



Clifton Scannell Emerson
Associates

Lucan Village Public Realm

Riverside Promenade & Lucan Demesne Entrance Engineering Planning Report



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1 Introduction and Background

1.1 Background

South Dublin County Council (SDCC) have appointed dhbArchitects (DHB) to provide Technical Consultancy Services as project coordinators and design team lead for the planning process for the proposed Lucan Village Public Realm Scheme. As part of the design team, Clifton Scannell Emerson Associates (CSEA) have been commissioned to provide engineering (Civil & Structural) consultancy services.

This report has been prepared by CSEA to detail preliminary engineering proposals and assess the flood risk for the Riverside Promenade area and the Lucan Demesne Entrance area, part of the Lucan Village Public Realm Scheme.

The leading planning report has been prepared by DHB and it details several different aspects of the existing site conditions and the proposed scheme. With the intention not to include redundant information, this report will focus on the engineering aspects of the proposed scheme.

1.2 The Proposed Scheme

Figure 1.2.1 below show location of Riverside Promenade and Lucan Demesne Entrance project areas, part of the overall Lucan Village Public Realm Scheme.

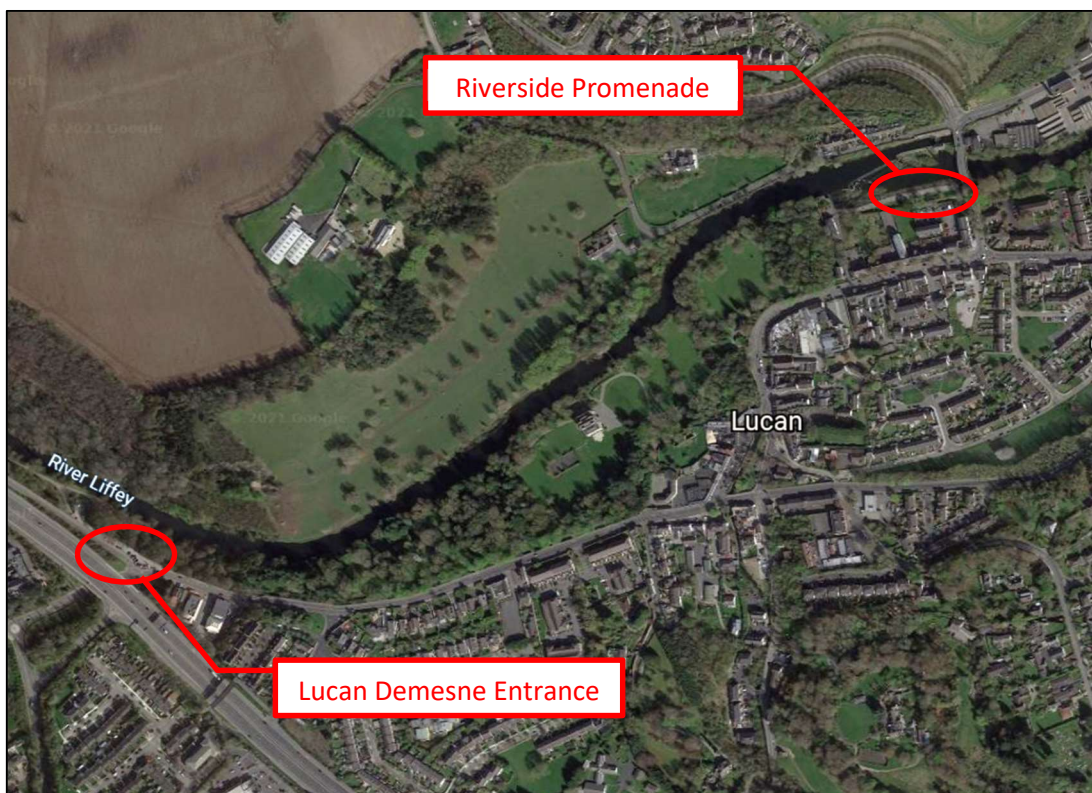


Figure 1.2.1 – Project Area Locations

This report will detail preliminary engineering proposals and assess the flood risk for the Riverside Promenade and Lucan Demesne Entrance

The overall intention of the proposed scheme is to upgrade the existing areas and transform them into a more usable, amenable, and safe space for pedestrian, cyclists, and drivers. Figure 1.2.2 and Figure 1.2.3 below displays the architects' proposed layout for the Riverside Promenade area and Lucan Demesne Entrance area, respectively. The final proposed layouts can be reviewed on **Appendix A**.

The final proposed layout for each area has been defined by DHB and has taken into consideration engineering advise provided by CSEA.

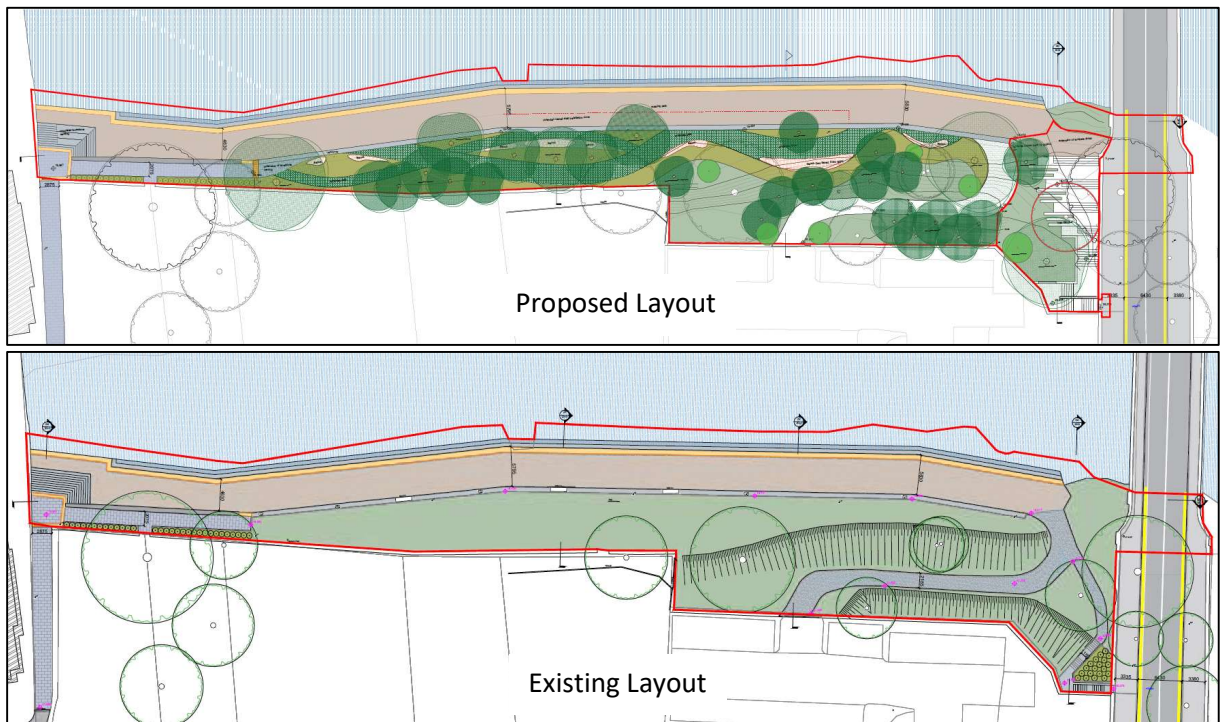


Figure 1.2.2 – Riverside Promenade - Existing and Proposed Layout

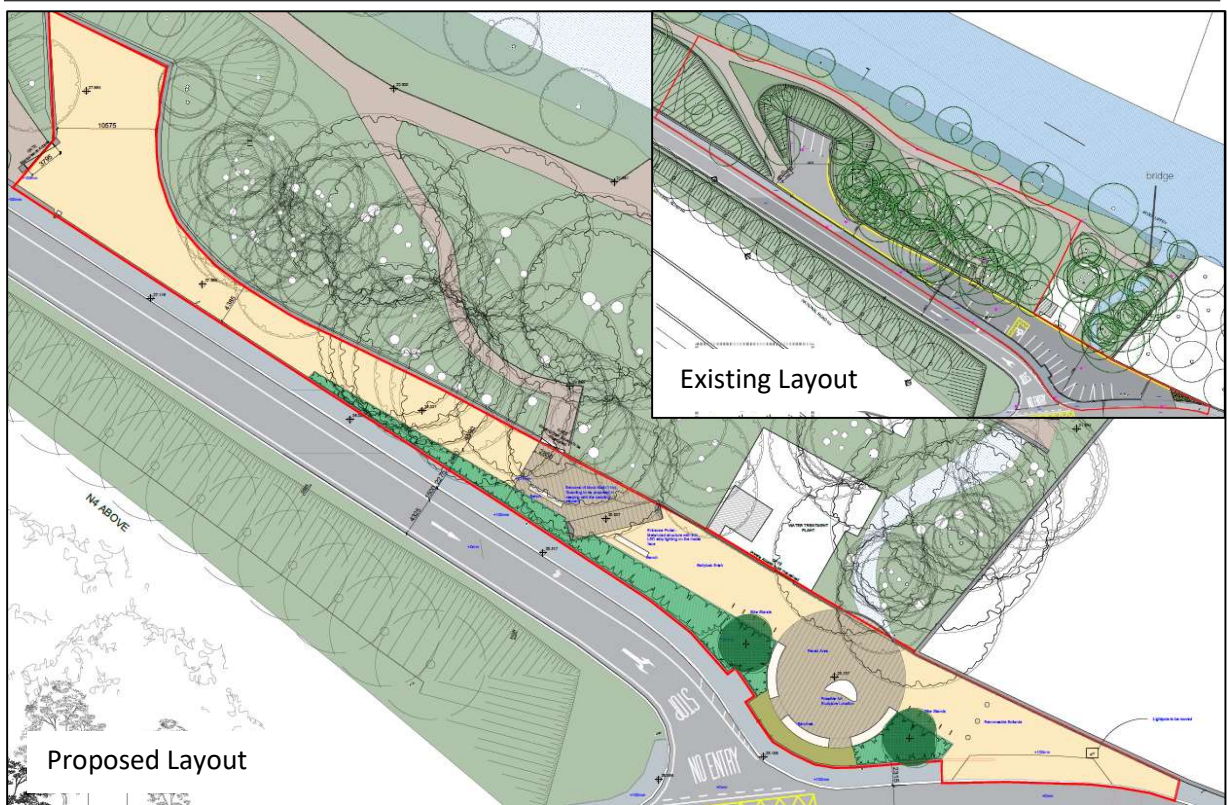


Figure 1.2.3 – Demesne Entrance - Existing and Proposed Layout

2 Preliminary Engineering Design

2.1 The Scheme

The proposals, as detailed by dhbArchitects, for the Village Green Project area comprises of the following:

Riverside Promenade

- The construction of a set of landscaped steps, retaining walls and railings from the current access point at bridge level to the end of the bridge wall at river level. The stairway is configured as a series of short flights with landings along its lower half followed by a longer flight and dogleg return for the upper half. Retaining walls and seating are clad in black limestone and the steps and landings are concrete with a resinbond finish (as per Part 8 drawing 01 by SDCC/2015).
- New concrete paving to the footpath ends and carriageway at the entrance to Watery Lane, and a new tree on its western side (as per Part 8 drawing 01 by SDCC/2015).
- Some modifications to the steps at the western end of the Promenade will be made to form a series of seats facing the weir. These seats will be finished in black marble, just like the seats along the steps
- at the Bridge end.
- The re-landscaping of the area between the existing promenade path and the southern boundary. All existing trees are being retained and approx. 25 no. new trees and shrubs are being planted along this edge. These are native deciduous varieties such as Elm, Birch and Alder, in keeping with existing and traditional species found in this Liffey Valley habitat.
- A number of natural stone benches are proposed along the edge of the Promenade, sitting on a reinforced grass finish having a backdrop of wildflower meadow.
- An adjustment of the arrival point of the access route beside the Promenade is proposed in order to allow the construction of the landscaped steps at their connection with the promenade path. Any connection between the bottom of these steps and the Promenade will be made using the same materials and finish as the Promenade path.
- One of the existing lighting poles is being moved a few metres to the east where it clashes with this redirected access path. It is proposed to add a series of service oint pop-ups along the southern edge of the Promenade path to enable to space to function as an open-air market, or for organized community events, performances etc.

Lucan Demesne Entrance

- Releveling of the landing/entrance area outside the pedestrian access gates to the Park to provide a continuous, consistent level across the works area (the level rises steadily from east to west). This landing area is to be paved in concrete pavements or similar.
- Construction and installation of a box-section painted steel portal to mark this pedestrian entrance from the eastern approaches.
- Construction of a circular paved area (diam. 17.5m approx.) at the widest point of the site (opposite N4 Underpass). A length of existing wall in plastered block which the circle intersects on the northern

- side is to be removed and replaced with a circular concrete wall and seat. A foundation is to be provided towards the centre of the circular area for a piece of public art (to be commissioned separately to this Part 8).
- Two lengths of existing wall, one of concrete block, at the circular paved area, the other in block with stone facing beside the existing pedestrian entrance are to be removed. Note the existing pedestrian entrance to the Park is being retained under these proposals.
- Fabrication and installation of a painted steel railing the same height as the existing demesne wall, from the circular paved area as far as the pedestrian entrance.
- The provision of masonry bench-seating to both paved areas.
- The provision of landscaping to the N4 boundary consisting of shrubs and hedges, a pair of deciduous trees and an area of wildflower meadow.
- The removal of existing tarmac surfacing and the resurfacing of the non-paved areas in a Ballylusk gravel or similar.
- The installation of 3 no. removable bollards at the eastern end of the site, the installation of a series of bicycle stands at this location too.

2.2 Proposed Road Cross Section, Levels and Slopes.

Riverside Promenade

The existing levels of the footpath along the river Liffey are intended to be retained with minimum variation that will accommodate the proposed slopes that will direct the rainfall runoff towards the river.

The existing landscape area will be upgraded, and the levels will be retained, where possible, with minimum variations.

A new set of steps that will link R109 (Bridge) to the promenade is proposed to replace the current steps in place. The proposed finish levels for this step and for the adjacent area that includes a small roadway for maintenance vehicular access will be detailed during detail design stage.

Lucan Demesne Park Entrance

The existing area will be upgraded and resurfaced, and the finish surface levels will be detailed at detail design stage where the aim will be to retain the existing levels and surface slopes where possible and/or have minimum variation in level.

2.3 Surface Water Drainage

It is the schemes' objective to introduce additional surface water drainage elements, such as drainage channels and road gullies to accommodate and cater for all runoff generated by the revised surface slopes and levels.

The new surface water drainage elements will be connected to existing surface water drainage system on the site.

During detail design stage the existing surface water system will be investigated to determine if it requires cleaning and/or unclogging. The existing discharging points will be investigated and if

necessary, a petrol interceptor will be installed immediately upstream to discharging points within the existing surface water drainage system.

As the proposal for both areas (Riverside Promenade & Lucan Demesne Entrance) does not include additional impermeable areas, is envisaged that the scheme will not require attenuation system.

All the above is designed in parallel and in accordance with the Greater Dublin Strategic Drainage Study (GDSDS), the 2010 Building Regulation - Technical Guidance Document H, the SuDS Manual, the TII Design of 'earthworks drainage, network drainage, attenuation and pollution control' DN-DNG-03066 and all other relevant drainage standards and guidance documents available at the time of design.

2.4 Foul Water Drainage

According to Irish Water's (IW) existing service records, there are underground foul water lines that near the site. Its exact location and depth are unknown and will be investigated during detail design stage.

It is envisaged that existing chamber covers, and frame will be removed and reinstalled at new finished level. However, the proposed scheme will not affect the existing underground Foul Water Drainage System and will not require any upgrade works under the scheme's proposed scope of works.

2.5 Water Main

According to Irish Water's (IW) existing service records, there are underground watermain that near the site. Its exact location and depth are unknown and will be investigated during detail design stage.

It is envisaged that existing chamber covers, and frame will be removed and reinstalled at new finished level. However, the scheme will not disturb the existing underground water main system and will not require the introduction of any new or additional watermain infrastructure.

2.6 Gas

According to Gas Networks existing service records, there are underground gas main located near the sites. Its exact location and depth are unknown and will be investigated during detail design stage.

The scheme will not disturb the existing underground gas system and will not introduce any additional gas distribution mains under the scheme's proposed scope of works.

3 Flood Risk Assessment

The Catchment-based Flood Risk Assessment and Management (CFRAM) program has been implemented by the Office of Public Works (OPW) as a competent authority in Ireland for the EU floods directive. Over 29 Flood Risk Management Plans (FRMPs) have been prepared in coordination with the implementation of the Water Framework Directive (WFD). The FRMPs involved undertaking detailed engineering assessments and producing flood protection measures. The assessments addressed the potential impact of the proposed measures on waterbodies, hydromorphology and quality status.

The purpose of The Planning System and Flood Risk Management Guidelines for Planning Authorities published by the OPW in 2009 (OPW Guidelines) is to introduce comprehensive mechanisms for the incorporation of flood risk identification, assessment, and management into the planning process.

For carrying out a Site-specific Flood Risk Assessment (SSFRA), the OPW Guidelines recommend using the Source-Path-Receptor concept model to identify where the flood originates from, the floodwaters path, and the areas in which assets and people might be affected by such flooding (section 2.18 of the OPW Guidelines, 2009). Figure 3.1 below displays a schematic representation of S-P-R model.

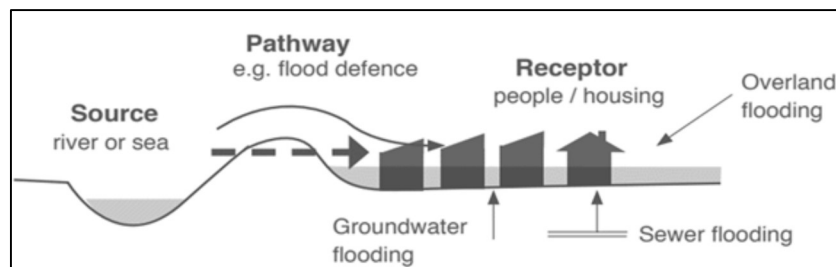


Figure 3.1 – Source-Path-Receptor Model

The other key concept in flood management is the “Flood Risk”, which is “the combination of the likelihood of flooding and the potential consequences arising”. Consideration of flood risk must be addressed in terms of:

- The likelihood of flooding, expressed as percentage probability or exceedance each year;
- The consequences of flooding as the associated hazard e.g. flood depth and velocity.

Flood risk is then expressed with the relationship:

$$\text{Flood Risk} = \text{Likelihood of flooding} \times \text{Consequences of flooding.}$$

3.1 Flood Zones

The Flood Zone is the spatial inundation area that falls within a range of likelihood of flooding. The OPW Guidelines specify three levels of flood zones:

- Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% Annual Exceedance Probability (AEP) for river flooding and 0.5% AEP for coastal flooding);
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% and 1% AEP for river flooding and between 0.1% and 0.5% AEP for coastal flooding);
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% AEP for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in Zones A or B.

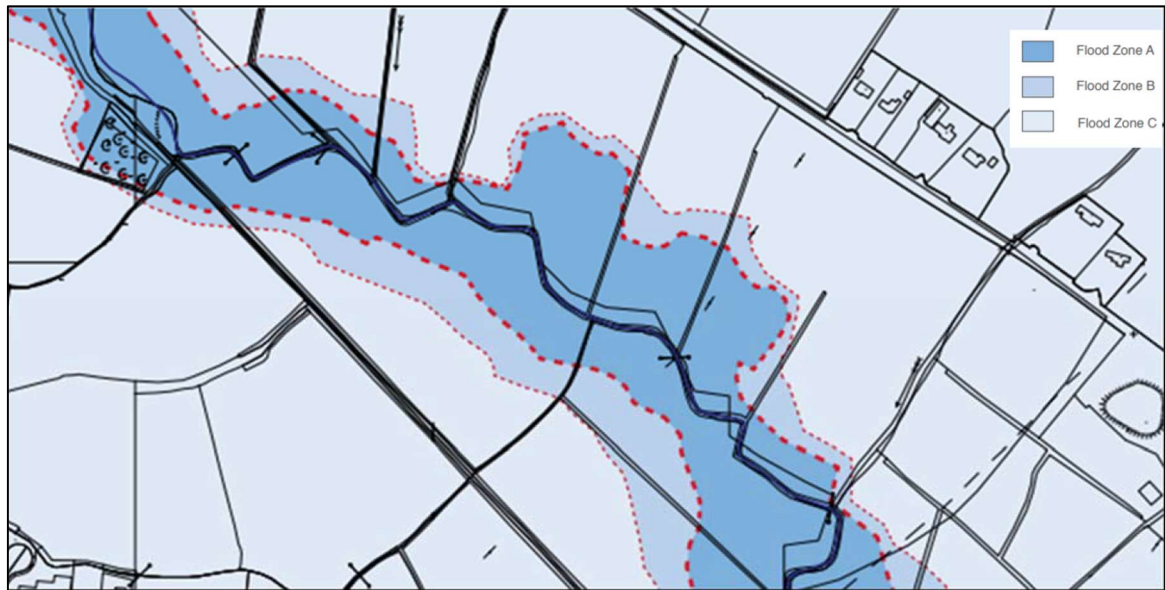


Figure 3.1.1 – Example of the three flood risk zones along typical water body.

3.2 Stage 1 - Flood Risk Identification

A stage 1 flood risk identifications was undertaken to determine if a flood risk exists for the three project areas, and if so to determine the extent of the risk.

The following documents and sources were reviewed in order to identify the flood risk for the three project areas:

- Environmental Protection Agency (EPA) Maps
- OPW Flood Risk Maps
- Historical Flood Records

3.2.1 Environmental Protection Agency (EPA) Maps

EPA maps are available at '<https://gis.epa.ie/EPAMaps/>' and show existing water features such as rivers, streams through the subject site which would contribute to flooding. The maps also identify the flow network and the direction of flow of the water features. Figure 3 below is an extract from the webmap available at the EPA website.



Figure 3.2.1.1 – Water features from EPA Maps.

3.2.2 OPW Flood Risk Maps

The images presented below are extracts from the final flood risk maps published by the Office of Public Works (OPW) and can also be found at 'www.floodinfo.ie'. The maps identify the estimated extent of a flood event and the areas that are at risk. The maps identify the areas that are prone to flood, and it indicates the percentage probability of occurring in any one year.

Figure 3.2.2.1 identify that the Liffey River that runs in close proximity with the proposed areas of the scheme poses a flood risk for the Riverside Promenade project area.

The Lucan Demesne Entrance is included within Zone C of the flood risks zones and therefore does not present risk of flooding.

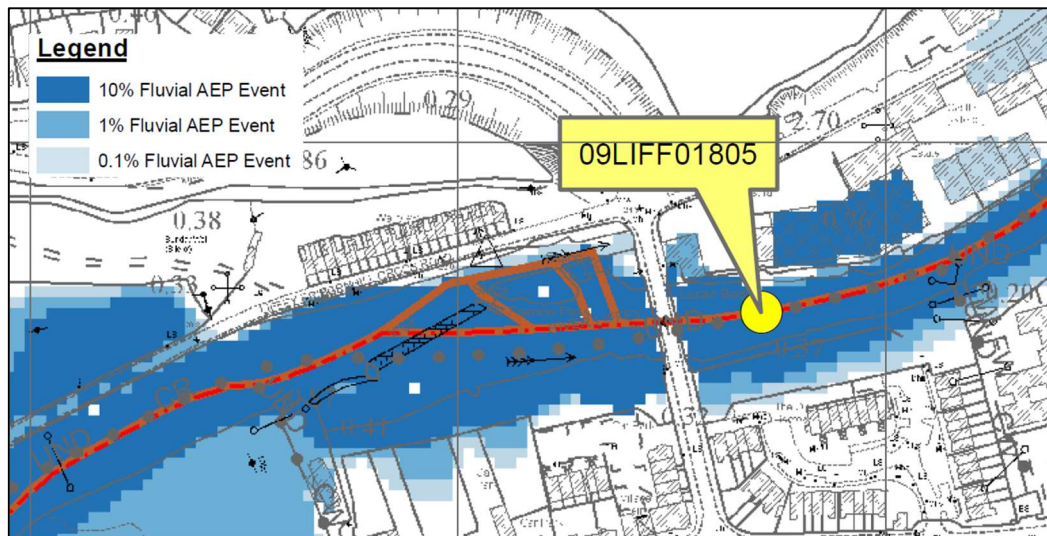


Figure 3.2.2.1 – Riverside Promenade Flood Risk Mapping

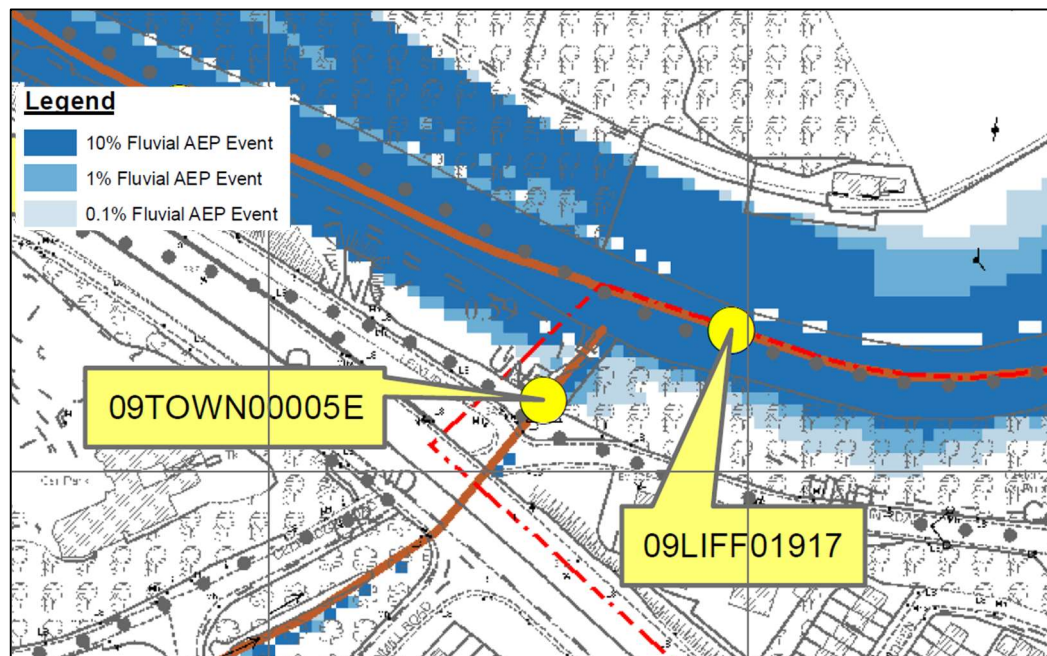


Figure 3.2.2.2 – Lucan Demesne Park Entrance Flood Risk Mapping

3.2.3 Historical Flood Records

Past flood event records can also be found at the OPW’s flood information website (www.floodinfo.ie). The records show that the Riverside Promenade have a history of flooding. The images below are extracts from the records and reports produced by the website and show the past flood events and the past flood extent.

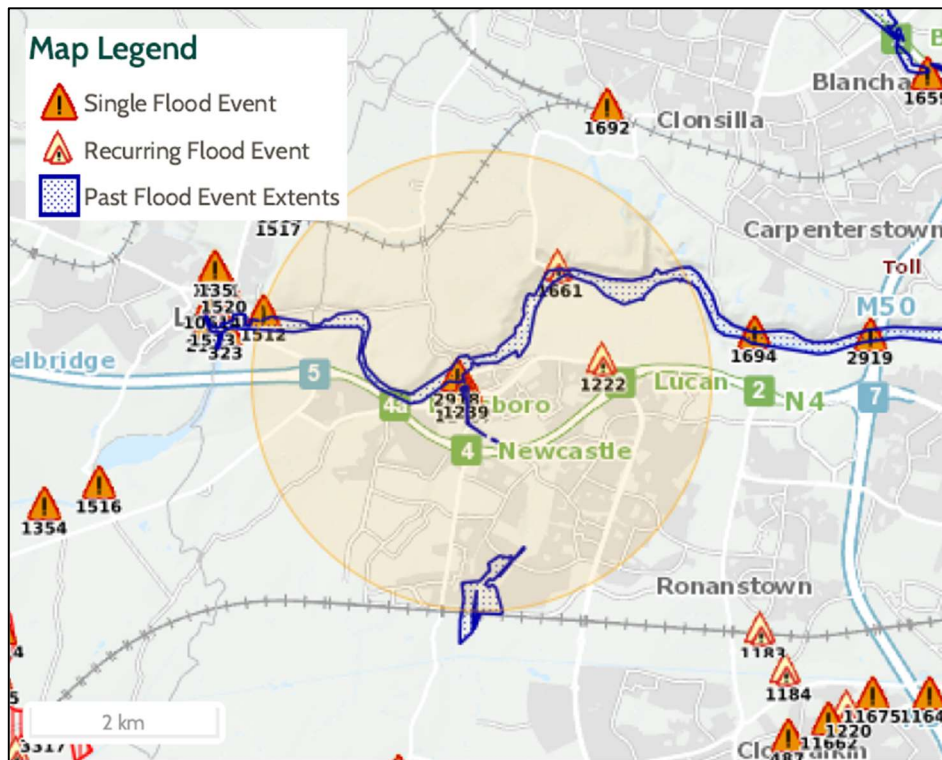


Figure 3.2.3.1 – Past Flood Events Overall Map for Lucan Area



Figure 3.2.3.2 – Riverside Promenade Flood Event from 30/01/2021

3.2.4 Past Flood risk Management Measures

Data and studies were collected from the “Flood Risk Management Plan - 2018” (FRMP) published by The Office of Public Works (OPW), The “Catchment Flood Risk Assessment and Management Study” (CFRAMS) carried out in 2015 by the Water, Environment and Climate Change Department within South Dublin County Council (SDCC) and the ‘Strategic Flood Risk Assessment (SFRA) for South Dublin County Council Development Plan 2016-2022’.

The three documents mentioned above summarises the existing flood risk management measures that were carried out on the Griffeen River corridor (Village Green area), which includes the following:

- The lowering of the river’s bedrock in Lucan Village,
- the repointing and raising height of masonry pillars and wall in Main Street in Lucan,
- the installation of gabion protection along the river bank at Lucan Pitch and Putt Club,
- the construction of 2 no. offline storm water retention ponds in Griffeen Park.
- The lowering of the horseshoe weir at Vesey Bridge,
- New culverts under Hayden’s Lane, the railway and Griffeen Avenue.

It should be noted that all flood risk management measures described above were carried out considering the 1% Annual Exceedance Probability (AEP) flood event.

Source-Path-Receptor Model

A Source-Pathway-Receptor (SPR) model, as detailed on table 1 below, has been produced to assess the possible sources of floodwater, the pathways by which flood water reaches receptors, and the receptors that could be affected by potential flooding. The SPR below assess the two areas subject of this report.

Flooding Type	Source	Path	Receptor	Likelihood	Impact	Risk
Tidal	Dublin Bay	Liffey River	People and Property, infrastructure	Possible	High	Very Low
Fluvial	Liffey River / Griffeen River	Roads / Footpaths	People and Property, infrastructure.	Possible	High	High
Pluvial / Surface Water	Flooding from surcharge of existing surface water drainage system	Roads / Footpaths	People and Property, infrastructure.	Possible	Moderate	Moderate
Ground Water	Rising GWL on the site. TBC	Buildings/ Open space	People and Property.	Possible	Low	Very Low

Table 3.2.4.1 – SPR Model

3.2.5 Preliminary Flood Risk Assessment

Section 7 of the FRMP - 2018 sets out the strategy for the sustainable, long-term management of flood risk. The strategy comprises of potential measures that could be brought forward and proposed as part of the project. For the subject area, the plan indicates, under section 7.4.8, a series of hard defences (flood embankments and walls) as being the preferred flood risk management measures to be further developed. However, the FRMP also identify the potential negative ecological and environmental impacts associated with the proposed measures and it indicate that future assessments should be carried out.

The SDCC's internal CFRAM Study describes a series of recommendations based on the previous Part 8 proposal. These recommendations have been interpreted, summarised and amended to suit the current conditions and intentions (subject to alteration) of the project and they are as follow:

- Any proposed footbridge over canalised section of the Griffeen River within the Lucan Village Park to be raised in level to the top level of the existing flood defence masonry wall to avoid compromising the existing flood defence wall.
- Any permanent partial removal of the existing defence wall should be avoided. Therefore, any proposed railed viewing panel must be replaced by a non-hollow material and could be comprise of a structural glazed unit incorporated into the existing masonry flood defence wall.

Upon reviewing of the current flood maps and studies, all three areas of the project presented flood risks, with the Village Green and the Promenade area being the two areas with a higher flood risk.

All three areas will be further reviewed and assessed considering the recommendations from the OPW's FRMP and parallel studies, such as the Eastern CFRAMS by OPW. In addition, consultations with OPW and SDCC were arranged to discuss the intended works related to the flood risk management plan and the proposed part 8 works for Lucan Village.

3.2.6 OPW Consultation

CSEA arranged a meeting with the Flood Relief and Risk Management Division within the Office of Public Works (OPW) to present and discuss how the proposed Lucan Village Public Realm scheme will manage the flood risk within the areas of the proposed project.

The meeting occurred online via Microsoft Teams on the 14th of September 2021. The proposed scheme was presented, and the design team noted to be cognizance of the outputs and recommendations of the OPW's Flood Risk Management plans for the Lucan to Chapelizod corridor.

Were present at the meeting, from the OPW, Francis Kenna and Mark Hayes. The conclusions and recommendations from OPW were generic and indicated that further consultation with the OPW will be required once the project progresses to detail design stage.

3.3 Stage 2 - Flood Risk Assessment

3.3.1 Tidal Flood Risk

As noted on Table 3.2.4.1 the existing Tidal Flood Risk is considered to be very low. The existing nearest areas prone to Tidal Flood is located east of the Lucan Village at approximately 9.0km as show on Figure 3.3.1.1 below. Therefore, the Lucan Village area is considered to have no Tidal Flood Risk.

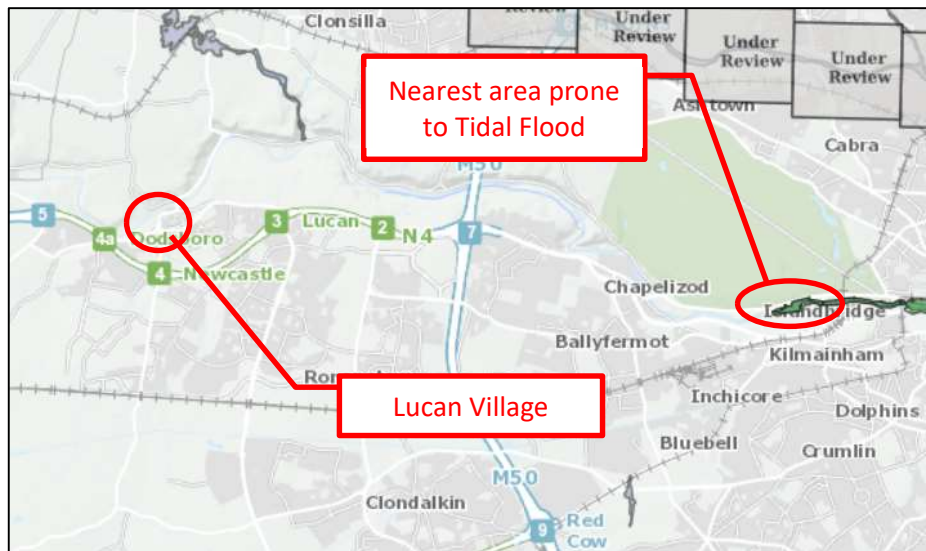


Figure 3.3.1.1 – Tidal Flood Risk

3.3.2 Fluvial Flood Risk

According to the Figure 3.2.2.2 (Lucan Demesne Park Entrance Flood Risk Mapping), the Lucan Demesne Park entrance area, subjected to the proposed scheme, is not prone to flood according to the OPW's flood risk maps.

As noted on 3.2.2, the Riverside Promenade area presents flood risks with the area being included within zone a of the flood risk zones.

3.3.3 Pluvial Flooding from Surface Water Drainage

The Source-Pathway-Receptor model presented in Stage 1 of the flood risk assessment indicated the likelihood of Fluvial and Pluvial flooding types within the site. The SPR model indicates that the likelihood of pluvial flooding from surface water is moderated because of the uncertainty of the conditions of the existing surface water drainage system within the three projects sites.

Based on the historical flood records for the three project areas, it is assumed that the existing surface water drainage system has capacity to cater for critical rainfalls. In order to confirm the conditions of the existing surface water drainage system, during detail design stage, the existing network will be investigated and if deemed necessary remedial works will be proposed.

3.3.4 Ground Water Flooding

Groundwater flooding occurs when storage in the underground aquifer is full and rainfall (recharge) cannot discharge quick enough, causing the water table to rise above the ground surface. According to the Geological Survey of Ireland (GSI), groundwater flooding in Ireland occurs mainly on the limestone lowlands to the west of the Shannon.

According to the OPW's flood risk maps, the Lucan Village area has no risk of Ground Water Flooding.

3.3.5 Increasing flood risk downstream

The proposed scheme is expected to have zero increase on the flood risk, as well as on the current flow of the existing drainage system. As the proposed scheme intends to reduce the impermeable area by introducing landscape and grassed areas and permeable surfaces, the post-development runoff volumes are envisaged to be lower than the current ones

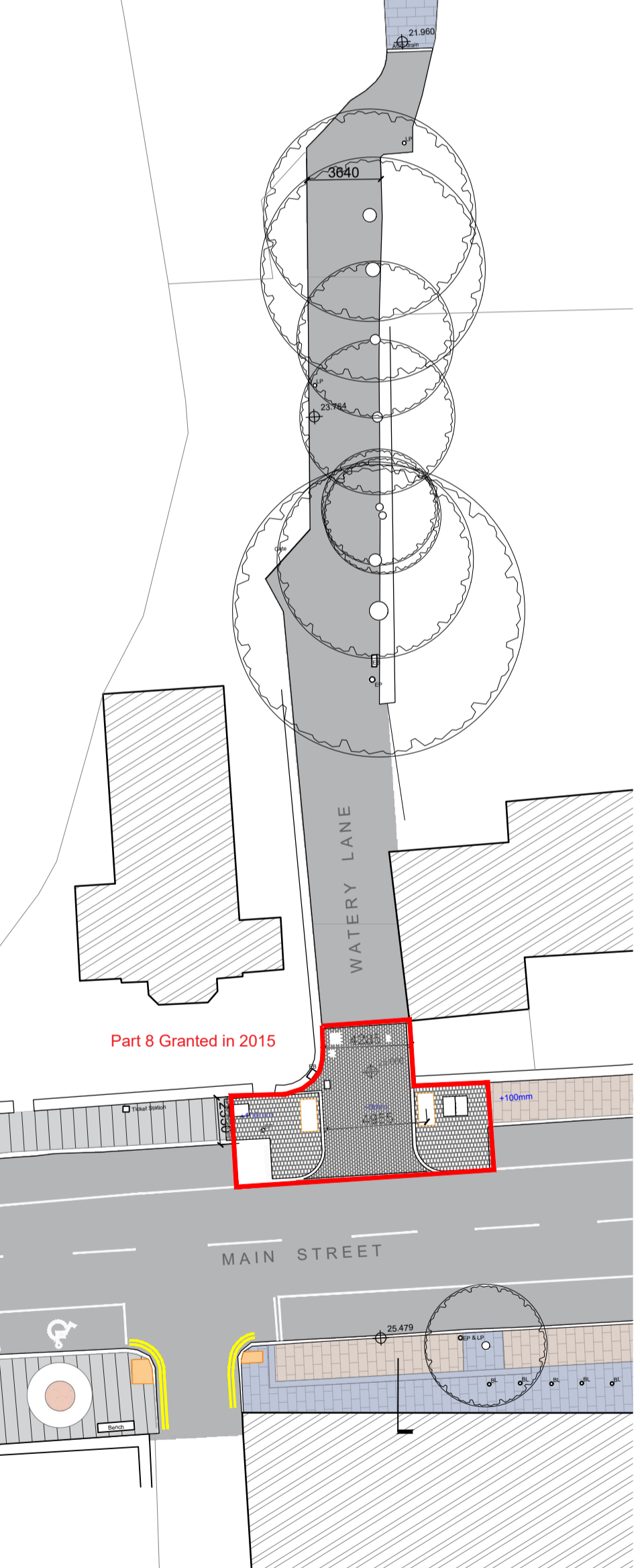
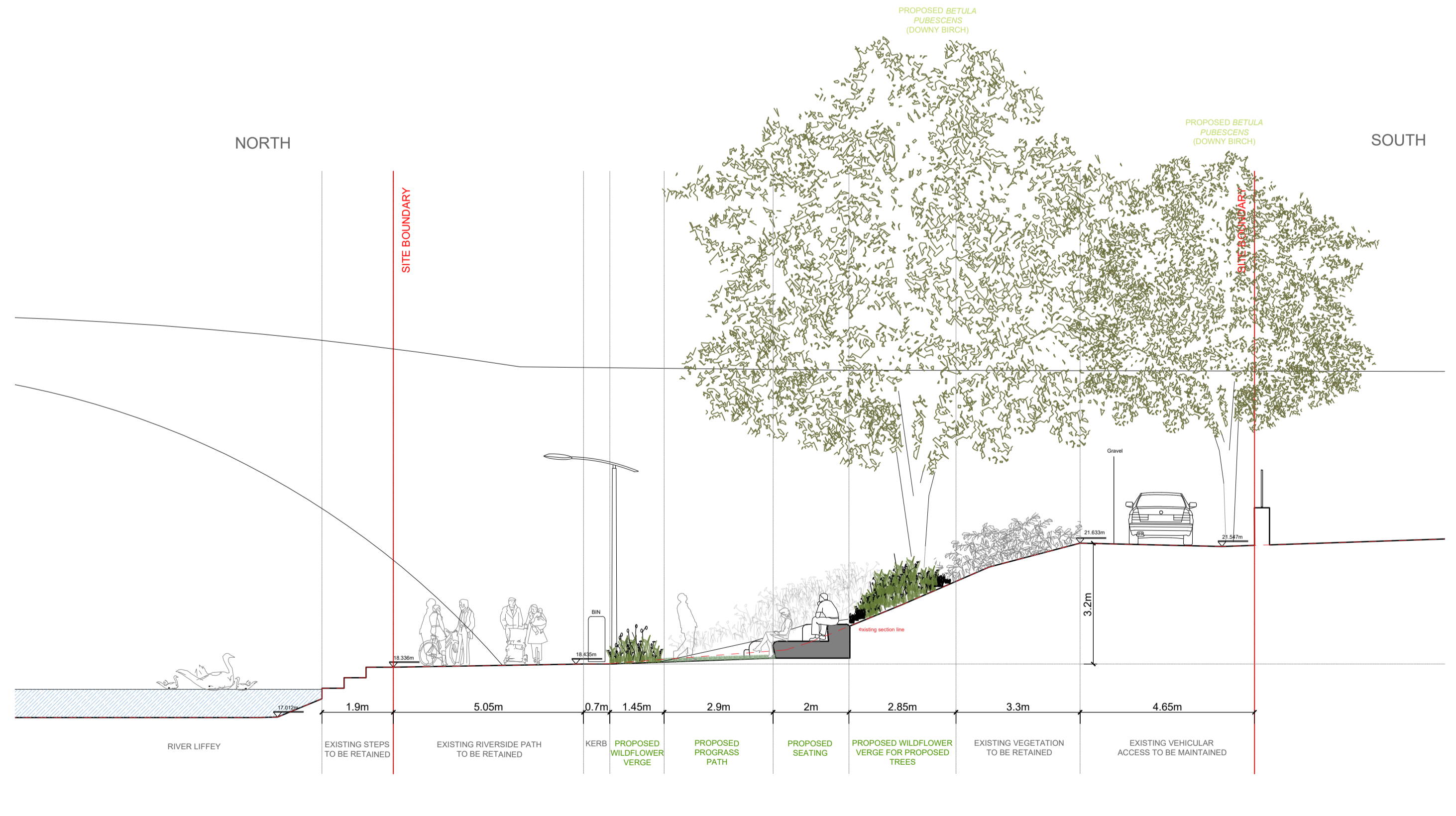
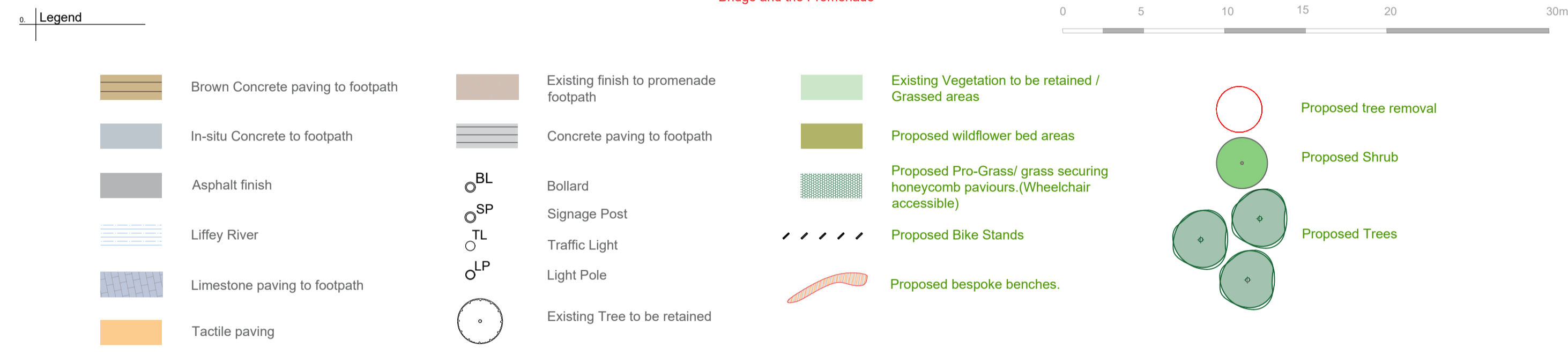
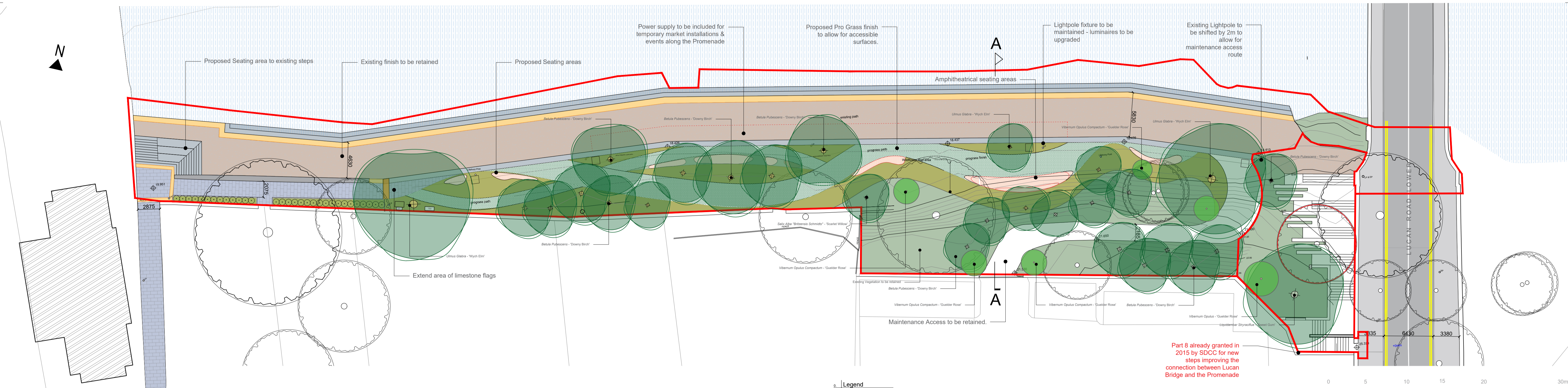
Therefore, post-development runoff volume will not contribute to increasing flood risk downstream.

3.4 Conclusion and Recommendations

This flood risk assessment has identified the areas of flood risk as well as assessed if the proposed scheme will contribute to increase the flood risk within these areas. The preliminary design of the scheme has taken into consideration recommendations made by CSEA, the Flood Risk Management Plan (FRMP) and parallel studies, such as the Eastern CFRAMS by OPW, and has aimed to not increase the flood risk.

In conclusion, the subject areas are in fact at risk of flooding, as detailed on section 3.2, and the existing flood risk for the theses areas will not be negatively impacted by the proposed scheme.

Appendix A – Overall Architectural Layout

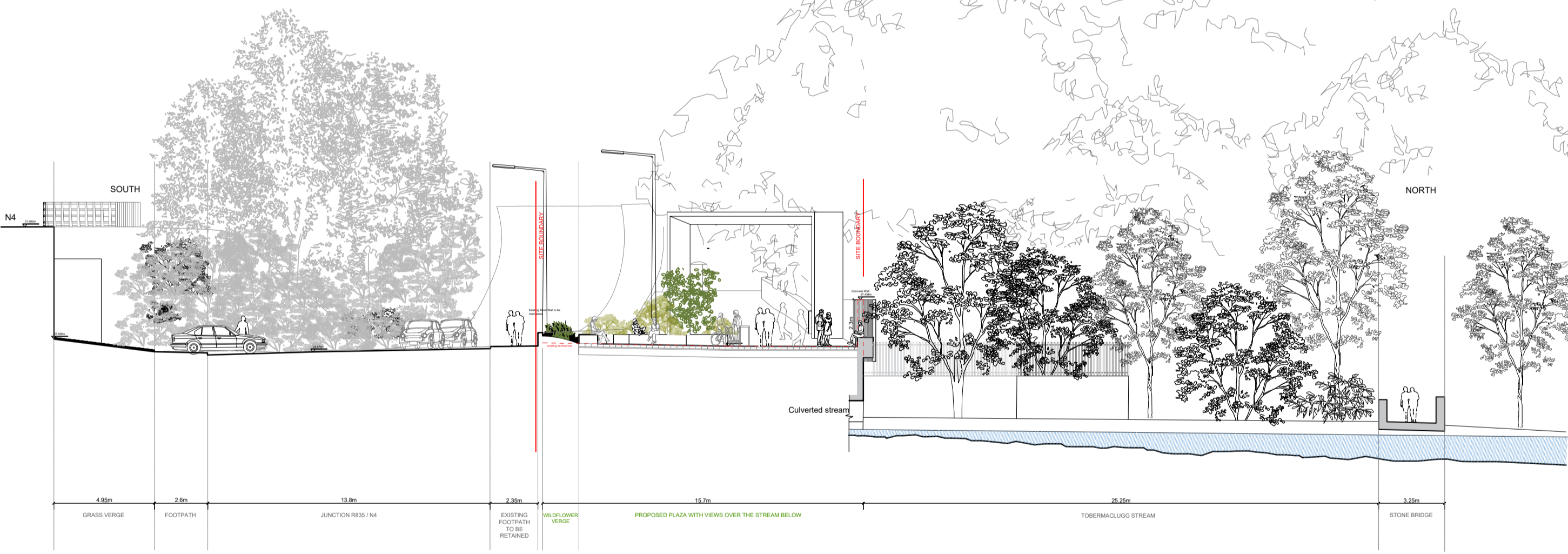




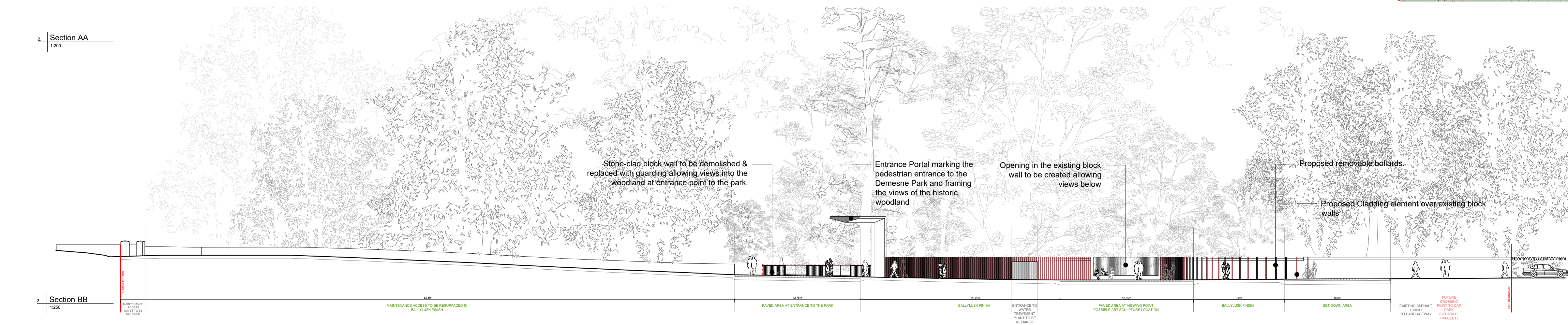
1 View of park entrance looking west



1 Proposed Site Plan 1:200

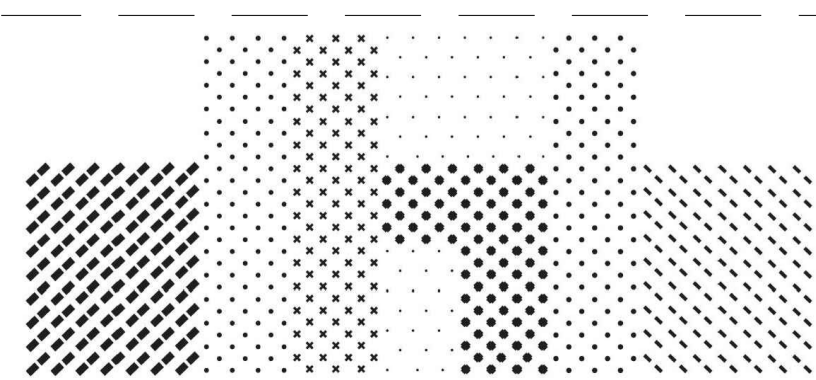
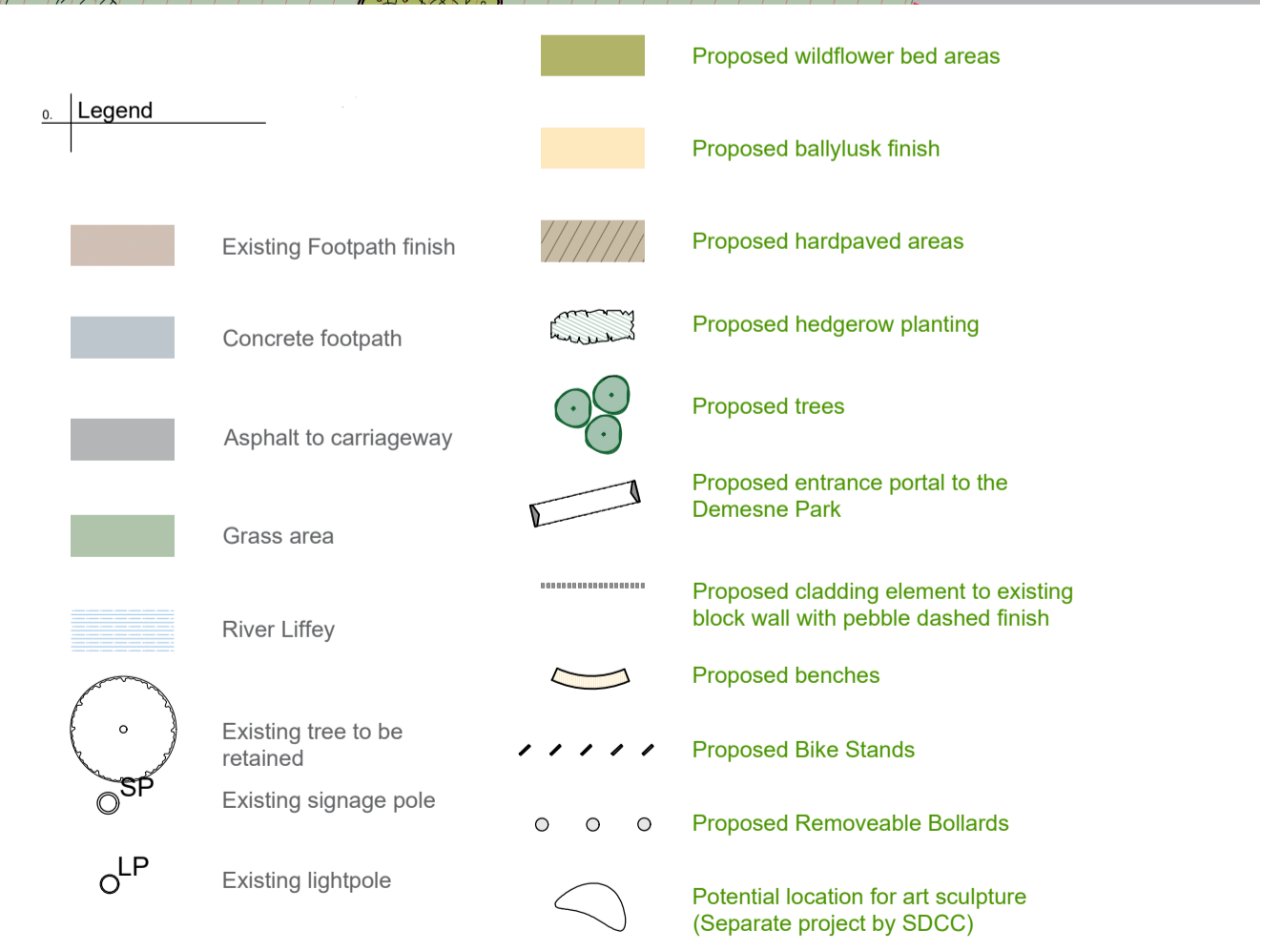


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Legend



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dhbarchitects
St. Catherine's Hall
Catherine Street
Waterford City
X91 RX99, Ireland.
+353 (0)51 858121
info@dhbarchitects.ie
www.dhbarchitects.ie



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Clifton Scannell Emerson Associates Limited, Civil & Structural Consulting Engineers

Mentec House, Bakers Point, Pottery Road, Dun Laoghaire, Co Dublin,

T. +353 1 288 5006 F. +353 1 283 3466 E. info@csea.ie W. www.csea.ie

