Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]

STAGE 6 : EXCAVATION UP TO 7.4M

Ground level [m] LEFT: 0.00 RIGHT: -7.40 Soil zones changed

Water data on LEFT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	-7.90000	0.00000	10.00000

Water data on RIGHT side

No.	Level [m]	Pressure [kN/m²]	Unit wt. [kN/m³]
1	-7.90000	0.00000	10.00000

RESULTS FOR STAGE 6 : Excavation up to 7.4m (DA1-2)

Summary Results

	Node	Level [m]	Displacement [mm]	Moment [kNm/m]	Shear [kN/m]
Top wall node	1	0.00000	115.83	0.0	0.0
Dig level (R)	9	-8.00000	28.474	-649.04	216.14
Max BM	11	-10.64286	8.6359	-1198.2	59.699
Max Shear	13	-13.21429	0.40996	-531.34	-432.75
Wall toe	14	-14.50000	-0.99614	-1.2999E-9	230.82E-12

Results Envelope

Node	Level [m]	Displacements [mm] Min	Displacements [mm] Max	Moments [kNm/m] Min	Moments [kNm/m] Max	Shears [kN/m] Min	Shears [kN/m] Max
1	0.00000	0.00000	115.83044	0.00000	0.00000	0.00000	0.00000
2	-0.80000	0.00000	106.74833	-0.43049	0.02376	-0.07604	3.13931
3	-1.60000	0.00000	97.66733	-5.02290	0.12167	0.00000	11.67724
4	-2.40000	0.00000	88.59289	-19.11407	0.01028	0.00000	27.30185
5	-3.60000	0.00000	75.02986	-63.50506	0.00000	0.00000	50.66993
6	-4.40000	0.00000	66.06419	-114.97133	0.00000	-0.09751	77.36549
7	-5.20000	0.00000	57.21623	-187.28983	0.00000	-2.42911	113.11721
8	-6.80000	0.00000	40.19856	-404.62791	0.00000	-3.99656	169.75794
9	-8.00000	-0.00017	28.47377	-649.04344	0.00000	-35.70162	216.13877
10	-9.35714	-0.00016	17.00689	-959.28331	0.00000	-29.08962	207.19211
11	-10.64286	-0.00009	8.63588	-1198.15162	0.00957	-121.82333	59.69861
12	-11.92857	-0.00004	3.20110	-1112.79425	0.01127	-259.31644	0.00173
13	-13.21429	-0.00002	0.40996	-531.33794	0.00512	-432.75334	0.00438
14	***-14.50000***	***-0.99614***	***0.13920***	***-0.00000***	***0.00000***	***0.00000***	***0.00000***
15	-15.75000	-0.15375	0.12866	-0.00000	0.00000	0.00000	0.00000
16	-17.00000	0.00000	0.00000	-0.00000	0.00000	0.00000	0.00000

Appendix B – AdSec Output

Job number	B2516
Job title	Greenhills Road
Subtitle	Contiguous pile wall design
Calculation heading	900mm dia Section analysis
By	SP
Checked by	KJ

1 Units

The following units are used throughout this calculation.

Force	kN	*Area*	mm^2
Length	m	*Second moment of area*	mm^4
Section dimensions	mm	*Section modulus*	mm^3
Stress	N/mm^2	*Area per unit length*	mm^2/m
Strain	‰	*Angle*	°
Moment	kNm	*Axial stiffness*	kN
Curvature	‰/m	*Bending stiffness*	kNm^2
Density	t/m^3		

2 Design code

The following design code is used: Eurocode 2 (part 1), National Annex: PD6687-1 (2010)

3 Materials

The following materials are used in these calculations.

3.1 Concrete

C30/37

Strength, f_{ck}:	30 N/mm^2
Elastic modulus, E:	32837 N/mm^2
Density, ρ:	2.4 t/m^3

3.2 Reinforcement

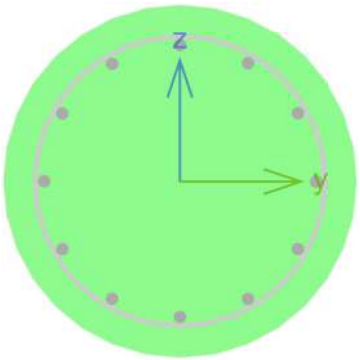
500A

Strength, f_{yk}:	500 N/mm^2

Elastic modulus, E:	200e3 N/mm²
Density, ρ:	7.85 t/m³

4 Sections

4.1 Section 1 (900mm dia)



Definition		*Reinforcement*	
Material	Concrete	*Type*	*Description*
Grade	C30/37	*LINK*	A12
Profile	STD C 900	*PERIMETER*	12A32
Cover	75mm		

4.1.1 Analysis task 1

4.1.1.1 ULS Results Summary

Case	*F_x (kN)*	*M_{yy} (kNm)*	*M_{zz} (kNm)*	*Utilisation*	*Status*
1	0	1258.1	0	99%	✓

4.1.1.2 SLS Results Summary

Case	*F_x (kN)*	*M_{yy} (kNm)*	*M_{zz} (kNm)*	*Cracked?*	*Crack width (mm)*	*EA (kN)*	*EI_{yy} (kNm²)*	*EI_{zz} (kNm²)*
1	0	1258.1	0	**CRACKED**	1.0169	0	273.91e3	0

4.1.2 Analysis task 2

4.1.2.1 ULS Results Summary

Case	*F_x (kN)*	*M_{yy} (kNm)*	*M_{zz} (kNm)*	*Utilisation*	*Status*
1	0	774.4	0	61%	✓

4.1.2.2 SLS Results Summary

Case	F_x (kN)	M_{yy} (kNm)	M_{zz} (kNm)	Cracked?	Crack width (mm)	EA (kN)	EI_{yy} (kNm^2)	EI_{zz} (kNm^2)
1	0	774.4	0	CRACKED	0.2386	0	284.05e3	0

Appendix C – STR Design Calculations

ayesa	Project:	Greenhill Road	Job No.	B2156		
			Made by	SP	Date	24/07/2024
	Calc. Title:	Shear Link Check - 900mm Dia contiguous pile	Checked by	KJ	Date	24/07/2024
			Sheet No.	1 of 1	Rev.	0

DESIGN OF HELICAL LINKS SHEAR REINFORCEMENT IN ACCORDANCE WITH EN 1992, EN 1536 AND FELTHAM* (ARUP - 2011)

Type of Shear Link = Helical
Column or Pile = Pile

Section: 900 mm dia. Pile
Spacing= 1050 mm

C.1 Inputs

Actions on Pile

		ULS			
DESIGN SHEAR, V_{Ed}	=	433	kN/m	454	kN
DESIGN BENDING MOMENT,M_{ed}	=	532	kNm/m	559	kNm
DESIGN AXIAL LOAD, N_{Ed}	=	0	kN/m	0	kN

Pile Resistance

Design Moment Resistance, M_{rd} = 1271 kNm — Moment Resistance Must be entered

Pile Properties

Pile diameter, D	=	900	mm
EC2 Corrected Pile Diameter	=	855	mm
Cover	=	75	mm
Corrected Cover	=	52.5	mm
Main reinf. bar diameter	=	32	mm
No of main reinf. bars	=	12	

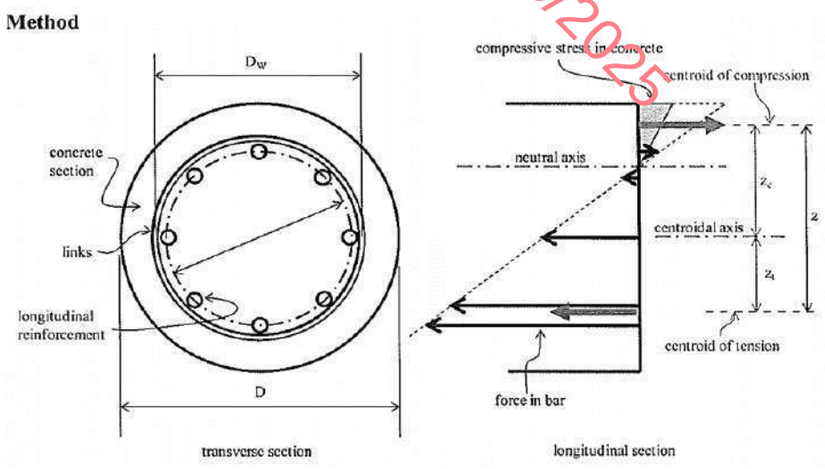
Link Properties

Links diameter	=	12	mm
No. of links per bundle	=	1	
Spacing of circular links, S_w	=	200	mm

Concrete & Reinforcement Properties

Cylinder strength of concrete, f_{ck}	=	30	N/mm²	γ_s = 1.15	partial material factor for reinforcing
Characteristic strength of links, f_{yk}	=	500	N/mm²	γ_c = 1.5	partial material factor for concrete
α_{cc} (1 for shear 0.85 axial load)	=	1		k_f = 1.1	for bored piles without permanent casing
Design value of concrete strength f_{cd}	=	18.2	N/mm²	$f_{cd} = (\alpha_{cc} \times f_{ck})/\gamma_c \times k_f$	

Method



C.2 Determine Inputs Required For Shear Design

Pile Diameter, D	=	855	mm
effective depth d = R(1 + Sinα)	=	648	mm
Diameter of longitudinal reinforcing, D_L	=	694	mm
Diameter to centre of Links, D_w =	=	738	mm
sin α = $2R_s/\pi R$ ∴α	=	0.543	Radians
Area of concrete section used in calculation of $V_{rd,max}$, $\{b_w z\}$	=	344487	mm²

Where $\{b_w z\}$ = 0.6Ac (if $A_s/A_c \geq 0.5\%$, $D_L/D \geq 0.6$ and $f_{ck} \leq 50$MPa)
otherwise $\{b_w z\} = A_C\left(\left(1.3 + 0.2\log_{10}\left[\frac{(E_S \times A_S)}{E_C \times A_C}\right]\right) \times \left(\frac{D_L}{D} - 0.3\right) + 0.6\left(1 - \frac{D_L}{D}\right)\right) \geq 0.4)$

p ≤ 0.5d -->Minimum pitch for contribution of helical links to shear resistance is satisfied

Strength reduction factor for concrete cracked in shear, v_1	=	0.53		Where v_1= 0.6 (1 - f_{ck}/250)
Factor for state of stress in compression chord, α_{cw}	=	1.00		Where α_{cw} = 1 for tension **or** 1 + σ_{cp} for $0 < \sigma_{cp} \leq 0.25 f_{cd}$ **or** 1.25 for $0.25 f_{cd} < \sigma_{cp} \leq 0.5 f_{cd}$ **or** $2.5(1 - \sigma_{cp}/f_{cd})$ for $0.5 f_{cd} < \sigma_{cp} \leq 1.0 f_{cd}$
Factor for interaction of shear and bending on shear area, α_{cMc}	=	1.00		Where α_{cMc} = 1 if $M_{Ed} \leq 0.6 M_{Rd}$ **otherwise** α_{cMs} = $2.5 \times \left(1 - \frac{M_{Ed}}{M_{Rd}}\right) + 18\frac{A_s}{A_c} \times \left(\frac{M_{Ed}}{M_{Rd}} - 0.6\right)$
Efficiency factor for curved links x lever arm, $\{\beta_{cric} z\}$	=	480	mm	Where $\beta_{circ} z$ = 0.65 D_w (if $A_s/A_c \geq 0.5\%$, $D_L/D \geq 0.6$ and $f_{ck} \leq 50$MPa) **otherwise** $\beta_{cric} z$ = $(0.4 + \frac{\frac{D_L}{D}}{1.3 - \log_{10}\left[\frac{E_S A_S}{E_C A_C}\right]}) \times D_w \leq 0.65$
Factor for interaction of shear and bending (spiral links), $\alpha_{cMs,spir}$	=	1.00		Where $\alpha_{cMs,spir}$ = 1 if $M_{Ed} \leq 0.6 M_{Rd}$ **otherwise** $\alpha_{cMs,spir}$ = $2.5 \times \left(1 - \frac{M_{Ed}}{M_{Rd}}\right) + min\left\{2{,}100\frac{A_s}{A_c}\right\} \times \left(\frac{M_{Ed}}{M_{Rd}} - 0.6\right)$
Factor for interaction of shear and bending (circular links), $\alpha_{cMs,circ}$	=	1.00		Where $\alpha_{cMs,circ}$ = 1 if $M_{Ed} \leq 0.6 M_{Rd}$ **otherwise** $\alpha_{cMs,circ}$ = $2.5 \times \left(1 - \frac{M_{Ed}}{M_{Rd}}\right) + min\left\{2.25{,}1.5 + 37.5\frac{A_s}{A_c}\right\} \times \left(\frac{M_{Ed}}{M_{Rd}} - 0.6\right)$

C.3 Determine if Shear Reinforcement is Required

If $V_{Rd,c} > V_{Ed}$ only nominal links required

V_{Ed}	**=**	**454**	**kN**	
$V_{Rd,c}$	=	203	kN	

Detailed shear reinforcement required. Continue to section C.4

$k = 1 + (200/d)^{0.5} \leq 2.0$	=	1.56
$\rho_l = A_{sl}/A_v \leq 0.02$	=	0.0140
$C_{Rd,c} = 0.18/\gamma_c$	=	0.11
k_1	=	0.15
$v_{min} = 0.035\ k^{3/2}\ f_{ck}^{1/2}$	=	0.372
$\sigma_{cp} = N_{Ed}/A_c < 0.2 f_{cd}$	=	0.000000000
$C_{Rd,c}\ k\ (100\ \rho_l\ f_{ck})^{1/3}$	=	0.59

EC 6.2.2
$V_{Rd,c} = [C_{Rd,c}\ k\ (100\ \rho_l\ f_{ck})^{1/3} + k_1\ \sigma_{cp}]\ A_v$
with a minimum of $V_{Rd,c} = (v_{min} + k_1\ \sigma_{cp})\ A_v$

C.4 Determine Concrete Strut Capacity $V_{Rd,}$max cotθ =2.5

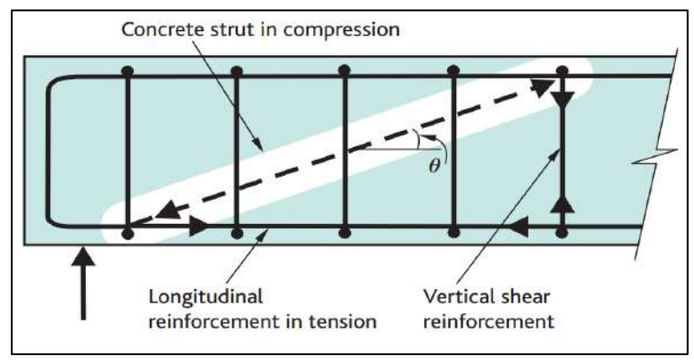
$V_{Rd,max}$ = $(\{b_w z\} \times a_{cw} \times a_{cMc} \times v_1 \times f_{cd})/(\cot\theta + \tan\theta)$ for $1 \leq \cot\theta \leq 2.5$

Case 1	Cotθ =2.5	→	$V_{Rd,max}$ =	1140 kN	***VRd,max > VEd Continue to section C.5 using cotθ = 2.5***
Case 2	Cotθ =1.0	→	$V_{Rd,max}$ =	1654 kN	***VRd,max > VEd OK Continue using calculated θ***

$\theta = 0.5 \sin^{-1}\left(2V_{ed} / (\{b_w z\} \times 0.6 \times \alpha_{cMs} \times \alpha_{cw} \times f_{cd} \times (1 - f_{ck}/250))\right)$

= 7.97 ° = 0.13918921 Radians

cotθ = 7.14



C.5 Calculate Area of Shear Reinforcement A_{sw}

Cot θ = 2.50

$A_{sw} \geq v_{Ed}\ x\ s / 2\ x\ \alpha_{cMs,circ}\ x\ \{\beta_{circ} z\}\ x\ f_{ywd}\ x\ \cot\theta$ = mm² *FOR CIRCULAR LINKS*

$$A_{sw} \geq \frac{V_{Ed} \times p}{\left(1 - \frac{p}{\beta_{circ} \times \pi \times D_w \times \cot\theta}\right) \times \alpha_{cMs,spir} \times \{\beta_{circ} z\} \times f_{ywd} \times \cot\theta \times 2}$$

= 92 mm² *FOR HELICAL LINKS*

A_{sw} *provided* = 113 mm²

Shear reinforcing provided OK, check quantities

Where β_{circ} = 0.72 (if $A_s/A_c \geq 0.5\%$, $D_L/D \geq 0.6$ and $f_{ck} \leq 50$MPa) **otherwise**

$\beta_{circ} = 0.9 \times \left[1 - \left(1 - \frac{D_L}{D}\right)^{2.5 + 0.6\log_{10}\frac{(E_S \times A_S)}{(E_C \times A_C)}}\right]$ = 0.72

C.6 Shear Links Spacing Requirement and Minimum Steel Requirements to EC2

Area of concrete, A_c	=	0.574	m²	
Area of steel (main reinforcement), A_{smin}	=	0.00250	m²	(EN1536:1999 7.6.2.2)
Maximum area of steel, A_{smax}	=	0.02297	m²	(9.2.1.1)
Area of steel provided, $A_{sprovided}$	=	0.00965	m²	**Main reinforcement quantity OK**
Main Reinforcement Spacing	=	150	mm	**Main reinforcing spacing OK**
Shear reinforcing ratio, p_w (circular)	=	0.00157		
Shear reinforcing ratio, p_w (helical)	=	0.00150		
Minimum shear reinforcing ratio, $p_{w,min}$	=	0.00088		**Minimum shear reinforcing provided**

Where p_w (circular) = $\frac{2A_{sw}}{s}\frac{\alpha_{cMs,circ}\{\beta_{circ} z\}}{\alpha_{cMc}\{b_w z\}}$

Where p_w (helical) = $\left(\frac{1 - \frac{p}{\beta_{circ} \times \pi \times D_w \times \cot\theta}}{\sqrt{1 + \left(\frac{p}{\pi \times D_w}\right)}}\right)\frac{2A_{sw}}{p}\frac{\alpha_{cMs,circ}\{\beta_{circ} z\}}{\alpha_{cMc}\{b_w z\}}$

* from internal communication

Appendix D – Designer's Risk Assessment

BYRNELOOBY

Project Risk Assessment of S&H hazards / risk

Engineers Ireland

Designer's assessment of safety and health hazards / risks

Project: Carrigroe Churchtown	**Designer: SP**	**Date:**	24/07/2024
Ref No: B2156_DRA01_00	**Checker: KJ** **Signed:**	**Sheet No:**	24/07/2024

Design Phase (Concept; Preliminary; Detailed or Redesign): Detailed design of Contiguous Pile Wall

Note: review previous phase b/f items

No.	Key construction hazards (or risks) identified	Evaluations. Design decisions made (or alternative actions)
1	Unsuitable Wall Design	Contiguous Pile retaining wall designed in accordance with EC7 and EC2 with recommendations from CIRIA C760 also taken into account. Refer to Ayesa design report B2156-GEO-RP001 for detailed design package and Ayesa B2156 series of drawings.
2	Unforeseen Ground Conditions resulting in excessive deflections, settlements or pile failure.	Contiguous pile retaining wall designed in accordance with relevant SI data as supplied to Ayesa and referenced in design report. Any variations to be communicated to Ayesa immediately. Ayesa have outlined expected ground conditions in Design Report and Design Drawings.
3	Strike of Wells, Underground Tunnels or Buried Services.	Contractor to set up safe system of work and complete review of underground services. Detailed review should be completed by contractor. Special care should be taken for unchartered services.
4	Burial or Engulfment, Falling into Pile Bores, Open Holes and Wet Concrete	Contractor to set up a safe system of works on site and ensure that open holes, pile bores and excavations are adequately highlighted and protected.
5	Ground Movements and Vibartions causing damage to adjacent structures.	Contractor to set up safe system of works and complete a review of expected vibrations/movements in relation to any adjacent properties. Maximum expected displacement is determined for varied retained heights. Contractor to assess the impact of this displacement in relation to the stability of the area behind the Contiguous pile wall.
6	Chemical or biological issues - contaminated ground.	Contractor to set up safe system of work and maintain vigilance in relation to pile arisings. A review of any chemical or environmental testing is outside the scope of the pile design and no comment on risk is given.
7	Working near high voltage power lines causing electric shock of personal.	Contractor to set up safe system of work during works adjacent to overhead lines or operational electrical equipment and note associated risk level.
8	Assembly / Dismantling of Heavy Prefabricated Components (i.e. Pile Reinformcent) causing injury to worker.	Contractor to set up a safe system of works during piling operations on site.
9	Temporary wall support	The temporary passive propping shall be installed based on the construction sequence detailed on the Ayesa suite of drawings. Should the construction sequence deviate from those indicated on the Ayesa drawings, Ayesa shall be informed immediately.
10	Incorrect pile setting out resulting in out of position piles and permanent works	Setting out details to be confirmed by the Engineer. Ayesa drawings are indicative only. Setting out to allow for standard installation tolerances as per ICE specification for piling and embedded retaining walls.
11	Groundwater control during excavation	The Contiguous piles will provide groundwater control during the excavation below pile toe level. Groundwater control below this level is the responsibility of LDCE, as well as assessment of the impact of the dewatering process.

Notes re providing info.	Item Nos. (from above)	Remarks
a) For client's designer	1 - 3	
b) Hazards particular risks	4 - 13	
c) Other particular risks		
d) Re assumed construction		
e) For safety file		
f) In-house: b/f to future stages		

Other parties please take note: These are designer's risk evaluations of design options carried out in-house for the purpose of our complying with

PLEASE COMPLETE AND SAVE ALL PAGES IN STANDARD FOLDER 1c (ref: DRA_yyyymmdd_rev1) AND ENSURE RELEVANT INFORMATION IS COMMUNICATED TO ALL DESIGN TEAM(S) /CONTRACTORS / THIRD PARTIES AS PART OF DESIGNER DUTIES FOR EACH ELEMENT OR STAGE OF THE WORKS

Appendix I – Confirmation of Feasibility (Irish Water – Diversions Department)

Uisce Éireann
Teach Colvill
24-26 Sráid Thalbóid
Baile Átha Cliath 1
D01 NP86
Éire

Uisce Éireann
Colvill House
24-26 Talbot Street
Dublin 1
D01 NP86
Ireland

T: +353 1 89 25000
F: +353 1 89 25001
www.water.ie

Edvinas Valadka
Logan & Donnelly Consulting Engineers,
13 Gardiner Place,
Mountjoy Square,
Dublin 1,
D01V0T8

21 October 2024

Dear Edvinas,

Re: Diversion Reference DIV21274 Diversion enquiry. Subject to contract | Contract denied

Uisce Éireann has reviewed your enquiry in relation to a build-over and diversion of Uisce Éireann's 1200 DI water main and 225mm sewer as part of the proposed Development at as indicated on drawing no. 20189-LDE-ZZ-ZZ-DR-SC-SK003, 20189-LDE-ZZ-ZZ-DR-SC-SK004, B2156-1001 Rev 00, B2156-1001 Rev 00, 20189-LDE-07-00-DR-SC-1C01a, 20189-LDE-07-00-DR-SC-1C01b, 20189-LDE-07-00-DR-SC-1C01c, 20189-LDE-07-00-DR-SC-1C01d, 20189-LDE-07-00-DR-SC-3C02a, 20189-LDE-07-00-DR-SC-3C02b and report no. B2156-AYE-GEO-RP001.

Based upon the details you have provided with your enquiry and as assessed by Uisce Éireann, we wish to advise you that, subject to valid agreement/s being put in place, the proposed build over and diversion can be facilitated.

A deed of easement will be required over the existing 1200mm watermain. A CCTV survey will be required of the existing 225mm sewer to confirm there are no other properties connected to it.

You are advised that this correspondence does not constitute an agreement in whole or in part to provide a diversion or to build near any Uisce Éireann infrastructure and is provided subject to diversion/build over agreement being executed at a later date. You are advised to make contact with the diversions team at diversions@water.ie once planning permission has been granted and prior to any works commencing on site in order to enter into a diversion/build over agreement with Uisce Éireann Water.

If you have any further questions, please contact Niall Byrne from the diversions team on 087 165 7337 or email niall.byrne@water.ie. For further information, visit **www.water.ie/connections.**

Yours sincerely,

Dermot Phelan
Connections Delivery Manager

APPENDIX 15.1

CONSULTED DOCUMENTARY SOURCES

85 Merrion Square, Dublin 2, D02 FX60
+353 (0)1 539 0710 info@hpdc.ie www.hpdc.ie

HUGHES PLANNING
& DEVELOPMENT CONSULTANTS

APPENDIX 15
Consulted Documentary Sources

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APPENDIX 16.1

GENERIC TVIA TERMINOLOGY

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APPENDIX 16A GENERIC TVIA TERMINOLOGY

Terminology	Definition
Access Land	Land where the public have access either by legal right or by informal agreement.
Activity	Activity on site tends to draw the eye whether it is a moving object or light reflection of an object changing with movement and thus the degree of impact is increased. It is sudden changes in contrast ratios that draw the attention of the viewer.
Baseline Studies	Work undertaken to determine and describe the environmental conditions against which any future changes can be measured, predicted or assessed.
Characterisation	The process of identifying areas of similar landscape character, classifying and mapping them and describing their character.
Characteristics	A distinctive element or combination of elements, which make a particular contribution to distinctive landscape character.
Compensation	Measures devised to offset or compensate for residual adverse effects which cannot be prevented / avoided or further reduced.
Cumulative	The additional changes caused by a proposed development in conjunction with other similar Developments or as the combined effect of a set of Developments, taken together.
Cumulative Town /Landscape and Visual Assessment (CLVIA)	The changes to townscape / landscape or visual amenity caused by the proposed development in conjunction with similar Developments or as the combined effect of a set of Developments, taken together.
Designated Landscape	Areas of landscape/ townscape identified as being of importance at international, national or local levels, either defined by statute or identified in Development plans or other documents. e.g., Greenbelt, Conservation Areas, Areas of High Scenic Quality or National Parks
Development	Any proposal that results in a change to the existing landscape and / or visual environment.
Digital Terrain Model	Computerised representation of ground topography in 3D as digital model based on the contour data (either 10m or 50m grid) of the OSI Ordinance Survey Maps.
Direct Effect	An effect that is directly attributable to the proposed development
Distance	The greater the distance, the less detail is observable and the more difficult it is to discern the proposal from its background, diminishing potential impact.
“Do nothing” situation	Continued change/evolution of a landscape in the absence of the proposed development.

Elevation	Viewed from a higher elevation, a proposal is likely to be viewed against a backdrop thus decreasing the degree of impact. Viewed from a lower elevation, a proposal may be seen against the skyline and thus the impact is increased.
Enhancement	Proposals that seek to improve the landscape resource and the visual amenity of the proposed development site and its wider setting, over and above its baseline condition.
Environmental Impact Assessment (EIA)	An Environmental Impact Assessment (EIA) is the process of examining the anticipated environmental effects of a proposed project - from consideration of environmental aspects at design stage, through consultation and preparation of an Environmental Impact Assessment Report (EIAR)
Geographical Information System (GIS)	A system that captures, stores, analyses, manages and presents data linked to location. Its links spatial information to a digital database.
Indirect Effects	Effects that result indirectly from the proposed project as a consequence of the direct effects, often occurring away from the site, or as a result of a sequence of interrelationships or a complex pathway. They may be separated by distance or in time from the source of the effects.
Key Characteristics	The combinations of elements, which are particularly important to the current character of the landscape and help to If the key characteristics which are identified were to change or be lost, there would be significant consequences for the current condition of the landscape.
Land Cover	The surface cover of the land, usually expressed in terms of vegetation cover or lack of it. Related but not the same as Land Use.
Land Use	What land is used for, based on broad categories of functional land cover, such as urban and industrial use and different types of agriculture and forestry.
Landform	The shape and form of the land surface which has resulted from combinations of geology, geomorphology, slope, elevation and physical processes.
Landscape	An area, perceived by people, the character of which is the result of the action and interaction of natural and / or human factors.
Landscape and Visual Assessment (LVA)	A tool used to identify and assess the likely significance of the effects of change resulting from Development both on the landscape as an environmental resource in its own right and on people's views and visual amenity.
Landscape Character	A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse.
Landscape Character Areas (LCA)	Landscape Character Area as defined in local or regional policy guidance. These areas that have been determined to be single unique areas that are distinct geographically or of a particular landscape type. Every LCA is geographically specific and has its own distinctive character and sense of place based upon

	patterns of geology, landform, land-use, cultural, historical and ecological features.
Landscape Capacity	The degree to which a particular landscape character type or area is able to accommodate change without significant effects on its character or overall change to the landscape character type.
Landscape Constraints	Components of the landscape resource such as views or mature trees recognised as constraints to Development.
Landscape Effects	Effects on the landscape as a resource in its own right.
Landscape Elements	Individual components, which make up the landscape such as trees and hedgerows.
Landscape Features	Particularly prominent or eye-catching elements in the landscape such as tree clumps, church towers or wooded skylines.
Landscape Patterns	Spatial distributions of landscape elements combining to form patterns, which may be distinctive e.g., hedgerows that combine to form a distinctive field pattern.
Landscape Quality / Condition	A measure of the physical state of the landscape. It may include the extent to which typical character is represented in individual areas, the intactness of the landscape and condition of individual elements.
Landscape Value	The relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a variety of reasons.
Landscape Resource	The combination of elements that contribute to landscape context, character and value.
Magnitude (of effect)	A term that combines judgements about the size and scale of the effect, the extent the area over which it occurs, whether it is reversible or irreversible and whether it is short or long term in duration.
Mitigation	Measures including any process, activity, or design to avoid, reduce, remedy or offset for potential adverse environmental effects arising from a proposed development.
Perception	Combines the sensory (that we receive through our senses) with the cognitive (our knowledge and understanding gained from sources and experiences)
Photomontage	A visualisation which superimposes an image of the proposed development upon a photograph or a series of photographs.
Receptors	Defined aspects of the landscape resource that have the potential to be affected by a proposal.

Seascape	Landscapes with views of coast or seas, and coasts and adjacent marine environments with cultural, historical and archaeological links with each other.
Sensitivity	A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or Development proposed and the value related to that receptor.
Significance	A measure of the importance or gravity of the environmental effect, defined by significance criteria specific to the environmental topic.
Townscape	The character and composition of the built environment including the buildings and relationships between them, the different types of urban open space, including green spaces, and the relationships between buildings and open spaces.
Tranquillity	A state of calm and quietude associated with peace, considered to be a significant asset of landscape.
Visual Amenity	The overall pleasantness of the views people enjoy of their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of the people living, working, recreating, visiting or travelling through the area.
Visual Effects	Effects on specific views and the general visual amenity experienced by people.
Visual Receptors	Individuals and / or defined groups of people who have the potential to be affected by the proposal.
Visual Reference Points	Abbreviated to VRP, these are selected locations of viewpoints within the study area towards the proposal that allow analysis of the existing and proposed visual setting.
Combined Views	This occurs when the observer is able to see two or more Developments from one viewpoint and within the same arc of vision.
Successive Views	This occurs where the observer has to turn their head to see the various Developments.
Sequential Views	This occurs when the observer has to move to another viewpoint to see the same or different Developments (i.e., when moving through the landscape).
Size	The greater the proportion of the view taken up by the proposed development the greater the impact. Camouflage brought about by form and colour can alter the degree of impact.
Visualisation	A computer simulation, photomontage or other technique illustrating the predicted appearance of a Development.
Wireframe	A computer generated line drawing of the DTM (digital terrain model) and the proposed development from a known location.

Weather conditions	Visibility is affected by the sun direction during different times of the day. It is also affected by clarity of air. For example, on a bright and sunny morning after a frosty night the air tends to be clear. This is in contrast to a heat haze, which may be experienced during summer months.
Zone of Theoretical Visibility	Often abbreviated to ZTV, this is a digitally produced map showing the areas of land within which a Development is theoretically visible.

APPENDIX 16.2

VISUALISATIONS AND PHOTOMONTAGES

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Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12

CGIs, Aerials and Verified Views

LRD Stage 02: Opinion Stage Application

Applicant: Steeplefield Limited

February 2025

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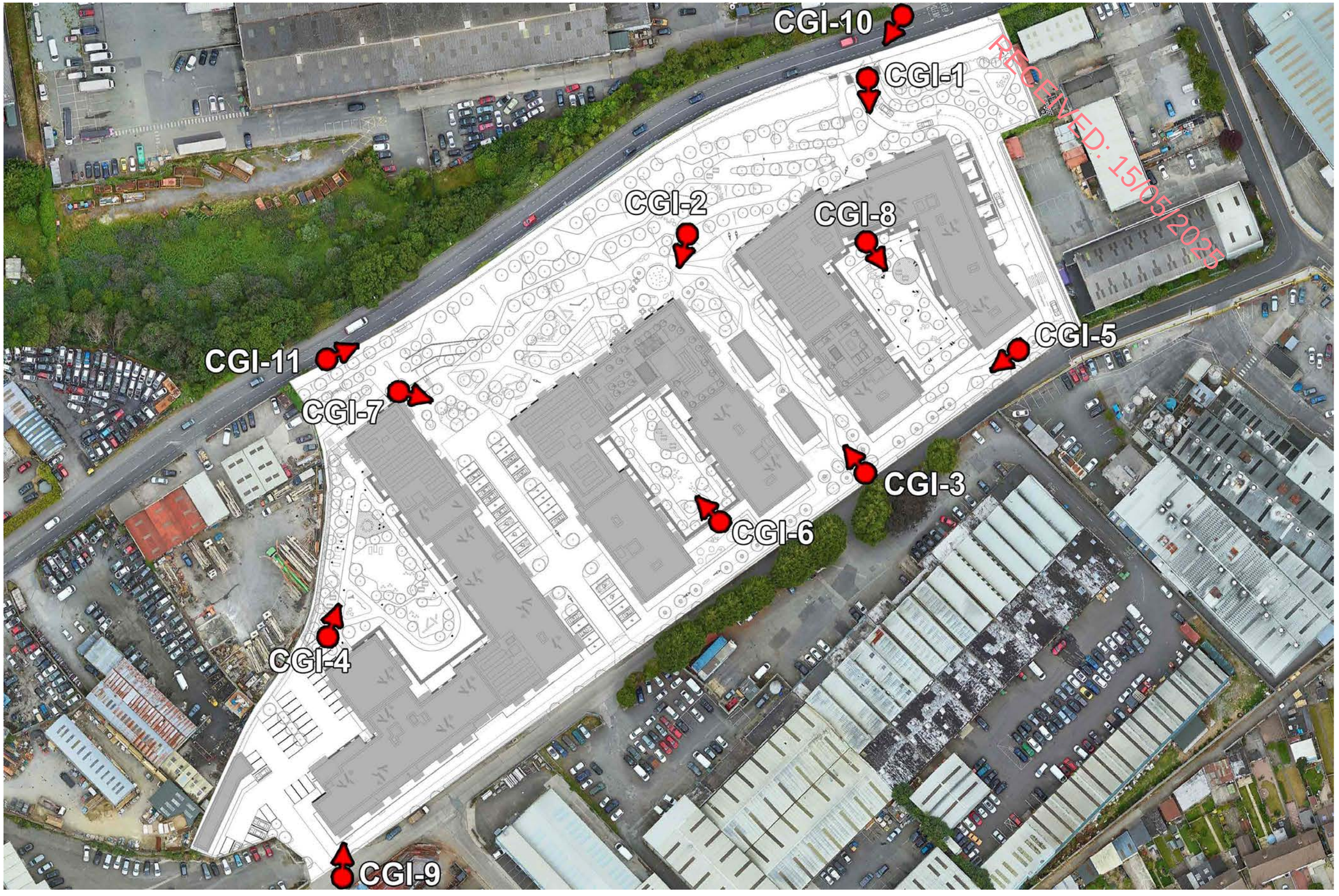

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: CGI Location Map
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: CGI 1
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: CGI 2
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: CGI 3
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: CGI 4
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: CGI 5
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: CGI 6
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: CGI 7
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: CGI 8
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: CGI 9
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: CGI 10
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	**Applicant Name: Steeplefield Limited**	**Image Title: CGI 11**
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Approximate Location for Aerial Views
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Aerial 1
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Aerial 2
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	**Applicant Name: Steeplefield Limited**	**Image Title: Viewpoint Location Map**
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 369m	Date & Time: 22/02/202109:12:21

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Baseline VVM 1
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 369m	Date & Time: 22/02/202109:12:21

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Proposed VVM 1
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 132m	Date & Time: 22/02/202110:05:55

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Baseline VVM 2
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 132m	Date & Time: 22/02/202110:05:55

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Proposed VVM 2
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 243m	Date & Time: 22/02/202110:14:54

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Baseline VVM 3
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 243m	Date & Time: 22/02/202110:14:54

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Proposed VVM 3
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 341m	Date & Time: 22/02/202110:31:20

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Baseline VVM 4
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 341m	Date & Time: 22/02/202110:31:20

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Proposed VVM 4
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 26mm	Approx Dist: 670m	Date & Time: 22/02/202110:45:55

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Baseline VVM 5
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 26mm	Approx Dist: 670m	Date & Time: 22/02/202110:45:55

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Proposed VVM 5
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 344m	Date & Time: 22/02/202111:23:33

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Baseline VVM 6
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 344m	Date & Time: 22/02/202111:23:33

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Proposed VVM 6
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 581m	Date & Time: 22/02/202111:43:14

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Baseline VVM 7
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 581m	Date & Time: 22/02/202111:43:14

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Proposed VVM 7
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

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Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Baseline VVM 8
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 378m	Date & Time: 22/02/202112:08:10

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Proposed VVM 8
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 981m	Date & Time: 22/02/202112:59:23

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Baseline VVM 9
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 981m	Date & Time: 22/02/202112:59:23

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Proposed VVM 9
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 342.5m	Date & Time: 22/02/202113:19:05

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Baseline VVM 10
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 342.5m	Date & Time: 22/02/202113:19:05

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Proposed VVM 10
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 28mm	Approx Dist: 805m	Date & Time: 22/02/202113:55:21

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Baseline VVM 11
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 28mm	Approx Dist: 805m	Date & Time: 22/02/202113:55:21

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Proposed VVM 11
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF16-35mmf/4LISUSM	Focal Length: 16mm	Approx Dist: 48m	Date & Time: 10/11/202113:28:04

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Baseline VVM 12
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF16-35mmf/4LISUSM	Focal Length: 16mm	Approx Dist: 48m	Date & Time: 10/11/202113:28:04

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Proposed VVM 12
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF16-35mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 36m	Date & Time: 10/11/202113:15:17

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Baseline VVM 13
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF16-35mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 36m	Date & Time: 10/11/202113:15:17

Project Title: Former Chadwicks Site, Greenhills Road, Walkinstown, Dublin 12	Applicant Name: Steeplefield Limited	Image Title: Proposed VVM 13
	Imagery by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

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APPENDIX

Methodology
Verified Views Montages (VVM)

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1.Overview

This methodology has been prepared by 3D Design Bureau to explain the production of Verified View Montages (VVM). The preparation and presentation of reliable verifiable visual information is a key component to the writing of Landscape Visual Impact Assessment reports. It should be noted that VVMs are technical images and should be produced and used in a technically appropriate manner.

This booklet maybe accompanied by the inclusion of a number of CGIs from various viewpoint locations within the proposed site. These have been produced to give a better understanding of the design intent from a close range perspective. Whilst we have included soft landscaping that reflects the proposed design as close as possible, artistic license may have been used for certain planting and trees with regard to species, size and exact locations.

2.What Is A Verified View Montage

A Verified View Montage (VVM) is an accurate visual representation of the potential impact (or lack there of) that a proposed development may have on its surrounding environment when constructed. VVMs are produced using technical scientific verification methods, through the use of photography, surveying, 3D modelling, rendering and post-production.
Verified View Montages work by using the correct geospatial insertion of accurate and detailed digital 3D models in the existing landscape allowing for a photorealistic view of the planned development in its intended location.
The correct combination of all these fields of expertise will deliver a result in which we believe and trust to be accurate for official usage by the client for their intended purposes (ex. Planning applications, impact studies,...).

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3.Methodology

3.1 Project Planning

Following appointment to the project, a desktop study is carried out with a full list of suggested views being drawn up for review prior to visiting the site. This is carried
out between 3D Design Bureau, the client, and the planning consultant.

Note: If a LVIA report is being written by a third party (landscape architect or planning consultant), the medium to long range views will be guided by them. After obtaining a full list of viewpoint locations, it is reviewed, checked and a plan for the taking of baseline photographs is put in place.
Note: 3D modelling of the proposed scheme can, and usually is, commenced prior to the photographic site visit.

3.2 Data Capture: High Resolution Baseline Photography

Every baseline photograph is captured in raw settings using a high-resolution digital SLR camera. This allows for the maximum possible information to be retained in the digital file. It also avoids the file being altered by any internal camera processing definitions, which retains the maximum control and fidelity on the end results.

The focal lengths used depend on the surrounding context and proximity to the subject site. 3D Design Bureau use high quality lenses with focal lengths that allow for capturing enough surrounding context without compromising quality and fidelity, by avoiding excessive barrelling, distortion, or aberrations. All shots are taken horizontally with the use of a 50mm lens (where possible) and wider angle also.

Note: Although the 50mm focal length represents the perceived scale of the human eye, it does not represent the human field of view and therefore should not necessarily be used to show the proposed development in its context. Peripheral vision needs to be accounted for and whilst the 50mm lens option is recommended in the *British Landscape Institute Technical Guidance Note*, this does not take into account the dynamic movement of the human eye.

Furthermore, panoramic VVMs are described in the *British Landscape Institute Technical Guidance Note*. 3DDB do not produce these type of VVMs as they are made up of a series of individual VVMs stitched together. The stitching process is a non repeatable action which can result in different outputs of the same image each time. Therefore accuracy and verifiability can be called into question.

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3.Methodology

3.2 Data Capture: High Resolution Baseline Photography (cont`d)

Each photo location is correctly recorded and marked as follows

On-Site:

The tripod location on site is paint marked and photographed in relation to existing elements. (Fig 1 below)
The location of each photo is manually marked on a printed map while on site.
The camera height is recorded.

In-Studio:

All photographs go through post processing back in the studio. The full set of photos along with a viewpoint location map (Fig 2 below) are issued to the client for review and to choose the best shots that will demonstrate the visual impact that the proposed scheme may/may not have. For each photo at each location, two focal lengths will be issued – the 50mm option and a wider field of view option. The most appropriate shot will be chosen depending on the surrounding context and location of the shot. See earlier section 3.2 for further explanation.

Fig.1: Camera Location marked and photographed.

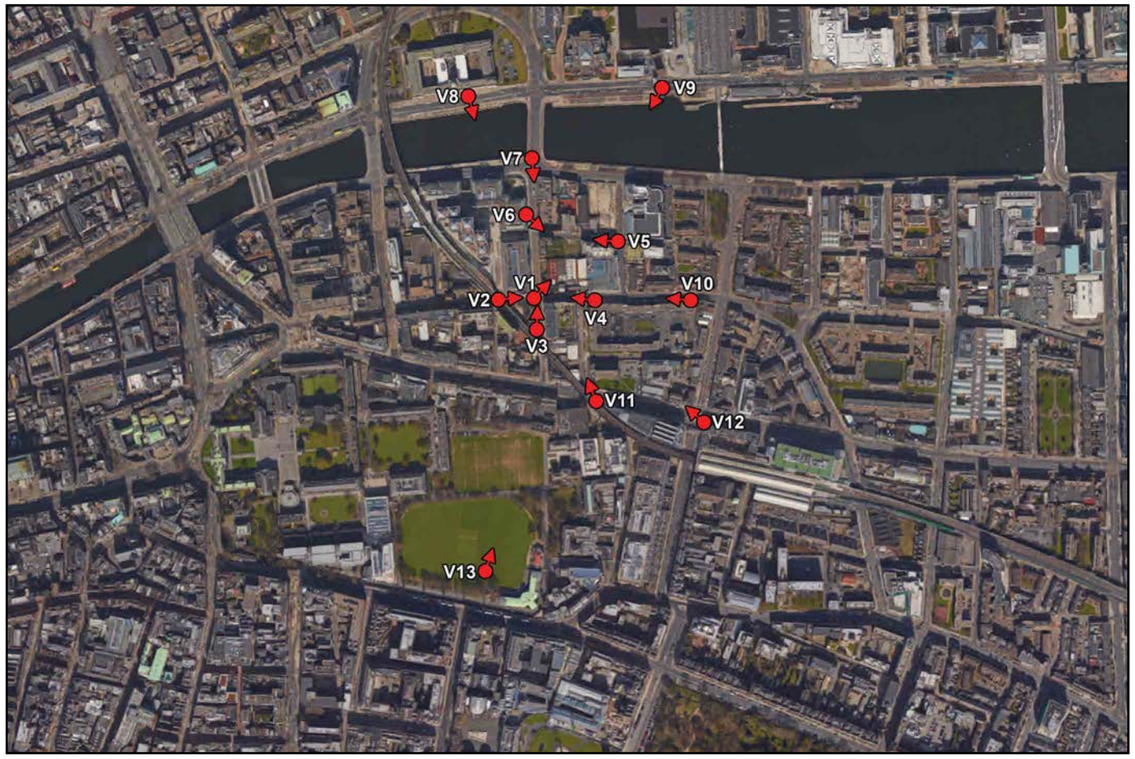

Fig.2: Viewpoint location map post site visit.

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3.Methodology

3.2 Data Capture: High Resolution Baseline Photography (cont`d)

Sample baseline photographs prior to selection and prior to marking up for surveying.

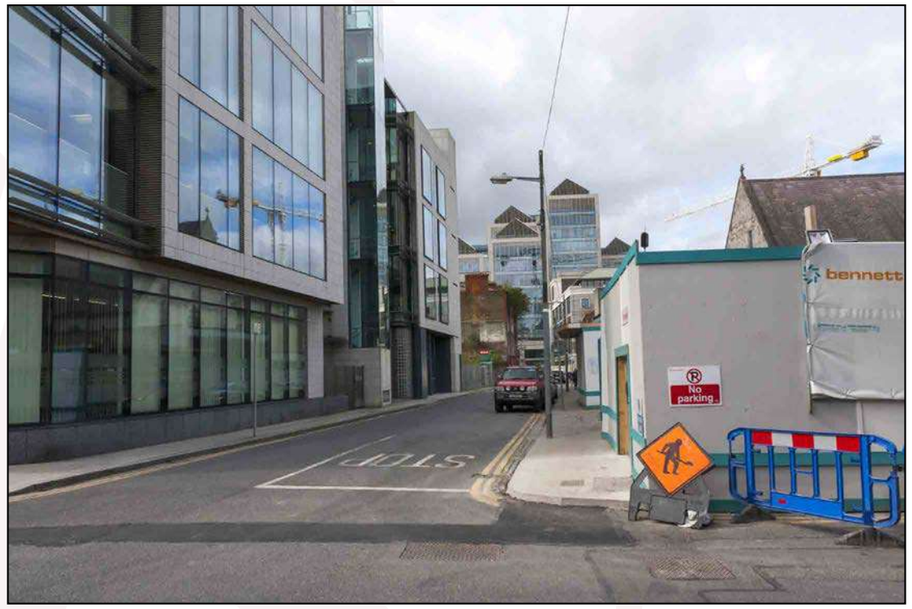

Fig.3: Baseline photo for view 5

Fig.4: Baseline photo for view 3

Fig.5: Baseline photo for view 4

Fig.6: Baseline photo for view 9

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3.Methodology

3.3 Baseline Photo Surveying

When all baseline photos are chosen for the VVMs, each one is marked up in studio as per Fig 7 below. Fixed reference points within each photo, such as parapet heights, kerbing, lamp posts etc are coloured coded on the baseline photos. All ‘marked up’ baseline photos are then issued to our qualified topographical surveyor for surveying purposes.
The survey team records the camera/tripod position using GPS and Total Station to an accuracy of +/-1cm Northing and Easting and to an accuracy of +/- 2cm Elevation. The ‘marked up’ fixed reference points identified in each photo are then surveyed to establish exact orientation of the view and to verify the photomontage process. (Fig 8 below). This survey data is later modelled and included in the digital 3D model of the proposed development. (See section 3.4)

Fig.7: Fixed reference points marked for surveyour.

Fig.8: Fixed reference points surveyed and numbered by surveyor.

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3.Methodology

3.4 3D Modelling & Visualisation

3D Modelling

An accurate digital 3D model of the ‘proposed’ development is produced using 3D software of choice. All of 3D Design Bureau’s 3D modelling is carried out within AutoDesk’s Revit. The digital 3D model is created from a combination of the third party architectural, engineering and landscape drawings. All proposed model information is contained in the one file and it is always positioned relative to the existing topographical site survey information supplied.
The ‘marked up’ fixed reference points (see section 3.3) which have been surveyed, are also modelled along with any other relevant survey information from the supplied topographical survey drawings. As stated above, the proposed 3D model and survey 3D model information are geospatially positioned relative to one another. This is imperative to ensure the accurate positioning and camera matching of the proposed digital 3D model within each chosen photo.

Visualisation

Once the digital 3D Revit model is complete, it is handed over to the 3D visualisation team for production. This stage of production involves matching of textures & finishes, lighting conditions and asset population for the proposed scheme. This ensures the accurate visual representation of the digital 3D model is as close as possible to the intended future ‘As Built’ development. Note: For accurate camera matching of the digital model to the baseline photography (which can take place prior to the visualisation process) please see Section 3.5. There are various 3D visualisation software’s that are widely used for this stage of production. 3D Design Bureau use Autodesk 3D Studio Max as its main software for the visualisation process. This is accepted as the leading industry standard for architectural visualisation work and production of VVMs.

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3.Methodology

3.4 3D Modelling & Visualisation

Fig.8: Digital 3D model including the fixed reference points

Fig.9: Fixed reference points surveyed and numbered by surveyor.

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3.Methodology

3.5 Camera Matching / Rendering / Post Production

Following the completion of the 3D visualisation process, Section 3.4, (but in some instances prior to this) the following methodology is applied to ensure views are verifiable.

Camera Matching

All of the information recorded at the time of the baseline photographic site visit, that is, camera co-ordinates, angle of view, and direction of view, is programmed into the virtual camera within the 3D software package of choice - 3D Studio Max. Insertion of digital cameras within the software, with the matching attributes of the physical camera, is carried out. All elements of the photo survey, that have been surveyed and included in the digital model and geolocated relative to the proposed development are a key component to the camera matching process. This careful methodology ensures that the size, position, and height, of the proposed development in each VVM is correct to an accuracy of 0.33% i.e. +/- 1mm on an A3 print.

Rendering

Following the camera matching and 3D visualisation process the views are ‘rendered’ at high resolution and placed onto its matching baseline photograph using Adobe Photoshop software. The mathematical accuracy is then double checked and verified by ensuring that existing ‘marked up’ fixed reference p point features, which were also rendered, line up exactly in the baseline photo.

Post Production

Post production for all views is the last stage in the VVM process. The VVM specialist establishes which existing features such as buildings, landscape and trees, are in the foreground of the proposed development and those that are in the background, i.e. which features will mask the development and which ones will appear behind the development. When it is found that the development is not visible due to foreground features, its extremities will be indicated with a red outline. Furthermore on wide angle chosen views, the extent of 50mm lens is identified on the shot.

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3.Methodology

3.5 Camera Matching / Rendering / Post Production

Fig.10: Fixed reference points for surveyor on Baseline untreated photo.

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3.Methodology

3.5 Camera Matching / Rendering / Post Production

Fig.11: Fixed reference points modelled, rendered and overlaid on baseline photo confirming accuracy

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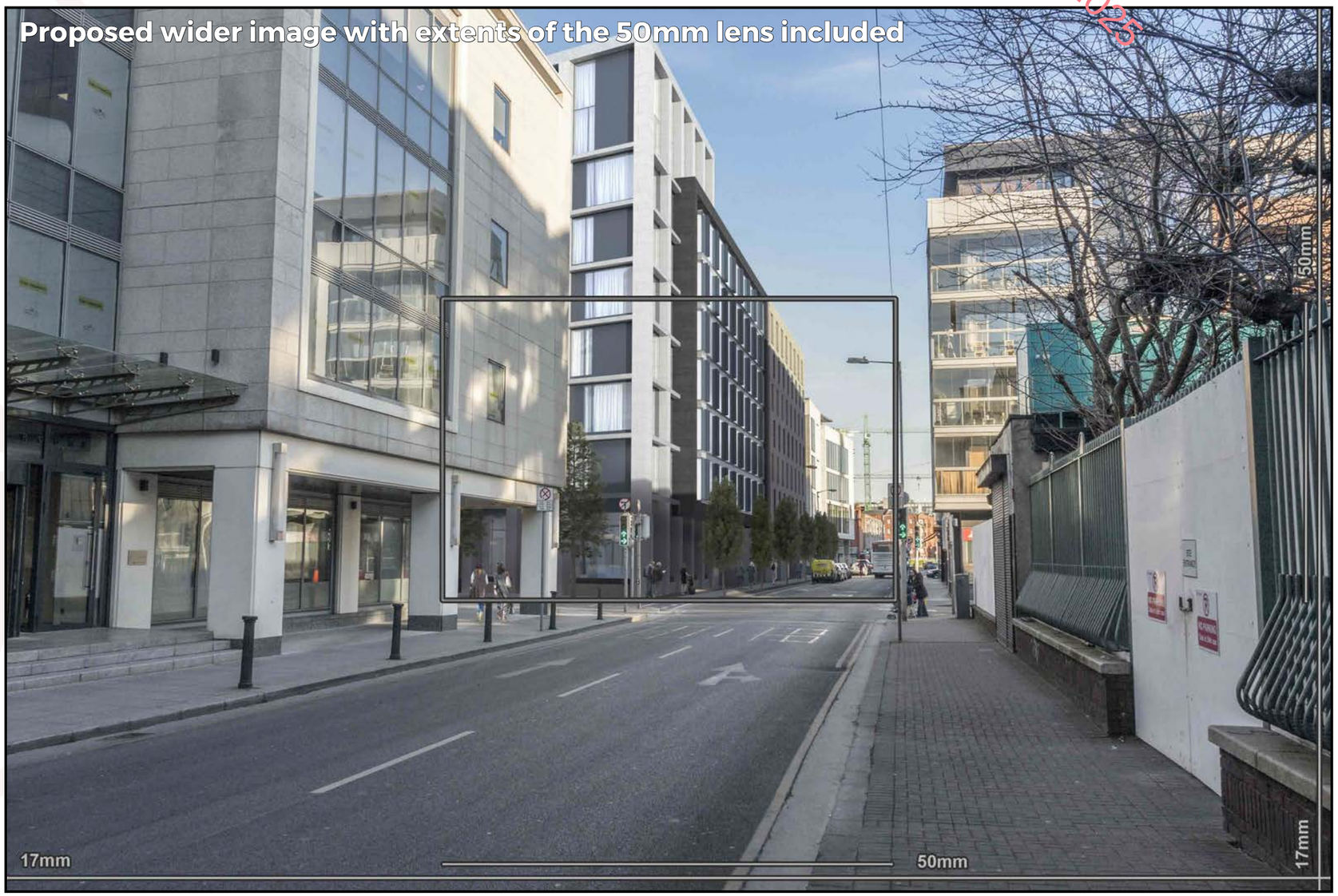
4. Results

The resulting VVM, having gone through this extensive procedure, is classed as an accurate and verifiable representation of the proposed development as viewed from the selected photo locations. This shows, as closely as possible, any future impact a proposed development may have on the surrounding environment and existing buildings. It should be noted that the foundation of any Landscape/Townscape Visual Impact Assessment (LVIA / TVIA) report are accurate verified view montages.



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