Knockrabo

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Contract

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This report describes work commissioned by Knockrabo Investments DAC, by an instruction dated 3rd May 2024. Knockrabo Investments DAC representative for the

contract was Shirley Adamson. Tom Sampson and Jemima Kivikoski of JBA Consulting carried out this work.

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Abbreviations

AEP	Annual Exceedance Probability
CDP	County Development Plan
CFRAM	Catchment Flood Risk Assessment and Management
DEBP	Dublin Eastern By-Pass
DLRCC	Dún Laoghaire-Rathdown County Council
DoHELG.....	Department of the Environment, Heritage, and Local Government
DTM	Digital Terrain Model
FB	Freeboard
FFL	Finish Floor Levels
FRA.....	Flood Risk Assessment
FSR	Flood Studies Report
GHG	Greenhouse Gas
LiDAR.....	Light Detection and Ranging
LRD	Large-scale Residential Development
NAF	National Adaptation Framework
NDC	Nationally Determined Contribution
NIFM	National Indicative Fluvial Mapping
NMP	National Mitigation Plan
NPF	National Planning Framework
nZEB	Nearly Zero Energy Building
OPW	Office of Public Works
PFRA	Preliminary Flood Risk Assessment
RR	Rainfall-Runoff
SDG	Sustainable Development Goal
SFRA	Strategic Flood Risk Assessment
SI	Statutory Instrument
SuDS	Sustainable Urban Drainage System
TGD	Technical Guidance Document
UNFCCC	United Nations Framework Convention on Climate Change
WL	Water Level

1 Introduction

1.1 Background

JBA Consulting was commissioned by Knockrabo Investments DAC to carry out a Climate Impact Assessment for the Proposed Knockrabo Large-scale Residential Development (LRD) at lands in Knockrabo, Mount Anville Rd, Roebuck, Dublin.

This Climate Change Impact Assessment Report considers the potential impact of climate change on the Proposed Development and whether the design demonstrates adequate climate mitigation and resilience to climate change related impacts in accordance with the Development Management Thresholds Information Document prepared by Dun Laoghaire Rathdown County Council (DLRCC).

The thresholds information document acts as a guideline to assist applicants in relation to the documents they may be required to submit as part of their planning application. It includes a Climate Change Impact Assessment for developments with '*50 residential units or more' and 'all other developments measuring 1,000 sq.m GFA and above*'.

The Thresholds Information Document indicates that a Climate Change Impact Assessment should include '*an assessment of the impacts of climate change on the development and provisions for these impacts in particular relating to drainage design*'.

This Climate Impact Assessment Report therefore assesses the impact of climate change on the Proposed Development and ensures that the policies and objectives outlined in the DLRCC County Development Plan (CDP) 2022-2028 in relation to climate change and climate change protection measures and DLRCC Climate Action Plan (CAP) 2024-2029 have been incorporated into the Proposed Development design.

1.2 Climate Change

It is widely recognised that the Earth's climate is changing at a pace exceeding normal variation. This is primarily attributed to a rise in Greenhouse Gas (GHG) emissions as a result of human activity[1]. It is now likely that global temperature will warm by 1.5°C by 2050 resulting in more extreme weather patterns and prompting severe weather events. Changes in Irelands climate mirror the global trend, which is evident in temperature records broken annually, alongside an increase in flood and storm events incurring significant environmental, social, and economic impacts and losses.

[1] Climate Change: Synthesis Report Summary for Policymakers, Intergovernmental Panel on Climate Change, 2023

Severe weather across the country has exposed the vulnerability of all sectors and highlights a national adaptation deficit[2]. Policy response across sectors must now address the causes and consequences of climate change through a reduction of emissions in parallel with adaptation actions. Mitigation and adaptation are inherently linked, and it is important to recognise that achieving net-zero will not prevent the continued changes in the climate system with multi-decadal or longer feedback times. Adaptation is crucial for future sustainable development and climate resilient communities.

1.3 Policy Context

1.3.1 International

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty adopted in May 1992. The framework's objective is "*to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system*". Although no binding limits on emissions or enforcement procedures were enacted, the framework formed the foundation for future climate policy.

Within the context of the UNFCCC, the Kyoto Protocol (2005) and Paris Agreement (2016) made more meaningful steps by setting binding emissions targets and the long-term objective to limit global temperature rise to 1.5°C. The Paris Agreement stipulates that countries must submit Nationally Determined Contributions (NDCs) every 5 years which most often take the form of national climate action plans (CAPs). Through these plans, countries communicate how they will reach the goals of the Agreement through increasingly ambitious climate objectives and rigorous adaptation action across sectors.

In 2015, the UN published the Agenda for 2030 identifying the 17 Sustainable Development Goals (SDGs). While not legally binding, the SDGs represent global ambition to sustainable development and offer a roadmap of practical guidance for the international community.

1.3.2 European[3]

The European Green Deal was published in 2019 affirming the 1.5°C objective of the Paris agreement and defining actions for the implementation of SDGs. Borne from this are several pieces of key legislation, including:

[2] Ireland's Climate Change Assessment: Synthesis Report, Environmental Protection Agency, 2023

[3] Cifuentes-Faura J. European Union policies and their role in combating climate change over the years. Air Qual Atmos Health. 2022;15(8):1333-1340. doi: 10.1007/s11869-022-01156-5. Epub 2022 Jan 8. PMID: 35035604; PMCID: PMC8742565.

- The European Climate Law which commits the EU to achieving climate neutrality by 2050.
- The Fit for 55 Package which included revisions to the Renewable Energy Directive (2009/28/EC) and the Energy Efficiency Directive (EU/2023/1791).
- The Circular Economy Action Plan sets binding targets for Member States for waste reduction, use of recycled materials, and recycling rates.
- The Biodiversity Strategy promotes the integration of biodiversity considerations into the planning process.

The 2013 EU Strategy on Adaptation to Climate Change encouraged all Member States to adopt comprehensive adaptation strategies. It sought better informed decision making through the identification and addressing of gaps in knowledge about adaptation. The European Climate Adaptation Platform Climate-ADAPT, was developed as a resource to help users access and share information on adaptation.

The Global Covenant of Mayors for Climate and Energy is one of several initiatives set up in the wake of the Green Deal and UN Sustainable Agenda. It is a network of voluntary participants of cities and local governments committed to creating a low emission, resilient society. The Global Covenant of Mayors for Climate and Energy consolidated the Compact of Mayors and the EU Covenant of Mayors in 2017 bringing together over 9,000 cities and local governments into a single international body.

DLRCC is a signatory to the EU Covenant of the Mayors for Climate and Energy Initiative which commits them to achieving a 40% reduction in their regions' GHG emissions by 2030.

1.3.3 National

The principal climate legislation in Ireland is the Climate Action and Low Carbon Act 2015 (as amended), herein referred to as 'the Act'. The Act was amended by the Climate Action and Low Carbon Amendment Act in 2021 which strengthened governance mechanisms and commits to bolder climate targets in line with the European Climate Law. Legally binding targets of the Act are:

- A 51% GHG emission reduction by 2030 and;
- A climate neutral economy by 2050.

Under the Act, the National Mitigation Plan (NMP) and National Adaptation Framework (NAF) were published in 2017 and 2018 and address the causes and consequences of climate change in Ireland, respectively.

Aligned to both the NMP and NAF, the National Planning Framework (NPF) also named "Project Ireland 2040", was published in 2018 which integrates climate adaptation into strategic land-use planning and new infrastructure development.

Several policy objectives reflect the Act, the NMP, and the NAF:

National Policy Objective 52 - The planning system will be responsive to our national environmental challenges and ensure that development occurs within environmental limits, having regard to the requirements of all relevant environmental legislation and the sustainable management of our natural capital.

National Policy Objective 53 - Support the circular and bio economy including through greater efficiency in land management, greater use of renewable resources and by reducing the rate of land use change from urban sprawl and new development.

National Policy Objective 54 - Reduce our carbon footprint by integrating climate action into the planning system in support of national targets for climate policy mitigation and adaptation objectives, as well as targets for greenhouse gas emissions reductions.

National Policy Objective 55 - Promote renewable energy use and generation at appropriate locations within the built and natural environment to meet national objectives towards achieving a low carbon economy by 2050.

National Policy Objective 56 - Sustainably manage waste generation, invest in different types of waste treatment and support circular economy principles, prioritising prevention, reuse, recycling and recovery, to support a healthy environment, economy and society

National Policy Objective 57 - Enhance water quality and resource management by: Ensuring flood risk management informs place-making by avoiding inappropriate development in areas at risk of flooding in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities. Ensuring that River Basin Management Plan objectives are fully considered throughout the physical planning process. Integrating sustainable water management solutions, such as Sustainable Urban Drainage (SUDS), non-porous surfacing and green roofs, to create safe places.

National Policy Objective 58 - Integrated planning for Green Infrastructure and ecosystem services will be incorporated into the preparation of statutory land use plans.

National Policy Objective 64 - Improve air quality and help prevent people being exposed to unacceptable levels of pollution in our urban and rural areas through integrated land use and spatial planning that supports public transport, walking and cycling as more favourable modes of transport to the private car, the promotion of energy efficient buildings and homes, heating systems with zero local emissions, green infrastructure planning and innovative design solutions.

Together, the Act, the NMP, the NAF, and the NPF form a structured and comprehensive climate strategy bound to EU and International legal obligations.

1.3.4 Local

Local authorities align their individual CDPs to the NPF ensuring that local development collectively contributes to overarching national objectives. The DLRCC signed the Local Authority Climate Action Charter in October 2019 which commits local authorities to robust efforts in advancing climate action at regional and local levels while adhering to the UN SDGs, in particular Goal 13 Climate Action. Councils will collaborate and partner with local enterprise, community groups, residents as well as public, private, and educational sectors on climate action initiatives.

The DLRCC CDP 2022-2028 upholds the commitments of national, European and global climate change policy by outlining a holistic approach to climate mitigation and adaptation across all chapters. As a signatory to the EU Covenant of the Mayors for Climate and Energy Initiative, DLRCC has committed to achieving a 40% reduction in regions' GHG emissions by 2030.

The CDP outlines a framework for developing the region into a climate-neutral climate-resilient community. Four key issues were identified as being of significance for accomplishing national and local climate objectives.

- Energy Efficiency in Buildings;
- Renewable Energy;
- Decarbonising Motorised Transport; and
- Urban Greening.

Chapter 12 of the CDP - Development Management outlines threshold criteria for a broad range of developments that will ensure climate objectives are met through smart, sustainable development.

In tandem with the CDP, DLRCC publishes a CAP in 5-year cycles to incorporate up-to-date climate research and recommendations. The most recent CAP (2024-2029), identified 6 target action areas:

- Energy and Buildings
- Transport
- Flood Resilience
- Nature-Based Solutions
- Resource Management
- Community Engagement

Local policy frameworks provide specific guidelines for sustainable development at to ensure district government bodies contribute to meeting national legally binding climate obligations.

2 Proposed Development

2.1 Description

Knockrabo Investments DAC intend to apply for permission for a Large-scale Residential Development (for a period of 7 years) with a total application site area of c. 2.54 hectares, at Knockrabo, Mount Anville Road, Goatstown, Dublin 14. The proposed development relates to Phase 2 of the development on the 'Knockrabo' lands. Phase 1 of 'Knockrabo' was granted under Dún Laoghaire-Rathdown County Council (DLRCC) Reg. Ref. D13A/0689/An Bord Pleanála (ABP) Ref. PL06D.243799 and DLRCC Reg. Ref. D16A/0821 (Phase 1) and DLRCC Reg. Ref. D16A/0960 (Phase 1A) and comprises a total of 119 No. units.

The site is bounded to the south-east by Mount Anville Road; to the south by 'Mount Anville Lodge' and by the rear boundaries of 'Thendara' (a Protected Structure – RPS Ref. 812), 'The Garth' (a Protected Structure – RPS Ref. 819), 'Chimes', 'Hollywood House' (a Protected Structure – RPS Ref. 829); to the south-west by existing allotments; to the north by the reservation corridor for the Dublin Eastern By-Pass (DEBP); and to the east by the site of residential development 'Knockrabo' (Phase 1, permitted under DLRCC Reg. Ref. D13A/0689 / An Bord Pleanála (ABP) Ref. PL.06D.243799 and DLRCC Reg. Ref. D16A/0821 (Phase 1); and DLRCC Reg. Ref. D16A/0960 (Phase 1A)). The site includes 'Cedar Mount' (a Protected Structure- RPS Ref. 783), 'Knockrabo Gate Lodge (West)' (a Protected Structure RPS Ref. 796), including Entrance Gates and Piers.

The development with total of c.17,312.2 sq.m. gross internal area (GIA) will consist of the construction of 158 No. residential units (12 No. houses and 146 No. apartments (35 No. 1 beds, 81 No. 2 beds, 3 No. 3 beds and 27 No. 3 bed duplex units), a childcare facility (c.400 sq.m. GIA) and Community / Leisure Uses (c. 223 sq.m. GIA), as follows:

Block E (c.1,077 sq.m. GIA): a 5-storey including semi-basement podium level apartment block, comprising 8 No. apartments (1 No. 1 bed and 7 No. 2 beds);

Block F: (c.8,390.8 sq.m. GIA): a part 2 to part 8 storeys including semi basement podium apartment block, comprising 84 No. units (31 No. 1 beds, 50 No. 2 beds and 3 No. 3 bed duplex units);

Block G: (c.2,022.1 sqm GIA): a part 4 to part 5-storey apartment block, comprising 20 No. units (3 No. 1 bed units, 14 No. 2 bed units and 3 No. 3 bed units);

(with sedum roof/PV panels at roof level of Blocks E, F and G; a communal Roof Terrace of c. 198 sqm on Block F; and balconies/wintergardens on all elevations of Blocks E, F and G);

Duplex Blocks: (c. 3,292.6 sqm GIA): 1 No. 3 storey and 1 No. 4 storey block, comprising a total of 32 No. units (8 No. 2 bed units and 24 No. 3 bed duplex units);

10 No. (new build) houses: 6 No. 4 bed 2.5-3 storey terraced/semi-detached units (ranging in size from c.162.1 sqm GIA to c.174.2 sq.m. GIA); 1 No. 3 bed 2 storey detached unit (126.2 sq.m. GIA); 1 No. 3 bed 2 storey mid terrace unit (c.127.4 sq.m. GIA); 1 No. 3 bed 2 storey end of terrace unit (c.127.9 sq.m. GIA); and 1 No. 1 - 2 storey 'Gate House' (c. 122.6 sq.m. GIA) to the west of proposed repositioned entrance to Cedar Mount from Mount Anville Road;

The use of existing 'Coach House' as a residential dwelling and for internal / external repair / refurbishment works at ground and first floor levels, including the removal of 3 No. roof lights, 1 No. metal clad dormer roof window and external water tank; the construction of 2 No. single storey flat roof extensions (c.35.5 sq.m. GIA), revisions to the external facade including the addition of 1 No. new window ope on the south facade and rendered finish to all original facades, solar panels at roof level; removal / re-use of stone to form new garden wall; to provide 1 No. 2 bed house (c. 99.5 sq.m. GIA) with refurbished stone shed (c. 13.9 sq.m. for storage GIA).

The use of Knockrabo Gate Lodge (West) (a Protected Structure) as a residential dwelling; and for repair / refurbishment works including demolition of existing section of extension on top of stone boundary wall; removal of 1 No. roof light and 1 No. internal partition wall; construction of replacement extension (c.77.5 sq.m. GIA) to provide 1 No. 3-bed unit (c. 128 sq.m. GIA) with solar panels at roof level, bin storage, landscaping, all repair works to the existing Gate and Piers, and all associated internal and external elevational changes.

The proposed development comprises works to Cedar Mount (a Protected Structure) to provide: 1 No. Childcare Facility at Lower Ground Floor level (c.400 sq.m. GIA) with associated external play and bin storage areas; Community / Leisure Uses at Ground Floor Level (c. 223 sq.m. GIA), comprising Gym / Studio (c.35.6 sq.m. GIA), Library / Office (c. 35.9 sq.m. GIA), Meeting room (c.28.4 sq.m. GIA) and Conservatory room (c. 21.6 sq.m. GIA); and 2 No. 2 bed apartments at 1st floor level, (c.77.6 sq.m. GIA and c.88.2 sq.m. GFA). The works to Cedar Mount to consist of:

At lower ground floor/ basement level, the removal of internal walls and sections of external and internal walls and access doors; insertion of openings through external and internal walls; repair of existing "loggia" (covered external corridor) on northern, north-western and north-eastern facades, with revised elevations comprising glazed panels / glazed entrance doors located within loggia opes; the additional area (c. 58 sq.m. GIA) to form part of proposed Childcare Facility;

At ground floor level removal of wooden staircase to 1st floor level and replacement with open-tread staircase, and construction of conservatory room (c. 21.6 sqm GIA)

with flat roof on south - western side of Cedar Mount with sedum roof; removal of 1 No. WC;

At 1st floor level removal of sections of internal walls; insertion of doors through internal walls;

Re-instatement of 1 no. new chimney stack on the western end of the existing roof; replacement of rubble masonry finish with lime and sand plaster finish on all elevations relating to sections of original façade; removal of security bars from existing windows in front porch; replacement / reconfiguration of rainwater downpipes, hopper heads and associated roof outlets; Re-modelling of extension on northern side including replacement of timber / pressed metal cladding with brick / zinc cladding and glazing at ground and 1st floor levels, removal / replacement of external doors and windows; replacement of flat roof deck, parapet, eaves and roof-light with flat roof comprising brick / zinc clad parapet and removal of internal link at 1st floor level; repair works to external walls at ground floor level; Construction of rendered blockwork wall and steel handrail to terrace and associated repair works to section of existing parapet wall on eastern side of Cedar Mount; all hard and soft landscaping; revisions to garden wall and pillars on western side of Cedar Mount; and all associated internal and elevational changes; and

The repositioning of existing access (including gates and piers) to Cedar Mount (a Protected Structure) on Mount Anville Road to the northeast with associated works to boundary wall to Mount Anville Road.

The development will also provide 130 No. car parking spaces consisting of 117 No. residential spaces (comprising 54 No. at podium level, 63 No. on-street and on curtilage spaces, 6 No. visitor spaces and 2 No. on-street car sharing spaces); and 5 No. non-residential spaces; provision of 366 No. bicycle parking spaces (consisting of: 288 No. residential spaces, 70 No. (residential) visitor spaces, 6 No. (non-residential) spaces and 2 No. visitor (non-residential) spaces); and 9 No. motorcycle parking spaces.

All other ancillary site development works to facilitate construction, site services, piped infrastructure, 1 No. sub-station, plant, public lighting, bin stores, bike stores, boundary treatments, provision of public, communal and private open space areas comprising hard and soft landscaping, site services all other associated site excavation, infrastructural and site development works above and below ground. In addition to the repositioned access to Cedar Mount (a Protected Structure) as referenced above, the development will be served by the permitted access road 'Knockrabo Way' (DLRCC Reg. Ref. D13A/0689; ABP Ref. PL.06D.243799, DLRCC Reg. Ref. D16A/0821 and DLRCC Reg. Ref. D16A/0960). The application does not impact on the future access to the Reservation for the Dublin Eastern Bypass.

The planning application may be inspected online at the following website: www.knockrabolrd.com. The planning application may be inspected or purchased at a

fee not exceeding the reasonable cost of making a copy, at the offices of Dún Laoghaire-Rathdown County Council, Marine Road, Dún Laoghaire, Co. Dublin, during its public opening hours of Monday to Friday from 10:00am to 4:00pm. A submission or observation in relation to the application may be made in writing to the planning authority on payment of the prescribed fee (€20.00) within the period of 5 weeks beginning on the date of receipt by the authority of the application, and such submissions or observations will be considered by the planning authority in making a decision on the application. The planning authority may grant permission subject to or without conditions, or may refuse to grant permission.

3 Climate Impacts and Action

Potential impacts to the Proposed Development as a result of climate change, adaptation to these impacts and climate mitigation measures in the design of the Proposed Development are discussed under the 6 primary action areas identified in the DLRCC Climate Change Action Plan (2024-2029):

- Energy and Buildings
- Transport
- Flood Resilience
- Nature-Based Solutions
- Resource Management
- Community Engagement

Adaptation measures protect infrastructure from certain risks associated with climate change. Mitigation measures lower carbon emissions and ultimately contribute to achieving Ireland's 2050 net zero commitments.

3.1 Energy and Buildings

A draft Energy Efficiency Design Statement was issued by Waterman Moylan Consulting Engineers Limited which outlines the regulatory requirements regarding energy efficiency and building materials. Several approaches are outlined by which compliance may be achieved. Following a cost-benefit analysis the most viable option will be selected.

3.1.1 Climate Mitigation and Carbon Reduction

Technical Guidance Document (TGD) L states that all new residential buildings must implement Nearly Zero Energy Building (nZEB) standards:

- A Maximum Energy Performance Coefficient of 0.3 and a Maximum Carbon Performance of 0.35 are not exceeded and that a minimum renewable Energy Ratio of 20% is obtained
- The maximum area-weighted and elemental U-values (as shown in Table 1 of TGD L) are not exceeded in new buildings. Allowable area-weighted average are shown below:
    - Walls and Ground Floor = 0.18 W/m^{2}K
    - Windows = 1.4 W/m^{2}K
    - Ground Floor (Underfloor Heating) = 0.15 W/m^{2}K
    - Pitched Roof or Cold Roof = 0.16 W/m^{2}K
- Thermal bridging is limited through the adoption of acceptable construction details or alternative methods discussed in TGD L

- Air permeability is less than 5m^3/hr/m^2
- Where applicable, boiler seasonal efficiency Of greater than 90% for gas or Oil and 77% for biomass

A likely overall strategy outlined in the Energy Efficiency Design Statement aims to include the following measures:

- Meet or exceed minimum U-Value standards
- Achieve a high level of air tightness (typically 3m^3/m^2/hr).
- Ensure thermal bridging details are designed to meet the performance of the ACDs or an equivalent standard.
- Provide an appropriate combination of technologies to ensure energy consumption is in line with Part L 2022 requirements. As it is not intended to bring a natural gas supply to the development, air source heat pumps will be chosen as the main source of heating and hot water.
- Install centralised mechanical ventilation systems to ensure adequate ventilation rates are achieved in the dwelling, maximising the benefits of the airtight construction.

Within the Proposed Development, apartments with green roofs have a target roof U-value of 0.12 W/m^2K which satisfies the requirement in TGD L. Details regarding other U-values, air tightness, and ventilation will be provided later.

3.1.2 In-built Resilience to Future Climate Change Hazards

The DEAP methodology is published by the Sustainable Energy Authority of Ireland (SEAI) and calculates the energy consumption and CO_2 emissions using standardised external environmental conditions.

The methodology is therefore calibrated to current climate conditions which are likely to change. The Proposed Development will achieve compliance with current conditions, as outlined in the Energy Efficiency Design Statement.

A Daylight, Sunlight and Overshadowing Study completed by IES shows that 76% of the tested spaces within the apartments blocks and 74% of the sampled houses and duplexes within the development are achieving the daylight provision targets in accordance with Table A.1 of IS EN 17037-2018+A1-2021 using Method 2.

3.1.3 Adaptive Capacity

Guidelines by the Chartered Institution of Building Services Engineers (TM59 on thermal comfort and TM37 on building design measures for overheating) are recommended to account for future overheating in buildings. There is, however, no

legislative requirement in Ireland. During detailed design we recommend the following be considered for adaptation to overheating frequency[4]:

- A moderate use of glazing
- Addition of external solar shading
- Effective ventilation

3.2 Transport

Draft reports of the Traffic and Transport Assessment, Public Transport Capacity Analysis, and Travel Plan were issued by Waterman Moylan Consulting Engineers Limited. The DLRCC CDP transport objectives are aligned to the 'Avoid-Shift-Improve' model and the '10-minute' neighbourhood concept is a priority in the DLRCC Climate Action Plan 2024-2029.

3.2.1 Climate Mitigation and Carbon Reduction

The Traffic and Transport Assessment report states:

Vehicular, cycle and pedestrian access to serve the development will be provided from Mount Anville Road (R112) via Knockrabo Way, which borders the Subject Development to the left. Additionally, it entails the establishment of a Creche in conjunction with a network of public and private open spaces. The project also encompasses the construction of roads, footpaths, car parking spaces, bicycle parking areas, storage facilities, and utility infrastructure. Furthermore, it includes the implementation of landscaping, boundary treatments, and public lighting.

The report estimates that there will be an additional 59 car trips in the AM peak hour and 53 in the PM peak hour. An assessment of the existing road network found there is the capacity to accommodate an increase in traffic volume.

Two parking spaces have been designated as a Go Car Station which will encourage the use of car sharing.

There are two bus options within a 3-5-minute walking distance of the Proposed Development. Route S6 along Mount Anville Road and Route 11 along Goatstown Road. The frequency of these routes is approximately 15 - 20 minutes. Route L25 operates along Eden Park Road approximately 18 minutes walking distance. The Stillorgan Road offers multiple bus services and is approximately 25 - 30 minutes walking distance. The S6 or cycling could shorten the travel time.

The Luas Green Line is also within the vicinity of the site. Dundrum and Balally Luas stops are within 1.5km with a walking distance of approximately 25 minutes. The S6 or cycling could shorten the travel time.

[4] Volume 3, Ireland's Climate Change Assessment, Environmental Protection Agency, 2023

A total of 366 No. cycle parking spaces have been incorporated into the design, of which, 288 are long-stay and 70 are short stay with an additional 8 spaces (6 for long-stay and 2 for short stay) for ancillary use. Internal footpaths have been designed with a 2.0m width to give pedestrians priority.

Minimum requirements have been met for parking within the Proposed Development. There are 133 no. car parking spaces with 11 reserved for non-residents, 9 no. motorcycle parking spaces, 5 no. disabled spaces, and 2 no. car sharing spaces.

3.2.2 In-built Resilience to Future Climate Change Hazards

Resilience to current and future climate related hazards (such as the impact of sea level rise or heatwaves on public transport) of public transport is outside the control of the applicant who bear no responsibility to address climate measures in this sector.

3.2.3 Adaptive Capacity

Adaptive capacity to climate change of public transport is outside the control of the applicant.

3.3 Flood Resilience

This section considers the flood and drainage aspects of the Proposed Development. The climate change impact assessment for flood resilience refers to the following documents:

- 20-086r.002 Engineering Assessment Report
- 20-086r.005 Flood Risk Assessment

The site is not at risk of fluvial (river) or coastal flooding. Pluvial (surface water) and groundwater flood risks are addressed in the Flood Risk Assessment.

The Engineering Assessment Report details the proposed stormwater management strategy and design:

"It is proposed to drain surface water from the development by gravity to the existing public surface water drainage outfall pipe in the north-eastern corner of the development site. Storm water will discharge to the outfall at a controlled rate, limited to the greenfield equivalent runoff. Excess surface water runoff during storm events will be attenuated in new below ground stormwater attenuation tanks within the open space at the northern end of the site. The suitability of the soil for infiltration soakaways has been explored through site investigation, however, the ground conditions are not favourable to this means of surface water design. As such, alternative SuDS measures are proposed…"

The Engineering Assessment Report and drawings (as references in the report) provide further details of the stormwater management system, which includes the following measures:

- *Source control*
  - *Green roofs*
  - *Rainwater harvesting*
- *Site control*
  - *Permeable paving*
  - *Filter drains*
  - *Tree Pits / Bio-retention areas*
- *Regional control*
  - *Flow control*
  - *Underground attenuation storage system*
  - *Downstream defender*

3.3.1 Climate Mitigation and Carbon Reduction

The stormwater drainage design maximises opportunity for natural solutions by exploiting the natural gradient of the site to minimise the need for structural materials. There is no requirement for pumps, electricity, or energy to operate the stormwater drainage system. The only energy use is in the maintenance of the stormwater drainage assets and is negligible.

3.3.2 In-built Resilience to Future Climate Change Hazards

A draft Site-Specific Flood Risk Assessment (FRA) has been prepared by Waterman Moylan Engineering Consultants for the Proposed Development. The site is at very low risk of fluvial (river) or coastal flooding now and in the future under climate change scenarios. The FRA identifies five pluvial or surface water flood risk pathways which could affect the site. Each are assessed and the FRA reaches the following conclusions:

- Surcharging of the on-site drainage
  - SuDS features, including a hydrobrake, and adequate sizing of the on-site network reduce the risk of surcharge by limiting the rate of run off to the greenfield rate. Attenuation tanks will accommodate 1-in-100-year storm volume + 20% under climate change scenarios.
- Surcharging from the existing surrounding drainage network
  - Risk to surrounding buildings is minimised by setting finished floor levels 200mm above existing road channels. Overland flow routing minimises risk to the external surface water network by reducing flow entering the system.
- Surface water discharge from the subject site
  - Risk from surface water discharging from the site is minimised through source control devices and attenuation. Additional risk of +20% volume is accounted for.
- Overland flooding from surrounding areas

    - Overland flooding risk is minimised through overland flood routing and raised floor levels.
- Overland flooding from the subject site
    - Risk from internal overland flooding is minimised through the surface water management strategy which incorporates several SuDS measures to slow increase infiltration and slow run-off rates.

The FRA considers that there is a high risk of groundwater flooding to the site. The text in the blue box below is taken from the FRA and details how this risk is managed for the present day scenario.

"Finished floor levels have been set above the road levels, as described in Section 3.6, to ensure that any seepage of ground water onto the development does not flood into the buildings. In the event of ground water flooding on site, this water can escape from the site via the overland flood routing, also described in Section 3.6.

The buildings' design will incorporate suitable damp-proof membranes to protect against damp and water ingress from below ground level."

The FRA also considers risk management measures to address failure or blockage of the proposed storm water drainage system as described below in the blue box.

"As described in Section 3.6, finished floor levels have been designed to be generally above the adjacent road network, which will reduce the risk of flooding if the surface water network were to block. In the event of the surface water system surcharging, the surface water can still escape from the site by overland flood routing, as described in Section 3.6, without causing damage to the proposed buildings."

"The surface water network (drains, gullies, manholes, AJs, attenuation) will need to be regularly maintained and where required cleaned out. A suitable maintenance regime of inspection and cleaning should be incorporated".

Strict separation of surface water and wastewater will be implemented throughout the development.

3.3.3 Adaptive Capacity

The surface water management strategy does not currently propose provisions for future adaptation into the design. Public open space north and south of Block F could be locations for consideration of future adaptation measures and bioretention features could be reconsidered at the detailed design stage where appropriate.

3.4 Nature-based Solutions

Nature-based measures commonly operate as adaptation solutions with co-benefits for biodiversity and ecosystem function. However, there is also the capacity to have mitigating effects in an urban environment.

3.4.1 Climate Mitigation and Carbon Reduction

In line with the DLRCC Green Roof Policy, sedum green roofs are proposed on Block E, F, and G together making a total of 2,239m^2 of green roof surface within the development.

Green roofs improve insulation and heat retention which in turn reduces the amount of energy required to heat or cool the building therefore reducing greenhouse gas emissions. This is an indirect contribution to climate mitigation.

The insulating results can be considered as additional to the strategy outlined in the Energy Efficiency Design Statement for achieving nZEB.

3.4.2 In-built Resilience to Future Climate Change Hazards

Proposed green roofs maximise the developments water retention capacity, but they also provide a cooling function which can limit the contribution of the building to the urban heat island effect. This can buffer current and future temperature extremes.

Bioretention areas have not been proposed within the development but there is opportunity to identify potential use-cases at the detailed design stage.

3.4.3 Adaptive Capacity

Areas of open space on the development lands demonstrate that the site has the capacity to integrate future nature-based features.

3.5 Circular Economy and Resource Management

EU and national policy on resource efficiency seeks to decouple the link between economic growth and environmental impact.[5]

A draft Resource and Waste Management Plan (RWMP) report and Operational Waste Management Plan (OWMP) report were provided by AWN Consulting. A draft Construction Management Plan (CMP) report was provided by Waterman Moylan Engineering Consultants

3.5.1 Climate Mitigation and Carbon Reduction

[5] Guidance on Soil and Stone By-Products, Environmental Protection Agency, Version 3; 2019

The guiding principles for optimising resources and minimising waste are outlined in the RWMP as follows:

- Prevention;
- Reuse;
- Recycling;
- Green Procurement Principles;
- Off-Site Construction;
- Materials Optimisation; and
- Flexibility and Deconstruction.

These considerations will guide the design process, selection of materials, and construction methodologies.

The reuse principle has been applied through the proposed reuse of salvaged stone rubble from demolition works to complete the construction of stone finishes along the boundary wall and Coach House as evident in the architectural design drawings.

All residential units will have provisions to accommodate 3 no. bin types to facilitate waste segregation within the home. A total of four waste streams will be collected within the development:

- Dry Mixed Recyclables
- Mixed/Non-Recyclable/General Waste
- Organic waste; and
- Glass

All recyclable materials will be segregated at the source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus contributing to the targets set out in the National Waste Management Plan for a Circular Economy (NWMPCE) 2024 – 2030.

Other waste materials such as textiles, batteries, printer toner / cartridges, light bulbs, cooking oil, and WEEE may be generated infrequently by the residents. Residents will be required to identify suitable temporary storage areas for these waste items within their own units and dispose of them appropriately.

The shared and creche Waste Storage Areas (WSAs) will be designed and fitted to meet the requirements of relevant design standards as outlined in the OWMP.

The Site Investigation report identified organic carbon levels above the inert level in one trial pit and asbestos was detected in a second trial pit. The removal will be carried out by a suitably permitted waste contractor, in accordance with the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010. All asbestos will be taken to a suitably licensed or permitted facility.

3.5.2 In-built Resilience to Future Climate Change Hazards

Resource and waste management is not vulnerable to climate change impacts.

3.5.3 Adaptive Capacity

Collection of additional waste streams may be introduced within the space constraints of the development in the future.

3.6 Community Engagement

Several design features of the Proposed Development demonstrate a commitment to community engagement through a well-connected network of communal open spaces. These shall help to facilitate greater awareness and support for climate action.

Public and private communal spaces are included at roof and ground level in compliance with the 2020 Apartment Guidelines. As outlined in the Architectural Statement:

In Block F, communal open space is provided at Level 01, in a courtyard that is located over the semi-basement carpark. The southern end of the courtyard will be at grade with the adjoining public open space, and the landscape design will create some synergy between the two spaces. In Block F, a roof terrace is provided at Level 06, with noise screening as appropriate. In Block E, communal open space is provided at Level 00, adjoining the public open space. For the 3 and 4 storey duplexes, a landscaped courtyard is provided between the two linear blocks. There is no basement below this courtyard, so deep-tree planting will be possible. In Block G, communal open space is provided at Level 00.

Total Public Open Space proposed within overall Knockrabo Lands is 11833.1 sq.m which represents 22% of the gross area. The current application proposes 31.5% of the red line area of the Proposed Development as public open space. In addition to public open space the Proposed Development has included 8 no. cycle parking spaces for non-residents.

Cedar Mount House will be a community resource containing a childcare facility and community rooms which link with a large open space to the northeast and east.

Waste stream provisions and waste storage areas described in the OWMP will encourage residents to segregate their waste and engage with appropriate waste management in their daily life.

Community allotments are located to the west of the site which could provide the opportunity for residents to engage in sustainable practices within the vicinity of their home.

4 Summary and Conclusion

This report includes an assessment of the impacts of climate change on the Proposed Development and provision for these impacts in the design of the Proposed Development under the six action areas identified in the Dun Laoghaire-Rathdown Climate Action Plan 2024-2029 in accordance with the requirements of the Dún Laoghaire Rathdown County Development Plan 2022-2028, and accordingly the *Development Management Thresholds Information Document*. The report summarises findings and recommendations from the following reports:

- Flood Risk Assessment, Waterman Moylan Engineering Consultants (May 2024)
- Energy Efficiency Design Statement, Waterman Moylan Engineering Consultants (May 2024)
- Engineering Assessment Report, Waterman Moylan Engineering Consultants (May 2024)
- Traffic and Transport Assessment, Waterman Moylan Engineering Consultants (May 2024)
- Public Transport Capacity Analysis, Waterman Moylan Engineering Consultants (May 2024)
- Travel Plan, Waterman Moylan Engineering Consultants (May 2024)
- Construction Management Plan, Waterman Moylan Engineering Consultants (May 2024)
- Resource & Waste Management Plan, AWN Consulting (May 2024)
- Operational Waste Management Plan, AWN Consulting (May 2024)
- Architectural Design Statement, O'Mahony Pike (February 2024)
- Ground Investigation Report, Ground Investigations Ireland Ltd. (February 2019)

A summary of the assessment under each action area is below.

Energy and Buildings

Buildings will be designed within zNEB standards in line with carbon reduction and climate mitigation objectives. The development demonstrates resiliency to temperature extremes through the use of green roofs. There is also opportunity to incorporate additional heat management into the detailed design according to the EPA Climate Change Assessment.

Transport

A full transport and travel assessment has been conducted by Waterman Moylan which outlines the sustainable transport infrastructure that has been incorporated into the proposed development including abundant cycle parking, designated car sharing parking and priority given to pedestrians throughout the road network with generous 2.0m walkways. The development has good connection to bus services and adequate connection to the Luas Green Line allowing Residents of the Proposed Development

will be able to engage in low carbon travel. Resiliency and adaptive capacity regarding public transport fall under the jurisdiction of transport and government authorities, not the applicant.

Flooding

Site-specific flood risks to the Proposed Development were identified from pluvial and groundwater sources. The Proposed Development demonstrates built-in attenuation resiliency up to the 1% AEP storm event and accounts for a 20% increase due to climate change. Green field run-off rates have been achieved across the site through SuDS measures and overland flow paths to mitigate pluvial flood risk.

Groundwater flood risk, although considered low has been addressed through finished floor levels and suitable damp-proof membranes.

Nature-based Solutions

Nature-based solutions have been included in the building design and stormwater management network including permeable paving, green roofs, and a soakaway, which contribute to the climate resiliency and carbon reduction of the development.

Resource Management and the Circular Economy

Segregation of waste streams within the home and across the development contribute to lower carbon emissions and promote good waste management. Resource management is inherently a climate mitigation strategy and is unaffected by climate change hazards.

Community Engagement

The provision of a creche, a community centre, and well connected public open spaces within the development will benefit the residents and wider community surrounding Knockrabo. Waste management on site will encourage residents to engage with recycling practices. While community engagement is neither a climate mitigation or adaptation measure, provision of facilities and infrastructure create strong communities which are less vulnerable to climate change.

The conclusions are based on the details of the Proposed Development available at the time of preparation of this report.

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