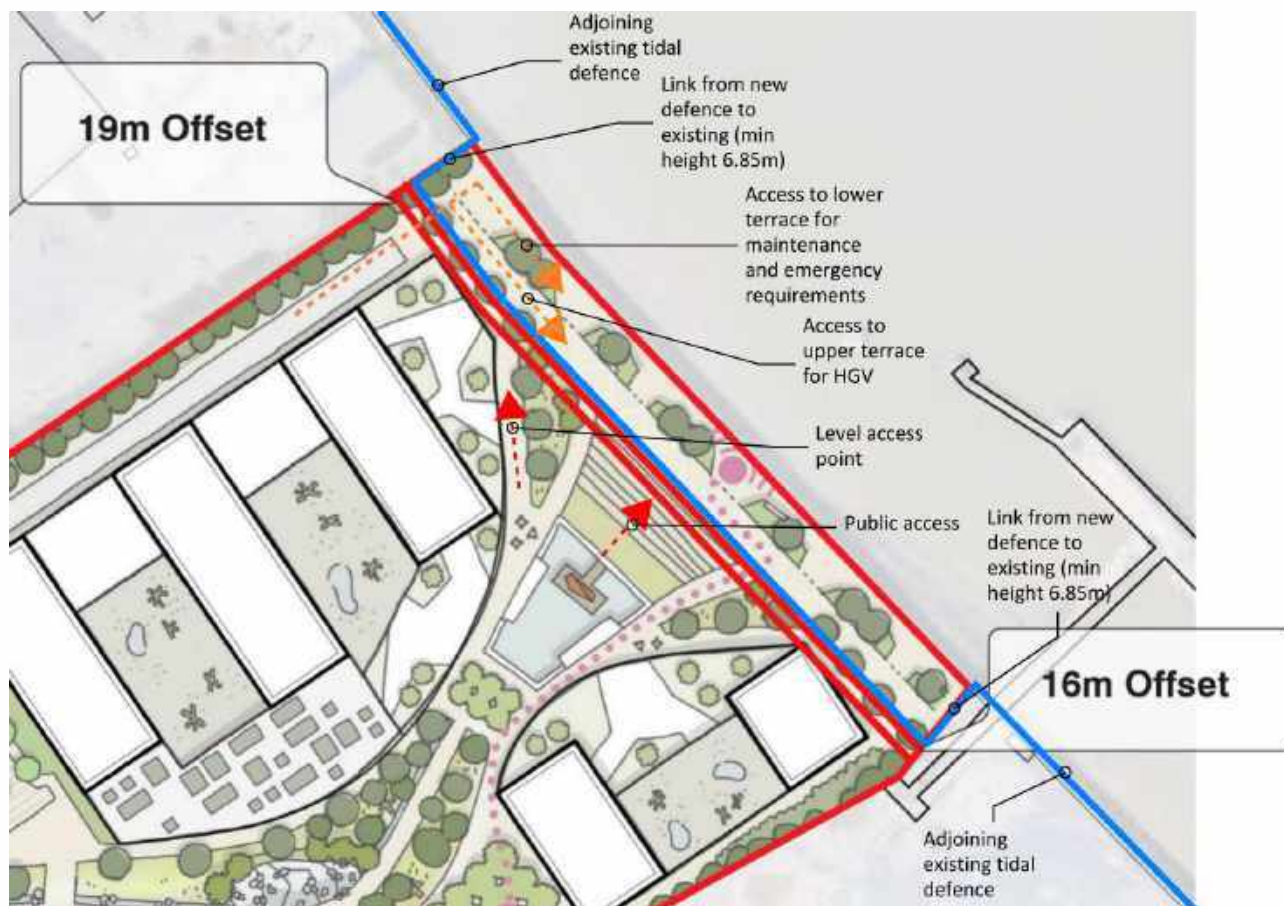


Figure 9 - Proposed access arrangements

5. Inspection and Maintenance

Consideration has been given to the access and maintenance strategy for each of the river wall options post development.

To demonstrate that the river walls can be adequately maintained a review has been undertaken to demonstrate suitable plant can be maneuvered into place to enable safe inspection and maintenance as required.

There are several ways and the requirements for access can be categorised as follows and we have dealt with these separately.

1. Regular Inspection
2. Detailed inspections and Minor Maintenance
3. Major Maintenance and repair
4. Environmental Enhancements
5. Emergency Access

It should be noted all paving materials proposed for access and tracked paths should be designed to support the proposed vehicles, such that the vehicle access described can be realised.

Below we have provided the key principles that will be incorporated into the design. It should be noted that these access requirements are purely for the river walls and flood defences. Further access requirements will be required for pedestrians, landscape maintenance and public emergencies. These will form part of the landscape design and access statement although they are likely to be similar.

5.1. Regular Inspections

Visual inspections would be possible from the riverside walk and from the river. Technology such as drones could also be used to provide a visual inspection. Such inspections would need to be undertaken regularly, say every 2 years. These types of inspection can be do for all the design options outlined.

Element	Requirement
Frequency of access	Every 2 years
Access requirements to “drop off zone” adjacent to riverside area	Standard highway access for small vehicles/vans and pedestrians
Access along riparian terracing and paths	Small vehicles/vans and pedestrians
Min width along riverside	3.5m
Max gradient	5% (8% for vehicle only ramps)
Loading/surfacing	Traffic Category 3 to BS7533:101

Table 3: Summary of Access Requirements for Regular Maintenance

5.2. Detailed Inspections and Minor Maintenance

A more detailed inspection will be required every five to six years. This may also include minor maintenance.

Access for a detailed inspection the river wall will generally be via the river itself at low tide but could also be via the use of specialist access equipment and plant which is readily available. Such equipment would facilitate closer “hands on” inspection and maintenance which may be required during detailed inspections.

Access for such equipment and associated transport would be via the site access road at the north where it could be dropped close to the riverside path. From the drop off point it would self-propel along the riverside walkway. Larger plant may be facilitated by the use of tracking mats and similar equipment.

Such equipment could also be used to undertake minor maintenance and testing if needed.

Element	Requirement
Frequency of access	Every 5 years
Access requirements to “drop off zone” adjacent to riverside area	Standard highway access for large vans and small (7.5T lorries)
Access along riparian terracing and paths	Unobstructed access for maintenance vehicles (MEWP’s and dumpers etc) and pedestrians. Ability for larger plant to access areas with tracking mats etc.
Min width	3.5m
Max gradient	5% (8% for vehicle only ramps)
Loading/surfacing	Traffic Category 4 to BS7533:101

Table 4: Summary of Access Requirements for Detailed Inspection and Minor Maintenance

5.3. Major Maintenance and Repair

Major maintenance and repairs may be required and it is likely that planned major maintenance will be required every 10-15 years.

For such tasks, a lorry up to 30T could access via the site highways and materials distributed along the river edge with “dumpers” and forklift type equipment. It is for these sorts of vehicles that the minimum width of 8m should be provided for the upper terrace of each design option.

Element	Requirement
Frequency of access	Every 5 years
Access requirements to “drop off zone” adjacent to riverside area	Full access for all road legal vehicles including “low loaders”
Access along riparian terracing and paths	Access along “upper terrace” for large plant and equipment – given that this work is likely to require some degree of planning some preparatory works (moving landscape features and the like) would be acceptable.
Min width	Typically 6m (incl working room) with min 4m
Max gradient	5% (6% for vehicle only ramps)
Loading/surfacing	Traffic Category 4 to BS7533:101

Table 5: Summary of Access Requirements for Major Maintenance and Repair

5.4. Environmental Enhancements and Climate Change

As policy changes throughout the life of the wall there may be a need for enhancements and/or upgrades, however the requirement for such work has been mitigated by the proposal to upgrade the flood defence level to 8.00m AOD.

Some enhancement may be required to the river edge walls as the accessibility of these areas may reduce as tide levels rise.

Other environmental enhancements could include set-backs, fenders, fish enhancements and/or safety chains.

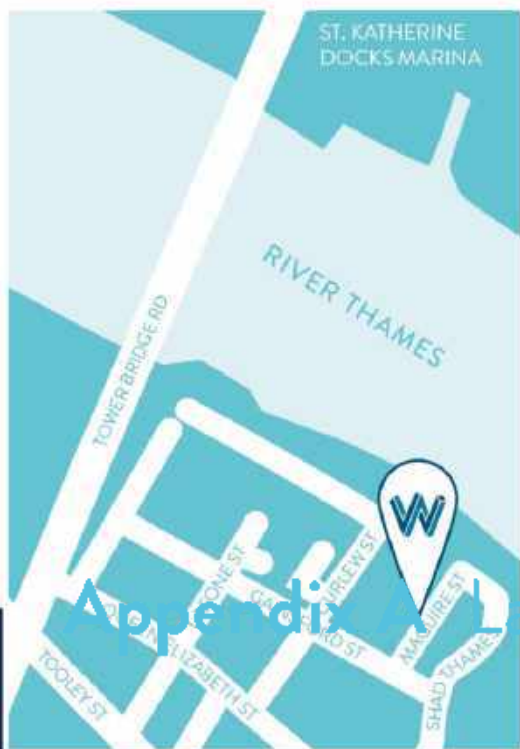
All of the above could be undertaken in the same way as a major maintenance would be and as such there are no separate requirements.

5.5. Emergency Access

It is noted that emergency access will be facilitated via the site access road and along the walls at whichever level that is required with minimum width of 4m always provided at terrace levels.

Element	Requirement
Frequency of access	Ad hoc
Access requirements to “drop off zone” adjacent to riverside area	Full access in accordance with ADB and BS9999
Access along riparian terracing and paths	Full access in accordance with ADB and BS9999
Min width	As ADB and BS9999
Max gradient	5% (6% for vehicle only ramps)
Loading/surfacing	Traffic Category 4 to BS7533:101

Table 6: Summary of Access Requirements for Emergency Access



Appendix A Landscape Strategy

Contact

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NORTHFLEET HARBOURSIDE

River edge retaining wall review



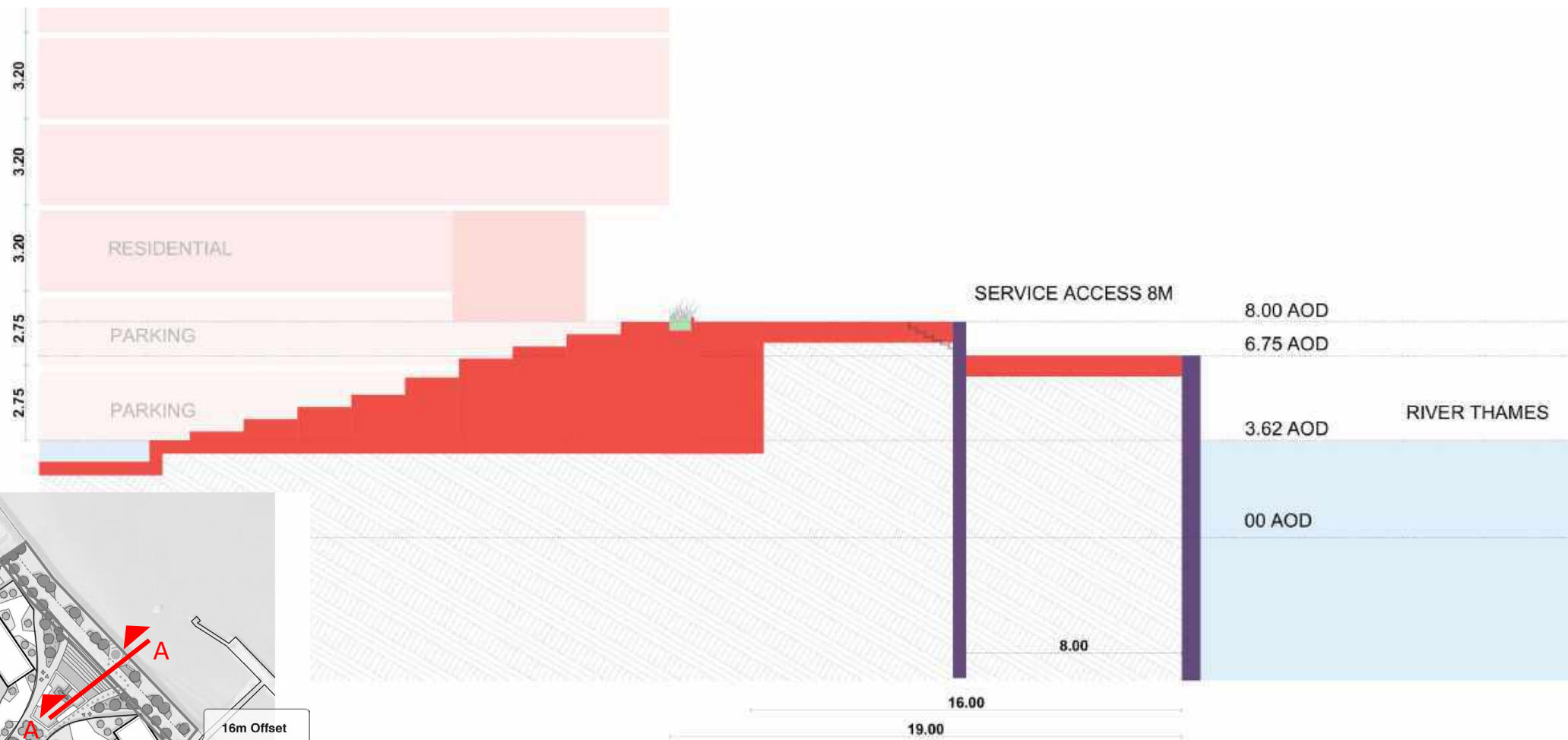
Constraints

- Distance of built form from existing retaining wall must be -16m
- Existing proposed built form ground FFL- 3.62AOD
- Top of existing retaining wall - 6.75 AOD
- Loss of views due to level difference between FFL and Top of retaining wall

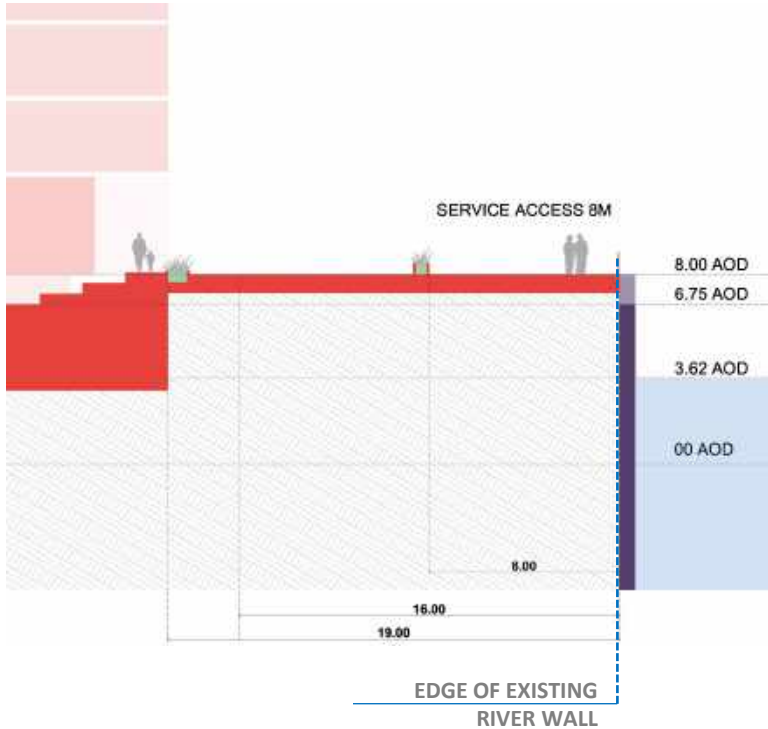
Requirements

- Top of proposed retaining wall – 8.00 AOD
- Finished ground level of public realm adjacent to wall- above 6.75 AOD
- Width of mandatory service access- 8 m

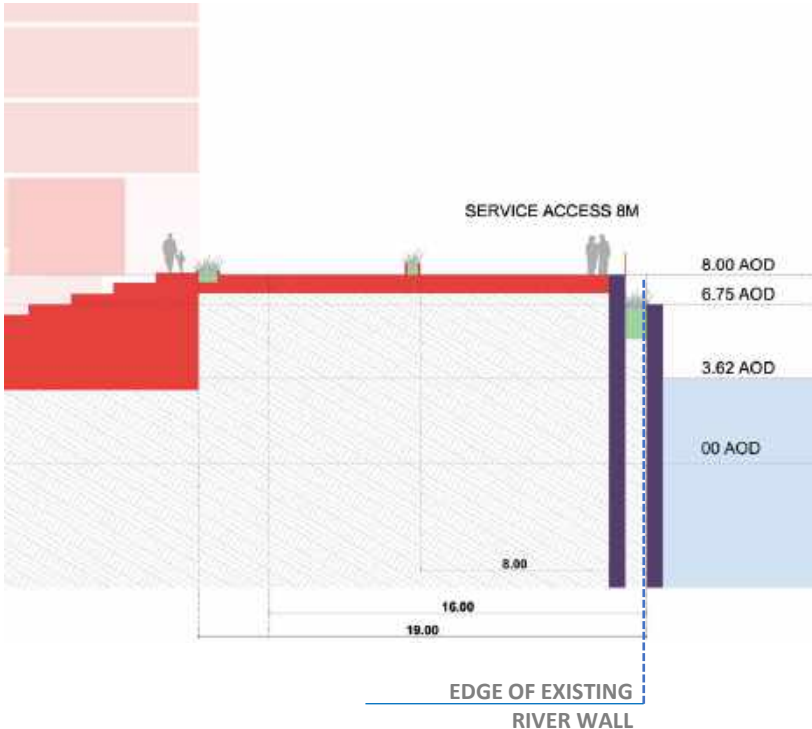
TYPICAL SECTION AA (AS PER EXISTING DESIGN)
Through Thames View promenade



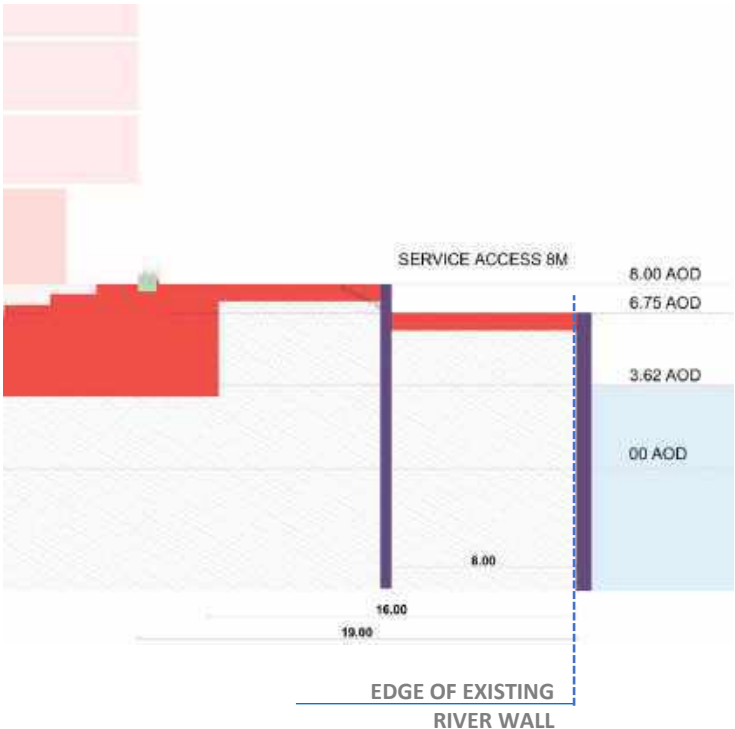
ALTERNATE RETAINING WALL CONDITIONS
Along the Thames View promenade



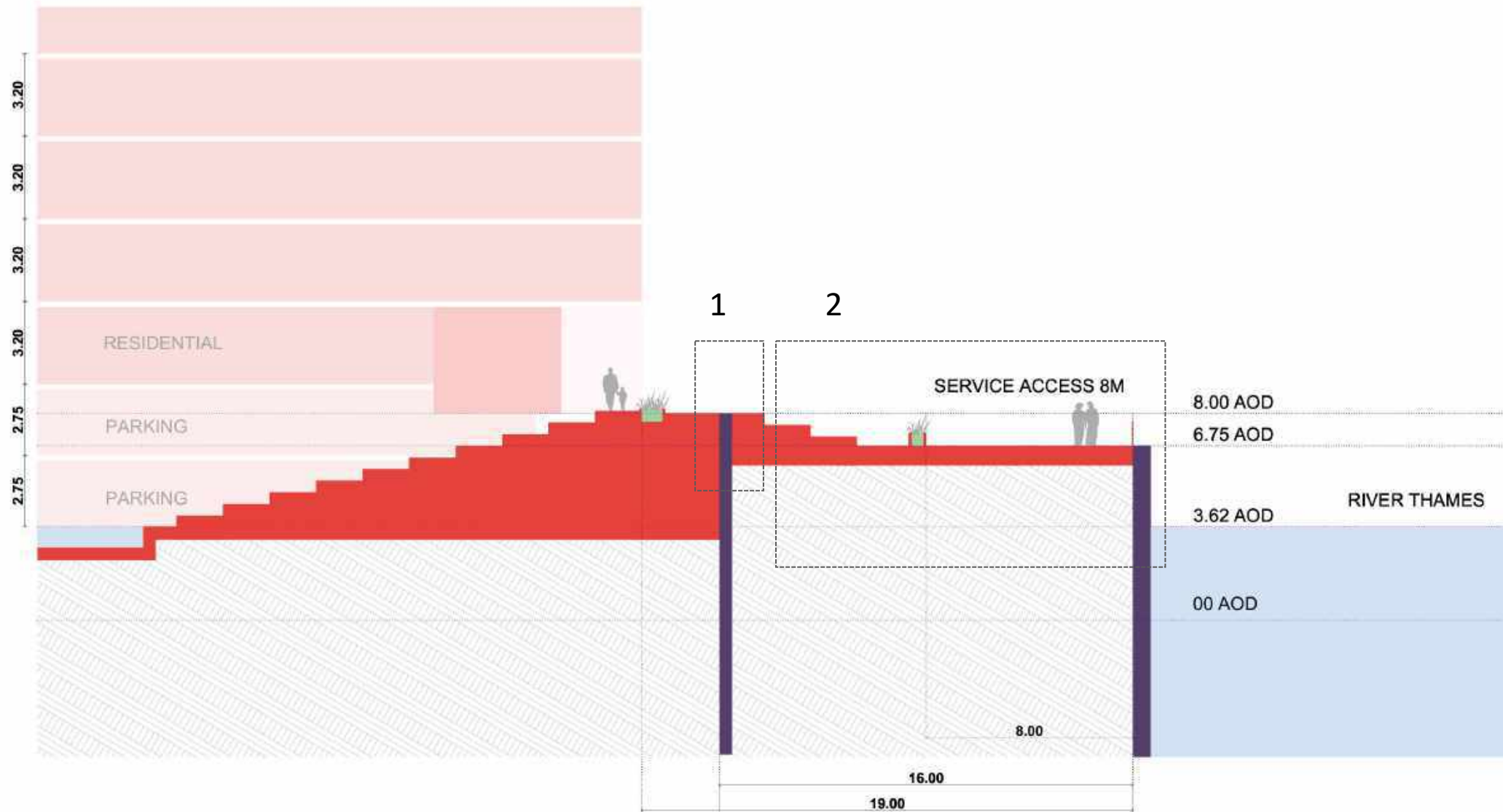
OPTION 1



OPTION 2



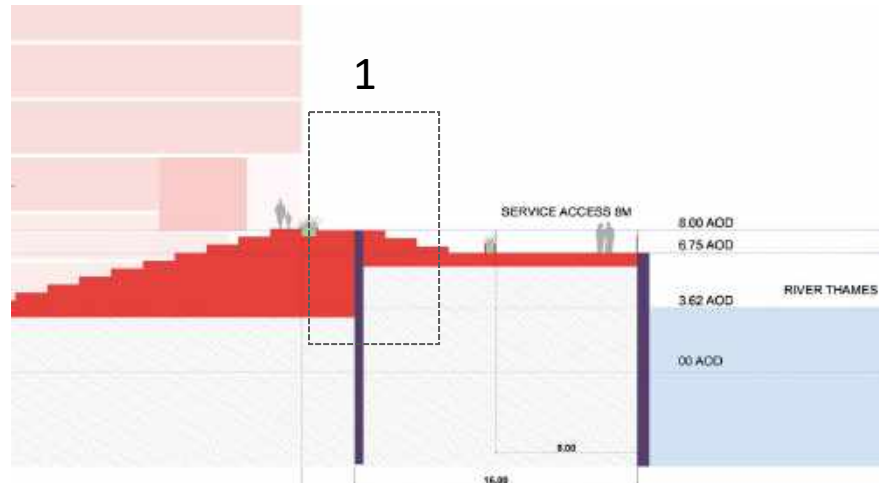
OPTION 3



PROPOSED CONCEPTS

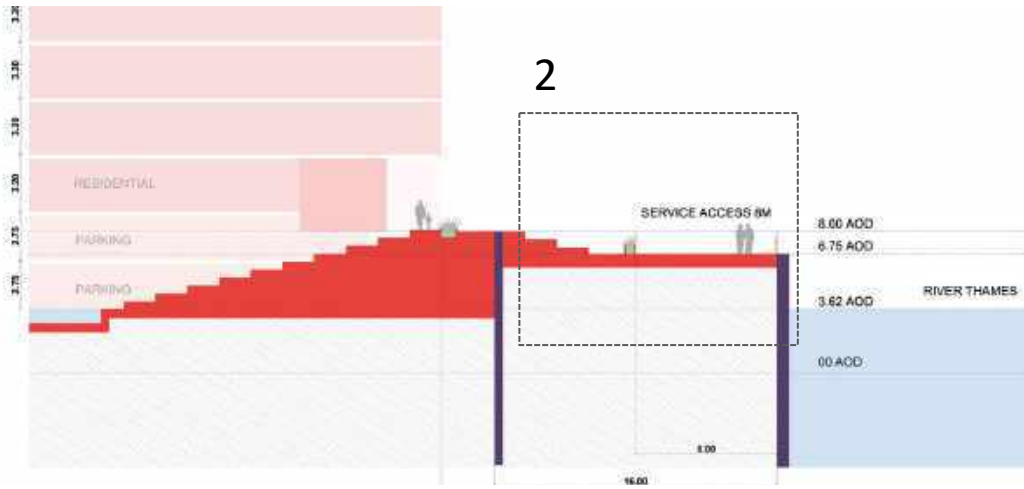
(Thames View promenade)

CONCEPT 1 (8.00 AOD RETAINING WALL)



1 _ MORE THAN JUST A RIVER RETAINING WALL !

CONCEPT 2 (THAMES VIEW PROMENADE)



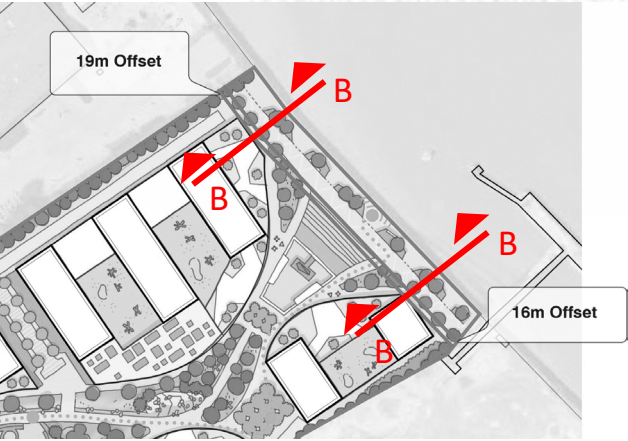
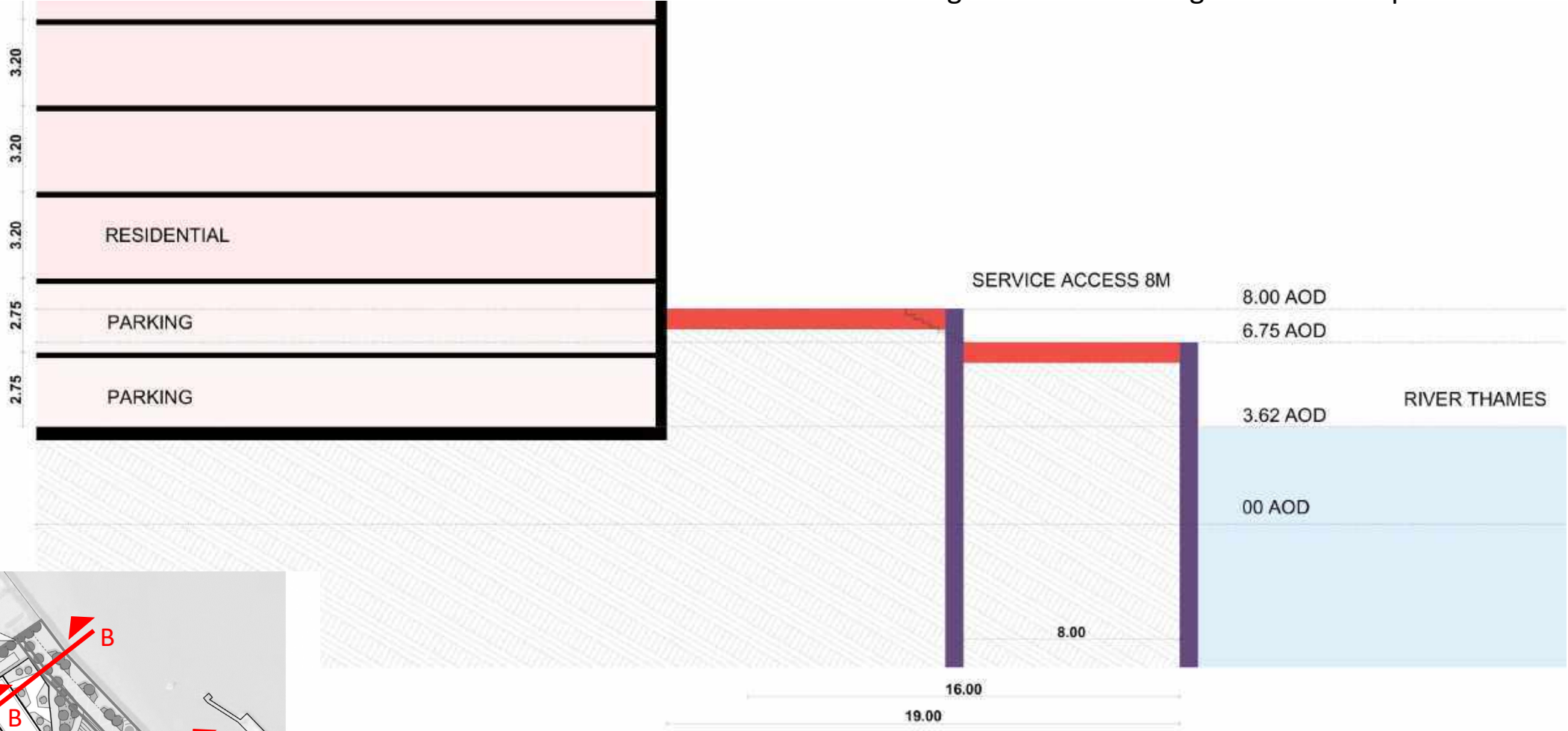
2 _ ACTIVATED RIVERFRONT EDGE

CONCEPT 2 (THAMES VIEW PROMENADE)

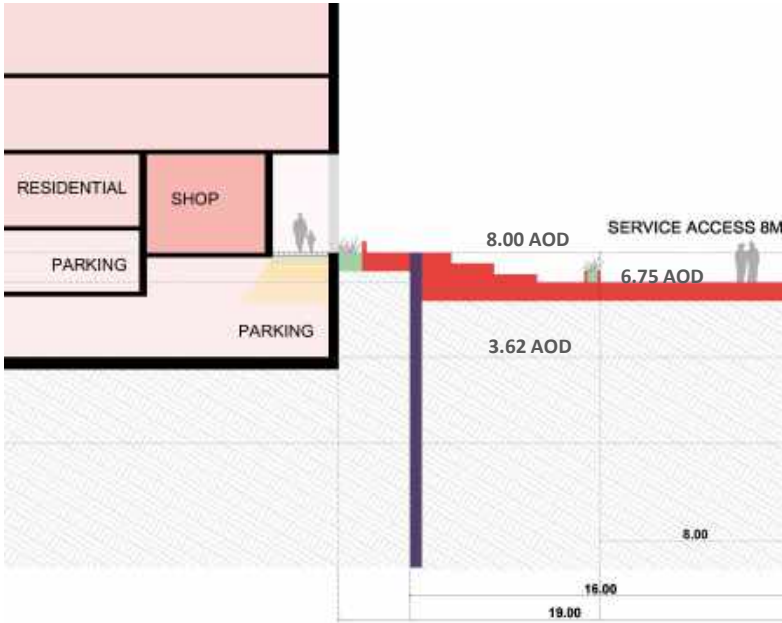
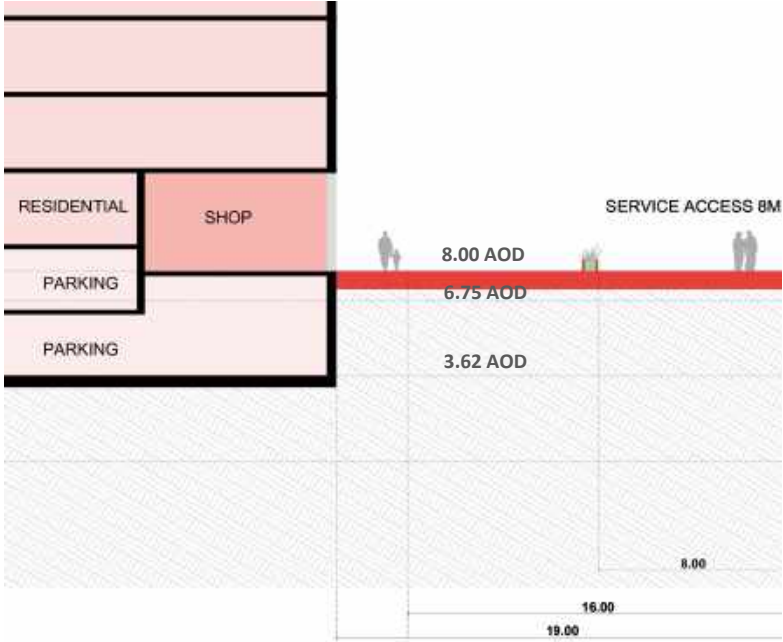
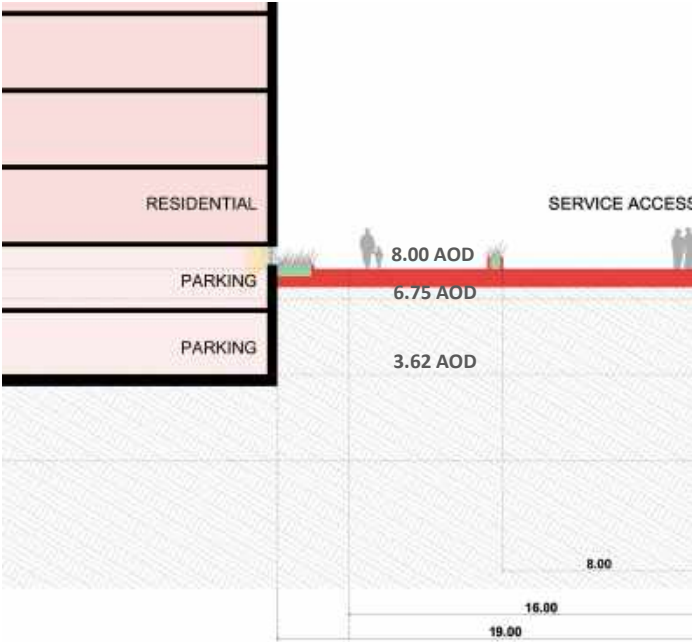


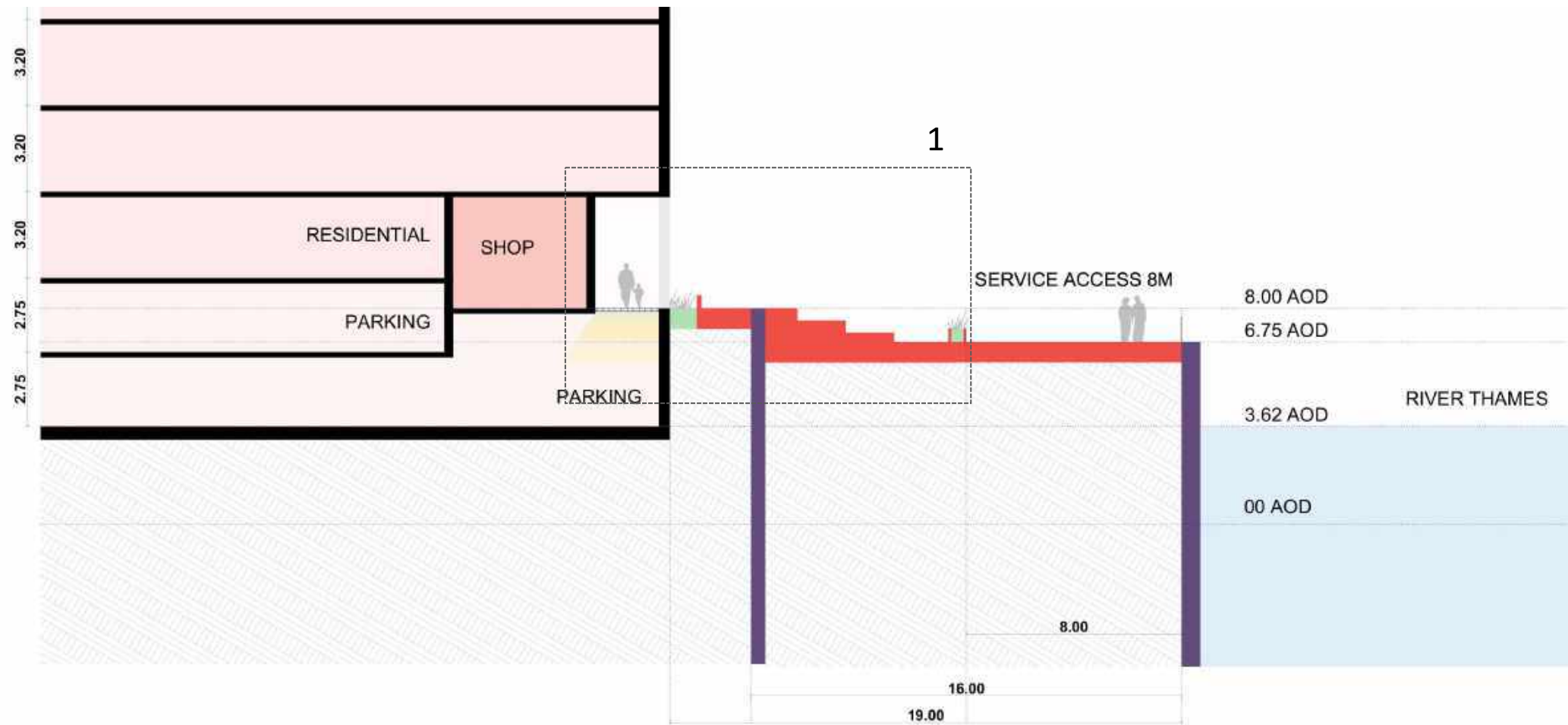
2 _ ACTIVATED RIVERFRONT EDGE

TYPICAL SECTION BB (AS PER EXISTING DESIGN)
Through built forms along Thames View promenade



ALTERNATE BUILDING INTERFACE CONDITIONS
Along the Thames View promenade

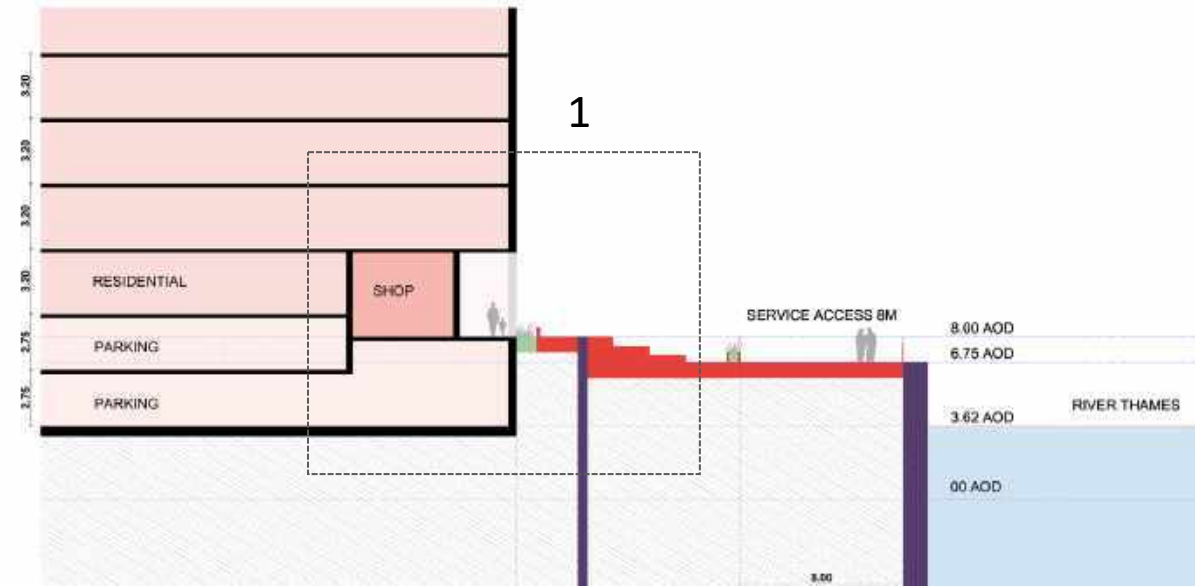




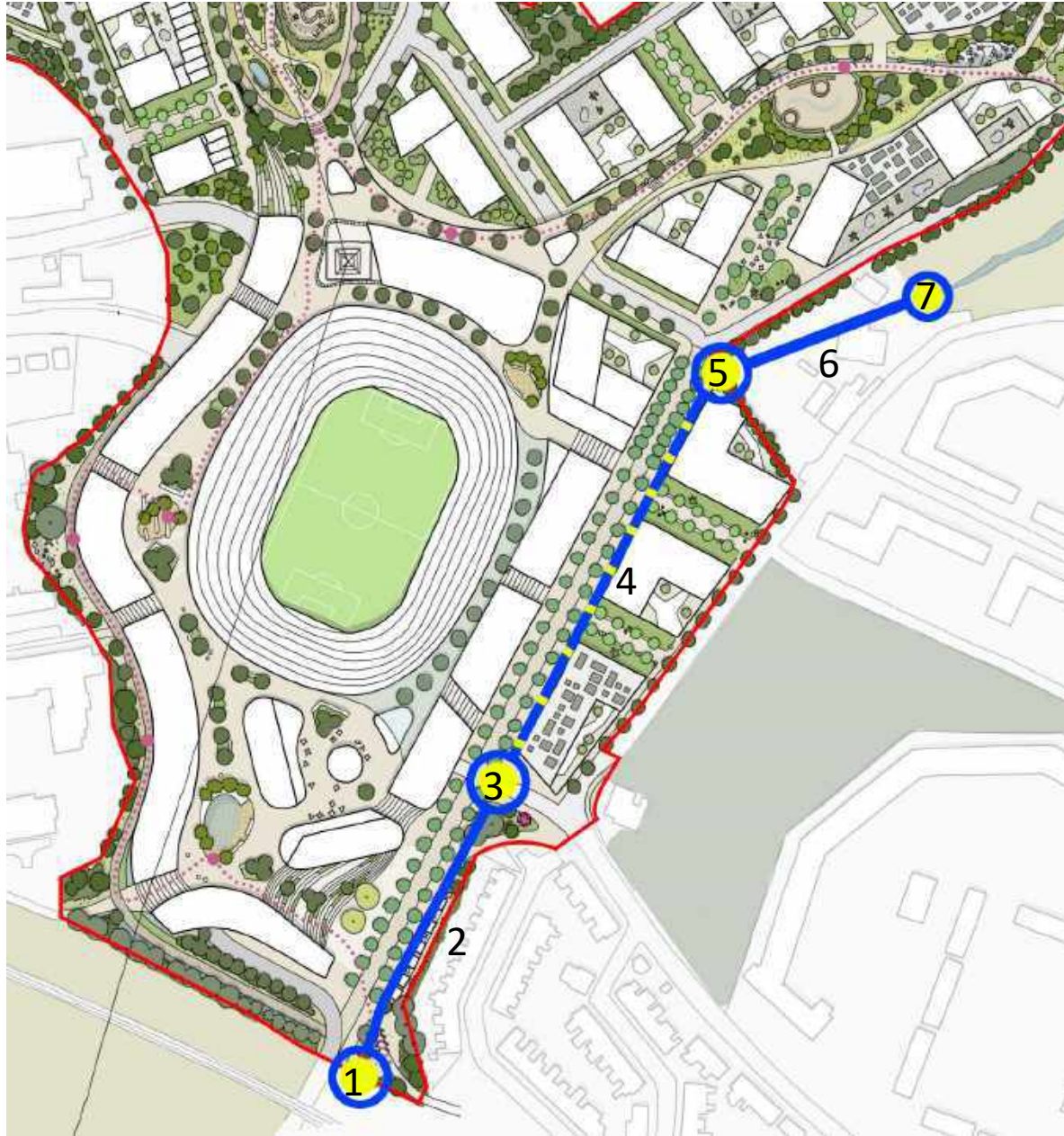
PROPOSED CONCEPTS

(Built form interface with Thames View promenade)

CONCEPT 1 (Built form interface with Thames View promenade)



1 _ BUILDING INTERFACE



CULVERTED ROBINS CREEK/RIVER EBBSFLEET ZONES

1. Connection into EDC land
2. Potential section of daylighting – within park area
3. Culverting required under Stonebridge Road
4. Potential section of daylighting – within Boulevard
5. Connection into third-party land
6. Existing culvert in third-party land
7. Existing outflow into Northfleet Harbour

DAYLIGHTING DESIGN IDEAS – Large options

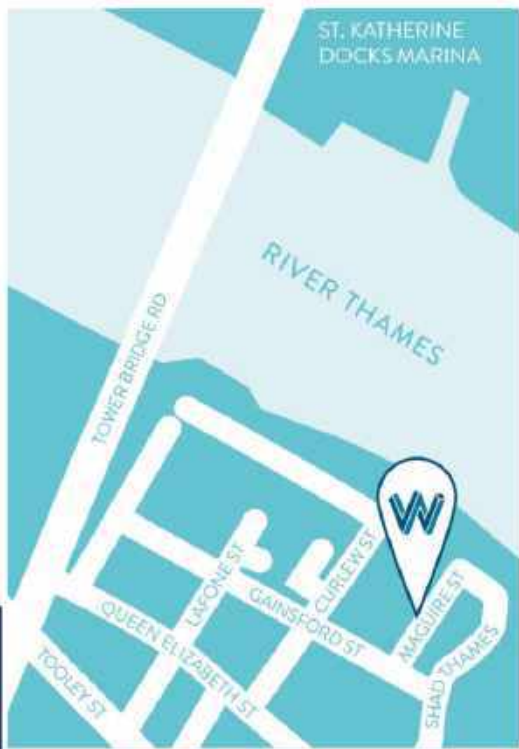


DAYLIGHTING DESIGN IDEAS – Medium options



DAYLIGHTING DESIGN IDEAS – Small options





Contact

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& Geotechnical Engineers

The Clove Building
4 Maguire Street
London, SE1 2NQ

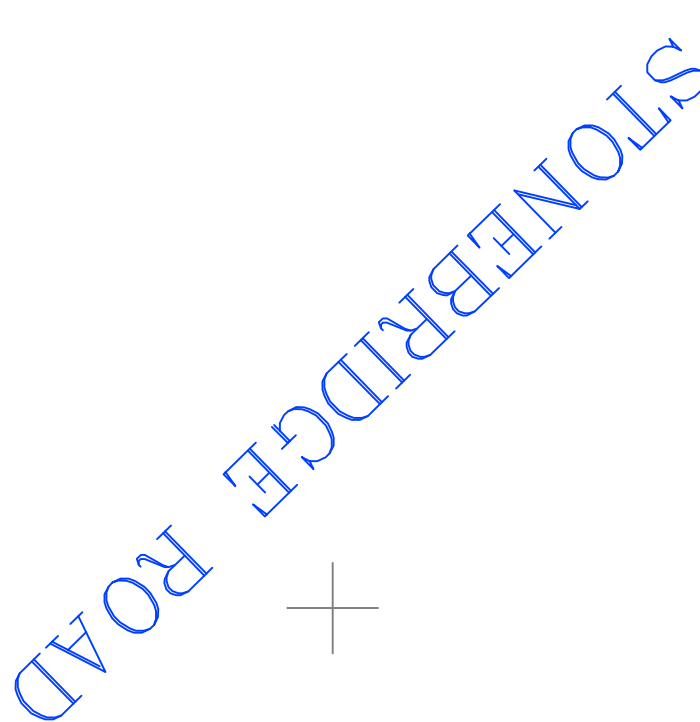
t. +44 (0)20 7089 6800

e. contact@walsh.co.uk

www.walsh.co.uk



***Appendix C:
Culvert Survey
(Reed Geomatics 2023)***



(21.00)	Floor to Ceiling Height	H Level	Window Head Level
(25.26)	or Ceiling Level		

LP	Lamp Post	WKH	Water Key Hole
MH	Manhole	WM	Water Meter

2

Level datum: Ordnance Datum Newlyn (ODN).

Rev	QA Check	Description	Date
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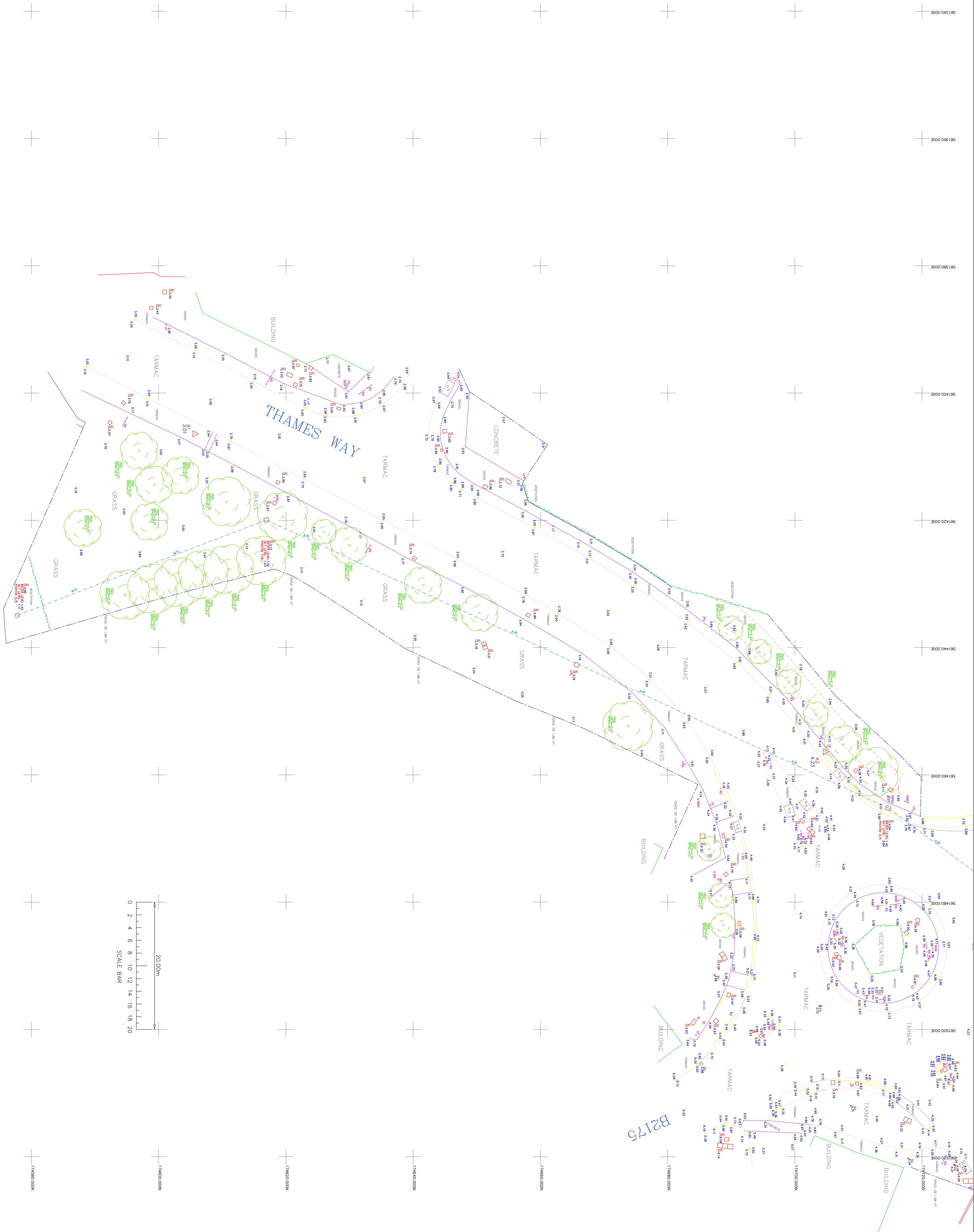
TEL 01302 221330 CELL 01303 100000
E-MAIL info@reedgeomatix.com www.reedgeomatix.com

SCALE	1:200
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DA11 9GN

100	100
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[illegible]

THIS SURVEY DATA HAS BEEN PREPARED FOR THE CLIENT OBTAINED BELOW TO AN AGREED SPECIFICATION. UNLESS OTHERWISE AGREED IN WRITING THE LIABILITY OF FIELD GEODATICS LTD IS LIMITED TO THE CLIENT OR HIS APPOINTED AGENT AND DOES NOT EXTEND TO USE BEYOND THE LIMITATIONS OF THE SPECIFICATION.									
Survey Station Information									
STATION	Building	Northon	Local	Time					
SN AL	501606365	171466104	3.01	North					
SN AL	501606366	171466105	4.23	North					
Notes	501606369	171472302	4.01	North					
Gold: Survey is based on a modified Ordnance Survey National Grid (OSGB36), also centered (or centered on SN AL where present) with a scale factor of 1 applied.									
Visions have been derived via GPS using the OS active network using the OSN415 transformation and OSN415 grid model.									
Lead Station: Ordnance Datum Newlyn (ODN)									
5	-	-	-	-					
4	-	-	-	-					
3	-	-	-	-					
2	-	-	-	-					
1	GR	First Complete Issue	-	-	25-04-2022				
0	Prelim	Preliminary - Not Complete	-	-					
Rev	QA	-	-	-					
Check	-	Description	-	-					
				Date					

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SCALE	1:200
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TOPOGRAPHICAL SURVEY

ADDRESS: RIVER EBSFLEET
NORTHFLEET
GRAVESEND
DA11 9GN





Photo 3



Photo 4



Photo 5



Photo 6

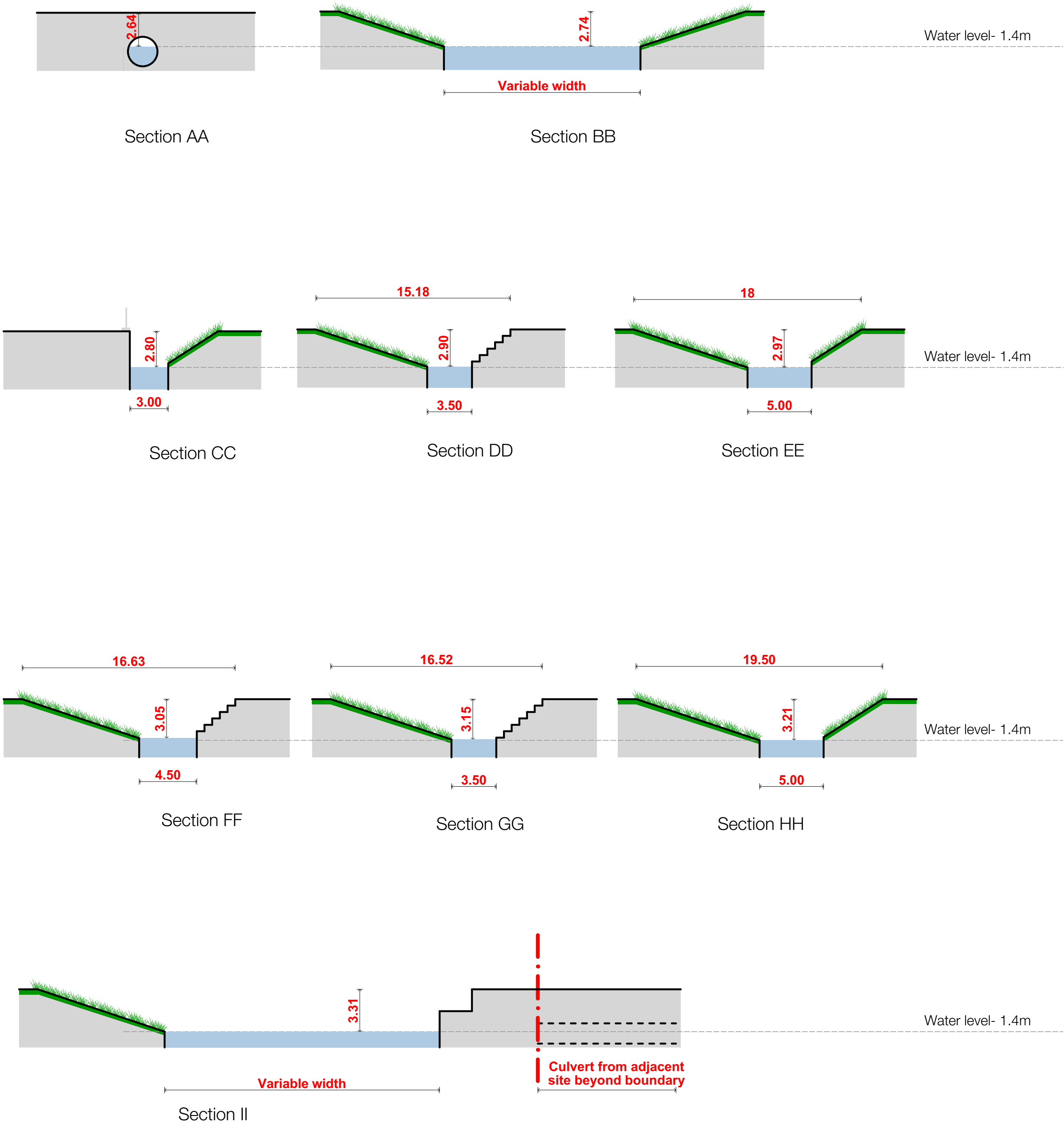


Photo 7



Photo 8

***Appendix D:
Proposed Daylighting Plans
(HLM Architects 2023)***



Day lighted river sections
@ every 25m distance

Revisions	Suitability
Project	

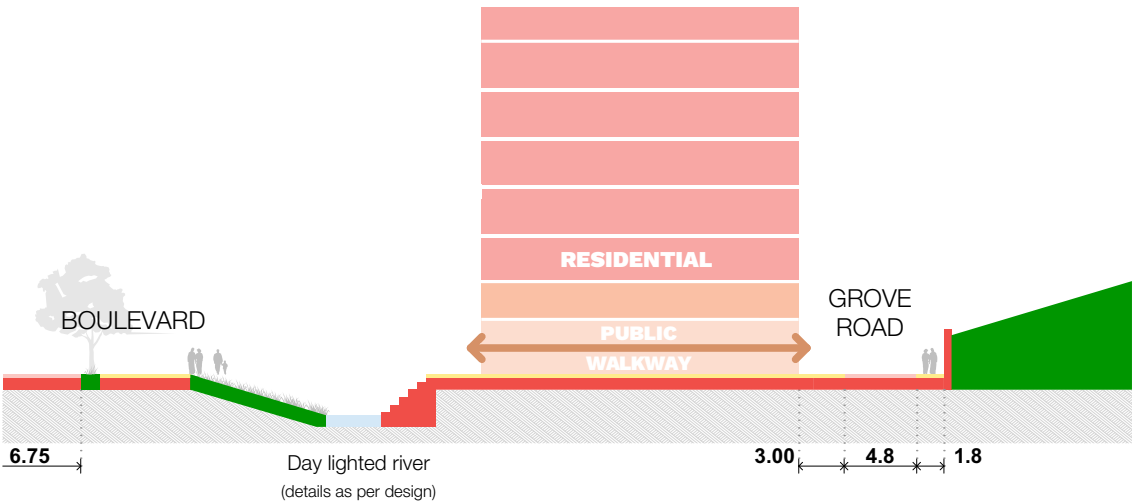
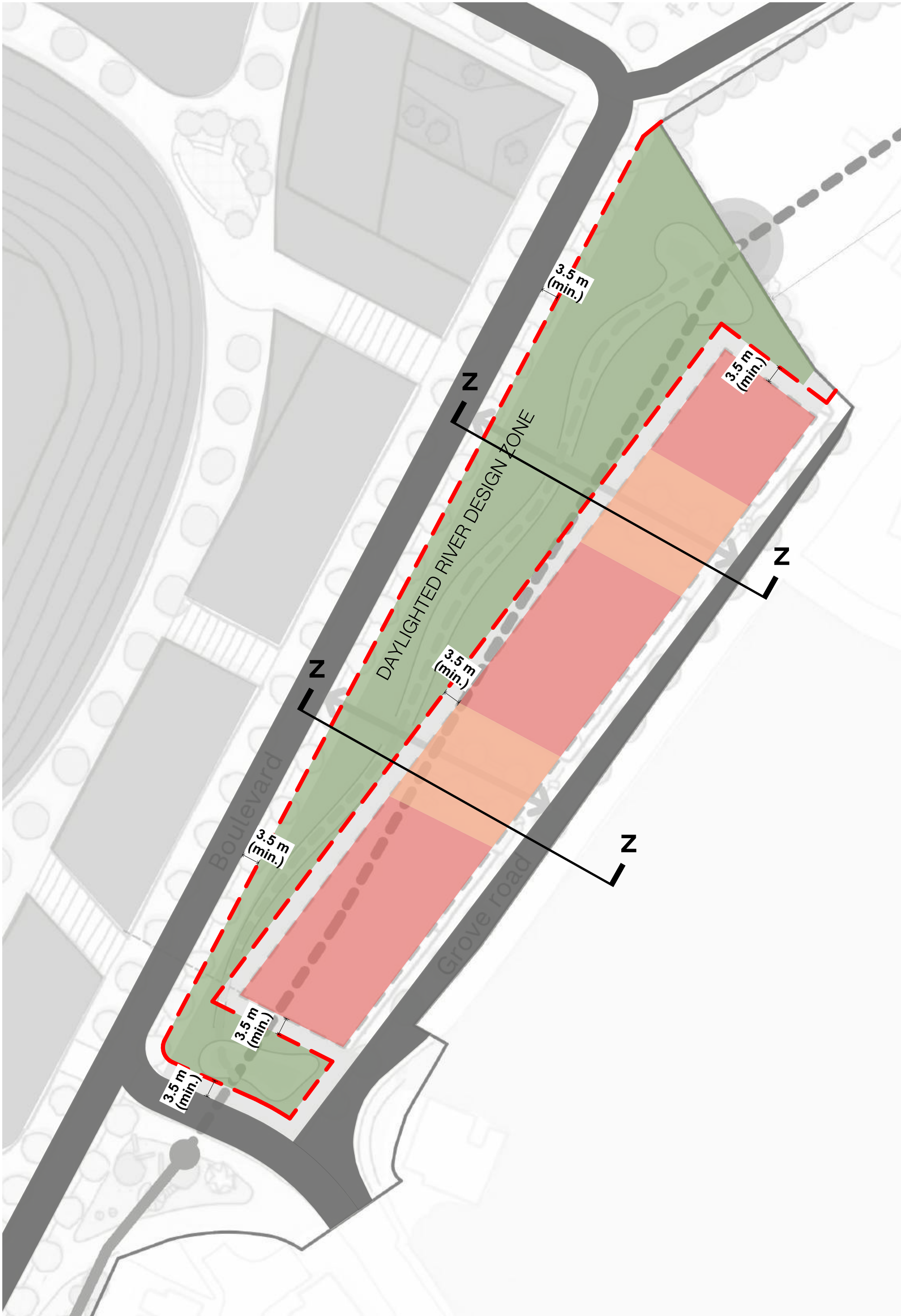
Northfleet Harbourside Gravesham

Title

Proposed River Daylighting Sections

Drawing No.	Revision
A.4	

Scale	Drawn
1:250 @A2	PC
Date	Checked
28.07.2023	JR



Typical Section ZZ @ 1:500

- Proposed daylighted river design zone
- Proposed built form
- Proposed built form with public walkway at ground level

Notes

Do not scale from this drawing
Report any discrepancies and omissions to
HLM Architects
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Revisions	Suitability
Project	

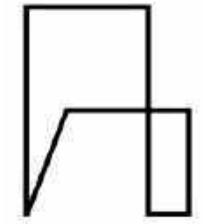
Northfleet
Harbourside
Gravesham

Title

Proposed
River Daylighting
Zone

Drawing No.	Revision
A.5	

Scale	Drawn
1:250 @A2	HLM
Date	Checked
23.08.2023	HLM



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