OnCourse®
Developments

WADI SAFAR GOLF SAUDI ARABIA

Sustainability Blueprint V1

Design Stage | Date: November 2022 | Version: 2.0

Sustainable.Golf

Quality Check

Prepared by: TA Approved by: ST

Revision	Date	Details	Authorised	Name	Position
0.1	26/08/2022	Internal first draft	N/A	N/A	N/A
0.2	09/09/2022	Draft shared with DGDA team.		Sam Thomas	Director Golf Developments (GEO)
1.0	12/10/2022	Shared with GEO independent verifier		Sam Thomas	Director Golf Developments (GEO)
2.0	17/11/2022	Signed by GEO independent verifier		Sam Thomas	Director Golf Developments (GEO)

Prepared for:

Diriyah Gate Company Limited

Prepared By:

GEO Foundation for Sustainable Golf

2 Quality Street
North Berwick
Scotland
EH39 4HW

t: +44 (0) 1620 895100
w: sustainable.golf
e: hello@sustainable.golf

Front cover image by GEO

Contents

Site Image (Credit: Author)


Sustainability was part of golf in the beginning and it must be part of golf in the future, creating golf courses that respect their surroundings and honour the natural environment.

INTRODUCTION

Project Journey

This Sustainability Blueprint V1 has been prepared by GEO in order to present a concise summary of the anticipated sustainability outcomes generated by the project. It aims to outline the practical ways in which this golf development will benefit local communities, individuals, and the environment.

It provides a comprehensive understanding of the golf project's sustainability vision and goals, and outlines a roadmap showing how these will be translated into real world deliverables in the subsequent stages of the project.

The V1 Blueprint forms the key milestone report, for the Wadi Safar Golf Course on the pathway to receiving the GEO Certified® Development mark.

The GEO Certified® Development mark is the international sustainability certification system for golf design and construction. It represents the highest available standard of sustainable design and construction for the golf industry.

The mark aims to distinguish the world's most sustainable golf developments. It gives credible recognition to projects which demonstrate leadership from local through to global level in all three pillars of sustainability; environment, society, and economy.

The project is independently verified at key milestones corresponding to the following stages of golf development:

1. **Design**
2. Construction
3. Completion

This Sustainability Blueprint V1 report corresponds to the design stage of the certification process. For more details of the certification system, its process and assurance model visit www.sustainable.golf

The Wadi Safar Golf Course formally registered in the OnCourse® Developments programme in November 2020.

OVERVIEW

PROJECT OVERVIEW

The purpose of this section of the report is to provide a brief overview of the context of the project with respect to the main factors potentially influencing sustainability. The site information is drawn primarily from the baseline studies undertaken for the project.

This development is part of a wider project for the creation of a new city 'Diriyah Gate'. For the purpose of this report, the 'site' will refer to the proposed Wadi Safar golf course land and the surrounding 186 hectares.

REGIONAL CONTEXT

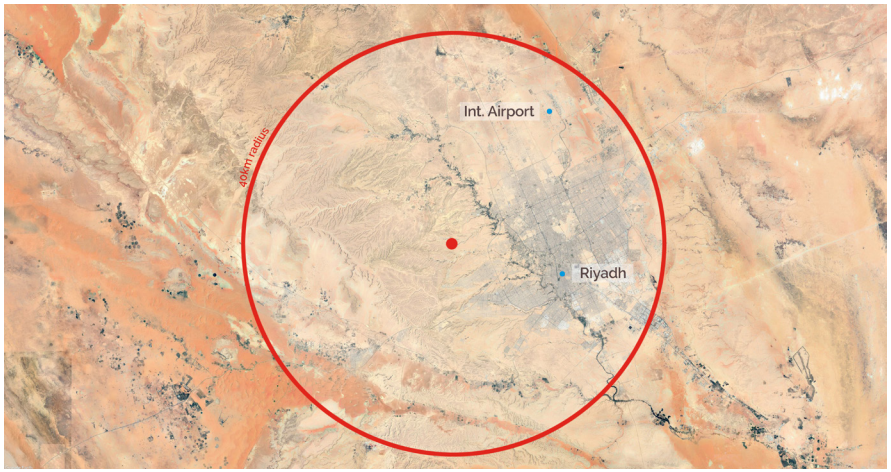


Figure 1 - Aerial map (regional context)

The site is located immediately to the west of the of Saudi Arabia's capital city, Riyadh. The international airport is around one hour away by car giving with good road links to Riyadh, this makes the site very accessible. This area of the country is set to go through extensive development over the coming years which will bring significant population growth by 2023. Currently there are a small number of golf courses existing in the region including Riyadh Golf Course and Dirab Golf & Country Club. There are extensive plans for the development of others in the future.

1 Live Sciences – 2013
2 https://whc.unesco.org/en/list/1329/

This region experiences an arid desert climate, with extremely hot temperatures in summer (July and August in particular) and slightly cooler, although variable, temperatures during winter months (primarily December and January). Temperatures are an average of 14.5°C in January and 36°C in July and August however actual daytime temperature is much higher. In the winter months the air temperature can drop to freezing through the night. Average annual rainfall here is around 100mm, which usually occurs during one rain event between November and March. The cloud cover levels are very low with infrequent cloud banks occurring during the year.

This area is mountainous and has an undulating landscape with limestone rock formations and wadis. There are a mixture of plateaus and rocky cliffs including the Central Najd Plateau and the Arabian shield which has rocks around 190 million years old[1].

The significant cultural heritage site of At-Turaif UNESCO World Heritage Site[2] exists approximately 1.3km east of the wider development. A number of other protected areas are located in the area surrounding the site, with the fairways falling within Wadi Laban Headwaters Reserve. Other protected areas within the surrounding areas include Al Ha'ir wetlands and Hima Huraymila National Park.

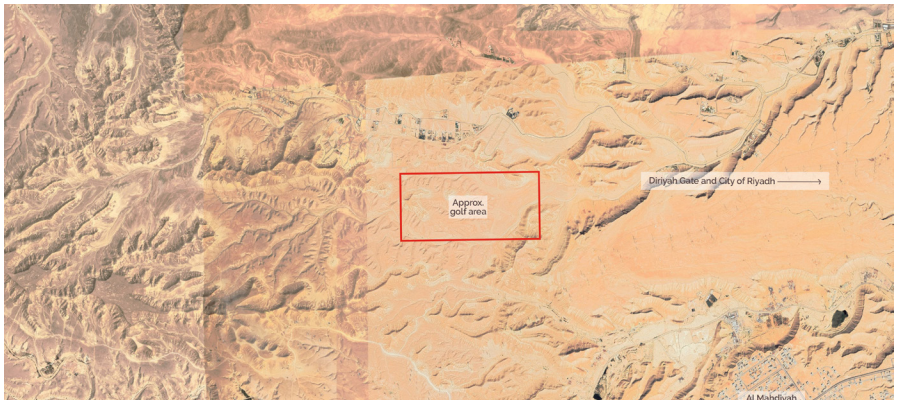


Figure 2 - Aerial Photo of site (source Google Earth)

Saudi Arabia is, furthermore, a signatory of the UNESCO Convention on Intangible Cultural Heritage (ICH) (UNESCO 2003), and a number of elements of ICH within KSA have been added to UNESCO's Representative List of the Intangible Cultural Heritage of Humanity (UNESCO, Elements on the Lists of Intangible Cultural Heritage: Saudi Arabia). These include:

- Falconry, a living heritage;
- Alardah Alnajdiyah, dance, drumming and poetry in Saudi Arabia;
- Arabic coffee, a symbol of generosity;
- Date palm farming, knowledge, skills, traditions and practices;
- Majlis, a cultural and social space; and
- Al-Qatt Al-Asiri, female traditional interior wall decoration in Asir.

The Wadi Safar development presents an opportunity to showcase and reflect the aforementioned Intangible Cultural Heritage and preserves the socio-cultural identity of the region.

There is a major landfill site at Al Sulay landfill south of Riyadh, which handles almost all of Riyadh City's waste. Other recycling facilities include Petcones plastic recycling factory, Holoul electronic recycling and WASCO facility for recycling of cardboard, paper, plastic, metal.

Figure 3 - Traditional falconry in KSI (source Gentleman's Journal)

PROJECT SITE

The golf course is situated approximately 20km west of the western periphery of Riyadh and 20km from the centre. The golf course itself is situated within the 'Green Zone' of the project and overs 186 hectares, which is 3% of the overall development area. The site is situated close to the Mecca Highway.

Although relatively flat in the context of the overall Wadi Safar area, the golf course has some dramatic terrain dictated by geological formations including cliffs and wadis. This presents a unique environment to have a golf course and some fantastic views out to the west.

The soils on site are fine and silty with poor water holding capacity and a resultant low moisture content, as outlined above. Such soil types can be relatively fertile and suitable for agricultural uses but not suitable for turfgrass cultivation. The soils are generally thin with bedrock found at a shallow depth.

The Project falls within the Minjur-Dhurma aquifer. The Minjur Formation is 400m thick, and consists of cross-bedded, coarse-to very coarse grained, quartz sandstone separated by middle Minjur shales and mudstones. It comprises of two sandstone aquifers: Upper Minjur aquifer and Lower Minjur aquifer and are of considerable importance, since they yield 90% of the groundwater supply to Riyadh (Alsharhan, 2001).

Isotopic measurements indicate that the water in the Minjur aquifer is about 25,000 years old. Heavy pumping from the aquifer has considerably lowered the potentiometric surface. In 1956, this was estimated to be 45m below the land surface and by 1980, it had dropped to 170 metres below.

Soil erosion is a concern, with evidence of rainwater erosion by recent and older rainfall events being noted frequently during the Environmental Impact Assessment (EIA) process undertaken by AECOM. The soils on site are also found to be low in nutrient and moisture content, meaning they are susceptible to infiltration. As a result, the stability of slopes and rocky areas on site may be compromised, leading to the assessment for the need of rockfall and erosion control measures. The EIA states that significant erosion from storm water is unlikely due to the low rainfall

records of the Wadi Safar golf course location. In line with this flooding is not a high risk for the site and, although flood events have occurred in the past, the site has not generally been affected by these.

There is a lack of available water which could be used on this site through construction and operation. There are no nearby sources of freshwater, groundwater would be the only source of this.

Although arid, the Wadi Safar development area, and specifically the Green Zone offers some ecological value. The wadi channel network can provide ecological corridors[3] for flora growth and fauna movement and nesting. However the topography and exposure of the Wadi Safar area present challenges in this regard. The wadi network around the golf is connected to the Wadi Laban Headwaters Reserve and as such care will be needed to respect these important wadi patterns and functions.

Currently, there are no existing protected species of flora and fauna currently identified on site. There is clear opportunity for a net positive contribution to biodiversity for the golf course and to attract some targeted protected species.

CLIENT VISION

The developer for this project is the Diriyah Gate Company Limited ('DGCL') and this project is directly relevant to Saudi Arabia's Vision 2030.

The vision of the project is to create an *'Exclusive gated residential community with world class resorts, golf course, and other amenities.... along a heritage and traditional theme.'* DGCL.

The design of the golf course is envisaged to use a native planting palette that will embrace and enhance the natural desert landscape. The buildings will work with the vernacular style, local colours and materials to sit comfortably in the wider landscape setting.

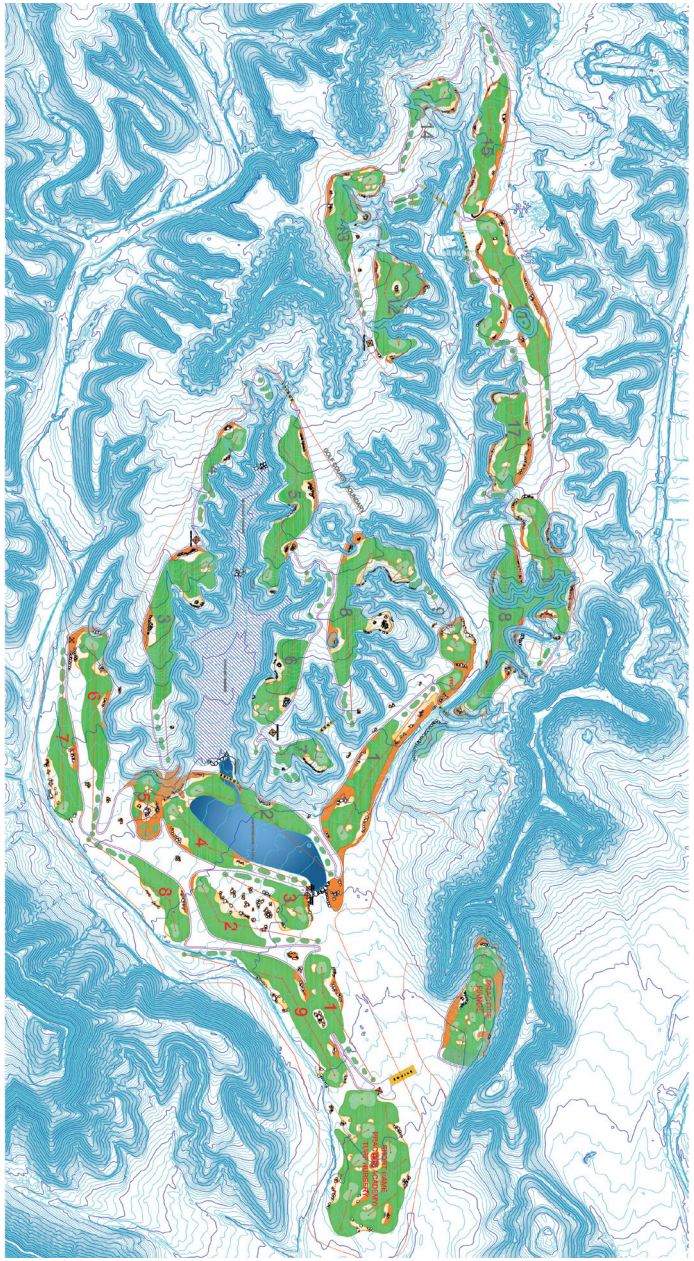


Figure 4 - Site contour map (Sourced: Client)

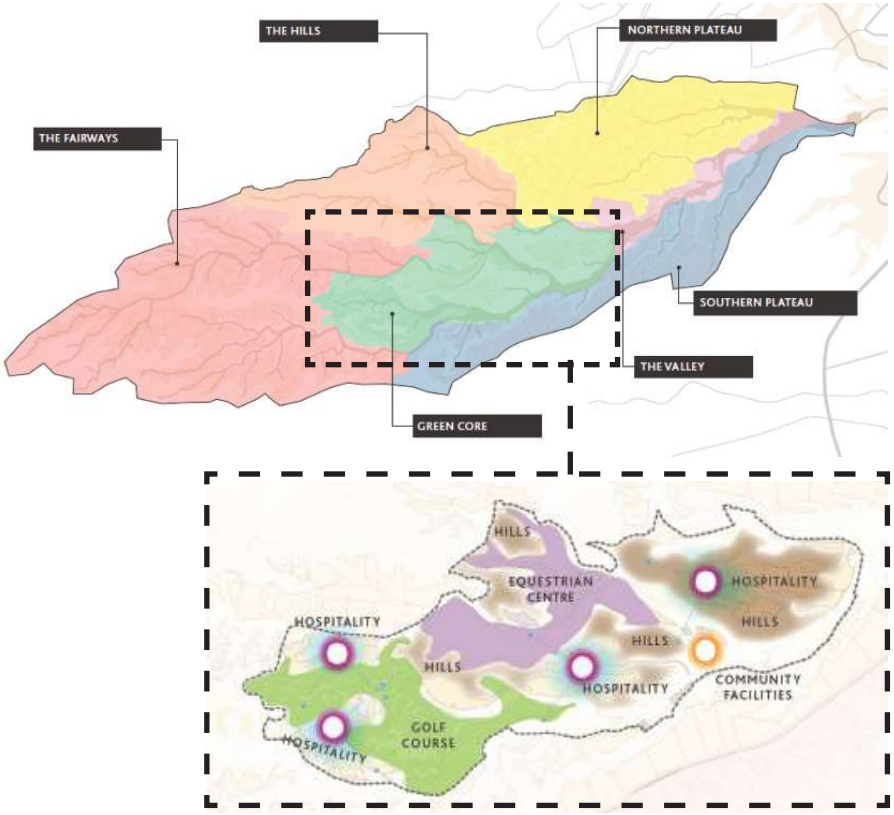


Figure 5 - Site location within Diyrah Gate (Sourced: Client)

The project team includes:

- Project Owner: DGCL
- Golf Course Architect: Greg Norman Golf Course Design
- Environmental Consultants: AECOM
- Engineers: WSP
- Project Managers: Turner and Townsend
- Contractor Citiscape

PROJECT SUMMARY

The main 18-hole course is set to be a challenging golf course which rewards golfers who take on the hazards. The layout of the course and facilities will maximize the potential from the existing terrain and the panoramic views.

The project aims to create state of the art golf course and facility which leads the way in sustainability. The proposed golf development comprises of:

- 18-hole Championship golf course
- 9-hole academy golf course
- Short game practice area
- Driving range

Other core golf facilities include:

- Comfort Stations
- Starter House
- Maintenance Facility
- Golf Academy

ARCHITECT STATEMENT

The golf course at Wadi Safar shall be the crown jewel of Saudi Arabian Golf. A tribute to the surrounding mountains, wadis and desert, the golf facilities will aim to complement the natural desertscape rather than compete with it.

The design and layout of the courses, as well as the clubhouse and amenities, shall take advantage of panoramic vistas and local materials to create a place that is unique from any other development.

The golf course design objectives are:

- A World Class Championship Golf Course (18 holes), Academy Golf course (9 holes), Short game practice area and Practice driving range.
- The strategy for playing the course to offer plenty risk-reward opportunities, favoring the player who dares to challenge the hazards and bite off the line of play to gain advantage.
- The layout to maximize the use of the exiting terrain and panoramic vistas.
- Sustainably led landscape design using native plant palette and materials.
- Golf facilities that will strive to complement the natural desert-scape rather than compete with it.

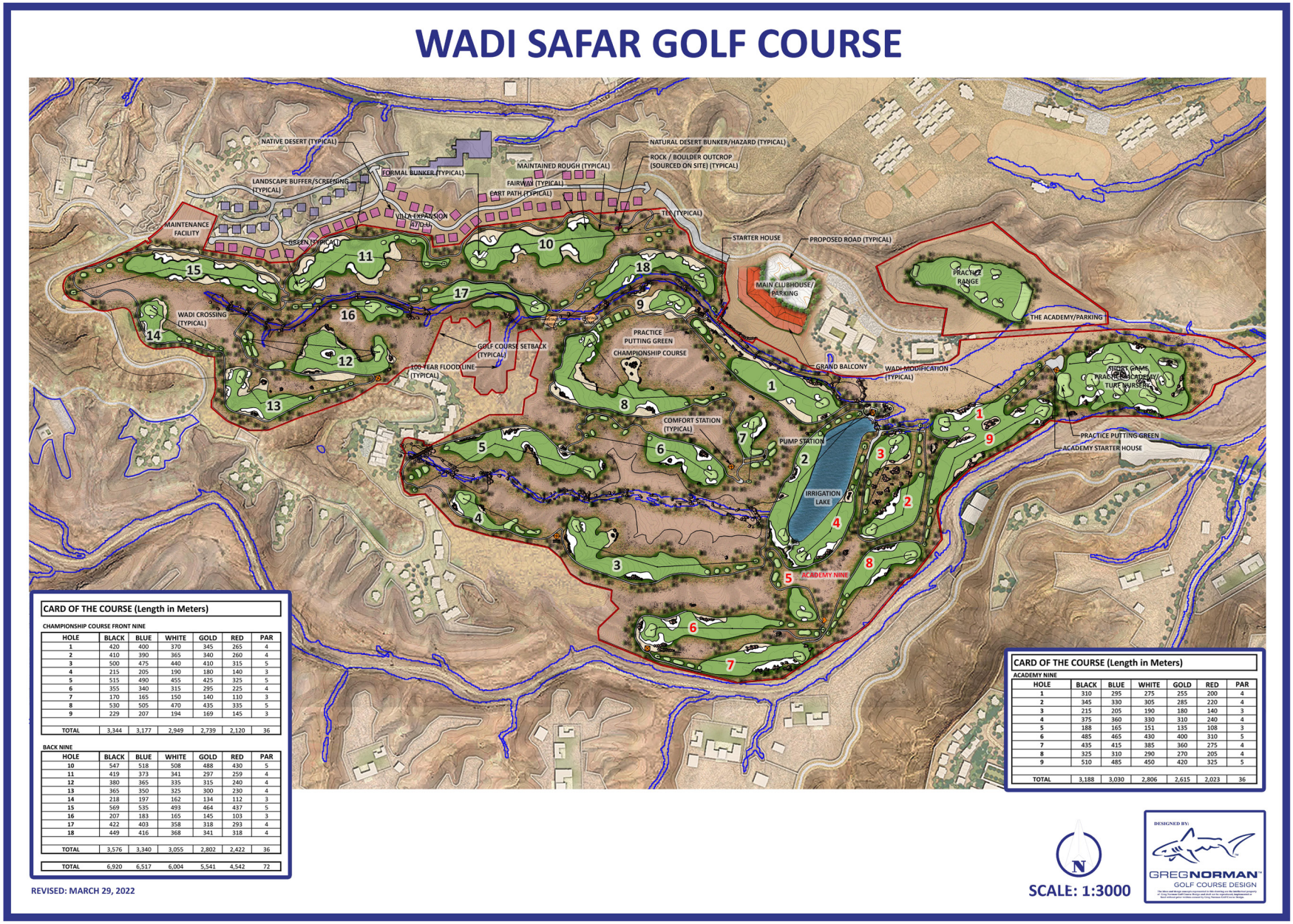


Figure 6 - Course Layout (Source: Client)

ROADMAP

Narrative Roadmap

The Wadi Safar project team are striving to create a golf course which compliments the natural environment and will be a world leader in sustainable construction. The roadmap below outlines the approach of the team and the actions that are being undertaken to ensure that nature conservation; resource efficiency; social value and climate action are all fully integrated into the project from the start.

SUSTAINABILITY OVERVIEW

The proposed golf course in the Wadi Safar site is aiming to be a world class golf facility that can enhance and protect the natural environment and has the potential to be a leader in developing the sport in Saudi Arabia and showcasing tournament golf.

The golf facilities would provide a internationally recognised golf destination for seasoned golfers as well as best-in-class academy facilities, which can not only be used by golfers around the world but will also help to foster future generations of Saudi golfers.

As part of the proposals there are key contributions towards a more sustainable form of golf development across issues of nature rehabilitation, combating desertification, resource savings and new community connections.

Figure 7 - Site Photos (Source: GEO)

Nature

A key factor of this project is the potential for it to significantly improve the biodiversity in and around the golf course area. This will be carried out using native or naturalised vegetation species throughout which will respond to the look and feel of the local area - creating an authentic golfing experience in this unique environment. To ensure that these plants are best suited to the climate and the soil conditions here the majority of plant material will be sourced from local nurseries and this effort forms part of a strategic landscape rehabilitation drive right across the masterplan of Wadi Safar.

Establishing native or naturalised vegetation in the areas around the golf course will give greater strength and support to the soil structure - reducing desertification and the risk of soil erosion.

In a similar fashion the project will carry out wadi restoration and enhancement works. This will help to ensure the future health and function of these habitats, ensuring preservation of natural drainage patterns and ecosystems.

These wadi elements are important landscape features culturally as well as playing a major role in stormwater management and as wildlife corridors. The nature goals will be specifically reached by:

- Establishing a comprehensive wadi restoration/enhancement plan
- Using 100% native or naturalised species of flora in the landscape
- Creating over 3 hectares of waterbodies and associated aquatic habitats

Increasing the net biodiversity across the site by at least 35%

Resources

Sensible water management is a key factor in the success of this development. To ensure this is done properly, a best-in-class irrigation system shall be installed which will maximise the efficiency of watering the golf course. Sprinkler heads will be focused only on the turfgrass as to not waste water to the landscape areas while moisture sensors are used to establish grass is only watered to the amount required and no more. To further reduce the impact on water supply in the country TSE will be used as irrigation water to reduce the demand on potable water.

Local resources and materials are proposed to be used throughout the construction as far as possible, including bulk materials, vegetation and building finishings. 'Found materials' from the site will be reused as far as possible for example, usable rock and gravel material gained through the clearance will be used in the shaping of the course and in the landscaping or crushed and used in cart paths construction or as course furniture. This will not only reduces in costs and carbon emissions but also ensures the authentic look, texture and feel of the course surrounds and the associated buildings.

Through proactive course maintenance there will be savings in turf inputs (fertiliser, pesticides, water), man hours and fuel usage. By only having two heights-of-cut on the course, this simplifies the maintenance processes. It also allows there to be no rough area surrounding the course, allowing it to better visually connect to the natural sandscape while still being very playable. The key resource goals will be specifically reached by:

- Having a nature based drainage system
- Using electric/hybrid vehicles & machines where available
- Establishing a water management plan

Community

The main aim with the community aspect of the project is to create an environment throughout the course and the golf buildings that pays respect to the heritage, tradition and culture of Saudi Arabia and this important UNESCO World Heritage Site At-Turaif[1]. This will be done by ensuring that authentic and local materials and craftsmen are used to create the desired traditional character of architecture and place.

While the design of the project looks to the past, the golf academy looks to inspire the future. The facility will engage with the future generations of Saudi golfers giving them, as well as golfers of all levels from around the world and industry leading golf academy. This will be a welcoming facility with a friendly atmosphere allowing players to feel comfortable when they hone their skills.

Staff training and new specialist skills development will be at the forefront of developing the next high level of service staff and management skills required to service such a high profile golf facility in this location. The community goals will be reached by:

- Creating a course which is capable of hosting international tour level events
- Creating new high skilled job in service and management sectors supported by internationally accredited training programs.

100% of vehicles & machinery on site should be electric or hybrid if available

1 https://whc.unesco.org/en/list/1329/

Tabular Roadmap

Target	Project Targets	Supporting Documentation (pending item)	SDG Target References
Nature			
N1	Increase the net biodiversity across the golf site using native or naturalised plant palette to increase vegetation cover by 50%.	Course Planting Design Veg planting list	
N2	Introduce new types of habitat in the form of aquatics and wetland marginal planting areas (around 4,000 plants) to target the colonisation by new fauna species to site.	Course Planting Design	
N3	Establish a Wadi Management and Enhancement Plan to ensure the protection of these, allowing for natural flood water management .	Wadi restoration plans Course Planting Design	
N4	Ensure that all golf buildings such as rest rooms, and auxiliary buildings and the golf maintenance facility is integrated with the natural landscape in terms of scale, colour and position.	Golf Building Designs	
N5	Reducing visual impact of surrounding built structures on the landscape and golfer view by allowing a ‘core golf’ layout, not lined by building and preserving views to the wider landscape.	Masterplan	
N6	Use 100% native or naturalised flora species in the landscaping of the golf course sourced from local nurseries wherever possible.	Planting list Aug 22_Progress Meeting	
N7	Use turfgrass species that are suited to the arid climate - proposed Platinum Paspalum TE.	Grassing plans Aug 22_Progress Meeting	
N8	Ensure that the golf course complements the natural contours of the landscape by utilising the flattest parts of the site for playing areas.	Masterplan Grading plan	
N9	Create over 3 hectares of new water bodies (primarily as an irrigation store) capable of supporting fauna and flora and managed using non chemical means algae building and lake ecosystem health.	Lake details (Section 5.2)	 
N10	Ensure that the golf course landscaping is keeping a ‘Desert feel’ with low density planting and use of desert sand and landscape type as a intrinsic hazard of the course.	Course Planting Detailed Design	
N11	Site wide policy to only shape the final levels for the golf course with rootzone material once water is guaranteed in an effort to reduce fuel requirements and soil loss through wind blow and drift.	Aug 22_Progress Meeting	

Target	Project Targets	Supporting Documentation (pending item)	SDG Target References
N12	Ensure through careful control of chemical input onto the golf course during grown-in and surface water management, that the groundwater quality parameters do not drop below the baseline levels established pre construction.	Water test result ESIA (02) (p251 - 10.5)	6 CLEAN WATER AND SANITATION, 12 RESPONSIBLE CONSUMPTION AND PRODUCTION
N13	The golf maintenance facility to include best in class pollution prevention measures to reduce risk of soil and groundwater contamination.	Maintenance Facility Designs	12 RESPONSIBLE CONSUMPTION AND PRODUCTION
N14	Vertical structures such as lighting columns and control boxes have been painted in a specially created 'brown' colour to tone in with the native sand and surrounds better.	Aug 22_Progress Meeting	
N15	Minimal approach to course signage and furniture to respect the natural landscape and views - explore using locally found materials or placement in sensitive locations being prioritised.	Signage and wayfinding strategy	
Resources			
R1	Simplified the height-of-cut to only two, tees and fairways as one and then greens as the other - no rough cut just desert sand areas.	Operations plan	
R2	All boulders used in the landscaping of the site should be sourced from the site.	DG Site visit meeeting notes	
R3	Greywater recycling facilities should be installed where feasible to the core golf buildings.	Building Designs (2) 220523 - MCB Queries	6 CLEAN WATER AND SANITATION
R4	There should be no import of bulk material for the mass grading work required to create the golf course rise and falls.	Cut & Fill plan	12 RESPONSIBLE CONSUMPTION AND PRODUCTION
R5	Soil amendments to be used in the green's profile to remove the requirement for any peat in the construction process.	Aug 22_Progress Meeting	
R6	Turfgrass species (Platinum Paspalum TE) to be managed with the minimal amount of water and fertility inputs possible for successful establishment - this include pro-active IPM plans to tackle pest issues.	Grassing plan Grow-in Program	6 CLEAN WATER AND SANITATION, 12 RESPONSIBLE CONSUMPTION AND PRODUCTION
R7	Landscape planting to be of an extreme drought tolerant nature in the planting immediately surrounding the golf course - requiring only irrigation to establish or in extreme drought episodes.	Veg planting list	6 CLEAN WATER AND SANITATION, 12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Target	Project Targets	Supporting Documentation (pending item)	SDG Target References
R8	Ensure that the future superintendent is employed during the construction so they have a full working understanding of the site	Employment plan	
R9	Cart paths should be limited to no more than 14 liner kilometres	Volume 3_SOPR (p5)	
R10	Minimise kerbs on the cart paths to only when needed and integrated into the path as 'roll kerbs'.	Cart Path Cross section	
R11	Minimise carbon footprint of cart paths by reducing build up depths to a minimum, using fibre reinforcement and re-use native hard rock material as suitable sub base material.	Cart Path Cross section	
R12	Less than 28,500m of plastic drainage pipes to be used and the drainage system will feed any captured and drained water back into the irrigation reservoir to reduce demand for TSE.	Drainage pipe email Jacobs Detailed Design	
R13	A natural approach to excess surface water runoff is to be taken on the site through the use of swales and wadi to capture this water in storm events..	Grading plan Particular Specification Technical (p15 - 3.2)	
R14	No requirement for drainage blanket beneath greens removing significant amounts of virgin aggregate material in the construction process.	Capping Sand Report	
R15	Lake liner and shelving to be created and help in place using local dune sand material versus a traditional concrete solution significantly reducing carbon footprint of the main lake construction.	Aug 22_Progress Meeting	
R16	Irrigation system designed to maximise energy and water efficiency through: • Pump sizing, quantity and location • Heads selection and layout • Head controls on greens and other specialist areas • Split pressure delivery to maximise water efficiency • Soil moisture sensors • On site weather stations for daily adjustment in scheduling • Quick coupler included	Irrigation specification report	
R17	The golf irrigated area to be restricted to no more than 45 Hectares	Aug 22_Progress Meeting	
R18	100% of golf carts to be electric powered	Vehicle specs Aug 22_Progress Meeting	

Target	Project Targets	Supporting Documentation (pending item)	SDG Target References
R19	Electric and hybrid golf course maintenance machinery to be used when the option is available	Vehicle specs Aug 22_Progress Meeting	
R20	Solar panels to be fitted to auxiliary building roofs where spacing allows to supplement energy demand where possible.	Building specs (p123)	
R21	A full and comprehensive water management plan including irrigation cycles timings, tracking, source, testing and monitoring to be established	Water management plan	
R22	100% of the water used on the golf site to be sourced from TSE source from a treatment plant within the city of Riyadh.	Aug 22_Progress Meeting	
R23	100% of waste produced on site should be segregated on site and recycled as far as possible	Waste management plan	
R24	100% of bulk materials and pipework for construction to be sourced from within KSA and as near as possible to Riyadh as possible.	Aug 22_Progress Meeting	
R25	Use a Diriyah Gate dedicated plant nursery (separate project) for the propagation of landscape vegetation and supply to the golf landscape and masterplan as needed.	Masterplan Aug 22_Progress Meeting	
R26	Efficient material movements should be carried out across the site to reduce fuel used and minimise land compaction.	Logistics policy/statement	
R27	All golf buildings should use natural sources of lighting (large windows) and heating as far as possible	Building designs	
R28	Non-Golf buildings to achieve LEED Gold certification	Building Specs (p187)	
Community			
C1	The development will represent a contemporary interpretation on the vernacular design, celebrating the heritage, history, culture, materials, style and foods of the country and region.	Masterplan Building designs	
C2	Create a world class golf training centre with state of the art training facilities to support future generations of Saudi golfers	Building designs	

Target	Project Targets	Supporting Documentation (pending item)	SDG Target References
C3	Local trades and craftsmen should make up the majority of the construction workforce	Citiscape Manpower & Equipment	
C4	Local artists and craftspeople should be invited to have their art and products displayed throughout the buildings	Operation plan	
C7	Ensure that the golf buildings and facilities are accessible to people of all abilities	Building designs	
C8	The course should be easy to find and get to using multiple modes of transport within the wider Wadi Safar masterplanned development	Masterplan Transport Strategy	
C9	The operational staff should be educated on the sustainable construction and management of the course as well as the local history and culture so they are able to pass this onto those using the course and its facilities	Staffing plan Operations Plan	
C10	The club should provide opportunities for internships, work experience and school/university educational visits and tours.	Operation plan	
C11	Opportunities to train locals in specialist work such as course management and golf machinery repair.	Operation plan	
C12	Create over 1,000 jobs throughout the design and construction process, some of which will be occupied by locals.	Citiscape Manpower & Equipment	
C13	Have the capacity to host high profile golf events, promoting the sport within the country and internationally.	Operation plan	

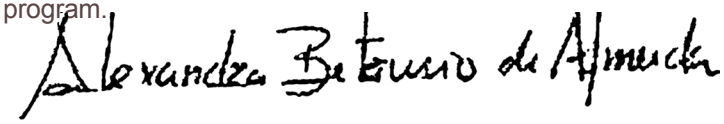
VERIFIER CONCLUSIONS

Verifier Conclusions

Following an accompanied site inspection carried out in May 2022, I have reviewed the Sustainability Blueprint V1 above in conjunction with the supporting information and have the following points for consideration:

- A constant and consistent supply of water must be established as soon as possible on site and this should be from a source of TSE. GEO and myself would like updates on the water supply as and when they occur.
- Where possible, impermeable surfaces should be replaced with permeable ones and if this is not possible they should be reduced. In particular when it comes to cart paths, these should be restricted to areas between green and tee.
- The project should look at the option of establishing a plant nursery on site specifiably for the golf course landscaping. This can be used during the grow in stage to establish the plant and can continue to be used throughout operation.
- It is important that the landscape design remains as is planned at this stage and the out of play and bordering areas are not heavily planted and not planted with non-native species.
- I would like to see the future superintendent for the course brought into the project at the earliest possible stage so that they have a full and comprehensive knowledge and understanding of the site and how the course was created.
- I would like to see a full wadi management plan including how the development will protect and enhance this feature/eco-system. These wadi's will be vital to the protection of the course in the case of a storm event.
- It would be good to have a better understanding of how waste will be managed/disposed on-site during the construction stage as well as the operation stage. For example, will green waste be composted on-site and used in the maintenance process?

Considering all of the above information I recommend that Diriyah Gate should progress to the Construction stage of the OnCourse® Developments program.



Alexandra Almeida
Independent Verifier for Diriyah Gate Golf Course

APPENDICES

A: External Sustainable Development Indicators

Project Green has been developemnt and designed with the United Nations Sustainable Development Goals as a key set of overarchiting targets to make contributions towards. The following Appendix A sets out the key goals and targets the project is set to contribute towards, referencing the relevant project targets

ENSURE INCLUSIVE AND EQUITABLE QUALITY EDUCATION AND PROMOTE LIFELONG LEARNING OPPORTUNITIES FOR ALL

SDG	SDG Target	Preoject Target Code
4.3	By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university	C10
4.4	By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship	C10, C12
4.7	By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.	C9

ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL

SDG	SDG Target	Project Target Code
6.4	By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	R3, R16, R17, R22
6.5	By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	R3, R6. R7, R13, R17, R21
6.6	By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	N9, N12, R13

ENSURE ACCESS TO AFFORDABLE, RELIABLE, SUSTAINABLE AND MODERN ENERGY FOR ALL

SDG	SDG Target	Project Target Code
7.1	By 2030, ensure universal access to affordable, reliable and modern energy services	R20
7.2	By 2030, increase substantially the share of renewable energy in the global energy mix	R20

PROMOTE SUSTAINED, INCLUSIVE AND SUSTAINABLE ECONOMIC GROWTH, FULL AND PRODUCTIVE EMPLOYMENT AND DECENT WORK FOR ALL

SDG	SDG Target	Project Target Code
8.5	By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	C9, C10, C12
8.6	By 2020, substantially reduce the proportion of youth not in employment, education or training	C9, C10, C12
8.9	By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products	C9, C10, C12

BUILD RESILIENT INFRASTRUCTURE, PROMOTE INCLUSIVE AND SUSTAINABLE INDUSTRIALIZATION AND FOSTER INNOVATION

SDG	SDG Target	Project Target Code
9.1	Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	C7

ENSURE SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS

SDG	SDG Target	Project Target Code
12.2	By 2030, achieve the sustainable management and efficient use of natural resources	N7, N13, R4, R6, R7
12.4	By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment	N12
12.5	By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	R23

TAKE URGENT ACTION TO COMBAT CLIMATE CHANGE AND ITS IMPACTS

SDG	SDG Target	Project Target Code
13.3	Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	C9

PROTECT, RESTORE AND PROMOTE SUSTAINABLE USE OF TERRESTRIAL ECOSYSTEMS, SUSTAINABLY MANAGE FORESTS, COMBAT DESERTIFICATION, AND HALT AND REVERSE LAND DEGRADATION AND HALT BIODIVERSITY LOSS

SDG	SDG Target	Project Target Code
15.1	By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.	N3, N9
15.3	By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world	N1, N10
15.5	Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species	N1

B: Ecosystem Services

Adopted by Project Green, these Ecosystem Services (ES) provide the project with a ficus on the shared benefits to the local community and users of the golf facility. The European Environment Agency's (EEA) Common International Classification of Ecosystem Service (CICES) has been used to identify the most relevant ES. Each ES has indicator(s) associated to it in order for a tangible Indicator to be set under each Section and Class.

Section	ES Classes	Indicator
Regulation & Maintenance (Biotic)	Regulation of water flows, regulation of extreme events	The use of natural contours and wadi management to control the movement of water across the site.
	Pollination	The number of native plant species planted throughout the site which spread seed and attract native pollinators.
	Biological control	Implementation of a pest/invasive species management plan
	Maintenance of soil fertility	Regular testing of soil fertility and qualities where planting has occurred.
	Water	• The quality of water in the lakes • The amount of buffer zones around water bodies
	Climate Regulation	The carbon balance of the site as a whole
Cultural (biotic)	Recreation and ecotourism	• The natural environment being used for sports • The opportunity to enjoy nature in its natural habitat
	Inspiration for culture, art and design, aesthetic information	All building and the environment on site are in-keeping with the history of the area.
Provisioning (Abiotic)	Water	The use of surface water for irrigation purposes
	No Equivalent	• The provision of open space where the benefits of sunlight can be enjoyed • The addition of solar panels to buildings across the golf site

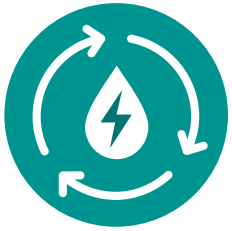
Appendix - Criteria Checklist

Nature

Baseline Criteria 12 of 12
Improvement Criteria 3 of 5

Criterion	Objective	Detailed Performance Requirements	Notes - OK | Pending | No
DN1B	Develop clear understanding of species, habitats, hydrology and geomorphology	Study in detail ecology, hydrology, designations, soils, geology and geomorphology of the site. Any invasive species to be identified and managed appropriately.	**OK**
DN2B	Ensure golf course and landscape design typology is clearly compatible with site and surroundings	Avoid predetermined artificial or enforced design styles.	**OK**
DN3B	Protect the most valuable landscape, cultural and ecological features	Avoid ecological hot spots and sensitive landscape zones. Retain existing valuable and/or protected trees, habitats and cultural sites.	**OK**
DN4B	Use native or locally important species in landscaping designs, and drought-tolerant varieties if applicable	Landscape planting to maximise native, naturalised, locally adapted and important species (exceptions for some sites where aesthetic or cultural heritage issues are relevant, or for garden areas).	**OK**
DN5B	Ensure that any topographic changes protect and enhance landscape character	Ensure no degradation to existing landscape character.	**OK**
DN6B	Consider whether open water is appropriate	Provide clear justification for any open water in desert/arid locations	**OK**
DN7B	Minimise pollution from maintenance facility	Plan early how to integrate best practice pollution control measures into maintenance facility design.	**OK**
DN8B	Plan an ecologically rich landscape	Maximise the integration of native habitats and ecology in the design	**OK**
DN9B	Maximise habitat patch sizes and connectivity	Internal habitat patches to be large enough for identified key species. Link internal patches, maximise habitat size, and create connections to wider landscape habitats.	**OK**

Criterion	Objective	Detailed Performance Requirements	Notes - OK | Pending | No
DN10B	Adopt a 'natural systems' approach to water management, considering water quality and habitat creation	Utilise natural soakaways, attenuation areas, swales and turfgrass biofilters. Incorporate vegetative buffer zones into design. Allow seasonal flooding where possible. Demonstrate that water table control does not adversely impact upon the quality of surrounding water and habitats.	OK
DN11B	Naturalise any water features as far as possible	Create diverse, living lakes and wetlands suitable to the site, maximising ecological value as far as practical	OK
DN12B	Minimise visual intrusion of bunkers, tees and green complexes on visually sensitive sites	No significant adverse impacts on visual amenity of key receptors or viewpoints.	OK
DN13I	Consider the visual impact of core golf buildings	Avoid prominent or highly exposed positions and breaking skylines. External materials to be in keeping with geographical region.	OK
DN14I	Use permeable surfaces	Hard surfaces on the golf course property, such as cart paths, to be made of permeable materials.	No
DN15I	Minimise the extent of intensively managed turfgrass areas	Minimum area of the site within the development boundary to become intensively managed turfgrass.	OK
DN16I	Increase ecological interest of the external skin of the core golf buildings	Utilise ecological building techniques such as green roofs, green walls and insect housing.	Pending
DN17I	Minimise the visual impact of signage and furniture	Maximise the use of local sustainably sourced materials and position to integrate with the surroundings.	OK



Resources

Baseline Criteria 12 of 12
Improvement Criteria 4 of 5

Criterion	Objective	Detailed Performance Requirements	Notes - OK | Pending | No
DR1B	Ensure responsible use of site and surrounding water resources, including watershed	Undertake and analyse baseline surveys to ensure informed water resource decisions and implement recommendations, particularly on water sourcing.	**OK**
DR2B	Seek opportunities to minimise energy use in design	Design to minimise energy use and demonstrate how this is achieved.	**OK**
DR3B	Minimise impact on key hydrological and flood zones on site if applicable	Avoid these areas for built development and net positive fill.	**OK**
DR4B	Minimise volume of earthwork	Design a course which does not require excessive earthworks in order to minimise fuel use during construction.	**OK**
DR5B	Maximise irrigation water efficiency	When needed, install irrigation systems and technologies, such as weather stations, to deliver the correct amount of water most efficiently to the smallest possible area. Restrict irrigation only to genuine priority areas with flexibility in the system to control application areas. Identify ways golf course irrigation water can come from recycled or 'off grid' sources.	**OK**
DR6B	Use local materials	Minimise the average total distance construction materials will travel. Give preference to on-site or locally, responsibly and sustainably sourced materials where feasible.	**OK**
DR7B	Select best-adapted turf species and cultivars for the local environmental conditions and to minimise long-term resource requirements	Maximum stress, disease, temperature and drought-resistant species to be selected where possible. Select grass species with moderate maintenance requirements such as mowing and top dressing rates. Consider these long-term maintenance impacts, budgets and the final quality of the playing surface in the decision-making process.	**OK**

Criterion	Objective	Detailed Performance Requirements	Notes - OK | Pending | No
DR8B	Optimise location of core golf buildings to benefit from natural heating, cooling and lighting	Analyse the location and aspect of core golf buildings.	OK
DR9B	Reduce fuel use in maintenance	Consider ease of maintenance access and mowing regimes to avoid excessive fuel use. Consider the use of electric- or hybrid-powered maintenance machinery.	OK
DR10B	Maximise the energy efficiency of drainage design	Justify the use of piped drains in light of criterion DN10B	OK
DR11B	Maximise the energy efficiency of irrigation system	Design irrigation system to maximise benefits of topography, soil type and climatic conditions. Design irrigation system to optimise use of pipe and wire. Consideration to be given to use of recycled HDPE or an equivalent high-quality pipe material.	OK
DR12B	Minimise fuel use in buggies	Design a golf course that can be walked where climate and terrain permit. Use electric- or hybrid-powered buggies if they are required.	OK
DR13I	Use recycled materials and materials with recycled content	Maximise the integration of recycled material into the supply chain. Where available, maximise use of certified products and materials equal to ISEAL Alliance standards.	Pending
DR14I	Manage precipitation on-site	Define the amount of precipitation to be retained and released from the site. Optimise the water management design to benefit the entire watershed.	OK
DR15I	Consider development as ‘net zero energy’	Assess the potential of on-site or local renewables such as solar panels. Assess the feasibility of exporting on-site- generated energy back to the national grid. Integrate either or both where possible.	OK
DR16I	Integrate re-use and re-cycling of water around core golf buildings	Where possible, utilise harvested rainwater for greywater for golf and landscape irrigation as well as cart and machinery wash down.	OK
DR17I	Achieve an appropriate sustainability certification for the non-golf buildings within the property	Undertake an appropriate sustainability certification from the relevant authority/ organisation for all non-golf buildings on the property.	OK

Community

Baseline Criteria 3 of 6
Improvement Criteria 1 of 5

Criterion	Objective	Detailed Performance Requirements	Notes - OK | Pending | No
DC1B	Define supply chain of products and materials	Identify key opportunities and challenges in materials supply and demonstrate how they can be addressed.	Pending
DC2B	Undertake local consultation	Consult with local community and advertise to raise local awareness. Encourage input through meetings/ open days, in writing, by phone and via email.	Pending
DC3B	Protect cultural heritage	Design to protect and/or incorporate features of historical and cultural significance if any.	OK
DC4B	Ensure principles of 'Access for All' are implemented	Pro-actively consider all requirements for accessible core golf buildings to meet the access needs of disabled people.	OK
DC5B	Incorporate public access where appropriate	Maintain an appropriate type of community access to all or part of the property, or mitigate any detrimental affects to the existing situation.	OK
DC6B	Justify transport impact	Minimise the demands placed on the community's transportation network through development both in construction and long-term. Promote future multi-modal transport methods as part of wider sustainable travel networks.	Pending

DC7I	Undertake local engagement	Engage with, listen and respond to local opinion. Encourage input through meetings/ open days, in writing, by phone and via email and give transparent feedback on how identified issues have been addressed.	**Pending**
DC8I	Promote ethically and environmentally led procurement	Define policy for procurement of products and services. Suppliers and contractors to conform with Ethical Trading Initiative's base code or equivalent.	**Pending**
DC9I	Promote community integration and awareness	Establish ways in which the development can contribute to local communities, for example, promoting publicly accessible outdoor facilities on-site or events programmes to help raise awareness of sustainability issues, such as local ecology, cultural heritage and renewable energy.	**Pending**
DC10I	Incorporate educational values	Design in educational opportunities such as placements, open days (i.e. pre- and post-construction) and on-site classroom facilities etc.	**Pending**
DC11I	Promote and improve community health and well-being	Incorporate opportunities for non-golf- related health and well-being activities appropriate and proportional to site conditions, project scope and location.	**OK**

Limitations

The content of the Sustainability Blueprint V1 is drawn from information contained within existing project documentation and surveys carried out by consultants hired by the Client. It reflects information correct at the time of writing,. It is possible that new information will become available after the completion of this report. This new information would be incorporated into future revisions of this report or in the subsequent stages of the certification reporting.

GEO Foundation
2 Quality Street, North Berwick,
East Lothian, Scotland, EH39 4HW

t: +44 (0) 1620 895100 | **e:** hello@sustainable.golf