metec
CONSULTING ENGINEERS

SUSTAINABILITY REPORT/ ENERGY STATEMENT

for

THE REDEVELOPMENT OF THE FORMER CHIVER'S FACTORY SITE

at

COOLOCK DRIVE DUBLIN 17

for

PLATINUM LAND LTD.

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issue no.	issue date	pages	issued for	by	approvals checked	approved
01	21/03/2019	20	PLANNING	SC	CMcC	MR
00	26/03/2018	22	DRAFT_DESIGN TEAM REVIEW	SC	CMcC	MR

CONTENTS

EXECUTIVE SUMMARY

This Sustainability Report / Energy Statement was compiled by METEC Consulting Engineers in March 2019 on behalf of our client, Platinum Land Ltd, as part of the planning submission for the proposed redevelopment of the former Chivers Factory Site in Coolock, Co. Dublin.

Platinum Land Ltd are proposing the redevelopment of the former Chivers Factory Site, where, following demolition of existing buildings, the site would be redeveloped to accommodate 495 apartments, residential support facilities, amenities and services in 4 no. blocks. A service building including 1 no. crèche, café and gym would also be provided. In addition the proposed development includes highway and pedestrian improvements.

Our client and the design team recognises the importance of creating a sustainable development which interplays between good urban design, accessibility to sustainable modes of transportation and the most efficient use of energy and natural resources. This report highlights how the demolition, construction and long term management of the proposed development will be catered for and how overall energy considerations have been inherently addressed.

The design intent is to follow the requirements of the E.P.B.D. (Energy Performance of Buildings Directive), Building Regulations Technical Guidance Document (TGD) Part L and the Dublin City Development Plan 2016-2022 which are the current drivers for sustainable building design in Ireland.

Where possible the design team intend to achieve building envelope and HVAC performance that is an improvement on the statutory requirements contained in the Irish Building Regulations. The proposed development has been designed to achieve the Nearly Zero Energy Buildings (NZEB) standard.

A preliminary DEAP analysis has been undertaken on the residential units within the development to inform the design strategy, demonstrate compliance with the domestic Building Regulations Part L and to ensure that the targeted Building Energy Ratings (BERs) of A3 (or better) will be achieved.

A Thermal Dynamic Simulation Model of the service building which includes 1 no. crèche, café and gym has been constructed to demonstrate compliance with the non-domestic Building Regulations Part L and to ensure that the targeted BER of a B3 (or better) will be achieved using the SEAI approved NEAP methodology. This simulation model will be used to generate heating loads in an energy conscious manner and will also be used to inform key decisions in the building design such as the fabric performance metrics.

DWELLINGS

Summary of the proposed Sustainability target:

Building Energy Rating (BER) using SEAI's DEAP Methodology	A3 or Better

Summary of the Energy Performance Quality Assurance checks carried out:

TGD Part L 2018 section 1.3.2.2 - A compliance check will be carried out to ensure that the average U-value complies with the maximum permitted by the TGD standard	✓
TGD Part L 2018 section 1.3.2.3 – Maximum elemental U-value Check will be carried out using SEAI approved software (DEAP)	✓
The Energy Performance Coefficient (EPC) for the proposed dwellings will be calculated to ensure it is less than 0.30	✓
The Carbon Performance Coefficient (CPC) for the proposed dwellings will be calculated ensure it is less than 0.35	✓
TGD Part L 2018 section 1.2.1 – Minimum level of renewable energy technology to be provided to comply with the Renewable Energy Ratio (RER) requirement	✓

NON-DWELLINGS

Summary of the proposed Sustainability target:

Building Energy Rating (BER) using SEAI's NEAP Methodology	B3 or Better

Summary of the Energy Performance Quality Assurance checks carried out:

TGD Part L 2017 section 1.3.2.5 - A compliance check will be carried out to ensure that the elemental and average U-values comply with the maximum permitted by the TGD standard	✓
The Energy Performance Coefficient (EPC) calculated to ensure that it is less than 1.0	✓
The Carbon Performance Coefficient (CPC) calculated to ensure that it is less than 1.15	✓
Minimum level of renewable energy technology to be provided to comply with the Renewable Energy Ratio (RER) requirement	✓
TGD Part L 2017 section 1.3.5 – Check carried out to ensure that the effects of solar gain in the summer meet the TGD standard requirements	✓
TGD Part L 2017 section 1.3.6 – Assessment of overheating carried out to ensure that naturally ventilated spaces will not overheat	✓

1.0 INTRODUCTION

This Sustainability Report / Energy Statement was compiled by METEC Consulting Engineers in March 2019 on behalf of our client, Platinum Land Ltd, as part of the planning submission for the proposed redevelopment of the former Chivers Factory Site in Coolock, Co. Dublin.

Platinum Land Ltd are proposing the redevelopment of the former Chivers Factory Site, where, following demolition of existing buildings, the site would be redeveloped to accommodate 495 apartments, residential support facilities, amenities and services in 4 no. blocks. A service building including 1 no. crèche, café and gym would also be provided. In addition the proposed development includes highway and pedestrian improvements.

Both the Client and the Design Team are committed to supporting energy efficiency and energy conservation to facilitate measures which seek to reduce emissions of greenhouse gases and to promote the ethos of sustainability. Residential and commercial buildings account for 55% of total CO_2 emissions and represent the biggest possible opportunity for CO_2 abatement in Dublin (Source: Dublin City Sustainability Energy Action Plan 2010-2020).

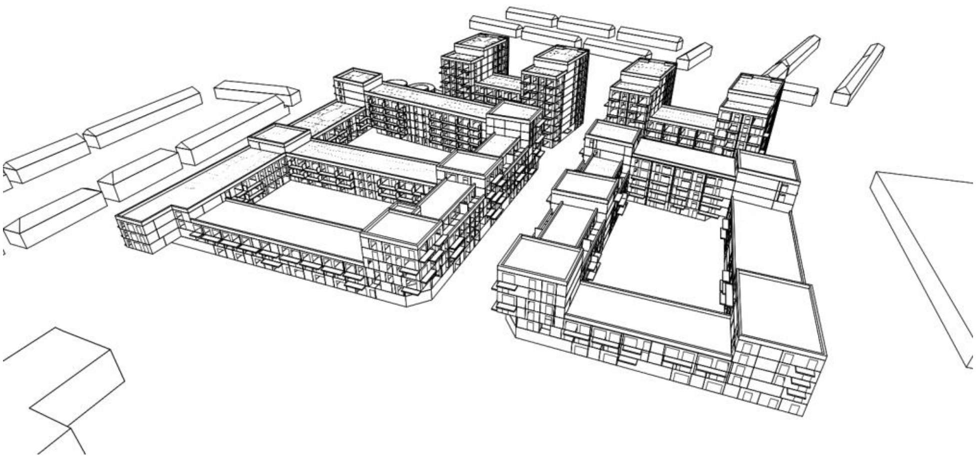

Figure 1.0.1 Computer generated image of the proposed development (source IESVE simulation software).

This report highlights how the construction and long term management of the proposed development will be catered for and how overall energy considerations have been inherently addressed. This report also addresses how the proposed development will achieve the Nearly Zero Energy Buildings (NZEB) standard and comply with Technical Guidance Document (TGD) Part L – Conservation of Fuel and Energy 2018 (Dwellings) and 2017 (Buildings other than Dwellings) which are the main influence on standards of energy performance and carbon dioxide emissions in Ireland. Where possible the design team intend to achieve building envelope and HVAC performance that is an improvement on the statutory requirements contained in the Irish Building Regulations.

The building services design strategy for the proposed development utilises as many sustainable design options and energy efficient systems that are technically, environmentally and economically viable for the project to achieve a low energy and environmentally friendly development, while also providing suitable dwellings to meet current market demands.

2.0 SITE AND DEVELOPMENT SUMMARY

Platinum Land Ltd are proposing the redevelopment of the former Chivers Factory Site, where, following demolition of existing buildings, the site would be redeveloped to accommodate 495 apartments, residential support facilities, amenities and services in 4 no. blocks. A service building including 1 no. crèche, café and gym would also be provided. In addition the proposed development includes highway and pedestrian improvements.

Figure 2.0.1 Proposed Site Layout Plan

The proposed site location and surroundings are identified in figure 2.0.1 above, with the site plan shown in figure 2.0.2.

Figure 2.0.2 Aerial view of the site (source: Google Earth) (Red line shown is indicative)

3.0 SUSTAINABLE TRANSPORT LINKS

Our Client and the Design Team recognise the importance of creating a sustainable development which interplays between good urban design, accessibility to sustainable modes of transportation, maximising the links between existing social and community infrastructure and the most efficient use of energy and natural resources.

The site is served by Dublin bus links, with full details provided in the Traffic and Transport Assessment produced by Aecom that accompanies this application. Additionally the dedicated and secure cycle parking for 650 spaces will be provided. Both non-car uses will encourage the development users to consider sustainable modes of transport to and from the site.

4.0 BUILDING DEMOLITION

The proposed scope of works includes the demolition of the existing buildings and other ancillary site clearance. Where possible the existing materials will be reused in the construction of the new buildings or disposed of in an environmentally friendly way.

5.0 DESIGN APPROACH

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" - from the World Commission on Environment and Development (Brundtland Commission) 1987.

Our Client and the Design Team recognises the importance of creating a sustainable development that contributes towards Irelands commitment to a range of renewable energy and efficiency targets, many of which are being implemented as Climate Change policy measures to reduce carbon emissions.

At the forefront of the design development will be the recognition that new buildings need to be designed, constructed and operated in an energy efficient manner that will have minimal effect on the local environment while achieving an internal environment that is comfortable, functional, and enjoyable to occupy and provides a cost optimal design solution. If new buildings are designed to avoid adding to the problem of global warming, there is proportionately less pressure on the far more complex issue of making the existing stock more energy efficient, while still meeting the Government energy and carbon reduction targets. As per the EU 2009 Renewable Energy Directive Ireland is committed to meeting its share of energy and carbon related targets for 2020.

For the former Chivers Factory Site Redevelopment the design intent will be to pay close attention to the requirements of the EPBD (Energy Performance Building Directive), the Building Regulations Technical Guidance Document Part L 2018 (Dwellings) and Part L 2017 (Buildings other than Dwellings) edition which are the current drivers for sustainable building design in Ireland.

The intent for the building services (mechanical and electrical) design strategy is to utilise as many sustainable design options and energy efficient features that are technically, environmentally and economically feasible for the project in an aim to achieve a development that is low energy and environmentally friendly. Making the right decisions in relation to design / construction can contribute greatly to the sustainability of a building, which will lead to cost savings in the future and raise comfort levels for the occupants of the buildings.

The design approach that shall be adopted for this development will be the LEAN, CLEAN, GREEN Approach.

Lean: The design intent is to reduce the demand for energy by designing efficiency into the very fabric of the buildings. This focus will extend to air tightness, thermal bridges and solar control, as well as taking into account the thermal mass of the areas being considered. A full DEAP (Domestic Energy Assessment Procedure) shall be carried out for all dwellings to ensure compliance with TGD Part L 2018. All dwellings on the site shall achieve an A3 BER (or better) in accordance with the DEAP methodology. A full NEAP (Non-Domestic Energy Assessment Procedure) shall be carried out for the non-dwelling units to ensure compliance with TGD Part L 2017. All non-dwelling units on the site shall achieve a B3 BER (or better) in accordance with the NEAP methodology.

Clean: In specifying mechanical and electrical services the design intent is to use systems that are best in class technology and most efficient in their range. Consideration will be given to both the embodied energy and the energy consumed over its lifespan within the development. This is relevant to the heating systems, hot water generation, and ventilation systems and lighting. The design team will also focus on the control and metering these energy end uses which would greatly assist future energy measurement and verification activities.

Green: leveraging renewable technologies to a higher degree due to the greatly reduced energy requirements of the building.

By adopting this approach ensures that where renewable technologies are considered, they are sized efficiently, not based on excessive over-sized plant loads. This approach helps to develop a more cost efficient renewable solution. A feasibility assessment will be carried out to determine the practical, economic and environmental benefits of such technologies for this development.

6.0 ENERGY PERFORMANCE STRATEGY – DWELLINGS

The design intent is to incorporate the following passive design measures for the proposed residential units where it is both technically and economically practical. These design parameters are the current targets and are subject to amendment during design development. As a minimum, all U-Values shall comply in full with TGD Part L 2018 (current edition for Dwellings).

Element	Performance Target
Roof U-Value	0.13 W/m² °K (target value).
Wall U-Value	0.16 W/m² °K (target value).
Floor U-Value	0.15 W/m² °K (target value).
Window U-Value	1.2 W/m² °K (target value including window frame).
Building Air Permeability	≤3.0 $m^3 h^{-1} m^{-2}$ @50Pa (target value) (all dwellings tested).

	A full appraisal of the building envelope will be carried out during the design development stage to clarify if this target is achievable.
Thermal Bridging	0.08 W/m^2 °K (Acceptable Construction Details to be specified and followed on site).

Table 6.0.1

6.1 PROPOSED ACTIVE DESIGN MEASURES – DWELLINGS

The intent is to ensure that the building services design strategy is to utilise as many sustainable design options and energy efficient features that are technically, environmentally and economically feasible for the project. Making the right decisions in relation to design / construction can contribute greatly to the sustainability of a building over its lifetime, which will lead to cost savings in the future and raise comfort levels for the future occupants of this development.

PROPOSED HEATING STRATEGY

The design intent is that the heating plant will consist of low temperature heat pumps. An air source (aerothermal) heat pump uses heat from the outside air to heat up the water circuit for space heating and domestic hot water. The outdoor unit extracts energy from the outside air and the compressor brings this thermal energy to a temperature suitable for space heating and hot water. As some of the energy is extracted from the outside air, the efficiency of this system, measured using a metric called COP (Coefficient of Performance) is very favourable in terms of energy and running costs. For example, typically, one unit of grid supplied electricity will generate between 3 & 4 units of heating depending on the system.

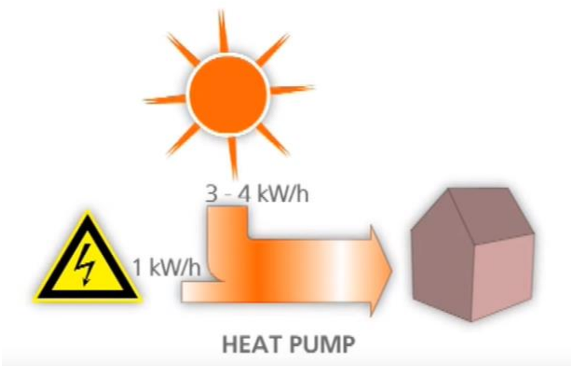

Figure 6.1.1 – image illustrating that one unit of grid supplied electricity will generate between 3 & 4 units of heating.

Air source heat pumps can generate water temperatures between 25°C and 50°C suitable for residential heating. When the heat pump detects a demand for domestic hot water it switches from space heating mode to hot water mode in order to heat the water to 50°C. For tank disinfection (which will be scheduled periodically) an electric immersion provides additional capacity to raise the water temperature.
These heat pumps shall be used to also meet the TGD Part L 2018 renewable energy requirements for the new dwellings by extracting renewable energy from the air.

 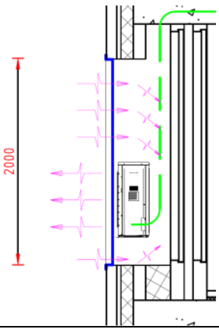		 
Outdoor Unit (can be concealed into the building's façade)	Indoor Unit Complete with stainless steel domestic hot tank.	Types of Heating Emitter can include underfloor heating or low temperature radiators.

Figure 6.1.2 – Air Source Heat Pump System.

LIGHTING

A variety of high efficiency LED lights will be provided to each apartment from recessed, track and pendant luminaires. Also the design of the buildings has been such that to allow natural light be maximised into occupied spaces, this will help to reduce the reliance on artificial light and therefore reduce energy consumption.

VENTILATION

The design intent is to provide ventilation by means of Mechanical Ventilation with Heat Recovery (MVHR) units. Additionally, all apartments will have openable windows therefore natural ventilation will also be possible.

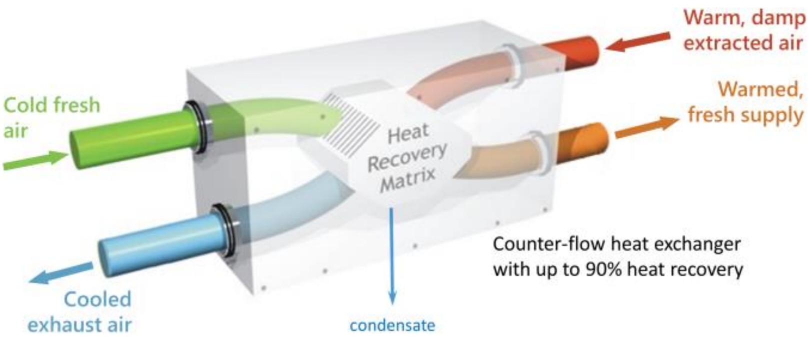

Figure 6.1.3 – Mechanical Ventilation Heat Recovery Unit.

RENEWABLE ENERGY TECHNOLOGIES

The use of renewable energy technologies such as Photovoltaics (PV) will be considered for the residential units. PV panels could be utilised to provide a source of renewable electricity to the residential units as required by Building Regulations for compliance with TGD Part L 2018. Should PV panels be specified they would be orientated southerly and installed at a pitch of approximately 15 degrees. Consideration will also be given to the full lifecycle analysis, efficiency, average degradation rates and economic payback.

Figure 6.1.4 – Photovoltaic Panels.

7.0 ENERGY PERFORMANCE STRATEGY – NON-DWELLINGS

The design intent is to incorporate the following passive design measures for the proposed non-dwelling building elements of the development where it is both technically and economically practical. These design parameters are the current targets and are subject to amendment during design development. As a minimum, all U-Values shall comply in full with TGD Part L 2017 (current edition for Buildings other than Dwellings).

Element	**Performance Target**
Roof U-Value	0.13 W/m^2 °K (target value).
Wall U-Value	0.16 W/m^2 °K (target value).
Floor U-Value	0.15 W/m^2 °K (target value).
Window U-Value	1.4 W/m^2 °K (target value including window frame).
Window G-Value EN 410	0.30 - 0.35 (target range). This will help to reduce unwanted solar gain and in turn reduce cooling plant loads.
Light Transmittance	0.65 - 0.71 (target range) – the highest value possible shall be specified where feasible.
Average Daylight Factor	2-5% (target range). This is the optimum range of daylighting for overall energy use.
Building Air Permeability	$\leq 3.0\ m^3\ h^{-1}\ m^{-2}$ @50Pa (target value). A full appraisal of the building envelope will be carried out during the design development stage to clarify if this target is achievable.

Table 7.0.1

By implementing these passive design measures energy consumption associated with heating will be reduced considerably at source.

7.1 PROPOSED ACTIVE DESIGN MEASURES – NON-DWELLINGS

The design team has also considered active energy measures which include the following technologies:

HEATING AND COOLING

The space heating and cooling requirements will be reduced by the passive fabric and air tightness measures identified above. The design intent is for heating and cooling (where required) to be provided by means of a high efficiency Variable Refrigerant Flowrate (VRF) system. This system is made up of two basic components: the indoor units and the outdoor condenser units which dumps the heat taken from the building. The indoor and outdoor units are linked by pipes which transport refrigerant between the units.

	
Typical Concealed Indoor Unit	Typical Outdoor Unit (Condenser)

Figure 7.1.1

This type of system is very efficient and performance is measured in terms of COP (Coefficient of Performance) for heating and EER (Energy Efficient Ratio) for cooling.

Typically the COP will be ≥ 3.0 kW /kW i.e. 1 unit of electricity will provide 3 units of heating. Similarly the EER will be ≥ 2.5 kW / kW. By comparison a central heating system using gas will only be approximately 90% efficient i.e. one unit of gas will provide 0.9 units of heat.

VENTILATION

The intention is to provide ventilation by natural means where feasible, by utilising openable windows. The reduces the need for Air Handling Units (AHUs) which would consume both thermal and electrical energy e.g. electrical energy to power the fans and pumps and thermal energy to heat/cool the tempered supply air to an acceptable temperature.

Where minimum fresh air ventilation rates (compliant with the Irish Building Regulations and CIBSE) cannot be achieved by natural means, 100% outdoor air AHUs complete with high heat recovery efficiency plate heat exchangers / thermal wheel will be specified. Heat recovery will be utilised to transfer energy from the extract air to the supply air with little or no cross contamination of air streams.

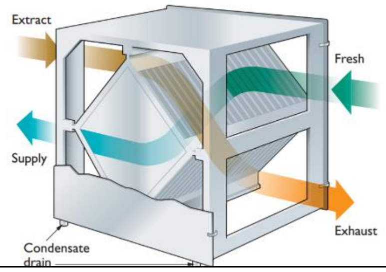	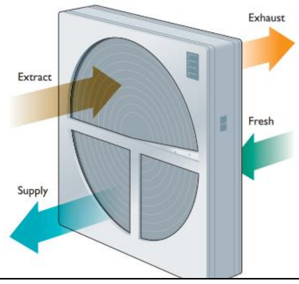
Option (a) Cross flow plate heat exchanger heat recovery	Option (b) Thermal wheel heat recovery

Figure 7.1.2

All fans specified will come complete with Variable Speed Drives. Specific Fan Powers (SFPe) specified will be ≤1.6 W/l/s which is the recommended minimum energy efficiency standard (Non-Domestic Building Services Compliance Guide: 2013 edition and Table 4 in TGD Part L 2017 – maximum specific fan power in air distribution systems).

LIGHTING

Lighting to be provide by LED luminaires. Automatic daylight lighting control (automatic dimming) complete with combined PIR detection will be specified where appropriate. Intelligent lighting controls in a commercial environment can realise significant electrical energy savings, as well as increasing the occupant's exposure to natural daylight – thereby promoting a healthier environment. PIR occupancy control will be used for lighting in areas that will have intermittent occupancy. Controller / sensors with low parasitic power will be specified for this project.

8.0 WATER CONSUMPTION

Our Client and the Design Team is committed to identify opportunities to reduce potable water consumption for this project. An analysis will be performed that explores how to reduce potable water loads in the building and accomplish related sustainability goals.

	
Dual Flush Toilets	Sensor Taps
	
Low Flush & Waterless Urinals	Shower Outlet Flow Regulator to achieve 7 litres per minute

Figure 8.0.1 Examples Sanitary ware fixtures and fittings that will be reviewed in detail in order to help reduce potable water consumption for this project.

9.0 GREEN ROOF

A green roof will be considered for roof areas where feasible. Consideration will be given to the structural viability, uniformity and local character. A green roof is a purposely fitted or cultivated roof with vegetation. There are many different types of green roofs and they provide many different benefits which include;

Figure 9.0.1 Green Roof Solutions

Reducing energy use

Green roofs have been shown to impact positively on a building's energy consumption by improving its thermal performance, although the amount of difference this makes varies depending on daily and seasonal weather.

Climate change mitigation

Residential and commercial buildings account for 55% of total CO_2 emissions and represent the biggest possible opportunity for CO_2 abatement in Dublin (Source: Dublin City Sustainability Energy Action Plan 2010-2020). A high proportion of these emissions are from heating and cooling the internal environment. Reducing the energy consumption of Dublin's buildings will reduce their impact on climate change. Green roofs can significantly reduce the cooling load of a building and may have a positive effect on the heating load.

Lessening the urban heat island effect

The urban heat island effect is the temperature disparity between urbanised areas and surrounding rural areas. Urban landscapes have a much higher proportion of tough, impermeable, darker surfaces (typified by conventional roof surfaces) which favour the retention of heat. Urban surfaces can convert up to 95% of the net incoming solar radiation into heat and in large cities this can result in a 4 °C variation between the city and surrounding areas, usually experienced at night. The urban heat island effect will increase as summer temperatures increase and will therefore become even more of a problem in Dublin in the future. Green roofs have very different evaporative, thermal and albedo (reflectivity) qualities from conventional roof types. Specifying a green roof over a bitumen roof effectively modifies the contribution of several factors key to the impact of the urban heat island effect; evaporating surfaces are increased, storage of heat within the building fabric is reduced, and the local albedo is positively altered.

Improving local air and water quality

The urban heat island effect exacerbates ground-level ozone production, which is formed by a reaction between volatile organic compounds and nitrous oxides catalysed by heat and sunlight. It is classified as a pollutant and is the foremost component of smog. Through mitigating the urban heat island effect, as well as producing oxygen, green roofs can thus improve local air quality. Having a green roof can also help to remove airborne particles, heavy metals and volatile organic compounds from the local atmosphere. As these contaminants are retained by the green roof itself, their infiltration of the water system through surface runoff is lessened, in turn improving local water quality.

10.0 ELECTRIC CAR CHARGING POINTS

It is the design intent to provide availability / infrastructure for 24 no. future car charging points in the carpark. Electric cars offer a real opportunity to reduce the carbon output of the transport sector, as they emit zero exhaust pipe emissions. Providing electric car charging points will encourage the buildings users towards this sustainable mode of transport.

Figure 10.0.1 Electric Car Charging Points

11.0 SUMMARY

This Sustainability Report / Energy Statement was compiled by METEC Consulting Engineers in March 2019 on behalf of our client, Platinum Land Ltd, as part of the planning submission for the proposed redevelopment of the former Chivers Factory Site in Coolock, Co. Dublin.

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