Site Specific Flood Risk Assessment

Cobh Shantyman Scheme

SWECO

Change list

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Executive Summary

Sweco have been commissioned by Cork County Council to undertake a site-specific flood risk assessment for the Shantyman Sculpture Scheme at Five foot Way Carpark, Cobh, Co. Cork. The latest policy and guidance on flood risk and objectives outlined by CCC in their Development Plan 2022 and associated documents were examined in relation to the consideration for this proposed new amenity development in Cobh. A site-specific flood risk assessment is required to be submitted to support the Part 8 planning, to demonstrate that flood risk can be reduced to an acceptable level.

A site-specific flood risk assessment has been carried out for the Shantyman Sculpture Scheme in Cobh. The scheme is within a Flood Zone A and B area. It is an amenity development which is classified as a water compatible development in accordance with the flood risk management guidelines. A justification test is not required and the development is considered appropriate within these flood zones. A commensurate flood risk assessment is however required, to examine all sources of flood risk and the requirements of any new development must be examined in accordance with objective WM 11-15 of the Cork CDP 2022. Flood risk to and from the scheme was examined. The site is within a tidal flood risk area and all aspects of flood resilience for the design of the scheme were considered appropriate. A 400 mm diameter foul rising main, which is part of the Cork Lower Harbour Drainage Scheme passes under the scheme extent. Consultation will be undertaken with Cork County Council Drainage Department and Irish Water to determine the preferred protection for the pipeline during excavations for construction of the scheme in proximity to the pipeline. Construction methods will avoid contact with the pipeline to ensure that there will be no impact to the integrity of the pipeline. This will avoid flood risk from this potentially polluting source or escape of gases and avoid disruption to this service. Planted areas will be contained around the pipeline trench to avoid rainwater or saltwater entering the pipeline trench and to protect against root damage to the pipeline The foul pipe will still have a protective cover of 1.24 m between the crown of the pipe and the underside of the finished pavement level of the proposed scheme. This area will not be subject to vehicular traffic or excess loadings. The pipeline will remain fully accessible after the scheme is constructed. Testing of the pipeline before and after construction is recommended between the nearest access chambers. All other sources of flooding were examined including a drainage impact assessment and it was considered that the objectives of WM 11-15 of the Cork CDP 2022 were met or improved.

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1 Introduction

Sweco have been commissioned by Cork County Council to undertake a Site Specific Flood Risk Assessment (SSFRA) to support their Part 8 Planning Submission for the Shantyman Sculpture Scheme in Cobh, Co. Cork.

This report describes:

- Existing Mapping and Surveys;
- Existing Hydrological Environment;
- Existing Hydrogeology and Geology;
- Existing Protected Areas;
- Review of Part 8 planning design of Cobh Shantyman Scheme for proposed sculpture, raingarden, seating area and associated features;
- Review of the proposed development in accordance with zoning and policy from Cork County Development Plan (CDP) 2022, in particular: Volume One (CDP Objective WM11-15) and Volume Four (South Cork – Cobh) and Strategic Flood Risk Assessment (SFRA) for the CDP;
- Provision of Source Pathway Receptor (S-P-R) model;
- Identification of at site flood risk;
- Recommendations for mitigation of flood risk
- Proposed Sustainable Drainage Systems (SuDS); and
- Conclusion on Flood Risk.

1.1 Site Location

The site for the proposed development includes an area of approximately 125 sq.m. and is located adjacent to Cork Harbour in the Five Foot Way Carpark, Cobh, Co. Cork. The site lies approximately 300 m west of the Cobh Railway Station and Heritage Centre and 70m south-west of the Cobh Garda Station. See site location in figure below.

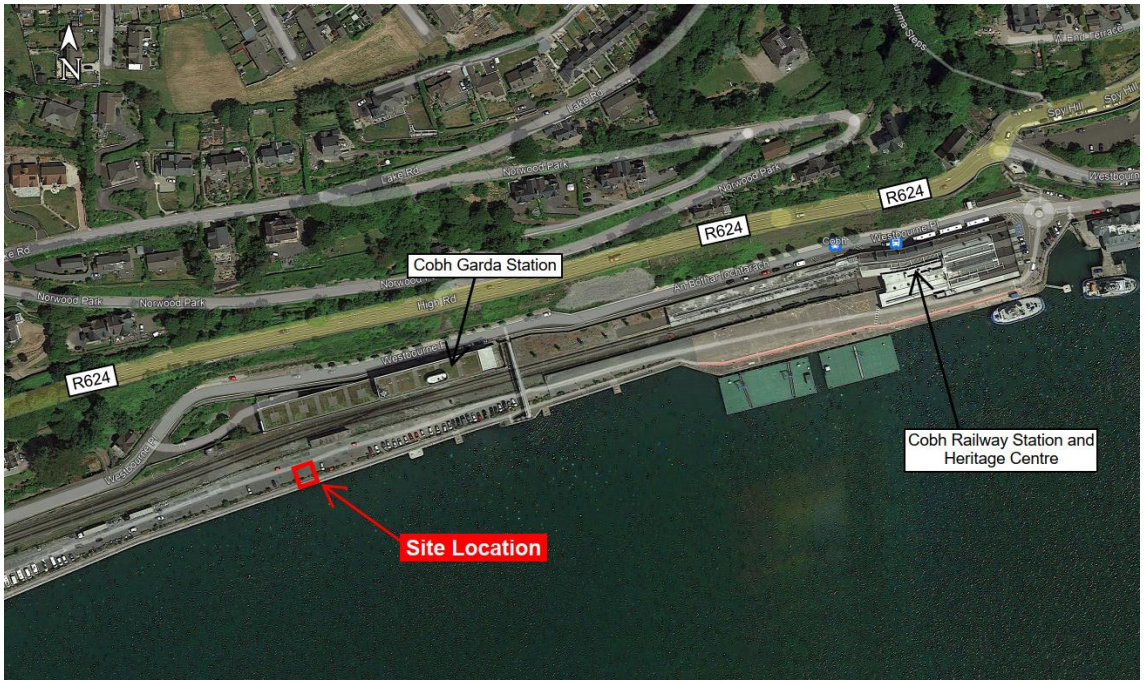


Figure 1.1: Site Location

1.2 Proposed Development

The layout of the proposed development was provided for information by Cork County Council and consists of an amenity development including the following:

- Shantyman Sculpture;
- Seating area;
- Universally accessible ramp;
- Rainwater garden (SuDS) with up to 6 No. trees and
- Associated strip lighting and audio feature.

The scheme extent measures approximately 125 sq.m.. The proposal results in the loss of 4 no. carparking spaces. The proposal is contiguous with the existing walkway to the south.

Figure 1.2 illustrates this layout, refer to **Appendix A** for further details.

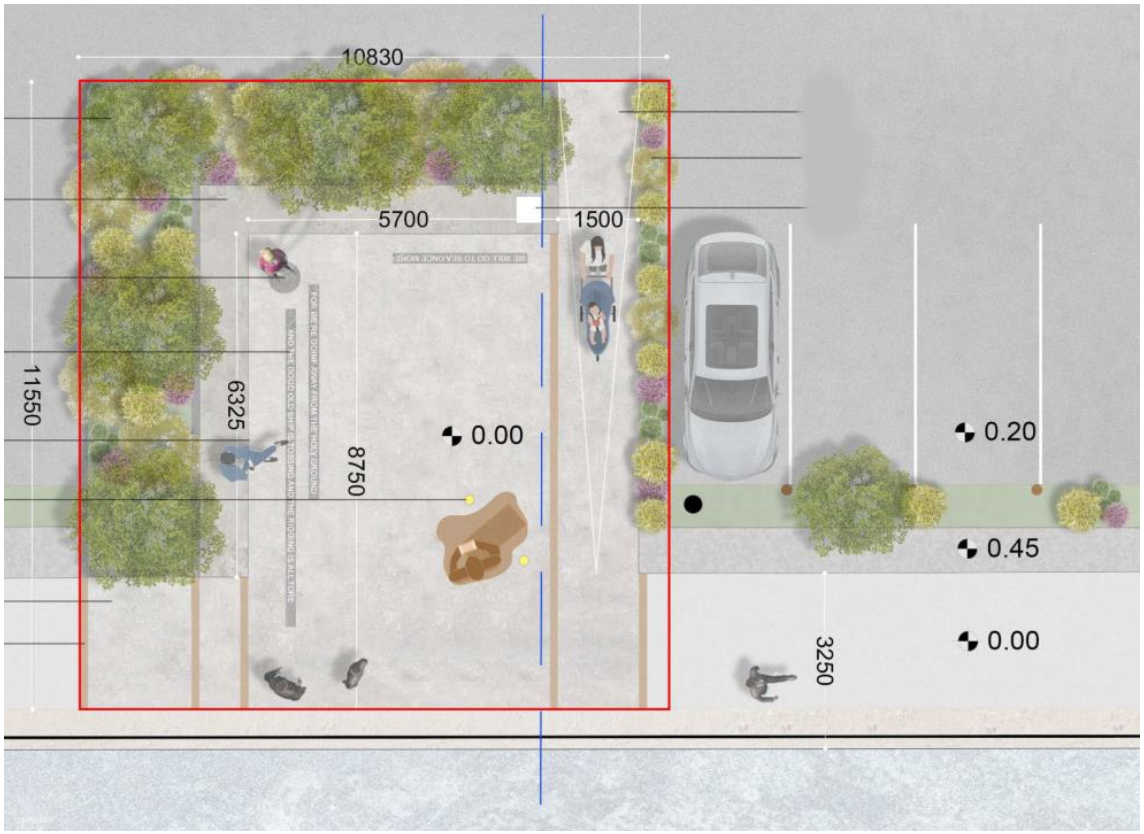


Figure 1.2: Proposed Layout of Shantyman Sculpture Scheme

1.3 Data Sources

The following online resources were used to inform the preliminary assessment for flood risk:

- Environmental Protection Agency (EPA) Online Mapping Service: https://gis.epa.ie/EPAMaps/Water and www.catchments.ie
- Geological Survey Ireland (GSI) Public Data Viewer: https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx
- National Parks and Wildlife Services (NPWS) GIS dataset: http://www.npws.ie
- Office of Public Works (OPW) Flood Risk Mapping Service: http://www.floodinfo.ie

2 Planning Guidance

As part of this Site-Specific Flood Risk Assessment, Sweco examined current policy on flood risk for planning applications for amenity development. The following documents were examined:

- Strategic Flood Risk Assessment (SFRA), June 2022 for the Cork County Development Plan (CCDP) 2022
- Volume Four of the Cork County Development Plan 2022 – South Cork – Carrigaline, Cobh, East Cork and Macroom Municipal Districts
- The Planning System and Flood Risk Management Guidelines for Planning Authorities (DEHLG and OPW, 2009) as amended by Circular PL2/2014 (August 2014) and Technical Appendices

2.1 Strategic Flood Risk Assessment (SFRA), June 2022 for the Cork County Development Plan (CCDP) 2022

The objectives and policy advice given in Chapter 4 *Flood Risk Assessment of Municipal Districts and Justification Tests* in the SFRA prepared for the CCDP 2022 was reviewed. Section 4.5 of the SFRA provides advice on flood risk for Cobh Municipal District. The predominant source of flooding for Cobh is declared in Section 4.5.8 as follows:

In the Municipal District, Cobh, Glounthaune, Haulbowline Island and Spike Island are or may be susceptible to tidal flooding and coastal erosion due to their coastal locations.

Additionally, Section 4.5.9 notes the incidence of historic flooding as follows:

Recent notable events include flooding in Carrigtwohill from the Glenamought River and Glen Stream. Periodic tidal flooding has also occurred in the area, with occasional flood events in Glounthaune and Cobh affecting a small number of properties. Further information about these flood events can be found on www.Floodinfo.ie .

Table 21 in the SFRA sets out the requirements by settlement for flood risk in the Cobh Municipal District and for the Cobh area where part of the settlement is within Flood Zone A or B the advice is directed to Table 22.

Specific Objectives for Cobh are set down in Section 2.5.123 of Volume 4 of the CDP. The mapped Objective 'CH-U-10' traverses the site and is discussed further in the next section. The advice in the SFRA in Table 22 for objective 'CH-U-10' is that appropriate development in this location would be to retain water compatible uses. A site-specific flood risk assessment is however required to be prepared in accordance with CDP Objective **WM11-15** as follows:

> *To require flood risk assessments to be undertaken for all new developments within the County in accordance with The Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009) and the requirements of DECLG Circular P12/2014 and the EU Floods Directive.*

- For sites within Flood Zone A or B, a site-specific Flood Risk Assessment will be required.

- For sites within Flood Zone C, an examination of all potential sources of flooding, and consideration of climate change (flood risk screening assessment), will be required. In limited circumstances where the 'Flood Risk Screening assessment' identifies potential sources of flood risk, a site-specific flood risk assessment may also be required.

- All proposed development must consider the impact of surface water flood risks on drainage design through a Drainage Impact Assessment. The drainage design should ensure no increase in flood risk to the site, or the downstream catchment.

The specific requirements for the Cobh Municipal District are discussed in the next **Section 2.2**.

2.2 Volume Four of the Cork County Development Plan 2022 – South Cork – Carrigaline, Cobh, East Cork and Macroom Municipal Districts

The Cork County Development Plan 2022 replaced the following plans from June 6th, 2022:

- The Cork County Development Plan, 2014
- The 8 Municipal District Local Area Plans adopted in 2017
- The 9 Town Development Plans of former Town Council Towns.

Volume Four of the Cork County Development Plan 2022 – South Cork – Carrigaline, Cobh, East Cork and Macroom Municipal Districts includes the plan for the main town of Cobh. In Section 2.5.40 of Volume 4 of the CDP, Figure 4.2.3 illustrates the Cobh Green Infrastructure Diagram as reproduced in **Figure 2.1** of this SSFRA. The green areas shown are zoned for development to support habitats of ecological value. It is hoped that new development in these areas would be planned to provide for the retention and protection of these habitats in so far as possible.

Figure 2.1: Cobh Green Infrastructure Diagram (Source: Volume 4 of the Cork County Development Plan 2022 – South Cork – Carrigaline, Cobh, East Cork and Macroom Municipal Districts)

In Section 2.5.87 of Volume 4 of the CDP, the requirements for surface water are as follows:

All new development will be required to address surface water disposal via Sustainable Urban Drainage Systems in line with surface water management policy set out in this plan (see Chapter 11 Water Management - Incl. Surface Water and Flood Risk).

In Section 2.5.88 of Volume 4 of the CDP, the requirements for flooding are as follows:

Flood risk is not a significant issue for Cobh apart from some coastal flooding including at Rushbrook dockyard and is illustrated on the settlement map. The approach to Flood Risk Management is set out in Chapter 11 Water Management in Volume One of this Plan and in the updated Strategic Flood Risk Assessment (SFRA), October 2021. The updated SFRA should be consulted for any settlement specific comments and recommendations, including site specific recommendations made as part of any Justification Tests carried out, prior to any application for development.

Specific Objectives for Cobh are set down in Section 2.5.123 of Volume 4 of the CDP. The site for the proposed Shantyman Sculpture Scheme is within a Flood Zone A/B. The site is zoned "Existing Residential/ Mixed Residential and other uses" with a mapped Objective 'CH-U-10' traversing the site. This can be seen in the Land Use Zoning plan, which is reproduced in **Figure 2.2** of this SSFRA. This mapped objective is for a "Waterfront amenity walkway/ cycleway from the western shore of Whitepoint to the eastern end of the Mall at Bishop Roche Park."

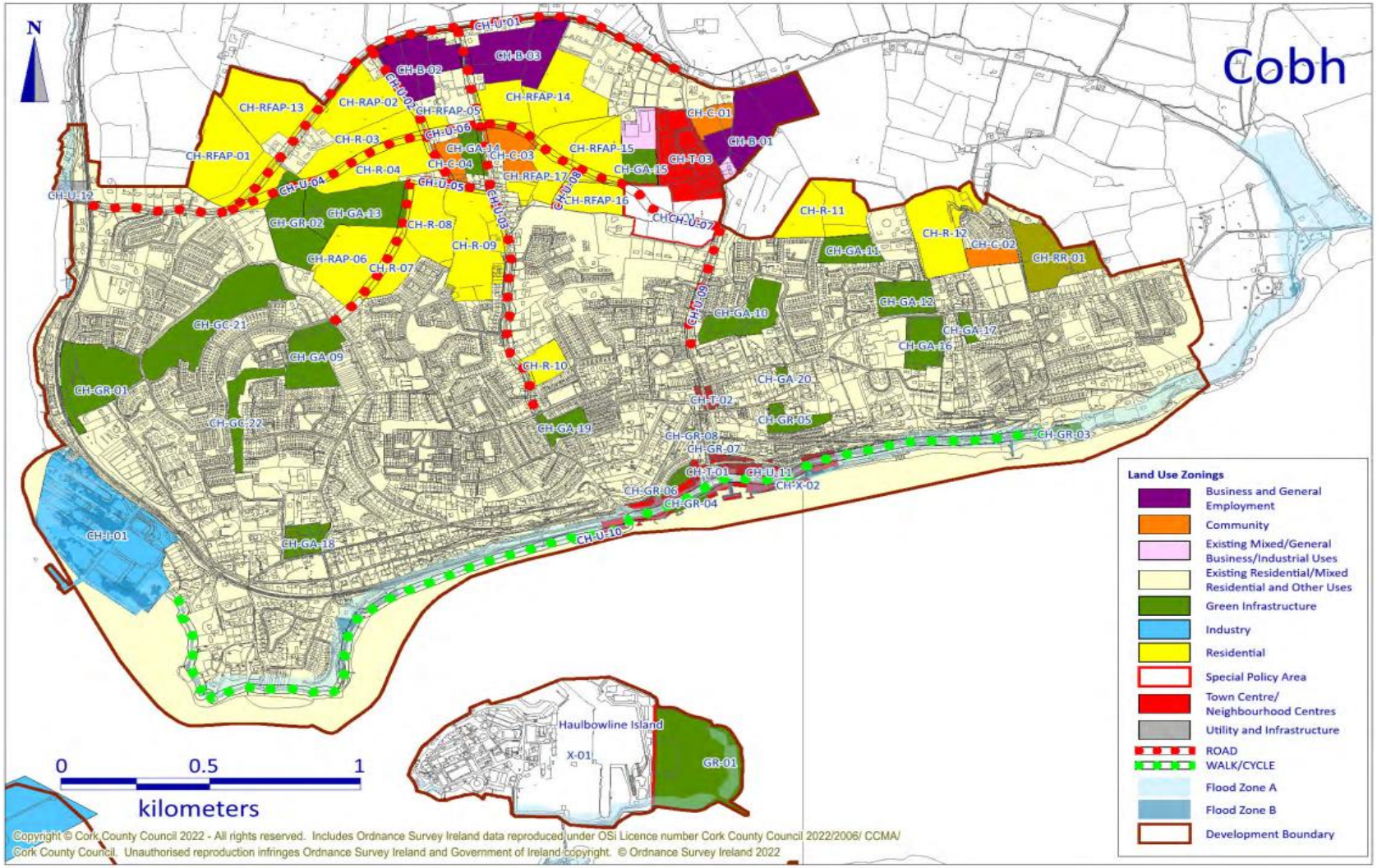


Figure 2.2: Specific Objectives for Cobh (Source: Volume 4 of the Cork County Development Plan 2022 – South Cork – Carrigaline, Cobh, East Cork and Macroom Municipal Districts)

2.3 The Planning System and Flood Risk Management Guidelines for Planning Authorities (DEHLG and OPW, 2009) as amended by Circular PL2/2014 (August 2014) and Technical Appendices

The proposed development at the Cobh site has been examined in the context of the planning guidelines in the following paragraphs.

Table 3.1 of the planning guidelines sets out the classification of vulnerability of different types of development. The site for the proposed development is an amenity open space and is classified as a 'Water-compatible development'. The requirements for a justification test are set out in Table 3.2 of the planning guidelines and in the case of a water compatible development in a Flood Zone A, B or C, development is considered to be 'appropriate' and no justification test is required.

In the Frequently Asked Questions section of the planning guidelines, the following response applies to the subject site in relation to the advice provided in the regional SFRA for the CDP 2022:

What does the SFRA not provide?

The SFRA is an area-wide study and the level of detail is commensurate with its strategic nature. It does not provide suitably detailed site-specific information, such as design flood levels. A site-specific flood risk assessment is still required to cover in more detail all sources of flood risk for individual developments. The level of detail required for a site-specific flood risk assessment depends on the scale and nature of the development and the risks involved.

When ground levels are being altered as part of a proposed development within a flood risk area, this is dealt with in Section B of the Technical Appendices of the Planning Guidelines as follows:

In general, level for level compensation should only be applied in areas where flood water is stored. Floodwater is stored in most natural and defended floodplains which are inundated in the 1% AEP event. It is important to ensure flood flow routes should be protected, whatever the cause of flooding. In some circumstances, this is more critical than providing level for level compensation. There may sometimes be benefits in altering routes or increasing flood flow capacity. However, it should only be carried out after careful assessment of the downstream impacts. This assessment must be included in the detailed site-specific FRA.

The proposed detail on the setting of levels for the proposed development and avoidance of impeding flood flows is discussed further in **Section 6.3** Flood Risk from the Proposed Development.

3 Existing Mapping and Surveys

A topographic survey of the site undertaken in May 2023 was available for review, refer to **Appendix B** for further details. It has indicated that the Car Park ground levels are higher than the Walkway levels. Levels within the proposed site in the Car Park varies from 3.32m to 3.41m (average level of 3.36m) and the Walkway levels are between 3.11m (by the pier) and 3.22m (average level of 3.19). It is noted that there is a concrete wall and flower bed separating the car park and walkway and gaps through the concrete wall are provided in order to allow pedestrians to access the walkway.

Figure 3.1, **Figure 3.2** and **Figure 3.3** show an aerial view of the site and photographs from a site visit (undertaken on 18th May 2023) to assist with understanding the context of the elements identified in the topographical survey.

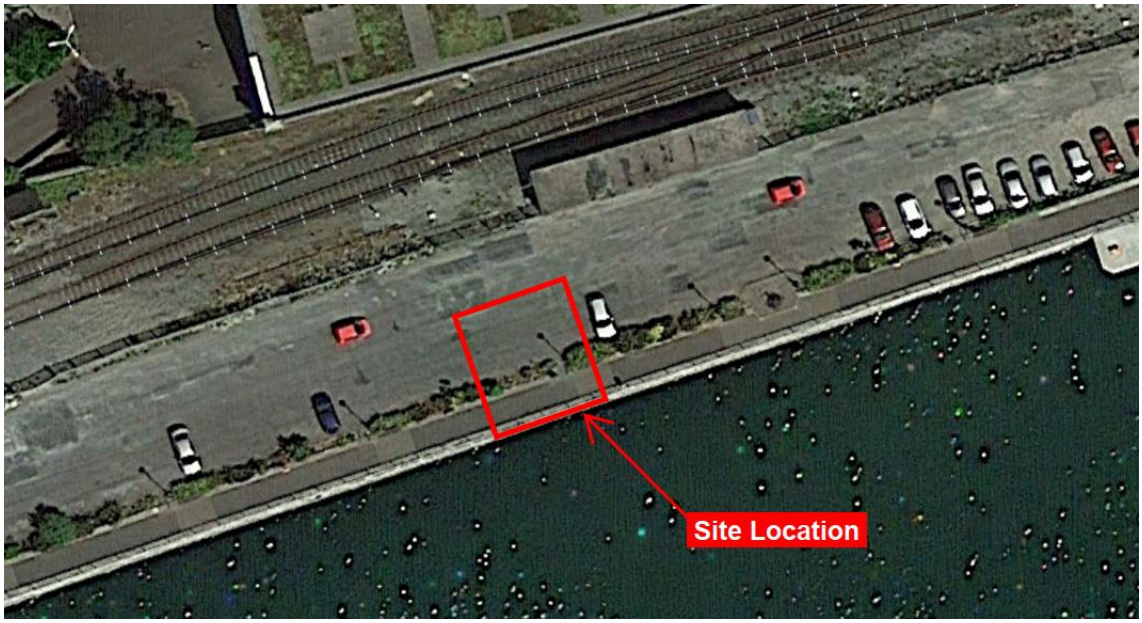


Figure 3.1: Aerial view of existing site (Source: Google Earth)

Figure 3.2: Pedestrian access through concrete wall

Figure 3.3: Existing walkway

4 Baseline Scenario

4.1 Existing Hydrological Environment

The site for the proposed development is within Hydrometric Area 19 in the catchment of the Lee, Cork Harbour and Youghal Bay, which includes the area drained by the River Lee and all streams entering tidal water in Cork Harbour and Youghal Bay and between Knockaverry and Templebreedy Battery, Co. Cork, draining a total area of 2,153 km^2. This site is also within the Water Framework Directive (WFD) Sub-catchment known as Tibbotstown_SC_010. **Figure 4.1** illustrates the extent of the catchment relative to the site in question. The site of the proposed development is indicated in red.

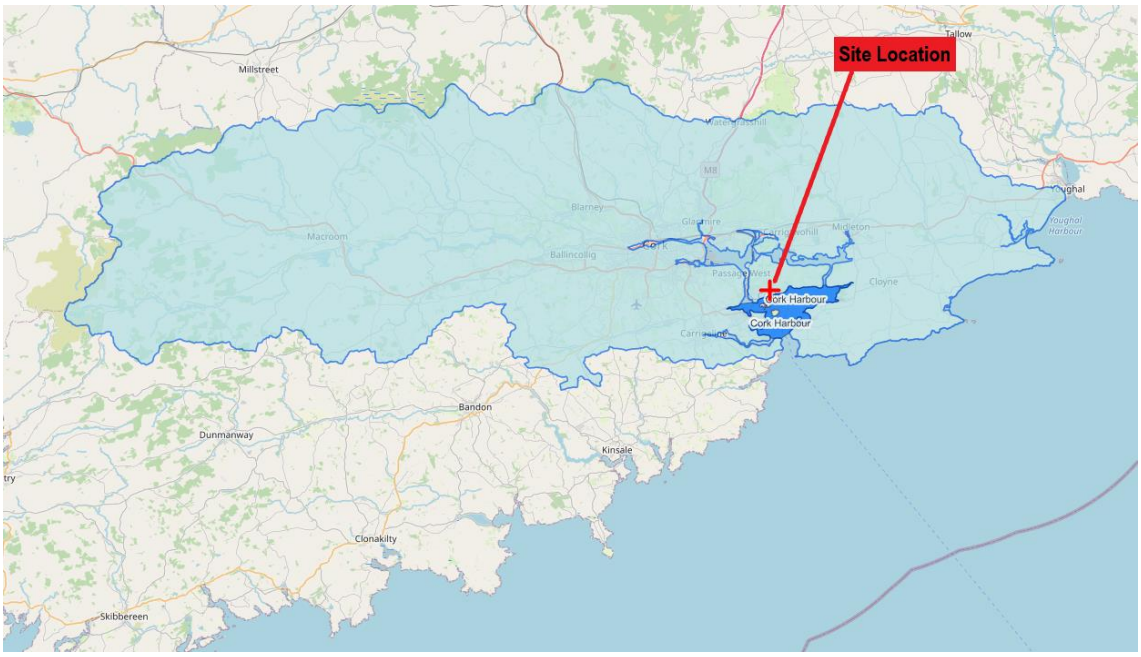


Figure 4.1: Overview of the Lee, Cork Harbour and Youghal Bay Catchment

The nearest water feature is Cork Harbour which is located to the south of the proposed site in Cobh, Co. Cork. This can be seen in **Figure 4.2** below.

Figure 4.2: Existing Hydrological Environment

4.1.1 Existing Site Drainage

Based on the topographic survey as detailed in **Section 3**, The existing car park drains northward in the direction of a vegetated strip next to the railway line and the walkway drains from the north in a southerly direction towards the sea. Surface water in the car park area also drains out through gaps in the concrete wall in a southerly direction into the sea. The surface water run-off direction is indicated in blue in **Figure 4.3**.

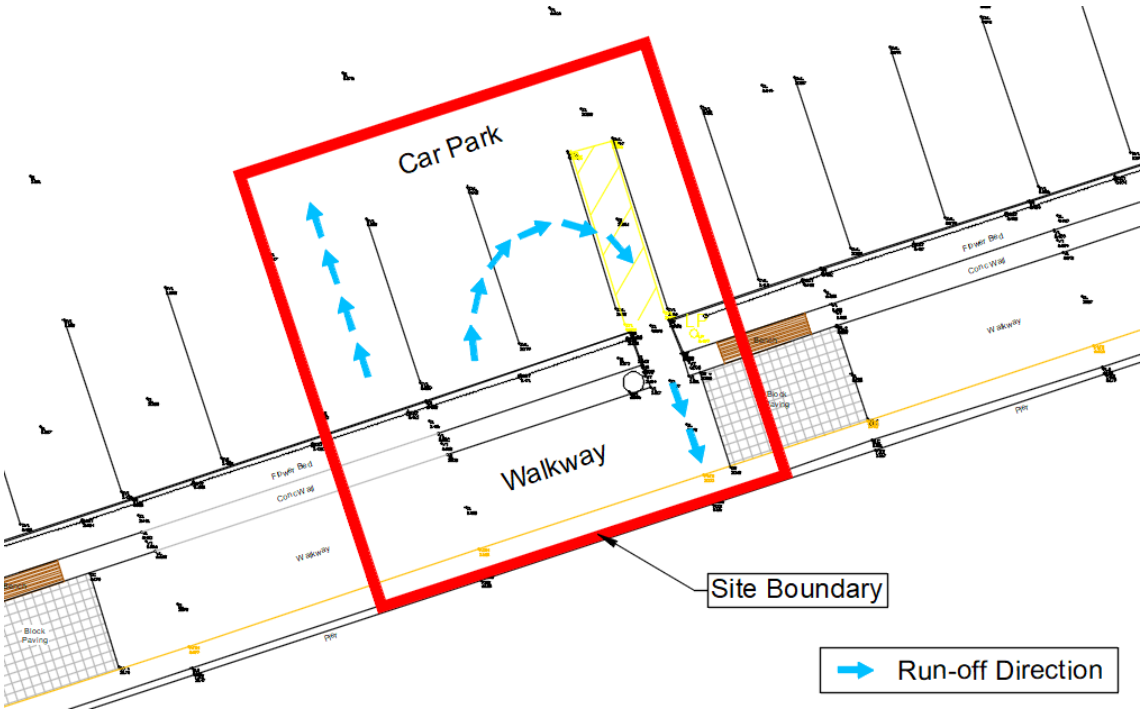


Figure 4.3: Topographical Survey at the site for the proposed Shantyman Sculpture Scheme

4.2 Existing Site Hydrogeology and Geology

The GSI website provides information on aquifer vulnerability and subsoils. These aspects are discussed in the following sections.

4.2.1 Aquifer Vulnerability

Groundwater Vulnerability is a term used to represent the natural ground characteristics that determine the ease with which groundwater may be contaminated by human activities. GSI classifies the vulnerability of the aquifer as 'Extreme' at the location of the site as illustrated in **Figure 4.4**.

Figure 4.4: Groundwater Vulnerability at the site (Source: www.GSI.ie)

It should be noted that there will be no significant change to the existing drainage as a result of the proposed scheme, in this way, no increase in pollution risk (that could be mobilised by flooding) would be anticipated to the aquifer from the proposed development. Additional treatment is provided in the proposed new raingarden for the surface water run-off draining the car park in a localised area adjacent to the proposed scheme.

4.2.2 Subsoils

GSI classifies the subsoil of the site as “Made ground” as illustrated in **Figure 4.5**. There is no record of estuarine silts in this location on the mapping which might indicate past flooding. Further detail on flood history and flood predictions can be seen in **Section 5** *Flood Risk Identification*.

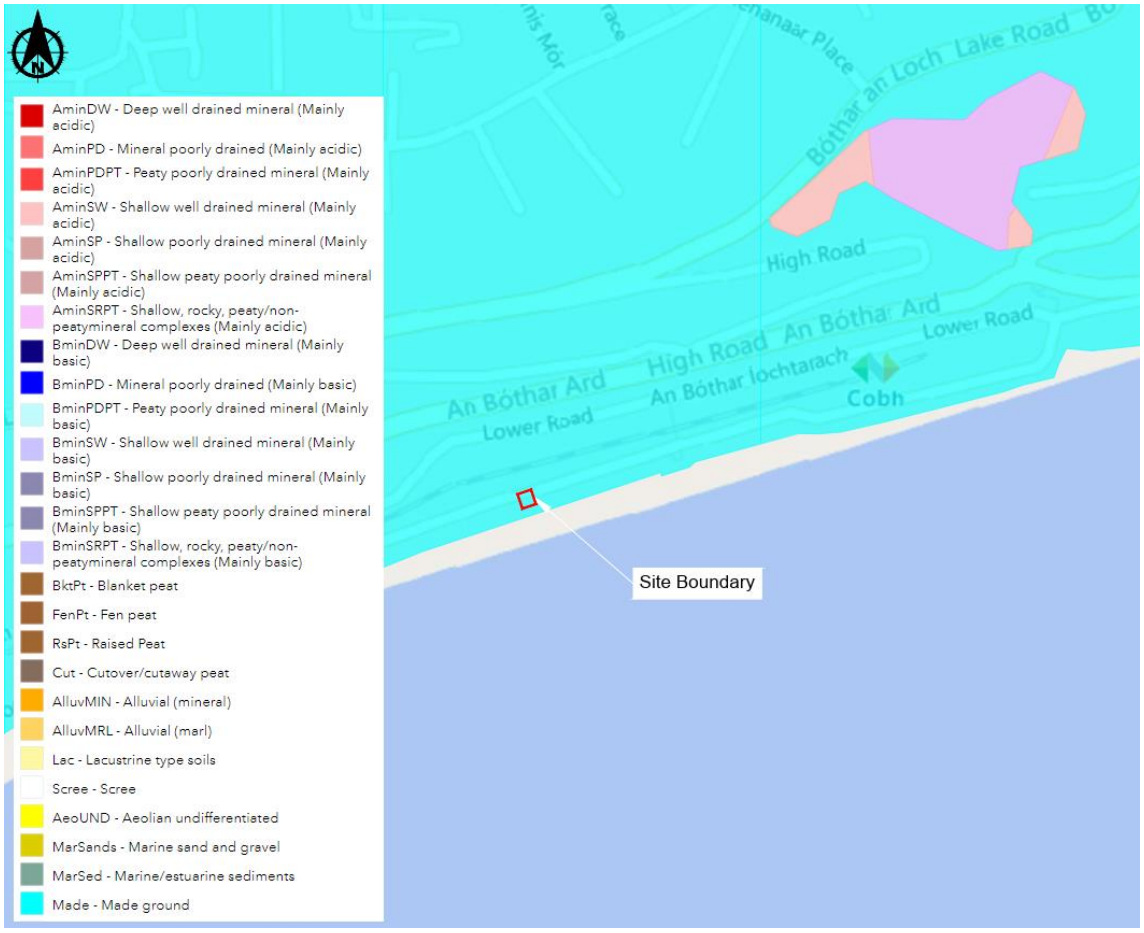


Figure 4.5: Subsoils at the site (Source: www.GSI.ie) – the proposed scheme is to be sited on 'made ground'.

4.3 Existing Protected Areas

Information on existing ecologically designated sites is available on the National Parks & Wildlife Service (NPWS) website, a map has been produced and is illustrated in **Figure 4.6**. It is noted that there is no protected area in the immediate vicinity of the proposed site. The nearest protected areas by distance from the proposed site are as follows:

- Proposed Natural Heritage Area (pNHA): Monkstown Creek (1.9 km to the south west)
- Proposed Natural Heritage Area (pNHA): Cuskinny Marsh (2.9 km to the north east)
- Special Protection Area (SPA): Cork Harbour SPA (1.9 km to the south west)
- Special Area of Conservation (SAC): Great Island Channel SAC (3.8 km to the north of the site)

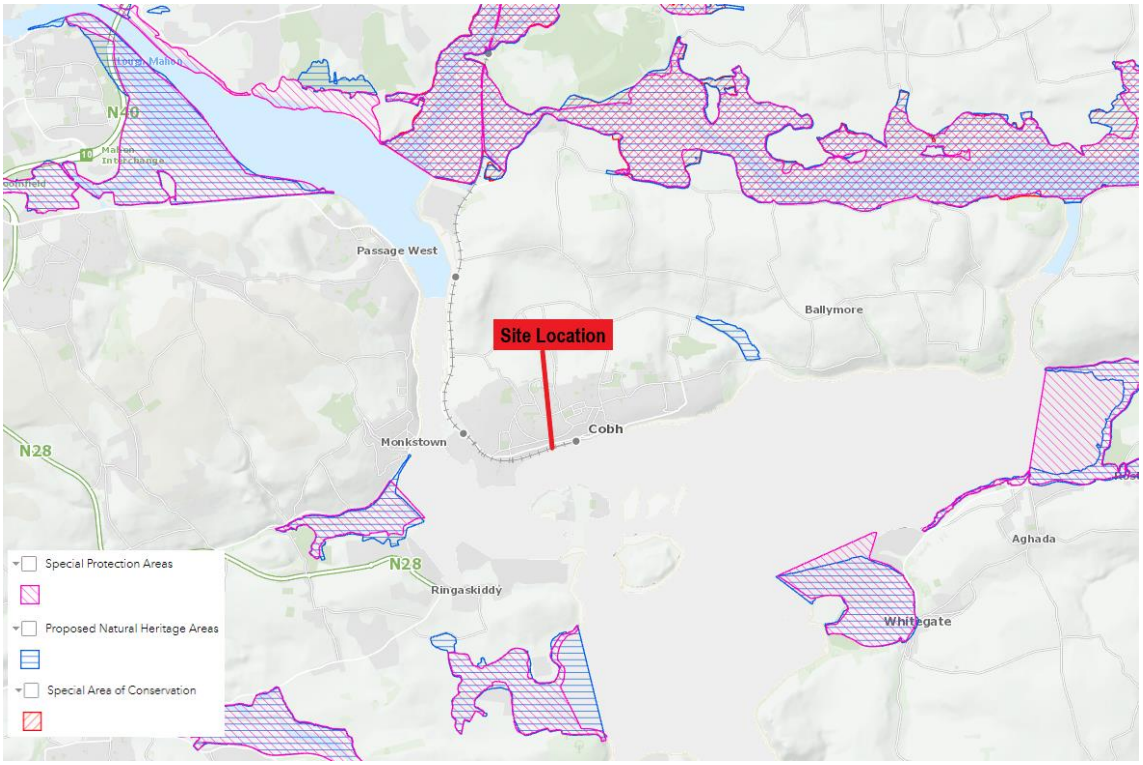


Figure 4.6: Existing Environmentally Protected Areas

The proposed development is for amenity use and as such it does not entail the storage of hazardous or potentially polluting substances that could become mobilised with flood waters. The development is not anticipated to have the potential to give rise to negative or adverse impacts on the integrity of Natura 2000 sites or Natural Heritage Areas or proposed Natural Heritage Areas. Control of water pollution during construction is discussed in **Section 6.3**.

5 Flood Risk Identification

The Planning System and Flood Risk Management: *Guidelines for Planning Authorities*, published in November 2009, have been used as a guideline for the identification of flood risk at the site.

Flood zones are a key tool in flood risk management, these zones are geographical areas within which the likelihood of flooding is in a particular range. There are three types or levels of flood zones defined for the purposes of these Guidelines:

- *"Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);*
- *Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and*
- *Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B."*

For the production of flood extent maps the Office of Public Works (OPW) uses the evidence from the Intergovernmental Panel on Climate Change (IPCC) and other authoritative sources, so that they can project two possible future scenarios:

- Mid-Range Future Scenario (MRFS) - increase in rainfall of 20% and sea level rise of 500 mm (20 inches), and
- High-End Future Scenario (HEFS) - increase in rainfall of 30% and sea level rise of 1,000 mm (40 inches).

The proposed development is an amenity open space and as such the flood management guidelines classify this type of development as 'Water-compatible development'. This type of development is considered appropriate to be developed within any flood zone (A, B or C). Refer to **Section 2.3** for further details.

The OPW have produced indicative flood mapping to assist in flood risk identification, this information is available on their website. The mapping included on this website was produced from a number of sources and was used, in conjunction with the Guidelines, to examine the risks in the sections below.

It should be noted that the site for the proposed development is tidally influenced and it is not at risk of fluvial flooding.

5.1 Existing Flood History

A summary report of the existing flood history for the location of the site was generated from the OPW website www.floodinfo.ie and this can be seen in **Figure 5.1**. It can be seen from this report that there are records of 6 No. past flood events within 2.5 km of the proposed site.

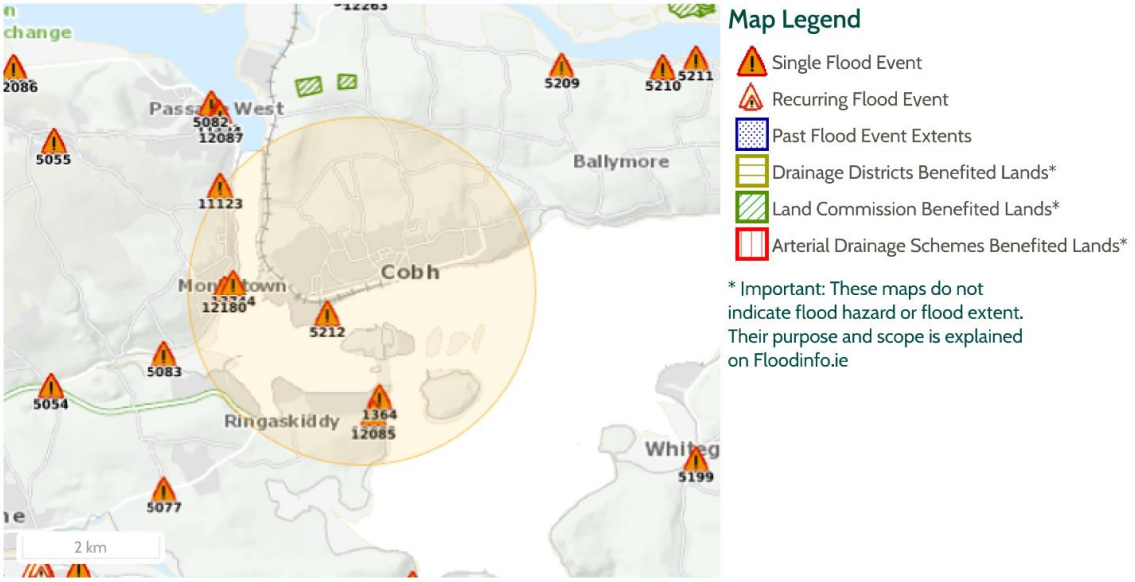


Figure 5.1: OPW Flood Map Report for flood incidents within 2.5 km of the development (Source: www.floodinfo.ie)

The nearest past flood event occurred in October 2004 at White Point Cobh and this was due to tides and south-easterly winds. A cottage was flooded approximately 700 m to the south-west of the proposed scheme.

5.2 OPW Arterial Drainage

The OPW carried out a number of arterial drainage schemes on catchments under the Arterial Drainage Act, 1945 to improve land for agriculture and to mitigate flooding. Flood protection in the benefiting lands was increased as a result of the Arterial Drainage Schemes.

Drainage Districts were carried out by the Commissioners of Public Works under a number of drainage and navigation acts from 1842 to the 1930s to improve land for agriculture and to mitigate flooding.

The Land Commission took over a number of embankments as part of its work. These embankments were created by landowners to reclaim land from rivers or the sea, typically in the 19th century. The purpose of the schemes was to create land for agriculture. In some cases, embankments were created and the area behind was allowed to flood and flush out a number of times to reduce the salt content of the soil.

As illustrated in the OPW Flood Map Report (**Figure 5.1**), there are no Arterial Drainage Schemes, Drainage Districts or Land Commission Benefited Lands in the vicinity of the location of the site.

5.3 OPW Predictive Mapping

5.3.1 Tidal Flooding

Tidal flooding is caused by higher than normal sea levels, largely as a result of storm surges, resulting in the sea overflowing onto the land. Coastal flooding is influenced by the following factors:

- High tide level;
- Low barometer pressure combined with high winds; and
- Wave action dependent on wind speeds, direction, local topography and exposure.

The OPW predictive flood mapping for the location of the site is shown in **Figure 5.2** for the 1 in 200 (Flood Zone A) and the 1 in 1000 (Flood Zone B) year return periods respectively. These maps were sourced from the National Coastal Flood Hazard Mapping 2021 Flood Mapping Project and they are available in the OPW Online Flood Maps Service at www.floodmaps.ie . These maps illustrate predicted tidal flooding in the Mid-Range Future Scenario (MRFS) which includes a 0.5m increase in sea level (to allow for Climate Change).

The extent of tidal flooding is similar for Flood Zone A and B at the site for the proposed development. As can be seen in **Figure 5.2**, the proposed site is within both flood zones.

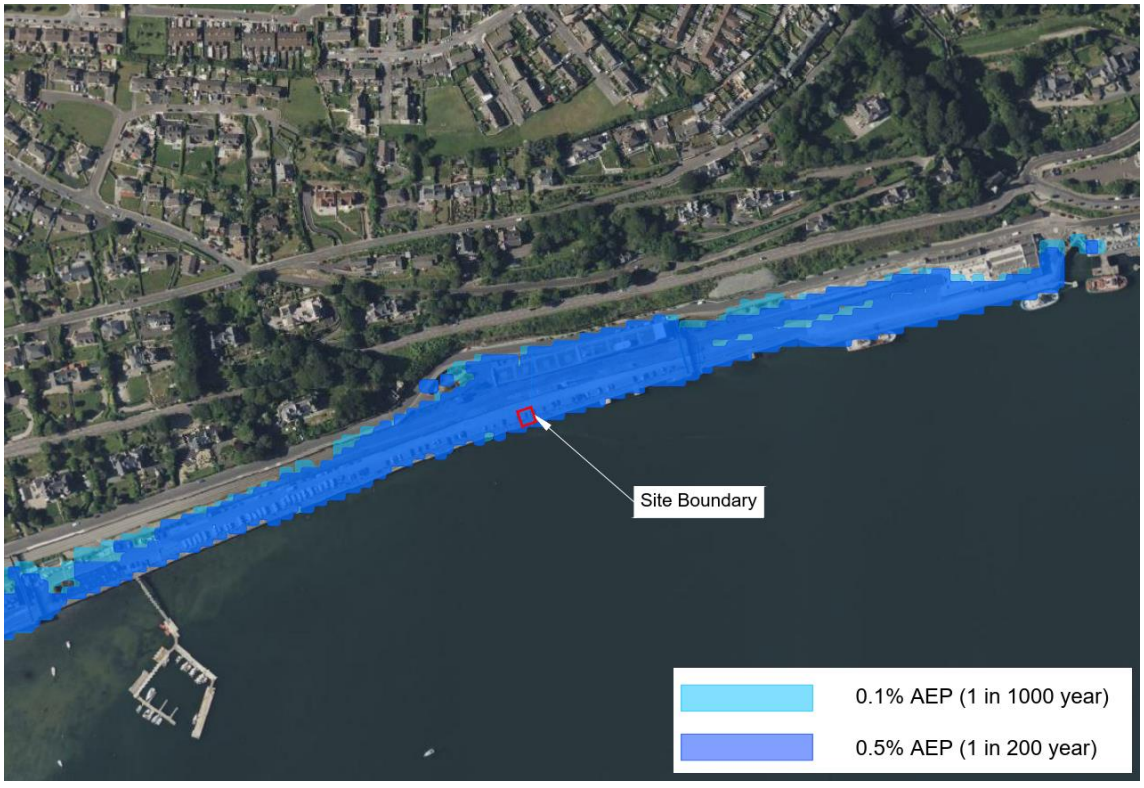


Figure 5.2: Predictive tidal flooding identified for 1 in 200 year and 1 in 1000 year return period MRFS (Source: www.floodinfo.ie)

5.3.2 Fluvial Flooding

The proposed site for development of the scheme is located adjacent to Cork Harbour and is subject to tidal flooding. There is no fluvial flood risk identified for the site or in the vicinity of the site.

5.3.3 Pluvial Flooding

Pluvial or surface water flooding is the result of rainfall generated flows that arise before runoff can enter a watercourse or sewer. In undeveloped land overland flow occurs when the amount of rainfall exceeds the infiltration capacity of the ground to absorb it. This excess water flows overland forming ponds in natural hollows.

The OPW Online Flood Maps Service does not present pluvial maps in the region of the proposed site. However, GSI presents the Synthetic Aperture Radar (SAR) Seasonal Flood Maps which shows observed peak surface water flood extents that took place between Autumn 2015 and Summer 2021. The maps were made using SAR images from the Copernicus Programme Sentinel-1 satellites. The flood maps show surface water flood extents which have been observed to occur. A lack of flooding in any part of the map only implies that a flood was not observed. It does not imply that a flood cannot occur in that location at present or in the future.

It should be noted that there is no SAR flooding recorded in the vicinity of the proposed site.

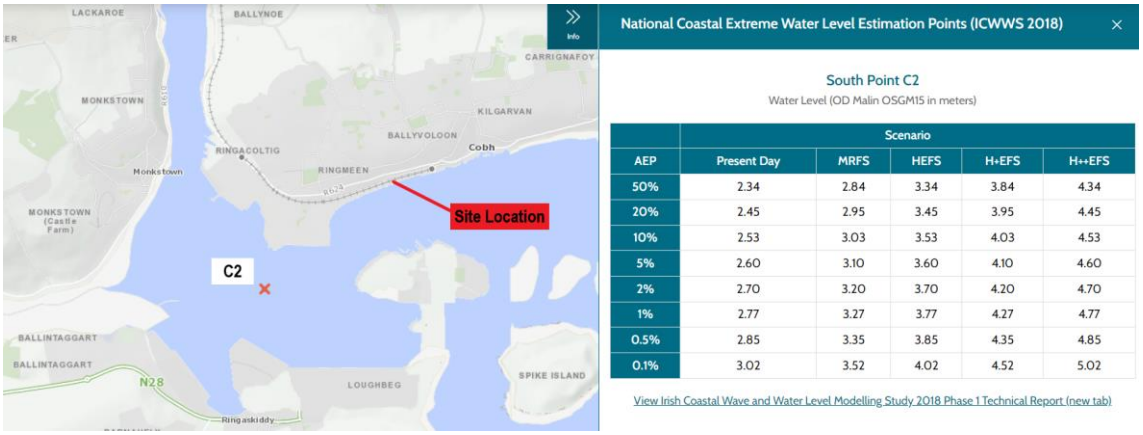
In addition, the Cork County Development Plan 2022-2028 does not show pluvial flooding on its flood zone maps. Nevertheless, the plan highlights that *"flood risk is not a significant issue for Cobh apart from some coastal flooding"*, therefore, it can be considered that pluvial flooding is not a major concern for Cobh.

5.3.4 Existing Flood Risk Studies

The Irish Coastal Wave and Water Level Modelling Study (ICWWS) Phase 1 was undertaken in 2018. Phase 1 is an update of the extreme water level estimation undertaken as part of the Irish Coastal Protection Strategy Study (ICPSS) between 2004 and 2013, which provided estimated water levels for a range of Annual Exceedance Probability (AEP) events at a series of estimation points around the Coast of Ireland.

The complete suite of ICWWS 2018 Phase 1 estimated extreme water level results for the Present Day sea levels as well as the Mid-Range Future Scenario (MRFS), High End Future Scenario (HEFS), High+ End Future Scenario (H+EFS) and High++ End Future Scenario (H++EFS) which represent a 0.5m, 1.0m, 1.5m and 2.0m increase in sea level, respectively.

The results of the predicted water levels from the ICWWS Phase 1 study can be seen in the OPW website www.floodinfo.ie for the nearest node 'South Point C2'. This data is reproduced in **Figure 5.3**.



	Scenario				
AEP	Present Day	MRFS	HEFS	H+EFS	H++EFS
50%	2.34	2.84	3.34	3.84	4.34
20%	2.45	2.95	3.45	3.95	4.45
10%	2.53	3.03	3.53	4.03	4.53
5%	2.60	3.10	3.60	4.10	4.60
2%	2.70	3.20	3.70	4.20	4.70
1%	2.77	3.27	3.77	4.27	4.77
0.5%	2.85	3.35	3.85	4.35	4.85
0.1%	3.02	3.52	4.02	4.52	5.02

Figure 5.3: Predictive water levels at South Point C2 from the ICWWS 2018 study (Source: www.floodinfo.ie)

It is identified that the predictive water-levels for the 0.5% Annual Exceedance Probability (AEP) (Flood Zone A) and 0.1% AEP (Flood Zone B) scenarios are 3.35m and 3.52m, respectively, for the MRFS. As discussed in **Section 3**, existing average ground level on site is 3.36m in the car park and 3.19m in the walkway. Therefore, considering the existing ground levels, the majority of the car park area within the site would not be flooded in an 0.5% AEP event and the entire site would be flooded in an 0.1% AEP event.

5.4 GSI Flood Mapping

Groundwater flooding occurs when the level of water stored in the ground rises, as a result of prolonged rainfall, to meet the ground surface and flows out over it. Groundwater flooding tends to be local and result from site specific factors such as tidal variations or poor ground conditions.

The GSI website provides information on groundwater flooding and includes surface water flooding recorded from the winter 2015/2016 period. The information where relevant to the site is discussed in the following paragraphs.

5.4.1 GSI Predictive Groundwater Flooding

There is no predicted groundwater flooding identified for the site in the mapping available from GSI.

5.4.2 GSI Historic Groundwater Flooding

There are no records of historic groundwater flooding at the site in the mapping available from GSI.

5.4.3 GSI Surface Water Flooding (Winter 2015/2016)

There are no records of surface water flooding reported from the winter 2015/2016 at the site in the mapping available from GSI.

5.5 Flooding from Artificial Drainage Systems

All sources of flooding are required to be examined including the potential for impacts on artificial drainage systems that could result in a breach of pipelines or disturbance to joints. This could cause flooding of the contents of a pipeline with the potential to cause pollution of the environment or escape of gases in addition to disruption of the service.

The As Built utility drawings were examined in the vicinity of the proposed Shantyman Sculpture Scheme and it was found that a 400mm diameter PVC foul rising main passes under the scheme extent. The route of this pipeline can be seen in **Appendix C**. This rising main is part of the Cork Lower Harbour Drainage Scheme and as such is of strategic importance.

The topographical survey was examined along with the As Built levels of the pipeline and the proposed levels of the scheme. It is proposed to lower the existing ground at the car park by approximately 0.2 m to create a central plaza for seating and appreciating the new sculpture. According to the topographical survey, this would lower the ground from an existing 3.36 m OD to 3.19 m OD. The crown of the foul rising main is at 1.95 m OD. Following construction of the scheme, the foul rising main will still have a protective cover of 1.24 m between the crown of the pipe and the underside of the finished pavement level of the proposed scheme. This area will not be subject to vehicular traffic or excess loadings.

Appropriate mitigation is required to be considered during the construction of the scheme to avoid damage to the pipeline, flooding or escape of gases from the pipeline. Consultation will be undertaken with Cork County Council Drainage Department and Irish Water to determine the preferred protection for the pipeline during excavations for construction of the scheme in proximity to the pipeline. Trial pits will be dug carefully in advance and detection equipment used to establish the exact position of the pipeline. This is to ensure that there will be no impact to the integrity of the pipeline to avoid flood risk from this potentially polluting source and to avoid disruption to the service. Where planting is proposed directly above the pipeline, the pavement will be left intact, with this section of planting concentrating on shallow rooting shrubs only. The adjacent tree pits will be contained where these lie up against the trench of the foul pipeline. Alternatively, a bridging feature will be incorporated over the pipeline within the rainwater garden section. This is to avoid root damage to the pipeline and to avoid rainfall and salt water from any overtopping waves migrating through the soil beds and into the backfill in the foul pipeline trench. The foul service trench is currently protected from contact with rainwater, salt water or flooding generally as it is covered over by the pavement in the car park. Any marker tape disturbed during excavations will be left in place or replaced as appropriate. The pipeline will remain fully accessible after the scheme is constructed. It is recommended that a performance check is undertaken of the section of the pipeline that passes the scheme before and after construction using an appropriate method.

6 Review of the Proposed Development

6.1 Foul and Surface Water Management Plan for the Proposed Development

The proposed layout of the development can be seen in **Appendix A**. There will be no facility for sanitary services with the exception of during the construction period for the proposed Shantyman Sculpture Scheme.

In accordance with the CDP Objective WM11-15, all proposed development must consider the impact of surface water flood risks on drainage design through a Drainage Impact Assessment. The drainage design should ensure no increase in flood risk to the site, or the downstream catchment. The following paragraph discusses the proposed surface water drainage for the scheme and provides the required drainage impact assessment.

6.1.1 Surface Water Drainage

There will be no hard drainage systems in this new amenity and no new outfalls through the adjacent quay wall. Drainage of the existing access road and car park is routed longitudinally west to east with an overall fall northwards towards a grassed strip next to the railway. Prolonged rainfall would collect in the car park and also drain via the stepped and ramped access gaps through the wall in the car park. These steps lead down to the walkway and any surface water would discharge diffusely into the sea from there. In the new proposal for the Shantyman Sculpture Scheme, the drainage of the scheme area that will take up the four car parking spaces car park (c. 75 sq.m.) will partly be replaced by sustainable drainage into the proposed rainwater garden/tree pits. Drainage of the rainwater gardens will be by infiltration and using the ‘Stockholm Soil’ Method, which is illustrated in **Appendix D**. Drainage of the central plaza and adjacent ramp (c. 45 sq.m.), which will no longer be a trafficked area, will be drained by free drainage towards the sea front. With the introduction of the SuDS measures, there will be a decrease in the overall surface water runoff discharging directly to the sea.

6.1.2 Foul Water Drainage

During construction portaloos and portacabins will be provided for welfare facilities for Construction Personnel while the works are being undertaken and these will be serviced by licenced contractors. These facilities will be sited at a suitable location above the maximum flood level.

6.2 Flood Risk to the Proposed Development

A Source – Pathway – Receptor (S-P-R) model cross-section through the site for the proposed development has been prepared following the parameters set out in Figure 6.1, to illustrate the proposed development with respect to the potential sources of flood risk.

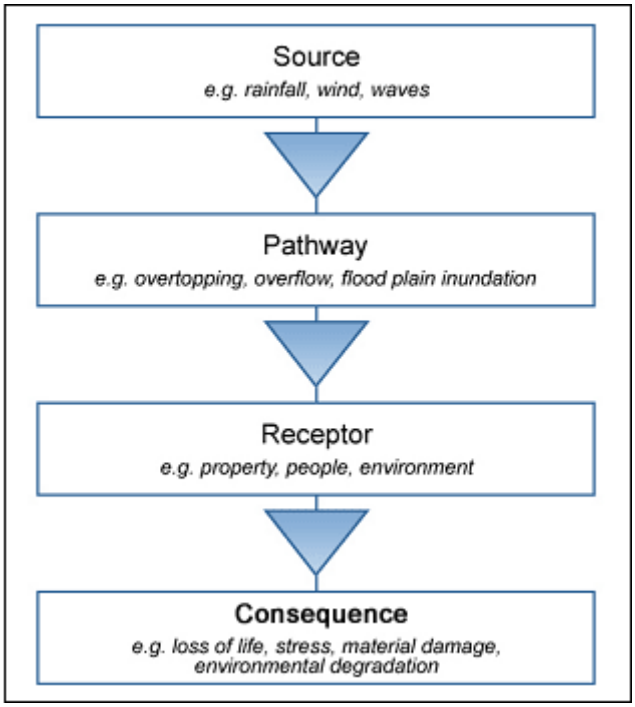


Figure 6.1: Source – Pathway – Receptor – Consequence Model Parameters

It can be seen in **Figure 6.2** that the Finished Floor Level (FFL) of the proposed amenity development is the same as the existing walkway, approximately 3.19m. This level lies below the predicted tidal flood levels for the 0.5% AEP (1 in 200 year return period - Flood Zone A) and 0.1% AEP (1 in 1000 year return period - Flood Zone B) scenarios considering the MRFS which includes a sea level rise of 0.5m allowing for Climate Change. The High++End Future Scenario (H++EFS), which includes a sea level rise of 2.0m allowing for a more extreme Climate Change scenario, is also illustrated in **Figure 6.2**. Although extreme events will present a tidal flood risk to the development, this is a proposed amenity development and the facility will not be used by the public in such cases. This is discussed further in **Section 6.4**. The flood resilience of the design of the scheme is discussed further in **Section 6.5**.

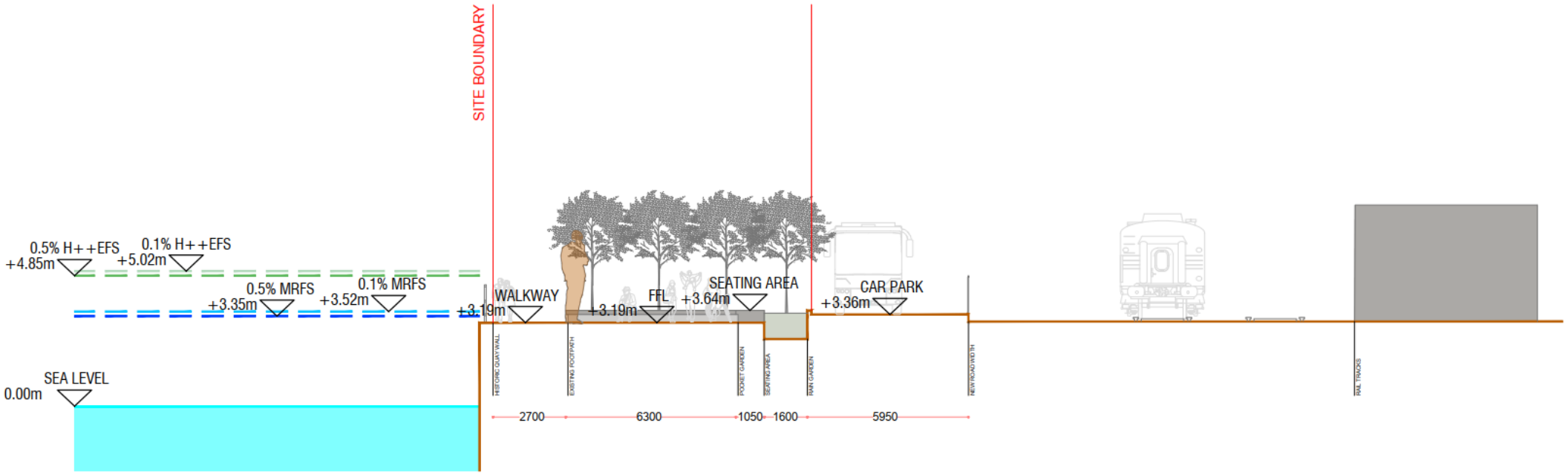


Figure 6.2: Source – Pathway – Receptor Model cross-section (West Elevation) through the site for the proposed development

6.3 Flood Risk from the Proposed Development

It is not anticipated that the proposed development will present a flood risk to adjacent property such as the access road, car park or railway which lies to the north of the proposed Shantyman Sculpture Scheme. The proposed development will reduce the overall footprint of hard surface area within the scheme boundary by introducing tree pits and a rainwater garden. In addition, drainage of a section of the car park will be replaced by sustainable drainage. The surface water run-off from the car park adjacent to the scheme will drain into the rainwater garden/tree pits by way of lateral inlet kerbs. It is not therefore anticipated that the scheme will result in any cumulative increase in flood risk with adjacent infrastructure. The existing ground levels will be dropped at the sunken plaza area in the centre of the scheme and the planter walls will be slightly raised, to contain soils servicing the site. These walls will have lateral inlets and therefore they will not impede surface water flows. There will be no overall raising of ground levels and this is in keeping with *The Planning System and Flood Risk Management – Guidelines for Planning Authorities.* As discussed in **Section 6.3.1**, a level for level balance is required to be met for proposed development in a flood risk area to avoid flood risk elsewhere and this is achieved for the proposed Shantyman Sculpture Scheme.

It is expected that there will be a reduction in the overall site surface water runoff draining directly to the sea and therefore there will be no increase in flood risk from the proposed development.

It is expected that good practice will be adhered to during the construction of the proposed development to avoid potentially polluted water entering the sea from building materials, fuels and oils should a flood event occur during construction. All fuels and oils on site will be bunded. Water filled traffic barriers sealed with sandbags or similar containment will be used around the site during construction to avoid any mobilisation of building materials. Supplies will be kept in storage in an area above the maximum flood level until needed for use in the construction of the scheme. Plant and materials will not be left on site overnight.

6.3.1 Level for level balance

In order to assess the level for level balance of the proposed development it should be noted that the existing ground level in the Five Foot Way Carpark within the proposed site will be lowered from approx. 3.36m to 3.19m (see area outlined in red in **Figure 6.3**). In addition, to accommodate the seating area part of the existing ground level will be raised to approx. 0.45m above the walkway level, thus the level on the top of the seating area will be approx. 3.64m (see area outlined in blue in **Figure 6.3**). **Table 6.1** presents the level for level balance and it is identified that the volume to be lowered is higher than the volume to be raised, therefore, it can be concluded that the proposed development will not increase the risk of flood elsewhere. It should be noted that side inlets are to be provided into the rain garden where the surface water run-off flows meet the wall of the rainwater garden.

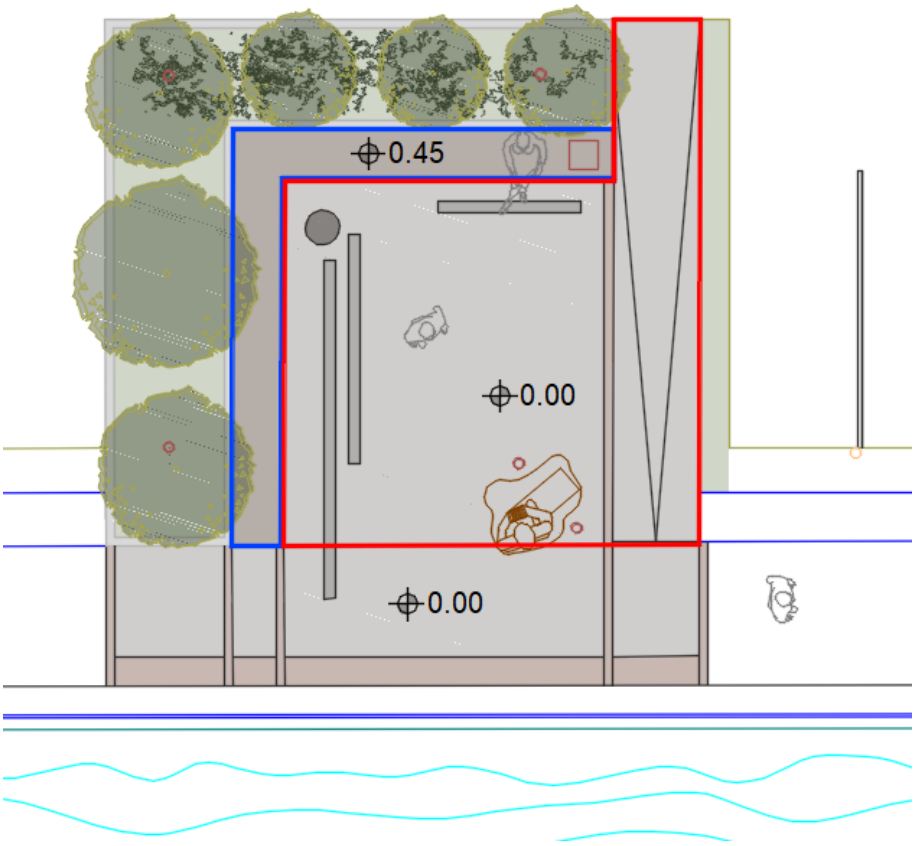


Figure 6.3: Areas to be raised and lowered

Table 6.1: Level for Level Balance

Area to be:	Volume (m^3)
Lowered	**-7.28**
Raised	**+3.25**
Balance	**-4.04**

6.4 Vulnerability of Personnel

Amenity development such as the proposed Shantyman Sculpture Scheme is considered to be water compatible in accordance with Table 3.1 of *The Planning System and Flood Risk Management – Guidelines for Planning Authorities* as previously discussed in **Section 2.3**. As with any amenities provided in a flood risk area, these will be avoided in flood conditions. It is considered that the proposed Shantyman Sculpture Scheme does not present any greater risk to the public over and above the existing pedestrian footway which follows a route along the quay wall to the south of the scheme. Construction Personnel will heed flood warnings during the construction period and reschedule activities where necessary.

Safe access and egress is available for Construction Personnel and those occupying the amenity area when constructed via the adjacent car park and access road.

6.5 Proposed Layout and Flood Resilience of the Development

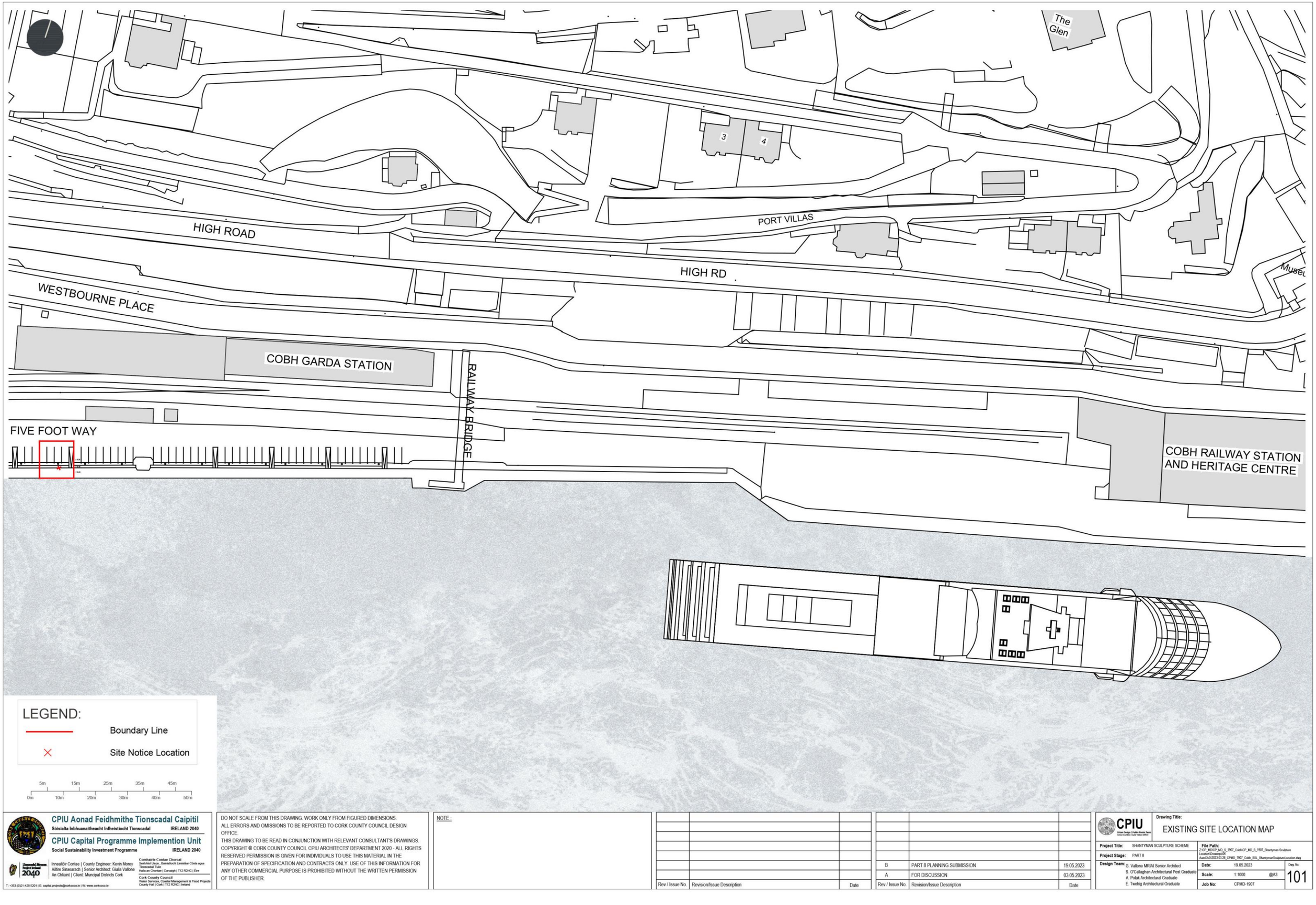
The proposed layout of the development can be seen in **Appendix A**. The proposed development consists of the erection of the 'Shantyman' Sculpture Scheme at Five Foot Way Carpark, Cobh, Co. Cork. The sculpture is set in a specially designed recreational area of c. 125 sq.m. includes seating and rainwater garden (SuDS) planted with up to 6 No. trees and lighting in the Five Foot Way Carpark on the seafront, close to the Cobh deep water liner berthing facility and Heritage Centre. The proposed scheme results in the loss of 4 No. carparking spaces. The proposed scheme is contiguous with the existing walkway at the seafront. The development will include flood resilient construction as follows:

1. **Flood Resilient Design and Construction for Sculpture:** The proposed Shantyman Sculpture requires a 1m deep concrete foundation and the Sculpture is made of weathered corten steel. Corten steel has high tensile strength and is corrosion resistant which makes it suitable for marine applications.
2. **Rainwater Garden and Tree Pits:** Planting in the rainwater garden and tree pits will be sourced from salt-tolerant planting. The trees will be planted using the Stockholm Soil method as shown in **Appendix D**.
3. **Seating Area and Central Plaza:** Use will be made of existing walls at the sea front side. The central plaza will be sunken locally to provide a wrap-around seating area and allow a ramped access from the car park. Any new paving and new walls will be of flood resilient construction. Marine standard decking boards will be used as a capping for walls, to be used for seating. It is anticipated that these decking boards will require periodic maintenance.
4. **Electrical and Audio Features:** Strip lighting will be integrated into the seating area. The lighting connection will be tapped off the adjacent lighting cabling and ducting will be flood resilient. The audio feature is a sound tile to be fitted to the top of the wall in the seating area. The switch for this feature will be flood resilient.
5. **Services:** All service entries on site will be sealed with expanding foam or similar closed cell material.
6. **Pipework:** Closed cell insulation will be used for pipes which are below the predicted flood level.
7. **Vents:** A tree pit aeration well will be included for the tree pits in accordance with the Stockholm Soil Method, as shown in **Appendix D**. This aeration well will be made up of flood resilient material.

7 Conclusion

A site-specific flood risk assessment has been carried out for the Shantyman Sculpture Scheme at Five foot Way Carpark, Cobh, Co. Cork. The scheme is within a Flood Zone A and B area. It is an amenity development which is classified as a water compatible development in accordance with the flood risk management guidelines. A justification test is not required and the development is considered appropriate within these flood zones. A commensurate flood risk assessment is however required, to examine all sources of flood risk and the requirements of any new development must be examined in accordance with objective WM 11-15 of the Cork CDP 2022. Flood risk to and from the scheme was examined. The site is within a tidal flood risk area and all aspects of flood resilience for the design of the scheme were considered appropriate. A 400 mm diameter foul rising main, which is part of the Cork Lower Harbour Drainage Scheme passes under the scheme extent. Consultation will be undertaken with Cork County Council Drainage Department and Irish Water to determine the preferred protection for the pipeline during excavations for construction of the scheme in proximity to the pipeline. Construction methods will avoid contact with the pipeline to ensure that there will be no impact to the integrity of the pipeline. This will avoid flood risk from this potentially polluting source or escape of gases and avoid disruption to this service. Planted areas will be contained around the pipeline trench to avoid rainwater or saltwater entering the pipeline trench and to protect against root damage to the pipeline The foul pipe will still have a protective cover of 1.24 m between the crown of the pipe and the underside of the finished pavement level of the proposed scheme. This area will not be subject to vehicular traffic or excess loadings. The pipeline will remain fully accessible after the scheme is constructed. Testing of the pipeline before and after construction is recommended between the nearest access chambers. All other sources of flooding were examined including a drainage impact assessment and it was considered that the objectives of WM 11-15 of the Cork CDP 2022 were met or improved.

Appendix A – Proposed Development Layout



LEGEND:

Boundary Line

Site Notice Location

5m 15m 25m 35m 45m
0m 10m 20m 30m 40m 50m

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NOTE :

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B	PART 8 PLANNING SUBMISSION	19.05.2023
A	FOR DISCUSSION	03.05.2023

CPIU
Urban Design | Public Realm Team
Senior Architect: Giulia Vallone MRIAI

Drawing Title: EXISTING SITE LOCATION MAP

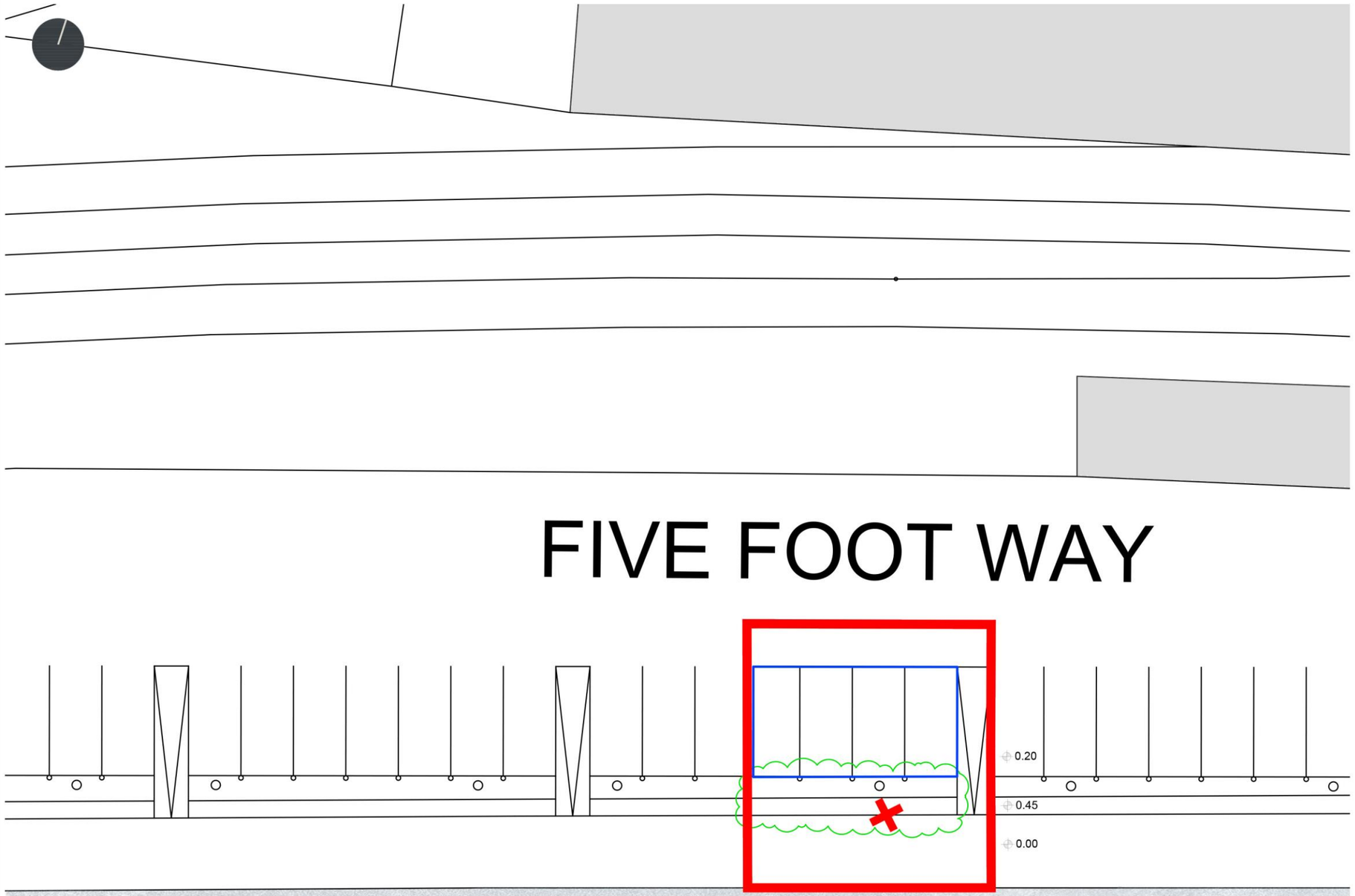
Project Title: SHANTYMAN SCULPTURE SCHEME

File Path: Z:\CP_MD\CP_MD_S_1907_Cobh\CP_MD_S_1907_Shantyman Sculpture Location\Drawings\04 AutoCAD\2023.03.28_CPMD_1907_Cobh_SSL_ShantymanSculptureLocation.dwg

Project Stage: PART 8

Design Team: G. Vallone MRIAI Senior Architect
S. O'Callaghan Architectural Post Graduate
A. Polak Architectural Graduate
E. Twohig Architectural Graduate

Date: 19.05.2023
Scale: 1:1000 @A3
Job No: CPMD-1907
Dwg. No. 101



EXISTING SITE IMAGES

LEGEND:

- Boundary Line
- Site Notice Location
- Levels
- Demolition of low concrete wall
- Removal of 4 car parking spaces

2.5m 7.5m

0m 5m 10m

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CPIU

Drawing Title: EXISTING SITE LAYOUT

Project Title: SHANTYMAN SCULPTURE SCHEME

Project Stage: PART 8

File Path: Z:\CP_MD\CP_MD_S_1907_Cobh\CP_MD_S_1907_Shantyman Sculpture Location\Drawings\04 AutoCAD\2023.03.28_CPMD_1907_Cobh_SSL_ShantymanSculptureLocation.dwg

Design Team: G. Vallone MRIAI Senior Architect
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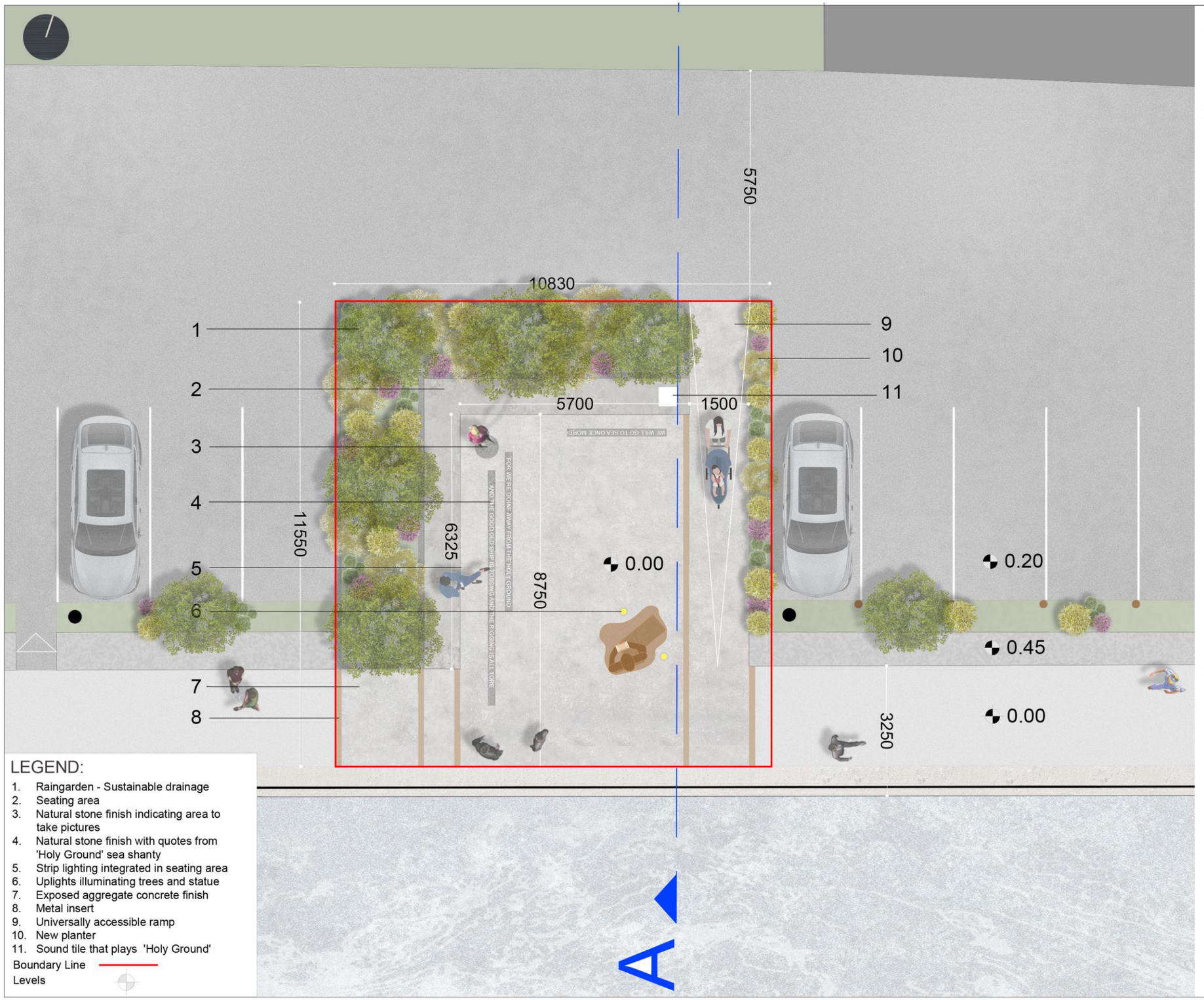
E. Twohig Architectural Graduate

Date: 19.05.2023

Scale: 1:200 @A3

Job No: CPMD-1907

Dwg. No. 102

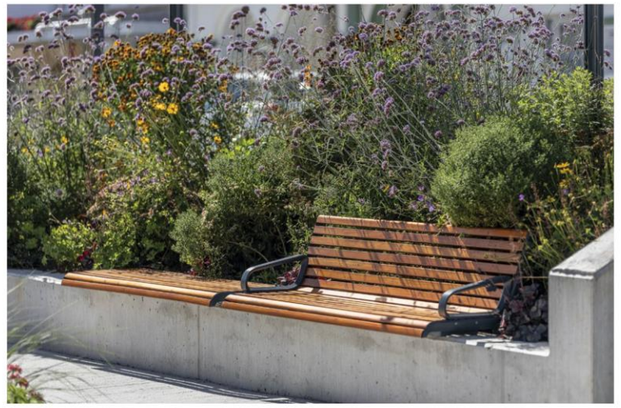


LEGEND:

1. Raingarden - Sustainable drainage
2. Seating area
3. Natural stone finish indicating area to take pictures
4. Natural stone finish with quotes from 'Holy Ground' sea shanty
5. Strip lighting integrated in seating area
6. Uplights illuminating trees and statue
7. Exposed aggregate concrete finish
8. Metal insert
9. Universally accessible ramp
10. New planter
11. Sound tile that plays 'Holy Ground'

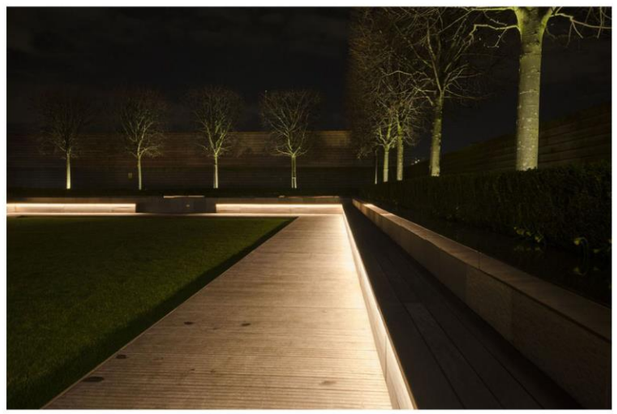
Boundary Line

Levels



2. Example of seating area - Furnished

4. Example of engraved text in natural stone from previous project



5. Placemaking strip lighting integrated in seating area

1m 3m 5m
0m 2m 4m

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Senior Architect: Giulia Vallone MRIAI

Drawing Title: PROPOSED PLAN OF SHANTYMAN SCHEME

Project Title: SHANTYMAN SCULPTURE SCHEME

File Path: Z:\CP_MD\CP_MD_S_1907_Cobh\CP_MD_S_1907_Shantyman Sculpture Location\Drawings\04 AutoCAD\2023.03.28_CPMD_1907_Cobh_SSL_ShantymanSculptureLocation.dwg

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Date: 19.05.2023

Scale: 1:100 @A3

Job No: CPMD-1907

Dwg No. 201

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Senior Architect: Giulia Vallone MRIAI

Drawing Title:
PROPOSED SECTION AA OF SHANTYMAN SCULPTURE SCHEME

Project Title:	SHANTYMAN SCULPTURE SCHEME
Project Stage:	PART 8
Design Team:	G. Vallone MRIAI Senior Architect S. O'Callaghan Architectural Post Graduate A. Polak Architectural Graduate E. Twohig Architectural Graduate
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Date:	19.05.2023
Scale:	1:100 @A3
Job No:	CPMD-1907
Dwg. No.	301

CPIU Aonad Feidhmithe Tionscadal Caipitil
Sóisialta Inbhuanaitheacht Infheistiocht Tionscadal — IRELAND 2040

CPIU Capital Programme Implemention Unit
Social Sustainability Investment Programme — IRELAND 2040

Innealtóir Contae | County Engineer: Kevin Morey
Ailtire Sinsearach | Senior Architect: Giulia Vallone
An Chliaint | Client: Muncipal Districts Cork

Comhairle Contae Chorcai
Seirbhisí Uisce , Bainistíocht Limistéar Cósta agus Tionscadail Tuile
Halla an Chontae | Corcaigh | T12 R2NC | Éire

Cork County Council
Water Services, Coastal Management & Flood Projects
County Hall | Cork | T12 R2NC | Ireland

T: +353-(0)21-428 5201 | E: capital.projects@corkcoco.ie | W: www.corkcoco.ie

DO NOT SCALE FROM THIS DRAWING. WORK ONLY FROM FIGURED DIMENSIONS.
ALL ERRORS AND OMISSIONS TO BE REPORTED TO CORK COUNTY COUNCIL DESIGN OFFICE.
THIS DRAWING TO BE READ IN CONJUNCTION WITH RELEVANT CONSULTANT'S DRAWINGS.

NOTE :

Rev / Issue No.	Revision/Issue Description	Date
B	PART 8 PLANNING SUBMISSION	19.05.2023
A	FOR DISCUSSION	03.05.2023

CPIU
Urban Design | Public Realm Team
Senior Architect: Giulia Vallone MRIAI

Drawing Title: PROPOSED ELEVATION OF SHANTYMAN SCULPTURE SCHEME

Project Title: SHANTYMAN SCULPTURE SCHEME

Project Stage: PART 8

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Design Team:
G. Vallone MRIAI Senior Architect
S. O'Callaghan Architectural Post Graduate
A. Polak Architectural Graduate
E. Twohig Architectural Graduate

Date: 19.05.2023

Scale: 1:100 @A3

Job No: CPMD-1907

Dwg. No. 302

CPIU Aonad Feidhmithe Tionscadal Caipitil
Soisialta Inbhuanaitheacht Infheistiocht Tionscadal IRELAND 2040

CPIU Capital Programme Implemention Unit
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Innealtóir Contae | County Engineer: Kevin Morey
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A	FOR DISCUSSION	03.05.2023

CPIU
Urban Design | Public Realm Team
Senior Architect: Giulia Vallone MRIAI

Drawing Title:
PROPOSED VISTA OF SHANTYMAN SCULPTURE SCHEME

Project Title:	SHANTYMAN SCULPTURE SCHEME
Project Stage:	PART 8
Design Team:	G. Vallone MRIAI Senior Architect S. O'Callaghan Architectural Post Graduate A. Polak Architectural Graduate E. Twohig Architectural Graduate
File Path:	Z:\CP_MDCP_MD_S_1907_Cobh\CP_MD_S_1907_Shantyman Sculpture Location\Drawings\04 Auto\CAD\2023.03.28_CPMD_1907_Cobh_SSL_ShantymanSculptureLocation.dwg
Date:	19.05.2023
Scale:	- @A3
Job No:	CPMD - 1907
Dwg. No.	401

CPIU Aonad Feidhmithe Tionscadal Caipitil
Soisialta Inbhuanaitheacht Infheisteoirt Tionscadal IRELAND 2040

CPIU Capital Programme Implemention Unit
Social Sustainability Investment Programme IRELAND 2040

Innealtóir Contae | County Engineer: Kevin Money
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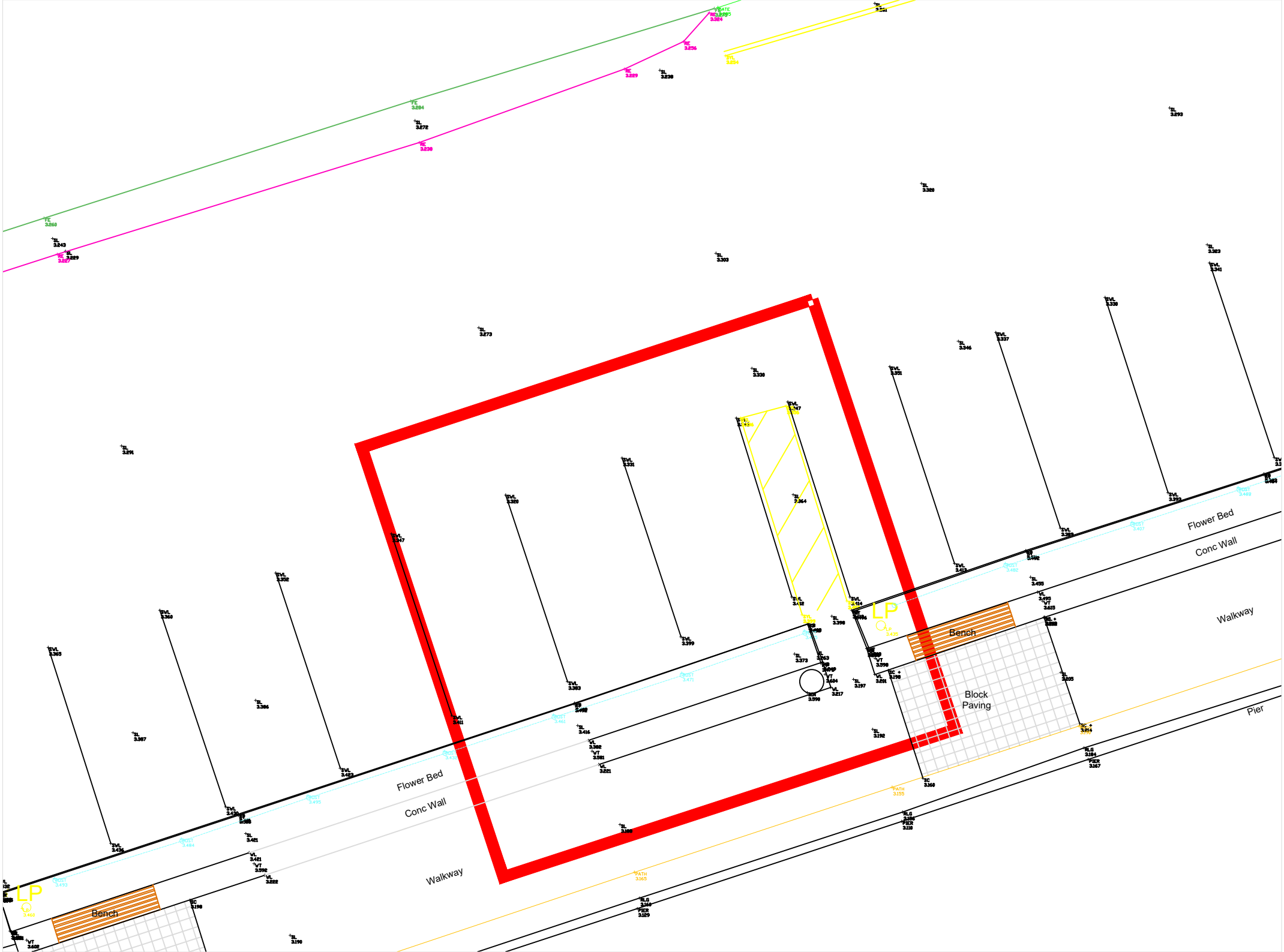
CPIU
Urban Design | Public Realm Team
Senior Architect: Giulia Vallone MRIAI

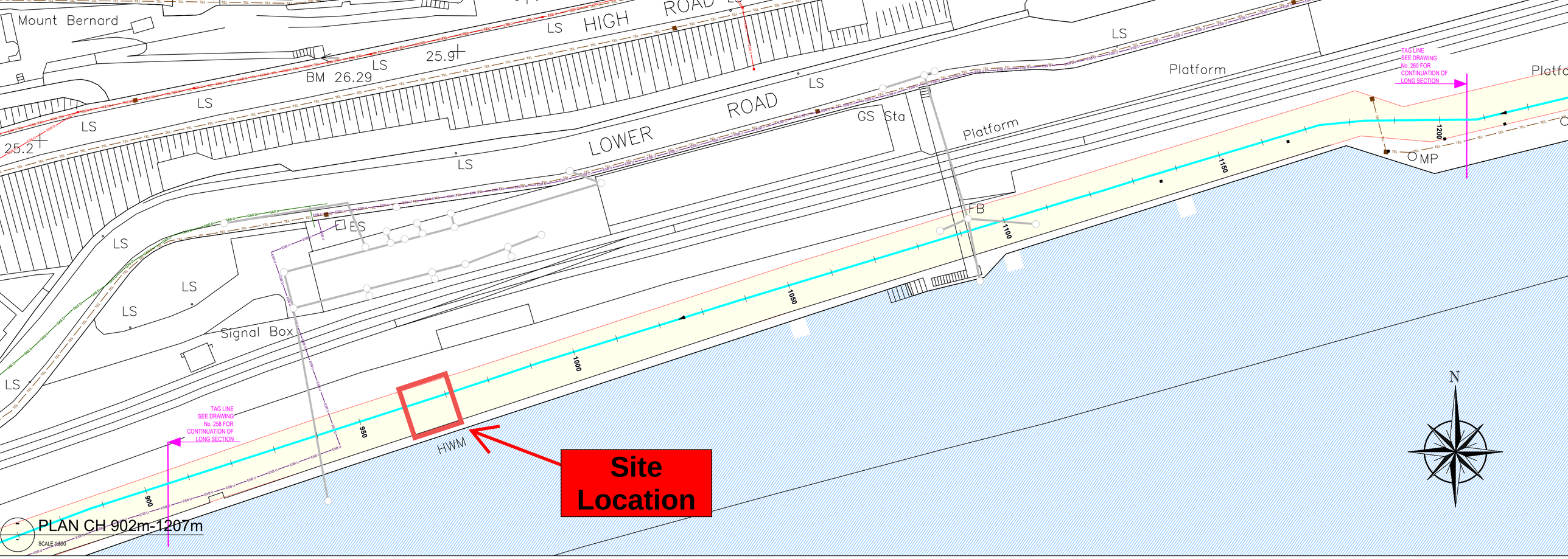
Drawing Title: PROPOSED VISTA FROM SHANTYMAN SCULPTURE SCHEME

Project Title:	SHANTYMAN SCULPTURE SCHEME
Project Stage:	PART 8
Design Team:	G. Vallone MRIAI Senior Architect S. O'Callaghan Architectural Post Graduate A. Polak Architectural Graduate E. Twohig Architectural Graduate
File Path:	Z:\CP_MDCP_MD_S_1907_Cobh\CP_MD_S_1907_Shantyman Sculpture Location\Drawings\04_Auto\CAD\2023.03.28_CPMD_1907_Cobh_SSL_ShantymanSculptureLocation.dwg
Date:	19.05.2023
Scale:	- @A3
Job No:	CPMD- 1907
Dwg No.	402

Appendix B – Topographical Survey


Flower Bed
Conc Wall
Walkway
Bench
Block
Paving
Pier
Flower Bed
Conc Wall
Walkway
Bench

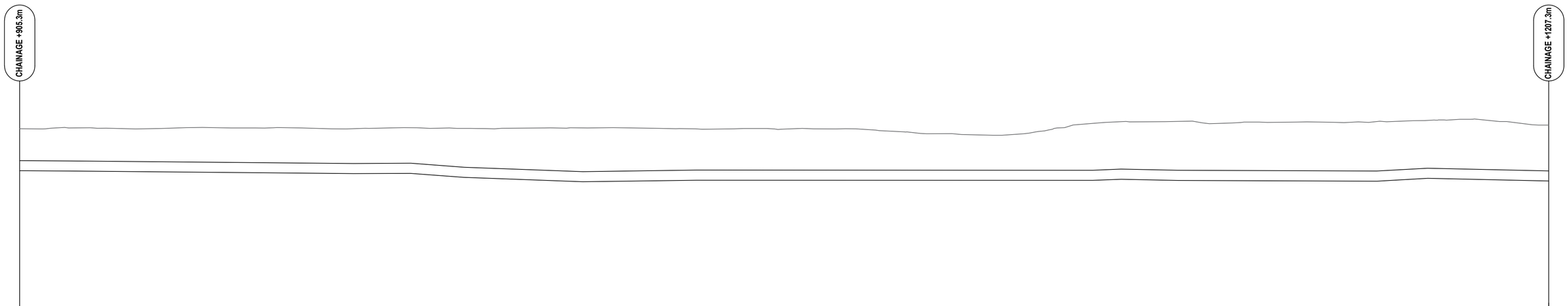
Appendix C – Cork Lower Harbour Main Drainage Project



PLAN CH 902m-1207m

SCALE 1:500

CONSTRUCTED RISING MAIN ▬



DATUM -4m O.D.

GROUND LEVEL	3.31	3.30	3.34	3.31	3.36	3.34	3.34	3.30	3.35	3.34	3.32	3.34	3.35	3.33	3.29
CROWN LEVEL	2.05	2.04	2.03	2.01	1.99	1.97	1.96	1.94	1.94	1.83	1.74	1.66	1.62	1.65	1.68
CHAINAGE	905.3	910	920	930	940	950	960	970	980	990	1000	1010	1020	1030	1040
PIPE DIAMETER & MATERIAL	400mm Ø PVC - O														
TYPE OF GROUND	CAR PARK														
BACKFILL & REINSTATEMENT	CLASS 5B														
BEDDING AND SURROUND	CLASS 1														

GROUND LEVEL	3.32	3.32	3.31	3.18	3.10	3.06	3.33	3.56	3.59	3.52	3.57	3.58	3.58	3.62	3.68	3.57	3.46
CROWN LEVEL	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.69	1.68	1.66	1.65	1.65	1.64	1.71	1.72	1.68	1.64
CHAINAGE	1050	1060	1070	1080	1090	1100	1110	1120	1130	1140	1150	1160	1170	1180	1190	1200	1207.3
PIPE DIAMETER & MATERIAL																	
TYPE OF GROUND															CRUISE LINER BERTH		
BACKFILL & REINSTATEMENT																	
BEDDING AND SURROUND																	

LONGITUDINAL SECTION OLD TOWN HALL PS RISING MAIN

V Scale: 1:100

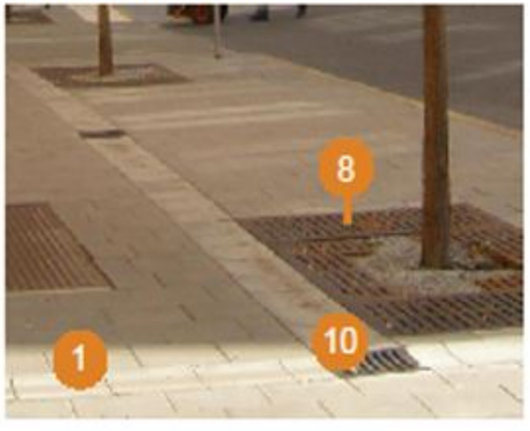
H Scale: 1:500

Appendix D – ‘Stockholm Soil’ Method

Stockholms stad

Structural soil

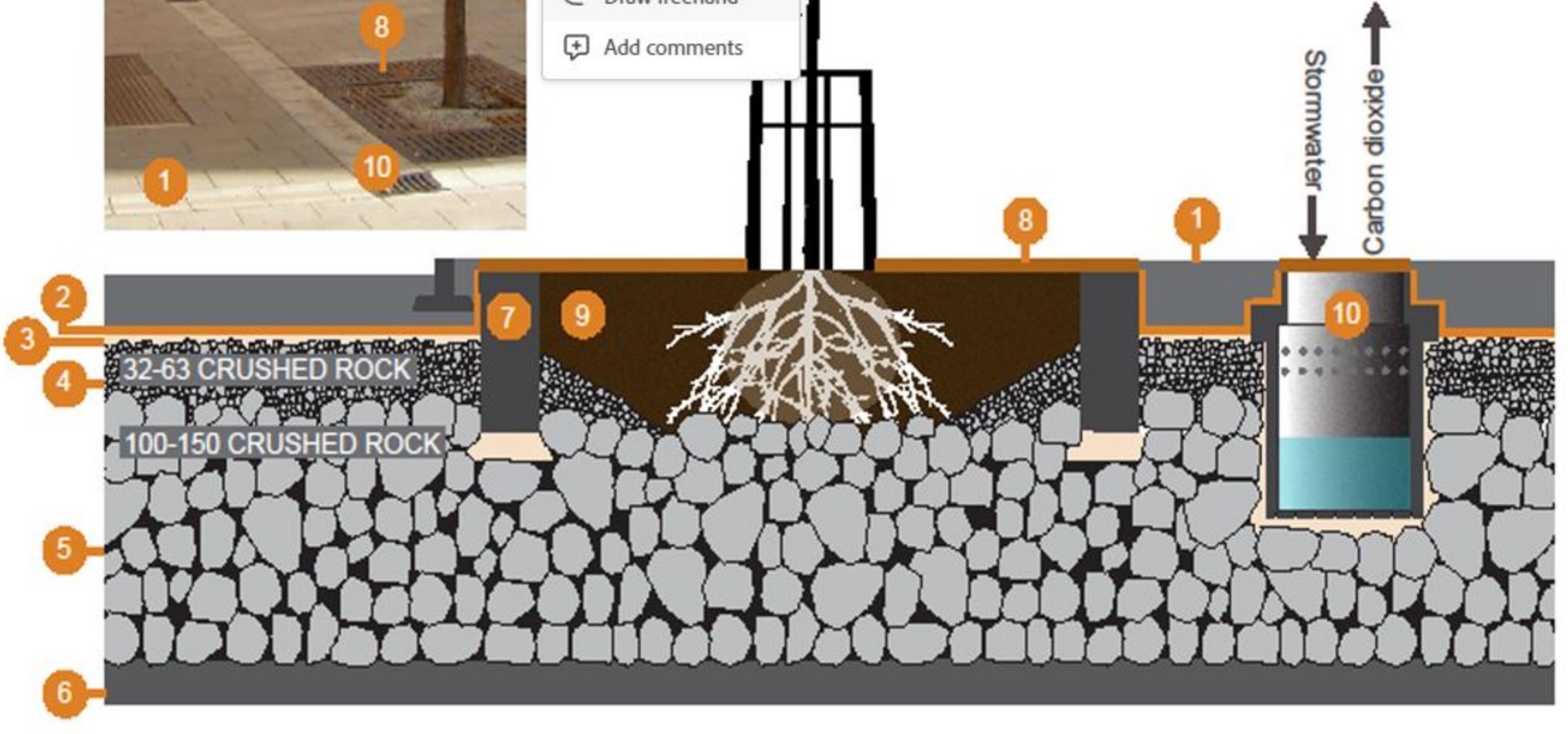
A method for building with stability and to create good growing conditions for trees in paved areas with the use of stormwater and the added value of decreasing the risk of roots damaging paving or underground pipes



1. Paved surface with dished stormwater gutters
2. Geotextile
3. Leveling layer (crushed rock 8-16 mm) – also used for concrete bunker and water/air inlet.
4. Aerated bearing layer (crushed rock 32-63 mm)
5. Structural soil (crushed rock 100-150 mm) with planting soil hosed into the structural volume
6. Terrace
7. Concrete bunker
8. Surface grid
9. Planting soil
10. Inlet for air and water supply

Draw freehand

Add comments



SWECO